

Analysis of Biology Classroom Activities in Senior High School under the Concept of Core Competencies and Values

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Abstract. In the new era, teaching concepts are updated rapidly, and cultivating core competencies and values have become the main teaching concept. The design of senior high school biology classroom activities should focus on the concept of core competencies and values, consider the needs of cultivating students' core competencies and values, and enrich teaching contents. The connotation of core competencies and values is analyzed in detail in the paper. The exploratory, intuitive, problematic as well as biological experiment classroom activities of senior high school biology are designed according to the core competencies and values.

Senior high school biology teaching is very important for shaping the values and outlook on life of senior high school students. Concept of core competencies and values is applied in the design of classroom activities to optimize the biological classroom teaching environment, realize the combination of teaching contents and life, improve the efficiency and quality of education, and truly reflect the value of education.

1 The Connotation of Core Competencies and Values

The teaching concept of core competencies and values has emerged in recent years. Students' quality, learning foundation, learning ability and interest are included in the teaching indicators to meet the individual development needs of students. The core competencies and values of biology in the new curriculum standard include concept of life, scientific thinking, scientific inquiry and social responsibility. In the learning process, a correct view of life is formed, and the character and ability of paying attention to personal and social development are cultivated ^{[1][2]}. In biology teaching in senior high school, it is embodied in leading students to understand biodiversity, summarize the laws of life, think deeply with the concept of life, gradually develop the reasoning and deductive way of thinking, dialectically solve difficult problems of biology, become interested in unknown things, try to interpret the laws of life, and establish a natural view with strict logic ^{[3][4]}.

Concept of core competencies and values plays a guiding role in the design of senior high school biology classroom activities. The design of classroom activities is based on the biological law to find out the existing biological contradictions, put forward and solve problems pertinently, study and demonstrate difficult problems, give scientific and reasonable explanations, and apply them to practice for verification in order to connect biology with life closely.

2 The Design of Biology Classroom Activities in Senior High School under the Concept of Core Competencies and Values

2.1 The Design of Exploratory Classroom Activities

Understanding and interest are the most important for senior high school students in learning biology courses. Teachers should pay more attention to students, understand them, design exploratory classroom activities in a reasonable way according to the textbook content, encourage students participate in classroom activities with a positive attitude, stimulate students' learning enthusiasm, and enable them to participate independently.

Teachers should construct appropriate classroom situations. The design of introduction of classroom teaching should evoke students' interest and visualize the originally abstract biological knowledge ^[5]. Teachers should play a good guiding role to lead students to think about problems, gradually form a deep understanding, and train students in biological thinking. For example, in the

“introduction to auxin”, the teacher can design experimental operation activities of corn germination for students to observe and think about the experimental situation independently, compare and record the growth characteristics of corn coleoptile in different environments to form their own understanding, record the growth situation in detail, and let them conduct independent analysis. In the following classroom teaching, multimedia is used to present students’ records. The teacher analyzes and supplements the growth characteristics of the corn coleoptile in detail, allowing students to find their own analytical deficiencies, and guiding them to analyze problems from a biological perspective and form a preliminary understanding so as to help them establish biological thinking. In this exploratory classroom activity, students can draw conclusions from practice, learn to explore and think independently. They will actively communicate with each other, understand each other's views, and realize the meaning of life. In the experiment, the growth law is summarized, and students are allowed to recognize the biological laws ^[6]. The teacher leads students to explore the magical biological world, which is conducive to cultivating students' outlook on life and values. Reasonable design of exploratory classroom activities can enable students to have a deep understanding of biological knowledge, grasp the difficulties and key points of teaching, and realize the humanistic connotation behind the classroom, which plays an important role in the cultivation of students' ethical attainments ^[7].

2.2 The Design of Intuitive Classroom Activities

Teachers should set clear teaching objectives, rationally use teaching resources to organize biology teaching classes, clarify the direction of teaching, and create vivid classroom situations. In the teaching of more abstract knowledge points, teachers can construct an intuitive teaching framework. Difficult knowledge points should be presented to students through examples and simulations to deepen their impression, facilitate their understanding and memory, and create a good learning environment ^{[8][9]}. For example, the relationship between insulin and regulating blood sugar balance is a key and difficult point in the teaching of “blood sugar regulation”. If students do not understand it, they will easily be confused when memorizing. The teacher can explain the prevention and harm of diabetes mellitus to students, show them some collected data in recent years, let students understand the causes of diabetes mellitus and the significance of prevention and treatment through practical cases, improve students’ biological core competencies and values, guide them to form rigorous scientific consciousness, and promote their comprehensive development.

2.3 The Design of Problematic Classroom Activities

Senior high school biology is a difficult subject. It is impossible to grasp biological knowledge only by memory and recitation. It requires students to truly digest and absorb it. In the traditional teaching mode, teachers explain knowledge points and, like a porter, deliver them to students rigidly. Students accept passively, and unable to truly understand the problem. In order to improve core competencies and values of students, senior high school biology teachers should design problematic classroom activities to train students' individual thinking ^[10]. Teachers should consider students’ interests and needs in the design of biology classroom activities make students master relevant curriculum knowledge according to teaching objectives, skillfully design biology problems, and link life with teaching. For example, during the explanation of “protein”, students are unfamiliar with the new knowledge point. The teacher should set up biological problems in combination with actual life. The content of the problem should be combined with real life ^[11]. Teachers can put questions such as “Poisoned milk powder with melamine has a serious impact on children's body. What makes children have kidney stones?” Or “Recently, the incident of big-headed children appeared in the news has aroused widespread concern in society. How to explain it with biological knowledge?” Based on questions raised by the teacher, students collect information, understand the background of the news, and analyze questions with biological knowledge. In the next class, students are required by the teacher to show the collected biological materials through lectures. They are guided to discuss and communicate in class. The teacher explains the problem based on the knowledge of protein, and students' biological thinking is effectively trained, their self-directed learning consciousness is cultivated, and the cultivation of core competencies and values is better realized.

2.4 The Design of Biological Experiment Classroom Activities

Biological experiment is an indispensable part of senior high school biology teaching, which directly determines the construction of students' core competencies and values. During the design process of biological classroom activities, teachers should set experimental situations reasonably, organize biological experiment teaching scientifically according to teaching content, and create a good experimental environment. In the biological experiment classroom, students can better comprehend, digest and absorb knowledge points by understanding biological laws by themselves. They can communicate and discuss with each other, and help each other when they encounter misunderstandings, which is conducive to improving their self-confidence and learning enthusiasm^[12]. For example, in the study of "extraction and separation of chloroplast pigments", the teacher should prepare experimental materials and equipments, explain the specific operation process of the experiment in advance, encourage students to use laboratory materials, construct biological experiment situations, and enable students to conduct experimental operations in an orderly manner, to verify the laws of biology in experiments, and to master biological knowledge in depth. When explaining "Structure of DNA Molecules", teachers can play videos related to "rough extraction and identification of DNA" to students through multimedia teaching equipment. Teachers can complete the experiment in their own kitchen and use mobile phones or cameras. Take it into a video, the experimental material is a common vegetable onion, use a knife to chop all the onion bulbs, then add a certain detergent, then grind and filter, and add the right amount of alcohol in the filter, after 4 seconds Flocculated DNA will appear^[13]. In operational experiments, teachers need to properly guide students to choose different experimental materials, including apples, bananas, kiwis, and so on. The final experimental results show that the experimental results of apples and bananas are very significant, and only the experimental effect of kiwifruit is not good. Under this premise, the teacher can appropriately guide the students to obtain DNA by means of cooking machine processing and manual grinding, and compare the results, so that the DNA characteristics obtained by manual grinding can be found to be silky. The DNA obtained by the processing method with cooking machine is flocculent. Through the students' own experiments, students can understand the truth more intuitively, that is, the presence of DNA in the cells, so that students can establish a correct outlook on life. Life-based teaching is implemented to cultivate students' inquiry ability and rational thinking, to guide them to conduct experiments scientifically and normatively, to enable them to treat experimental operations rigorously, and to promote the cultivation of core competencies and values^[14]. Biological exploratory experiments can create a broad space for students to explore, combine their own practice and thinking, and better cultivate the scientific spirit of students.

2.5 The Design of Biological Realistic Classroom Activities

High school students should be flexible in the use of biological knowledge in the attitude of providing services to human beings. They can pay close attention to the hot topics related to biology, and actively participate in the discussion. They can accurately explain this hot topic and be able to distinguish Superstition and science; continuously disseminate biological knowledge related to healthy living, environmental protection, etc.; can carry out scientific practice activities in combination with local resources, and solve many problems related to biology in real life^[1].

For example, when explaining the Structure of DNA Molecules, teachers can arrange an assignment for students before class, asking students to collect as much information as possible on how to do it. Because students have a preliminary understanding of the content of the course to be studied, they can explore each other in teaching. Some students propose to use genetic technology to understand genetic diseases, and thus achieve the goal of conquering cancer, but technology is a "double-edged knife." Teachers need to scientifically guide students to evaluate their strengths and weaknesses, and let students recognize that genetic technology can be used to treat diseases, but it also leads to many ethical issues^[15]. By organizing this type of activity, students can pay attention to the topic of social science related to life sciences, and thus strengthen students' social responsibility.

3 Conclusions

To sum up, biology is an important part of senior high school students' learning. The concept of biological core competencies and values should be established and correct outlook on life and values should be cultivated to promote students' all-round development. Under the concept of core competencies and values, teachers should improve traditional teaching methods, adjust teaching design timely, design exploratory, intuitive, problematic as well as biological experiment classroom activities, launch classroom teaching, combine biological knowledge with life experience, deepen the cultivation of biological core competencies and values, and improve teaching efficiency and quality.

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