

Research on the Innovation of University Chemistry Classroom Form and Teaching Model from the Perspective of Teacher-student Linked Learning

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Abstract : The connected learning theory established by American educational psychologist Thorndike has had a profound influence on modern education for a long time. In today's society where the demand for compound and professional talents is increasing, talents are the main force for the future development of society. As one of the basic disciplines in universities, university chemistry is an important part of university education. Chemistry classrooms help students improve their practical ability. Chemistry knowledge itself is also an important tool for other disciplines to conduct research. Therefore, improving the level of university chemistry education and teaching, promoting the scientificization of university chemistry education methods, and innovative research on new models of university chemistry classroom teaching are of great significance to the future development of university chemistry classrooms . This thesis conducts research and discussion on the university chemistry classroom form and teaching mode from the perspective of teacher-student connection learning, in order to provide innovative method support for the scientific development of university chemistry classroom.

Keyword : Teacher-student connection learning; university chemistry; teaching model innovation;

Introduction

Chemistry is a natural science with a long history that studies the composition, structure, properties, and changing laws of matter at the atomic level based on experiments. Chemistry plays an important role in helping us understand matter. Universities are an important position for cultivating chemistry research talents. The reform and innovation of chemistry classes in universities and colleges are related to the quality and efficiency of chemistry talent training. Research on how to innovate the teaching mode of chemistry classes in universities and colleges is of great value to talent cultivation^[1]. Starting from the educational theory of connected learning, this thesis explores the innovative methods for the teaching mode of university chemistry classroom from the perspective of teacher-student connection.

I. Connected learning theory

The connection learning theory emphasizes that the essence of learning is the process of establishing a connection between stimulus and response, so it is also called stimulus-response learning theory. There are four main contents of the connection learning theory. They are: the essence of learning is the process of building a connection between the situational stimulus and the response; learning is a gradual process of continuous trial and error, and finally gradually finding and establishing the correct connection; learning; The behavior follows the three laws of preparation, practice, and effect.

Figure 1. Connected learning theory

Learning Law of Effect means that the strength of the connection between stimulus and response is affected by the quality of the learning effect. When the learner obtains a satisfactory result, the connection between stimulus and response becomes stronger. Otherwise, it weakens.

Practice law means that repeated strengthening exercises on the pattern of stimulus and response can increase the strength of the connection between the two, and failure to practice will result in the weakening of the connection.

The law of preparation means that only when the learner is prepared and the connection is realized in accordance with the prepared situation, will the learner be satisfied; and the connection formed without preparation or without preparation will not be satisfied. Satisfying the learner, but will make it annoying.

From the perspective of the content of the connection learning theory, this theory particularly emphasizes the important role of reinforcement. The achievement of learning goals cannot be separated from the continuous strengthening of the connection between stimuli and response. At the same time, the connected learning theory also emphasizes the necessity of planned preparation before learning behavior ^[2].

II. The status of university chemistry classroom in universities

Figure 2. The status of university chemistry classroom in universities

2.1. Outdated teaching format

Chemistry is a natural science based on experiments. Experiments have an important position and value in the research and learning of chemistry. Chemistry knowledge must be consolidated in the course of experiments, but in actual university chemistry teaching, teachers often teach theoretical knowledge. Ignoring that experiment is the central link of chemistry research and learning. The teaching mode in the form of traditional teaching knowledge not only makes chemistry theory abstract, the classroom becomes boring, but also deviates from the preparatory law in the theory of teacher-student connection learning. Students only need to listen to the teacher's theoretical explanation, and do not need to prepare by themselves, which leads to unsatisfactory learning effects ^[3].

2.2. Students lack independent thinking and understanding of knowledge

The university-based learning model has significantly different characteristics from the basic education stage. The university chemistry teaching model often has a split between teachers and students. Teachers only teach knowledge in get out of class, and there is no connection or little between teachers and students after class Relations. Students practice knowledge outside the classroom to consolidate their knowledge entirely consciously, and lack the participation and guidance of teachers. There are even more students who only temporarily memorize the knowledge they have learned before the exam, and lack deep understanding and thinking. This violates the requirements of the exercise law in the connection learning theory. For university chemistry classroom teaching, on the one hand, there is too little proportion of prepared and planned experimental learning; on the other hand, teaching is always teacher-centered and does not regard students as the main body of learning. It is essentially a backwardness in teaching concepts.

2.3. Single teaching method

As a basic subject of other natural sciences, chemistry has an ancient and long history of development. For a long time, chemistry classrooms in universities and colleges have used traditional classroom teaching methods to

teach knowledge, which has led to the failure to improve the strength of learning connection ^[4]. The teaching methods in traditional classrooms also fail to reinforce the stimulation of students repeatedly, which directly leads to the failure of the important learning response of stimulation-connection. Simply listening to knowledge and staying in books is not conducive to the true teaching of knowledge. More importantly, this teaching mode hinders students' exploration and research spirit of the subject itself, making chemistry theory superficial and unable to develop.

III. Reasons for the current situation of university chemistry classes in Chinese universities

Figure 3. Reasons for the current situation of university chemistry classes in Chinese universities

3.1 Teachers rather than students as the main body of classroom teaching

Under the traditional teaching model, the teacher is still the absolute subject of the classroom. Students become vassals of the teacher and passively accept the theoretical knowledge of chemistry taught by the teacher in the classroom, resulting in a lack of opportunities for independent thinking. The teaching mode with the teacher as the main body of the classroom is not only not conducive to the cultivation of students' independent thinking consciousness, but also fails to teach students in accordance with their aptitude. There is a lack of in-depth communication and discussion between teachers and students.

3.2 Deeply influenced by test-oriented education teaching model

Affected by the test-oriented education model for a long time, those who have been promoting quality education in recent years have made great progress in basic education such as elementary and middle schools. On the contrary, they have realized and practiced quality education at the university stage where the learning atmosphere is more free. not enough. The teaching method of chemistry in colleges and universities is single, and students are mainly passive in the classroom. They not only lack practice, but also are not clear about their learning goals. The classroom atmosphere is also more serious and dull, and there is a lack of easy and interesting teaching methods to mobilize students to learn independently. Their enthusiasm for active research often leads to poor teaching effects, and because teachers and students at the university level are no longer driven by the pressure of the college entrance examination, the teaching model is also difficult to actively innovate and improve ^[5].

IV. Innovative suggestions on the form and teaching model of chemistry classroom in colleges and universities under the joint learning of teachers and students



Figure 4. Innovative suggestions on the form and teaching model of chemistry classroom in colleges and universities under the joint learning of teachers and students

4.1 Previewing before class and review after class, teachers and students prepare for teaching together

According to the requirements of the law of connected learning preparation, teachers should clarify the goals of the class and formulate reasonable classroom arrangements before the beginning of the class, and students should be prepared for learning before class. Good preparation before class is an important means to improve the efficiency of chemistry teaching. The preparation of the learning content by students themselves is not only helpful to the understanding of knowledge, but also effectively improves the teaching efficiency of teachers in the classroom. From the perspective of teacher-student connected learning, students cannot rely on pre-class preparation unilaterally.^[8] Teachers must also prepare for the teaching activities they want to carry out, and conduct actual teaching according to the preparation settings during the teaching process. Only when students prepare, teacher preparation and teaching practice are combined, and when the pre-class preparations of teachers and students are realized in the classroom together, can learners get satisfactory results. Students still have to review and review the knowledge after teaching, and consolidate the knowledge that has been learned in time, according to the requirements of the exercise law in the connection learning theory. Students should deepen the stimulus-response connection through continuous intensive exercises so as to truly master the content of learning, and will not easily forget.^[4] All in all, college chemistry classrooms should pay attention to the two links of pre-class preparation and after-class review. In particular, teachers should change the teaching methods that were separated from students in the past, prepare together with students and realize this preparation in teaching.

4.2 Attaching importance to experiment, teaching should be closely combined with experiment

College chemistry classes should pay attention to the important role of experiments, although chemistry theory is already complete and specific knowledge. However, students often feel that they are too vague and lack real sense in the study of pure theoretical knowledge. If the process of obtaining chemical theory lacks experimental evidence, the theory is always just the theory, and students cannot understand the process of experimenting by hand. The magic of chemical reaction can not find problems in the process of personal experiments and carry out independent thinking. The so-called simple experience on paper, university chemistry teaching should not be limited to the classroom form, but should adhere to the fact that chemistry is a science based on experiments, and closely integrate experiments with knowledge teaching, rather than on paper. The students' personal experience of the phenomenon in the experiment also corresponds to the "stimulus" in the theory of connected learning. In the experiments conducted by the students themselves, the experimental results that they have seen with their own eyes are the best way to deepen the stimulation process and obtain the connection^[6]. Such a classroom format is not only conducive to the mastery of students' learning, but also can assist teachers to make the classroom more interesting and lively. The charm of chemistry itself is in the process of experimentation. Therefore, university chemistry classrooms must be based on experiments and should not focus on the teaching of knowledge. It is necessary to clarify the important position of experiments in university chemistry teaching, explore the charm of chemistry itself, and improve teaching effects.

4.3 Combining professional lectures with classroom teaching

College chemistry teaching can use a combination of professional lectures and classroom teaching to supplement students' knowledge. School textbooks are always lagging behind the current scientific development. The theories and research involved in the textbooks are often mature discoveries or classic conclusions, and there is little or no frontier scientific research that is always ongoing. What today's society needs is to keep up with the pace of the times, and universities who can make contributions to the development of the times must have knowledge and understanding of emerging research results in addition to classic theories. For this reason, schools should reform the university chemistry teaching model, and provide students with opportunities to passively learn about the latest research and discoveries. The university offers professional lectures and invites experts and scholars active in the front line of subject research to introduce new researches and new discoveries in progress to students, which helps to supplement students' understanding of new knowledge outside of books and classrooms. On the other hand, new research topics and new discoveries are also a powerful stimulus to students' professional learning, which can inspire students to think independently and broaden their horizons and understanding. The university's new model of combining professional lectures with classroom teaching can greatly broaden students' knowledge, stimulate students to learn actively, and master more real research progress and conditions about chemistry, which is conducive to strengthening the connection of chemistry learning.

4.4 Introducing self-learning teaching model into traditional classroom teaching

The so-called autonomous learning means that students actively arrange research and learning activities on their own. Universities should not ignore the creativity and initiative of students as independent individuals, and should give them full freedom to allow them to choose their own interests for exploration and discovery. Teachers can guide students to set up a self-learning group of chemistry, choose a certain aspect of their interest as the goal of learning and research for self-study and research^[7]. Universities provide students with conditions for conducting experiments and references to materials and literature. Teachers provide students with professional guidance, allowing students to conduct experiments on their own, look up materials, and discuss with classmates. Finally, the teacher will check and accept the results, point out the deficiencies in the research, and put forward suggestions for improvement. This new teaching model not only relieves the pressure of teachers in teaching, but also gives full play to students' creativity and initiative, makes chemistry teaching a sense of accomplishment, and can increase students' interest and enthusiasm in chemistry. At the same time, in the process of self-learning, accessing materials and designing, and conducting experiments, it greatly promotes students' exploration consciousness and independent thinking ability. It is conducive to the future professional development of students, can fundamentally change the current teacher-centered teaching model of chemistry teaching in universities and colleges, and transform students into the main body of the classroom and the main body of learning.

V. Conclusion

The connected learning theory puts forward that the essence of learning is the process of establishing a connection between stimulus and response, which has also been fully applied in modern education. The theory of connected learning emphasizes that learning is a process of repeated trial and error and a gradual process. The three laws that learning behavior follows, the law of preparation, the law of practice and the law of effect, respectively put forward the importance of preparing for the learning content in the learning process, the necessity of repeated practice and the important influence of the effect on the connection of learning. At present, in the practice of chemistry teaching in universities and colleges, there are problems such as low classroom efficiency, lack of experiment in teaching, insufficient connection between teachers and students, and low class interest. In order to improve the effectiveness of university chemistry classrooms, enhance students' interest and enthusiasm for chemistry teaching, and cultivate students' innovative spirit and sense of autonomy, this thesis explores the form and mode of university chemistry teaching through the study of connected learning theory. Innovative research and put forward corresponding suggestions. This research proposes innovative suggestions for university chemistry classrooms from four aspects. First, it focuses on the important role of pre-class preparation and after-class review in the practice of chemistry teaching, so that both students and teachers are prepared for chemistry teaching and make preparations. It was successfully realized in classroom practice. According to the preparation law of the connection learning theory, this will help strengthen the stimulus-response learning connection, so that students can better master knowledge. Secondly, university chemistry teaching should clarify the important role of experiment in chemistry teaching, so that chemistry teaching and experiment can be closely integrated, so that students can practice and strengthen knowledge repeatedly in the process of doing experiments by themselves. Experiments should be regarded as an important part of teaching method. In addition to the emphasis on experiments, university chemistry teaching can also adopt a combination of professional lectures and classroom teaching to supplement

students' understanding of new discoveries and new research in the field of chemistry. Natural science is constantly developing, and teaching materials always lag behind the actual development process of the subject, so chemistry teaching cannot be limited to teaching materials. Conducting professional lectures is a good way to supplement students with cutting-edge chemical knowledge, broaden their horizons, and deepen their understanding. Finally, university chemistry teaching should introduce the independent learning model into the traditional teaching model, give full play to students' creativity and subjective initiative, and make students the main body of teaching.

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