

Research on the overall teaching design and practice of chemistry unit based on big concept middle school

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ABSTRACT

Middle school chemistry teaching is faced with problems such as knowledge fragmentation and insufficient cultivation of students core literacy. By integrating the core concepts of the subject and constructing a systematic knowledge structure, it provides new ideas for solving these problems. At the same time, the big concept teaching is conducive to promoting students to build a complete knowledge system and improving the core quality of the subject. In view of this, this study is based on the big concept teaching theory, discusses its application value in middle school chemistry teaching, and carries on the design and practice of large unit overall teaching, so as to provide reference for promoting the reform of middle school chemistry teaching.

KEYWORDS

big concept; middle school chemistry; big unit teaching; strategy exploration

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Introduction: Big concept teaching is an important theoretical and practical orientation in the field of education in recent years. It emphasizes the core concept of the discipline, through the integration and association of the concept, to help students to build a systematic knowledge structure, and promote the promotion of the core quality of the discipline. Chemistry teaching in middle school involves many abstract concepts and complex reaction principles, and students are easy to fall into the dilemma of knowledge fragmentation and mechanical memory. Therefore, it is of great significance to introduce big concept teaching to improve the teaching status and teaching quality.

1 The application value of big concept teaching in middle school chemistry teaching

1.1 It is conducive to promoting students to build a complete knowledge system

In middle school chemistry teaching, big concept teaching has gradually become an important strategy to help students build a complete knowledge system. The traditional teaching mode often focuses on the scattered teaching of knowledge points. Students are easy to form a fragmented knowledge structure in the learning process, and lack a clear understanding of the overall context of chemistry. The teaching of big concept focuses on guiding students to understand the core ideas

and basic principles of the subject from the overall perspective, so that students can not only master the scattered knowledge points, but also establish the internal connection between knowledge and form a systematic cognitive structure. This teaching method has important application value for middle school chemistry teaching, and helps students to build a complete knowledge system and improve their learning effect.

The core of big concept teaching lies in taking the basic concepts, principles and laws in chemistry as the pillars of the knowledge structure, and organically integrating the scattered knowledge points, so that students can spontaneously connect the knowledge points with the big concepts in the learning process, and form a deep cognitive system. Through such teaching, students can build a more complete framework of chemistry knowledge. The application of big concept teaching can also promote students long-term memory and knowledge transfer ability. Compared with the traditional knowledge-centered teaching mode, the big concept teaching enables students to deeply understand and remember the knowledge under the overall framework by strengthening the logical correlation between the knowledge points. For example, when learning the chemical properties of metals, through the concept of "energy changes in chemical reactions", students can understand that the reaction of metals not only involves the transformation of substances, but also accompanied by the transfer and change of energy, so as to deepen the understanding of the mechanism of metal reaction [1]. In this way, students can not only firmly grasp the current learning knowledge, but also can transfer these knowledge to new situations in the future learning, forming a comprehensive application ability.

1.2 It is conducive to improving students core quality of the subject

The application of big concept teaching in middle school chemistry teaching can significantly improve students core subject literacy. It emphasizes guiding students to understand the basic laws and core concepts of chemistry from the overall framework, and integrating scattered knowledge points into a broader subject background, so that students can form an organic knowledge network in the learning process. This teaching method effectively overcomes the problem of knowledge fragmentation in traditional teaching, helps students to master the connection between chemical principles and phenomena from a higher cognitive level, and enhances their ability to analyze and solve problems in complex situations. Big concept teaching promotes the comprehensive development of students core discipline literacy by promoting students deep understanding and integration of chemistry knowledge. The value of the big concept teaching mode is not only reflected in the optimization of knowledge transmission, but also lies in that it can cultivate students scientific thinking and inquiry ability. By focusing on the core concepts, teachers can guide students to discuss chemical issues from multiple perspectives and stimulate their curiosity and thirst for scientific phenomena. In this teaching mode, students are no longer just passively accept knowledge, but actively construct knowledge. The core qualities of chemistry, including scientific inquiry ability, evidence reasoning ability, model construction and application ability, can be strengthened through big concept teaching.

2 Overall teaching design and practice of chemistry unit based on big concept

2.1 Strengthen teachers professional development and enhance their ability in the design and implementation of big concept teaching

Strengthening teachers professional development is the key to improving the ability of big teaching design and implementation. The overall teaching design of large units helps students to

understand the core concepts of the subject from a macro perspective, so as to promote deep learning. In middle school chemistry teaching, large unit teaching design requires teachers to master systematic teaching methods, but also requires them to have a high degree of teaching innovation ability, and be able to flexibly use big concepts to guide students learning process.

In the big concept teaching mode, the role of teachers is no longer limited to the impartor of knowledge, but to the guide of knowledge and the facilitator of learning. In order to ensure the smooth implementation of the overall teaching design of large units, teachers need to have high teaching planning ability. The application of big concepts requires teachers to deeply understand the basic concepts of chemistry, and also to be able to design a teaching path in line with the students cognitive rules from a global perspective. The large unit teaching design breaks the traditional chapter teaching, emphasizing the core concept and organizing the teaching content around the key issues. Teachers need to comprehensively analyze students knowledge reserve, learning characteristics and cognitive needs, reasonably allocate the depth and breadth of teaching content, and guide students to deeply explore the core concepts through a variety of teaching activities, so as to finally realize the flexible application and transfer of knowledge.

To improve teachers ability of big concept teaching design is inseparable from professional training and teamwork. In the teaching practice, teachers should strengthen the cooperation with their colleagues, and jointly discuss the design ideas and implementation strategies of large unit teaching through collective lesson preparation and teaching discussion. With the help of the collective power, teachers can better understand the connotation of the big concept, clarify the key points and difficult points of the teaching design, and then improve their grasp of the overall teaching design. At the same time, professional development should also pay attention to help teachers continuously optimize their teaching programs through teaching reflection and classroom feedback. Through many teaching practices, teachers can accumulate experience in understanding big concepts, and flexibly adjust strategies in the teaching implementation process to improve their teaching effect [2].

2.2 Optimize the organization of teaching content, highlight the concept connection and thinking development

In middle school chemistry teaching, optimizing the organization of teaching content and highlighting the correlation between concepts can effectively promote the development of students thinking and the construction of knowledge system. The overall teaching design of a large unit based on the large concept emphasizes that starting from the core concept of the subject and integrating the relevant knowledge points, students can grasp the overall thinking while understanding the local content, and form a systematic cognition.

As a related subject, chemistry has a logical internal connection between its different knowledge points. When designing the curriculum, teachers should take the core concept as the link to organize the level and structure of each teaching content. In this way, students can shift from superficial mental knowledge memory to deep conceptual understanding and deepen their cognition of chemical phenomena. Optimizing the content organization is conducive to students to understand the complex chemical reaction and the internal mechanism of material properties changes through the grasp of the core concepts, and cultivate stronger thinking ability and problem solving ability.

In addition, the big concept teaching model focuses on the horizontal integration of knowledge, and also focuses on the vertical cognitive progress. By continuously deepening the understanding of the core concepts, students can gradually build a systematic knowledge structure from different cognitive levels. The optimization of teaching content is to help students put chemical concepts in a

broader disciplinary framework, so that they can not only explain individual phenomena, but also analyze more complex chemical problems through correlation thinking. In practical teaching, teachers need to gradually guide students to establish a complete knowledge system through hierarchical and progressive methods, so that students can have a deeper understanding of chemical principles.

In the practice of the overall teaching design of large units, the combination of experimental teaching and problem-oriented learning helps students to further understand the relevance between concepts. Experiments are a means to verify knowledge and a way to explore core concepts. Through experiments, students can combine theory with practice in hands-on practice, strengthen the mastery of knowledge, and stimulate their creative thinking. At the same time, problem-oriented learning can help students think about chemical phenomena from different perspectives and develop critical thinking and comprehensive analysis skills. Through such a teaching organization, students can more actively construct knowledge, form an independent learning ability, and adapt to the future learning needs.

2.3 Strengthen the integration and development of resources to provide support for big concept teaching

In the overall teaching design of the chemistry unit in middle school, strengthening the resources to integrate and develop and provide strong support for the teaching of big concepts is the key to promote the teaching reform and improve the teaching effect. The big idea teaching aims to help students understand the core concepts of chemistry from a macro perspective, and to build a complete knowledge system through the connection between the concepts. To achieve this teaching goal, we must rely on diversified teaching resources to help students to better understand and use the core concepts.

Resource integration should be systematically sorted out around big concepts, and existing teaching materials, teaching reference books, experimental resources, and digital teaching tools should be effectively combined to form an overall resource framework to support large-unit teaching. Through reasonable allocation and optimization of existing resources, teachers can adjust the depth and breadth of teaching content more flexibly, so that students can deeply understand the core content of the subject in different learning stages. At the same time, resource integration is not only limited to the collection and utilization of physical resources, but also includes the organic integration of knowledge structure, subject logic and experimental exploration methods. In this way, teachers can construct a coherent, logical and innovative teaching design under the framework of big concept teaching, so as to help students to better build a knowledge network.

At the same time, the development of resources is also crucial. Sometimes the existing teaching resources can not fully meet the requirements of the overall teaching design of large units, so teachers should actively participate in the development and creation of teaching resources. According to the needs of big concept teaching, teachers can develop experimental projects, after-class inquiry tasks or group discussion topics that are more in line with students cognitive rules according to the actual teaching situation. The application of digital resources is also a part that cannot be ignored. Teachers can provide students with rich learning materials and independent learning tools through the online teaching platform, online experimental simulation and the integration of multimedia materials. In this way, students can master the core knowledge through classroom teaching, and can further deepen the understanding and application of big concepts through diversified learning methods after class.

To strengthen the integration and development of resources also requires teachers to have a good sense of cooperation and professional development ability. In practice, teachers can share

their teaching resources and experience through the form of teaching and research groups or teaching community, and collectively develop resource packages suitable for the overall teaching of large units. Such a resource sharing mechanism not only improves the quality and richness of teaching resources, but also promotes the professional exchange and cooperation among teachers, and promotes the promotion and implementation of large concept teaching in a larger scope. Through continuous resource development and integration, teachers can more calmly cope with the challenges in the overall teaching design of large units, and provide students with a more perfect learning support system.

2.4 Build a diversified evaluation system to promote the improvement of students core literacy

Under the framework of big concept teaching, constructing multiple evaluation system is an effective way to promote the improvement of students core literacy. The traditional evaluation method often focuses on the single score and result orientation, ignoring the students thinking development and ability growth in the learning process. Big concept teaching emphasizes students deep understanding and application of core chemical concepts, which requires a more comprehensive evaluation system to measure students subject literacy and their knowledge transfer ability in different situations. Therefore, the establishment of a set of diversified, process and result-oriented evaluation system is helpful for teachers to fully understand students learning progress, and can promote students to continuously improve their core qualities in chemistry learning.

The construction of the multiple evaluation system should cover the multi-dimensional content such as cognition, skills and emotion. The evaluation of the cognitive dimension focuses on students ability to understand and apply the core chemical concepts, while the skill dimension focuses on students performance in experimental operation, problem solving and other aspects. The evaluation of the emotional dimension focuses on the students learning attitude, interest and teamwork spirit. Through this multi-angle evaluation, teachers can more comprehensively and accurately grasp the students subject development status, and find their potential and shortcomings in different aspects. Evaluation methods should also be diversified, such as classroom performance, experimental report, after-class inquiry items, group discussion, which can be used as evaluation basis, so as to realize an all-round investigation of students learning process.

Process evaluation is particularly important in big concept teaching. The overall teaching design of the large unit not only pays attention to the transmission of knowledge, but also emphasizes the change of students thinking and ability improvement in the learning process. Therefore, teachers need to observe and record students performance in class, especially in the participation and thinking depth of question inquiry and experimental operation. In this way, it can not only provide immediate feedback for students learning, but also help them to timely adjust their learning strategies, and then gradually improve their subject literacy. At the same time, the setting of process evaluation can encourage students to participate more actively in classroom activities, cultivate their ability of independent learning and reflection, and promote the development of their core literacy of the discipline.

Termination evaluation still plays an important role in the multi-evaluation system, but it should avoid excessive reliance on the traditional written test or single assessment method. Combined with the characteristics of the overall teaching of large units, teachers can design comprehensive evaluation tasks, and test the students mastery of large concepts through the open problem design and the setting of practical application situations. For example, the design of interdisciplinary projects based on core chemistry concepts requires students to comprehensively use the

knowledge they have learned to analyze and solve problems. Such an evaluation method can better reflect students flexible application of knowledge and innovative thinking. Through such an evaluation task, students can not only deepen their understanding of the core knowledge, but also exercise their ability to use knowledge in practical problems.

By constructing a multiple evaluation system, teachers can more flexibly respond to different teaching needs in big concept teaching and promote the all-round development of students. Evaluation is no longer a simple performance evaluation, but the motivation for students to make continuous progress. The evaluation system under the big concept teaching not only pays attention to the students knowledge mastery, but also emphasizes their comprehensive performance in knowledge transfer, innovative thinking, cooperative inquiry and other aspects, so as to promote the students to comprehensively improve their core literacy in the chemistry discipline.

3 Tag

This study discusses the application of big concept teaching in middle school chemistry education, and provides a new perspective for improving middle school chemistry teaching through theoretical analysis and practical exploration. The research shows that big concept teaching has unique advantages in promoting the construction of students knowledge system and improving the core literacy of subjects. In teaching practice, teachers should strengthen professional development, optimize the organization of teaching content, pay attention to the integration and development of resources, build a multi-evaluation system, and provide support for the effective implementation of big concept teaching. In the future, it is still necessary to make continuous efforts in teacher training, teaching resources construction and other aspects to promote the in-depth application of big concept teaching in middle school chemistry education.

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