

Research on heuristic teaching mode of physics life problems in junior middle school

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Abstract. In order to adapt to the change of learning style and pay attention to inquiry learning in the new curriculum reform, a heuristic teaching model of life problems is proposed. The heuristic teaching model of life problems is mainly divided into three steps: putting forward physical problems in life, teachers' guided learning and experimental demonstration. Through course practice, students who adopt the heuristic teaching mode of life problems have greatly improved their love for physics courses, and their practical ability is stronger. They can think independently, analyze and solve problems, find physical knowledge from life and explain it with physical theoretical knowledge, and have stronger application ability. At the same time, the results of students who adopt the heuristic teaching mode of life problems are greatly improved, which provides a feasible scheme for the curriculum reform and development of physics in junior middle school.

1 Introduction

The physics curriculum standard of compulsory education emphasizes that physics curriculum should be close to students' life, conform to students' cognitive characteristics, stimulate and maintain students' interest in learning and so on. It points out that the main value of physics is to stimulate students' thirst for knowledge, let students appreciate the beauty and harmony of natural phenomena, and cultivate students' lifelong interest in exploration through the cognitive process from nature and life to physics. Therefore, the reform of basic education curriculum strives to pay attention to students' development and social needs, pay more attention to students' existing life experience, and emphasize students' active learning^[1-2].

Since ancient times, many educators have expounded the relationship between education and life from different angles. On the basis of Dewey's "education is life", Mr. Tao Xingzhi critically put forward the theory of "life education". There are mainly three aspects: "life is education", "society is school" and "teaching and doing in one". Among them, "life is education" is the core of Tao Xingzhi's life education theory. In the awakening of Chinese education, Mr. Tao Xingzhi mentioned that the progress of culture is endless, and there is no certain change in the world environment and material. Living education should keep pace with the times. Physics in junior middle school teaches the knowledge of daily life. Therefore, the purpose of leading students to find the connection between physics and general life and extending physics education to general life is to make students learn better and make teaching and learning serve the needs of life at the same time^[3-5].

2 Characteristics of heuristic teaching model of life problems

The core of life problem heuristic teaching model is to put forward life problems related to junior middle school physics knowledge and guide students step by step.

2.1 Raising life problems

F Putting forward life problems related to junior middle school physics knowledge points is the primary link of life problem heuristic teaching, which is related to the success or failure of inquiry teaching. If we can't create life problems effectively, it will affect students' interest and enthusiasm in learning and the effect of teaching. By creating good life problems, we can cultivate students to find problems, generate interest or doubt in life, arouse students' enthusiasm, encourage them to study independently, and cultivate learning motivation and self-confidence. The so-called way of creating life problems should not only be interesting, but also lead to cognitive conflict^[6-8].

Interesting problem situations can stimulate students' desire to explore, be curious about the causes of problem situations, and generate the power of exploration. For example, when exploring the effect of convex lens on light, students can demonstrate that adjusting the distance between convex lens and paper can ignite paper under sunlight. When students see the phenomenon of paper smoking and burning, they feel that the experiment is full of interest and curiosity, and they will begin to further study the essence and principle of the phenomenon^[9].

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Students have their own understanding of the objective world. When creating problem situations, if the phenomenon does not conform to their cognition, they will have doubts about it, so as to stimulate students' interest and motivation of exploration by triggering students' cognitive conflict. As we all know, when students have cognitive conflict, they will break through the original cognitive balance, have a stronger need for learning, and are eager to adapt the new situation and new contact knowledge to their own knowledge structure, so as to achieve a new cognitive balance. For example, when introducing friction, students' thinking about the existence of friction can be triggered by creating a problem situation of "chopsticks TIMI". This "unreasonable" phenomenon can lead to students' cognitive conflict and further thinking, so as to verify the existence of friction and achieve the preset teaching goal.

2.2 Enlightening teaching

In the new curriculum reform, it emphasizes the reform of learning methods and inquiry learning, while the heuristic teaching mode of life problems emphasizes that students think about problems under the inspiration of teachers and study problems independently, so as to cultivate the ability to solve problems. For example, when teachers create problem situations to arouse students' thinking, teachers can not directly say the problems, but let students find problems in the situations and think according to the characteristics of the problems and existing knowledge and experience. The role of teachers is to give students a certain situation and direction, provide students with colorful, typical and intuitive teaching resources, and inspire students. The questions put forward by teachers should be skilled and deep, and can inspire students to think^[10].

3 Heuristic teaching steps of life problems

Life problem heuristic teaching is mainly divided into three steps: raising physical problems in life, teacher guided learning and experimental demonstration, as shown in Figure 1.

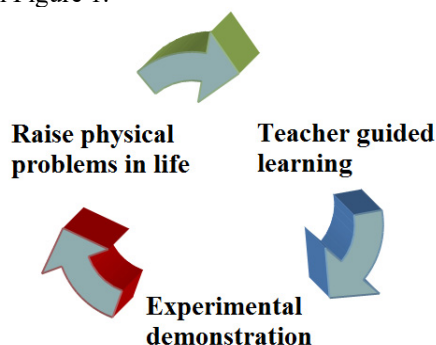


Fig.1. Heuristic teaching steps of life problems

3.1 Raise physical problems in life

It is proposed that physical problems in life are the primary link of heuristic teaching of life problems. A good life problem can quickly bring students into the classroom environment, arouse students' learning motivation and improve the atmosphere of classroom teaching. Physical problems in life are generally created by teachers according to the needs of teaching tasks, mainly from the life reality that students have seen, heard or understood in other ways, so that students feel familiar with and realize the practicability of physical knowledge. Physical problems in life can make students realize that life and social development are inseparable from physical knowledge, and fully implement the requirements of "from life to physics and from physics to society" in the physics curriculum standard of junior middle school.

3.2 Teacher guided learning

After teachers put forward the physical problems in life, they guide students to take the problems as the purpose of inquiry throughout the whole inquiry process, think about the problems, and put forward reasonable conjectures and assumptions. Conjectures and assumptions cannot be random out of thin air, and groundless conjectures have no exploratory significance. Teachers should adopt a tolerant attitude towards students' unreasonable conjectures, explain the reasons to students and give some conjecture guidance, which can come from daily life experience or infer according to the learned knowledge. Each student can put forward his own conjecture, and then the teacher classifies and summarizes all conjectures, removes some unreasonable and groundless conjectures, retains reasonable conjectures, and prepares for the next experimental demonstration. Figures and Tables.

3.3 Experimental demonstration

Design an appropriate experimental scheme for reasonable conjecture, including selecting experimental equipment, designing experimental steps, recording experimental data, etc. In this process, teachers give students some guidance, but they must not replace students in experiments. During the experiment, follow the experimental steps, observe the experimental phenomena and record the experimental data. In the process of students' experiment, it is necessary for teachers to manage and supervise the students' experimental process to ensure that the experimental process is carried out orderly and effectively. After the experiment, organize students to exchange and discuss and get the results. On the basis of the discussion results, teachers introduce the physics knowledge points of this course to enable students to learn subjectively and actively.

4 Analysis of teaching effect

4.1 Analysis on the improvement of students' quality

Before the heuristic teaching of life problems, a survey on learning interest and learning ability was conducted in class 3 of grade two (experimental class) and class 4 of grade two (control class). 30 people in the experimental class and the control class were given questionnaires respectively, with a total of 60 copies, and 60 points were recovered. After a semester's experiment, the same survey form was adopted to conduct a questionnaire survey on the experimental class and the control class. A total of 60 questionnaires were distributed and 60 questionnaires were recovered. The survey results of learning interest before and after the experimental class and the control class are shown in Table 1.

Table 1. Comparison table of students' quality improvement

| QUES TION | OPTI ON | CLASS 3 | | CLASS 4 | |
|----------------------------------|---|-----------|-----|-----------|-----|
| | | BEGI N | END | BEGI N | END |
| DO YOU LIKE PHYSI CS | LIKE ORDINA RY DISLIKE | 16 | 24 | 15 | 17 |
| | | 10 | 6 | 12 | 10 |
| | | 4 | 0 | 3 | 3 |

It can be seen from table 1 that before the experiment, the experimental class and the control class have basically the same love for physics courses. However, after the experiment, the students' love of physics in the experimental class increased significantly, while there was little change in the control class. It shows that life problem heuristic teaching can effectively improve students' interest and enthusiasm in learning physics.

The survey results of physical literacy before and after the experimental class and the control class are shown in Table 2.

Table 2. Questionnaire of physical literacy

| QUESTION | OPTI ON | CLASS 3 | | CLASS 4 | |
|---|----------------|-----------|-----|-----------|-----|
| | | BEGI N | END | BEGI N | END |
| CAN THE EXPERIMENT BE DESIGNED AND COMPLETED INDEPENDENTLY | CAN | 0 | 6 | 1 | 1 |
| | SOMETI MES | 4 | 22 | 5 | 6 |
| | CANNOT | 26 | 2 | 24 | 23 |
| CAN YOU EXPLAIN THE PHYSICAL PHENOMENA INVOLVING JUNIOR MIDDLE SCHOOL PHYSICS KNOWLEDGE IN LIFE | CAN | 4 | 16 | 3 | 5 |
| | SOMETI MES | 12 | 12 | 10 | 12 |
| | CANNOT | 14 | 2 | 17 | 13 |
| FEELING OF PHYSICS CLASS | EXCITE MENT | 6 | 25 | 8 | 10 |
| | INSIPID | 24 | 5 | 22 | 20 |
| | DISGUS TING | 0 | 0 | 0 | 0 |
| | | | | | |

It can be seen from table 2 that the students in the experimental class have greatly improved their experimental operation ability, thinking and application ability. They have stronger practical ability, can think independently, analyze and solve problems, find physical knowledge from life and explain it with physical theoretical knowledge, and have stronger application ability, It shows that the heuristic teaching mode of life problems promotes students' learning ability.

4.2 Analysis on the improvement of academic performance

Before and after the experiment, the academic achievements of students in class 3 (experimental class) and class 4 (control class) were counted as the basis of the experimental results. The student's academic performance is shown in Table 3.

Table 3. Statistical table of examination results

| EXAMINATION RESULTS | CLASS 3 | | CLASS 4 | |
|------------------------|-----------|-----|-----------|-----|
| | BEGI N | END | BEGI N | END |
| 90-100 | 3 | 6 | 2 | 3 |
| 80-89 | 12 | 18 | 13 | 13 |
| 70-79 | 11 | 4 | 9 | 10 |
| 60-69 | 3 | 1 | 4 | 3 |
| 0-59 | 1 | 1 | 2 | 1 |

It can be seen from table 3 that the number of students with more than 90 points in the experimental class has increased by 3, the number of students with 80-90 points has increased by 6, and the scores of one third of the students have been greatly improved. The results of the control class have improved slightly, but the degree of improvement is not large. It shows that the heuristic teaching of life problems can better improve students' academic performance compared with traditional teaching, and it also shows the necessity of promoting the heuristic teaching of life problems.

5 conclusion

The new curriculum reform emphasizes the change of learning style and inquiry learning. Therefore, it puts forward the heuristic teaching mode of life problems. The heuristic teaching model of life problems is mainly divided into three steps: putting forward physical problems in life, teachers' guided learning and experimental demonstration. Through the course practice, the students who adopt the heuristic teaching mode of life problems have greatly improved their love for physics courses. Students have stronger practical ability, can think independently, analyze and solve problems, find physical knowledge from life and explain it with physical

theoretical knowledge, and have stronger application ability. At the same time, the results of students who adopt the heuristic teaching mode of life problems are greatly improved, which provides a feasible scheme for the curriculum reform and development of physics in junior middle school.

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