The Construction of BOPPPS Teaching Model in The Course of Inorganic Chemistry Course

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Abstract: Through the teaching reform of BOPPPS model in inorganic chemistry teaching, the status of students as the main body is fully embodied, the role of the teacher's guidance is well realized, and the students' cognition, emotion and motivation are stimulated. A climate of teaching atmosphere full of democracy, harmony, joy and intelligence is created to promote students' active participation and create a good premise for students' initiative development.

1. Introduction

BOPPPS (guided learning interaction plus education) is a teaching mode adopted by many famous universities in Canada in recent years. It has a good teaching effect in the aspects of "taking students as the center" and participating in the interaction. This model system is divided into six links.\textsuperscript{[1]} First step is bridge-in. Using a flexible and diverse way of classroom introduction, a harmonious and equal classroom atmosphere are created. Second step is learning objectives. In the classroom, we can clearly convey the learning objectives of each class to students, so that they can clearly understand the content of a lesson, and know what extent they should know, think and value. The third step is pre-assessment. For the students to determine the starting point of learning, adjust the progress and depth of preparation, a variety of teaching techniques can be used to classify, organize and evaluate students. The fourth step is participatory learning. It is mainly to provide full interaction between students and students, students and teachers. The fifth step is post-assessment. Through feedback from the teaching activities, the students' learning effect is evaluated in order to achieve the best effect of memory and application. The sixth step is summary. A brief summary of the classroom teaching is made.

The BOPPPS model is an internationally recognized advanced teaching model at present. Applying this advanced teaching model to the teaching process of inorganic chemistry in our college, it is conducive to highlighting the teaching concept of "taking students as the center" and helping students achieve their learning goals as soon as possible. Inorganic chemistry is a required basic course for undergraduate chemistry majors. It is also the first part of the course of modern chemistry foundation, a compulsory course for environmental engineering majors. This course is connected with high school chemistry curriculum. It has a connecting link. It is an important part of developing the overall knowledge structure and ability structure of senior talents in chemistry related majors. It is also the foundation for subsequent chemistry courses. The teachers play a key role in the application of BOPPPS. The teacher must carefully design each class and use the six links in the BOPPPS model flexibly.

2. Construction of BOPPPS model in Inorganic Chemistry Teaching

Construction ideas. The teachers of our group are constantly innovating in the long-term teaching practice, and put forward the idea of "cooperative learning" in the teaching of inorganic chemistry experiment and elemental chemistry teaching.\textsuperscript{[2]} This method has effectively mobilized the learning enthusiasm of the students, highlighted the "student centered" teaching idea, and cultivated the team spirit of the students. We have been well received by the experts from the school teaching
supervision. In our teaching work, we found that the concept of cooperative learning is effective in experimental teaching and elemental chemistry teaching. However, the concept of “learner centered” is still not fully reflected, showing that the initiative of some members of the group is not sufficiently full. How to better mobilize the initiative of the students? The author proposes to apply the BOPPPS model to the teaching of inorganic chemistry, including three aspects, namely, theoretical argumentation, experimental teaching and discussion teaching of elemental chemistry. Provide sufficient opportunities for students to interact in class, including flexible interaction skills, including role playing, jigsaw puzzle and various field surveys. In the course of the discussion, the teaching idea of group cooperative learning is adopted to complete the learning of teaching content. Through frequent interaction between teachers and students, it guides students to develop the habit of finding problems, analyzing problems and solving problems. At the same time, it also raises the students' cooperative spirit and improves their learning enthusiasm and creativity. [3]

Construction method including experimental teaching and element chemistry discussion teaching. The two aspects of teaching still use the concept of cooperative learning, but in the implementation process, we should pay attention to the flexible use of BOPPPS model, especially the pretest and post-assessment links in BOPPPS model. The specific implementation methods are as follows:

Make a reasonable grouping. The teaching mode of cooperative learning is arranged in group under the guidance of teachers’ arrangement, and the group members are arranged according to three kinds of collocation: learning ability and academic achievement. The purpose of this arrangement is to allow the top students to help the backward students and make the progress of the backward students; help backward students to actively participate in the learning process, freedom of expression, and a correct understanding of form in the discussion, to learn knowledge; and top students get exercise and improve in helping backward students themselves. [4]

Intra-group cooperative learning. The process of learning in a group is basically that students learn to understand elements and contents of chemistry and experiment first, then discuss and learn knowledge in groups, and develop their abilities. The whole process of teaching is mainly based on students’ initiative learning. Teachers only play the role of guidance in the process of teaching, and it has highlighted the main position of the students in the teaching. In this session, students in the group often together freely and independently exchange and discussion, it not only cultivates the students sense of cooperation, but also creates a democratic, relaxed and harmonious learning atmosphere, to stimulate the enthusiasm of students, effectively exert their learning potential, and improve the learning efficiency. In the implementation of this step, teachers should also pay attention to the assessment before and after the discussion in the group. There are many ways. For example, pretest can take the form of questionnaire. In the process of group discussion, trainees can act as teachers, role playing and so on. Post-assessment can also be completed according to investigation, or be discussed by other groups when discussing between groups.

Inter group discussion innovation. In the formal class, a cadet acts as a host to ask questions from each group. At this time, there is a communication and discussion between the groups. This action can be said to expand the teaching idea of "cooperative learning" to the discussion and communication between groups. The participation of all participants, plus the form of discussions and activities, has created an excellent condition for innovative teaching. Moreover, there is a relationship between cooperation and competition in this teaching communication. These two relationships are opposites in nature, but they are closely related. They can promote each other under certain conditions, and competition among groups can promote cooperation among members. The cooperation among group members can also enhance the competition among groups. There will be some new perspectives in the process of group discussion. This is a continuous generation and continuous construction of knowledge, a creative process, which is more popular with students than imparting teaching, and is more conducive to improving students' quality. In the implementation of this step, teachers should also pay attention to the post-assessment, so that we can finish an anonymous investigation or write a learning experience after a round of discussions, which helps to adjust the next round of discussions in a timely manner.
**Classroom teaching.** In the course of teaching, we should pay attention to the flexible application of BOPPPS model, especially the three links of pre-assessment, participatory learning and post-assessment. Teachers use various interactive techniques, including role playing, jigsaw puzzle games, and various field investigations in the process of fine speaking. In the meantime, the interaction between the pre-assessment and the participatory learning can be carried out, and the post-assessment can be combined with the pre-assessment of the second class, and the method can be flexible and varied. But there is one point is invariable, which is "taking the students as the center". What do the students learn in the end? For example, when teaching some content that may take time to remember, we can use role play to help students memorize in the process of teaching, instead of requiring them to work hard to memorize.

**Application example.** When the author was teaching the naming of the complex, the author found that the knowledge point was not very complicated, but at the end of the exam, some students still didn't know the naming of the complexes very well. Therefore, in the course of teaching this class, the author uses the way of role play to explain. The specific way is to find a student play a center ion and find four students to play four kinds of ligands. Four students surround the students who play the central ion, looking for a classmate to name the student who plays the central ion. Because the student playing the center ion is surrounded by four students in the middle, in order to speak his name, he has to name the names of the four students. Through such a role-playing game, it makes easy for students to remember the system naming of the ions in the complexes. Through a small game of role play, the student has a more vivid memory of the knowledge point, not the memory of the past.

3. **Epilogue**

The BOPPPS model is the first attempt at the teaching of inorganic chemistry in our college. We expect that the application of BOPPPS model can fully embody the status of students as the main body, and also play a good role in instructing teachers to motivate students' cognition, emotion and motivation. This approach creates a teaching environment for students, full of democracy, harmony, pleasure and wisdom. This way helps create a stimulating scene for teachers and students to cooperate and participate in harmonious resonance, so as to create a good premise for maximally stimulating students' subjectivity and promoting students' active participation and initiative development.

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**References**


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