

Problem Based Learning: Its Advantages, Current Situations and Future Development

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ABSTRACT

Since the traditional teaching method overemphasizes systematic learning knowledge and rote learning, students lack practical and knowledge exploration abilities. In addition, in traditional learning curriculum is taught in single or multiple disciplines. In this case, disciplines are isolated from each other, which is the reason why students may lack interdisciplinary ability. Judging from above, taught in traditional teaching mode, pupils perhaps are short of many higher-order abilities, and Problem Based Learning can overcome these shortcomings. Thus Problem Based Learning was implemented at McMaster University as an innovative teaching approach. Up to now, it has been applied in many schools. Using the mode of literature review, in this paper we review the concept, origin, and characteristics of Problem Based Learning. In addition, it also reflects the advantages compared to traditional teaching mode, teachers' tasks, dilemmas, and future prospects. By comparing Problem Based Learning with the traditional learning method, Problem Based Learning is found to perform better in four dimensions: teaching objectives, teaching methods, discipline linkage modes, and teaching achievements. Owing to its merits, it is a wider tendency to implement Problem Based Learning in more schools and classes. However, it still has some weaknesses in practical application: reticent culture, educators' preference to previous teaching custom, and lack of resource-intensive environment. More endeavors are needed to be taken in research to overcome these shortcomings. And in a future implementation, Problem Based Learning should be associated more closely with present practical problems, not confined to settled problems of textbooks.

Keywords: *The differences between PBL and traditional education and the advantages of PBL, Current Situation of PBL, Future Development of PBL.*

1. INTRODUCTION

PBL (Problem Based Learning) is an educational concept or a teaching model based on problems, and organizing learning content with the research of authentic problems. This teaching model is superior to traditional education in the dimensions of teaching methods, discipline linkage, and teaching achievements. Although limited by educational policies, teaching conditions and teachers' level, the teaching model in many regions, such as China, is still dominated by traditional education, the development of PBL teaching mode is also very rapid. This paper discusses the historical origin and advantages of PBL compared with traditional education, the development status of PBL, the difficulties PBL faces, and the future development prospect. These four parts are of great significance for understanding the overall situation of PBL and studying the development direction

of education in the future. More details will be shown in the following sections.

2. THE DIFFERENCES BETWEEN PBL AND TRADITIONAL EDUCATION AND THE ADVANTAGES OF PBL

2.1. Definition of Traditional Education

In this paper, traditional education is a concept opposite to modern education. According to the definition in Cihai, a dictionary of China, it mainly refers to the classroom teaching system, teaching theory and method formed in Europe and America mainly based on the educational theory of Herbart and others [1]. In the traditional education mode, Herbart believes that there is a clear thinking path in the process of students accepting new knowledge, that is, the four-stage teaching method:

clearness-association-system-method. In this teaching mode he proposed, teachers designed the course in advance and led the whole teaching process. Later, his disciples expanded this method into a five-stage teaching method. Compared with the past educational modes, Herbart School gradually regarded pedagogy as an independent discipline, which has made a breakthrough in teaching methods, providing a teaching mode that is easier to understand, master and apply for many front-line teachers. However, with the development and progress of pedagogy, teachers need more clear and effective teaching methods and teaching processes. Based on the Herbart School Education Theory, former Soviet educator Kaipob believed that the classroom teaching mode should be divided into five steps: organizing teaching, reviewing previous knowledge, teaching new knowledge, practicing exercises, and assigning homework [2]. The mode was introduced into China in 1950s and then was widely applied in primary school and middle school.

Although the general education mode in China has developed based on Kaipob's education theory, the mode still follows his teaching theory in the process of teaching: advocating "teacher-centered" form, in which teachers plays the role of a leader and constitutes a dominant and submissive relationship with students. According to Kang, as students in the teaching process are often passive, this teaching mode is not conducive to the cultivation of students' subjectivity, which urges experts and scholars to come up with a more scientific and reasonable education mode [3].

2.2. Definition, Origin and Characteristics of PBL

In addition to traditional education, PBL is also a very important educational mode. It is an educational concept based on Problems and organizing learning content through the research of real problems. Other scholars also hold similar views, for example, Simamora et al. argue that "problem-based learning model (PBL) can be defined as a series of learning activities that emphasize the process of problem solving" [4]. Hu holds that PBL teaching method is a problem-oriented teaching method which is a student-centered education method based on the real world [5]. All these ways of defining PBL reflect the problem center, project center, student center and authenticity. These characteristics are difficult to be reflected in the traditional education mode.

PBL originated in the 1960s. Mac Master University in Canada established a new teaching mode in the reform of medical education. Its original intention is to organize learning content through the analysis and solution of medical cases. According to Li and Du, in the 1970s, PBL was widely used in emerging universities such as Aalborg University (AAU), Roskilde University in Denmark and Maastricht University in the Netherlands

[6]. At present, the application of PBL is no longer limited to the medical field, which is also applied to other fields such as engineering, social sciences, ideological and political education in Colleges and universities. Researchers believe that the research on the development and application of PBL is an important direction for the development of teaching mode in the future.

In PBL teaching mode, students will conduct activities around a learning theme, a problem to be solved or a specific project. The teacher's role in the teaching process is a learning facilitator rather than a leader. The main body of activities is changed from teachers to students. Students are divided into groups to study independently, consult materials, summarize, and sort out, and finally cooperate to solve problems. As the solution is an authentic problem, it usually needs the linkage and integration of knowledge of various disciplines. Hence, in this process, the interdisciplinary concept can be penetrated into all links of curriculum and teaching design. Students' learning comprehensively uses multi-disciplinary knowledge contents and methods to analyze and solve specific problems in life from the beginning.

2.3. Advantages of PBL teaching mode over traditional teaching mode

According to the characteristics of traditional teaching mode and PBL teaching mode, authors compare them from four dimensions: teaching purpose, teaching mode, discipline series mode and teaching results, and summarizes the advantages of PBL teaching mode compared with traditional teaching mode.

2.3.1. Teaching Objectives

The traditional teaching mode mainly aims at imparting knowledge and attaches importance to classroom teaching and systematic knowledge impartment. Students have learned theoretical knowledge in this mode, and the importance of practical ability and self-learning ability has been weakened. On the contrary, PBL teaching mode focuses on problems or projects. In addition to being beneficial to theoretical learning, the more important purpose is to exercise students' comprehensive ability.

2.3.2. Teaching Methods

Huang and Wang hold that the traditional teaching mode advocates systematic teaching by teachers and classroom teaching as the basic organizational form of teaching [7]. The teaching method is mainly based on Teachers' lectures and students' lectures. Teachers often have set up the problems and solution process of this class before class, so it is difficult to give full play to students' initiative. With the development of education to

a new stage, this collective teaching mode should also be adjusted with the development of society.

In PBL teaching mode, in most cases, what students encounter in the initial stage of learning is neither a question designed by teachers in advance nor a question with clear answers, but a problem situation in practice. Therefore, students need to gradually construct their own problems and form their own problem proposals through group discussion and collective work [8]. After the problem proposal is determined, students can continue to study in groups with problem solving as the core. Teachers only provide learning assistance as learning promoters in the whole teaching process.

Comparing the two teaching methods, it is not difficult to find that PBL is more flexible in teaching methods and has more advantages in solving complex problems and cultivating students' autonomous learning ability, comprehensive practical ability and social cooperation ability.

2.3.3. Discipline Series Mode

In the traditional teaching mode, curriculum design is based on disciplines. In the discipline series mode, it is dominated by single discipline or multi discipline, that is, it takes a single discipline as the teaching basis, or even if there are multiple disciplines, the disciplines are isolated from each other. According to Li and Du, in this mode, students often learn fragmented professional knowledge, which is difficult to effectively integrate the knowledge of different disciplines, and there are many deficiencies in dealing with specific problems in life [6]. Under the PBL teaching mode, students will gradually achieve cross disciplinary knowledge integration in the process of solving complex problems. The so-called interdisciplinary refers to the application of the concept of a discipline to other disciplines, which is the integration of different perspectives and methods.

2.3.4. Teaching Achievements

The traditional teaching mode can achieve the purpose of imparting knowledge or skills to students step by step through the five-stage teaching method or five steps of teaching. Students master the knowledge of corresponding disciplines, and teachers can continuously improve the teaching process through this process. Its remarkable feature is that the teaching process is controllable and easy to copy, which can give teachers a sense of "security"; Hu argues that in PBL teaching mode, in addition to finally solving problems, students can also exercise their abilities in many aspects, such as literature retrieval, data access, analysis and synthesis, deductive induction, logical reasoning, oral expression, autonomous learning, lifelong learning and so on [5]. These abilities are very important for students to go to professional posts and carry out professional work in the

future, and can help them establish a good foundation.

3. CURRENT SITUATIONS AND FUTURE DEVELOPMENT OF PBL

3.1. Some Features of PBL

Dahlgren, Castensson, and Dahlgren argue that there are three distinctive features in PBL: Practical learning situation, Self-directed learning, and Cooperation [9]. These three features will be reviewed in the following section.

3.1.1. Practical Learning Situation

The beginning of learning is based on real-life situations. In the research, we hold the view that aiming at solving practical problems, students need to search for information, discuss with teammates, give potential solutions, do reflection, and give outcomes. Thus, their self-directed learning, analytical, problem-solving, and thinking skills will be improved.

3.1.2. Self-directed Learning

Self-directed learning is the major learning mode. In the research, we argue that during the learning process, teachers create a learning environment to promote study instead of transferring knowledge directly to students. Barr and Tagg state that they should discover knowledge and build a new framework with their previous experience and learning outcomes [10]. Therefore, knowledge is not isolated, but interrelated, which will become easier to remember and master. Due to this, learning will be more effortless and efficient.

3.1.3. Cooperations

Teamwork is the learning form of PBL. Shan and Sun state that in a paper that researched 345 medical students, when it came to the feeling of isolation, the experimental group taught by PBL got higher scores than the control group, which meant that students of the experimental group felt less lonely [11]. PBL students need to communicate and collaborate with others, so they will have more opportunities to make friends. With companion and listening to friends, they can pour out negative thoughts, after that they will be eased and understood.

3.2. Teachers' Task

Teachers act as a guide rather than a leader in PBL, compared to the traditional teaching approach. Several duties play important role in PBL. Azer argues that they ought to build the basic rules at the beginning of the formation of new teams [12]. For example, they should emphasize respect, which means even students do not

agree with teammates' opinions, they should still listen carefully. And if different views are held, only debate is permitted. In addition, teaching assistants need to promote the discussion [12]. For instance, they need to raise questions that push the discussion forward and encourage everyone to engage, especially the dead silence that appears in the middle of the discussion. In addition, the record of daily devotion and making feedback timely is also essential [12]. Hence, evaluation of behaviors can be made more accurately and suggestions can be given in time. Except for giving feedback, educators ought to use diverse modes in students of different personalities without prejudice. For introverted ones, encouragement and more patience are significant, as encouragement can help them to build self-confidence and patience will give them a sense of respect. As for more outgoing ones, many thoughts may flash through their minds, educators had better take control of the discussion and make them talk around the topic.

3.3. Dilemmas

Because of the dissatisfactions with their traditional teaching method, some medical instructors at McMaster University decided to make changes. Spaulding and Cochran point out that in 1969, PBL was first implemented as an innovative teaching approach [13]. Wilkerson and Gijsselaers argue that around 1995, it was spread to some western medical schools and gradually became a wave [14]. Khoo and Chem state that PBL was adopted in Asia in the late 1990s [15]. Though it was applied in many areas, there are still some difficulties remaining to be solved.

3.3.1. Reticent Culture

PBL requires students to actively participate in discussions and bring out their opinions after brainstorming. However, Summers regards that in some Asian areas, the communication style is regarded as reticent [16]. People are accustomed to keeping silent and do not dare to express themselves, especially in front of the crowd. It is antithetical to the theory of PBL and makes applications get into some trouble. Plus, Ahn points out that in Korea, students tend to have blind respect for their teachers, in this case, they prefer to keep ideas in mind rather than question teachers [17]. When opinions are given by scholars, students need to make judgments based on their own experience and knowledge. Owing to different life experiences, people often think differently. If the relationship between them is too stiff, diverse views will be hard to be put forward and to be accepted. Thus, the construction of critical thinking also meets some obstacles.

3.3.2. Previous Teaching Custom

Another problem is that teaching assistants are used to the traditional teaching model, for it has been used longer and they can get more experience from previous teaching cases. Emphasis is frequently laid on guiding pupils in PBL, however, less attention is paid to guidance to faculty members. Ertmer and Simons view that when facing PBL, an innovative teaching method, both K-12 teachers and students will feel anxious and stressed because new roles mean new responsibilities [18]. In other words, more time and energy are needed. Mergendoller and Thomas state that the learner-centered model asks instructors to make more endeavors in management [19]. For example, they should also create a collaborative environment, facilitate pupils to get involved, and give proper feedback. Simons and Klein found that instructors felt frustrated about spending a large amount of time in implementing PBL [20]. Therefore, they may lose patience and passion in education.

3.3.3. Lack of Resource-intensive Environment

Additionally, according to Choon-Eng Gwee, PBL is a resource-intensive educational method, which demands support and resource [21]. Taking civil engineering as an example, if PBL is adopted, to offer more efficient, valuable and quality education, experienced tutors, experimental area and professional laboratory equipment are essential. However, the lack of teaching assistants and finance makes implements of PBL stick into trouble.

3.4. Future Prospects

Reflecting on the traditional teaching method, textbooks are used as the common teaching materials, however, they were usually written and edited many years ago. Therefore, a lot of questions mentioned in them have already found the answers, which means no more efforts are needed in the research. As an innovative method, PBL should not be limited to textbooks, which focus on the already settled problems. It will be better to associate this mode with present practical problems, like bad weather. In 2021, it seems that more natural disasters happened all over the world, such as floods, typhoons, and forest fires, causing vast losses to many countries. It is high time to find a balance between humans and the protection of the earth. Thus, when implementing PBL in environmental science or analogous subjects, instructors had better connect these tricky issues with education on purpose and lead learners to find solutions.

4. CONCLUSION

In this paper, researchers review the concept, origin, characteristic, comparison, feature, teachers' task, dilemma, and the prospect of PBL. PBL is an educational

concept based on problems and organizing learning content through the research of real problems. And it originated in 1969 at McMaster University. In PBL, students study around a learning theme. After comparing PBL with the traditional learning mode in four dimensions (teaching objectives, teaching methods, discipline linkage modes, and teaching achievements), PBL is found to perform better in developing students' comprehensive abilities. Teachers also play an important role in PBL. They ought to build the basic rules when the new teams are built. During the discussion, they should promote the discussion and use diverse teaching modes to suit the different personalities of students. After the discussions, records of daily devotion and making feedback based on pupils' behaviors in time are essential. And PBL still has some weaknesses in practical application: reticent culture, educators' preference to previous teaching customs, and lack of resource-intensive environment. When it comes to the prospects, PBL should be associated more closely with present practical problems, not confined to settled problems of textbooks. According to the analysis in dilemma, researchers state that experienced educators may meet more difficulties in adopting PBL because they are more accustomed to the traditional teaching method and adjustment to the innovative teaching model may cost them more energy. Thus, more support is needed when the experienced tutors implement Problem-Based Learning.

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