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A study on the challenges and strategies of cultivating students' core literacy in high school biology classroom

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Abstract: This paper aims to discuss the challenges and optimization strategies faced by high school biology class in the process of cultivating students' core literacy. By analyzing the characteristics of core literacy cultivation in high school biology classroom, including interdisciplinary integration, practicality and inquiry, bioethics and social responsibility, the paper reveals the existing problems in current teaching, such as the disconnection between teaching content and core literacy, the lack of teaching resources and teachers, and the low initiative and participation of students. To solve these problems, this paper puts forward optimization strategies, including innovation of teaching content and methods, strengthening teacher training and resource construction, stimulating students' interest and enhancing participation. Through the implementation of these strategies, the aim is to promote the effectiveness of the core literacy training in high school biology classroom and lay a solid foundation for the all-round development of students.

1. Introduction

With the in-depth development of education reform, the cultivation of core literacy has become an important issue in the field of education. As an important part of natural science, high school biology plays an irreplaceable role in cultivating students' life concept, scientific thinking, scientific inquiry and social responsibility. At present, high school biology classroom still faces many challenges in cultivating students' core quality. This paper will start from the characteristics of the cultivation of core literacy in high school biology classroom, analyze the existing problems, and put forward the corresponding optimization strategies, in order to provide reference for the reform of high school biology teaching.

2. The Characteristics Of High School Biology Classroom Core Literacy Training

2.1 Interdisciplinary Integration

The cultivation of core qualities in high school biology class significantly reflects the charm of interdisciplinary integration. This feature breaks the discipline barrier, so that biology teaching is no longer limited to a single field, but becomes a bridge connecting natural science and humanities and social science. In the in-depth discussion of ecosystem balance, students should not only master the

basic principles of biology, but also deeply understand the concepts of energy conservation and transformation in physics and element cycling in chemistry. This interdisciplinary perspective greatly broadens students' knowledge horizon and enables them to comprehensively and profoundly understand the complex operating mechanism of nature [1]. Genetic and evolutionary knowledge in biology is a deep fusion point with information science, mathematics and other disciplines. Through mathematical methods such as calculating genetic probability and analyzing gene sequence, as well as biological data analysis and simulation experiments by means of information technology, students can not only master the frontier knowledge of biology, but also cultivate the ability to think and solve problems across disciplines. Interdisciplinary integration is one of the important characteristics of the core literacy training of senior biology class, which provides students with a broader learning space and richer knowledge resources, so that they can better adapt to the diversified development needs of the future society while mastering biological knowledge.

2.2 Practicality and Inquiry

The core of high school biology class lies in its practicality and inquiry, which lay a solid foundation for the cultivation of students' core quality. Practical learning, through a series of biological experiments, careful observation records and rigorous data analysis, let students personally experience the mysteries of biological principles, so as to deepen their understanding and exercise experimental skills in hands-on practice. This process is not only the acquisition of skills, but also the stimulation of students' curiosity and the igniting of their desire to explore, leading the transition from passive acceptance of knowledge to active exploration of the unknown [2]. The introduction of inquiry-based learning further strengthens students' subject status. It encourages students to dare to question and explore, to find problems in life, to design experimental schemes, to collect and analyze data, and finally to draw their own conclusions. Through constant trial and error and correction, students learn to think independently and solve problems with a scientific attitude and method. This ability will be accompanied by a lifetime and become an important weapon to face future challenges [3]. The application of practical and inquiry-based teaching mode in high school biology classroom not only realizes the organic combination of knowledge imtransfer and ability cultivation, but also enables students to gradually build their own knowledge system and ability framework in doing and thinking in learning, laying a solid foundation for all-round development.

2.3 Bioethics and social responsibility

In addition to imparting knowledge, high school biology class deeply recognizes the importance of cultivating students' sense of bioethics and social responsibility. As a bridge between nature and society, biology deals with a wide range of ethical issues, such as the ethical considerations of gene editing technology, global issues of biodiversity conservation, and social responsibility for human health and disease prevention and control. The discussion of these topics not only broadens students' knowledge horizons, but also prompts them to think deeply about the ethical values and social impacts behind science and technology [4]. In the classroom, students are guided to examine the double-edged nature of science and technology and understand that while pursuing scientific and technological progress, they must adhere to the principles of dignity of life and respect for the laws of nature. Through a variety of teaching methods, such as case studies and role playing, students are stimulated to explore how to balance the relationship between technological development and social ethics, and how to participate in and promote social progress in a responsible manner. Such an educational process not only helps students build a sound life ethic, but also enhances their sense of social responsibility. Students learn to look at issues from a broader

perspective, understand the profound impact of individual actions on society and nature, and thus develop a firm belief in contributing to the construction of a harmonious society and the protection of our planet. Such educational achievements undoubtedly lay a solid foundation for students to become ethical and responsible citizens of society in the future.

3. The Problems Existing In High School Biology Classroom To Cultivate Students' Core Literacy

3.1 The Teaching Content Is Out Of Line with the Core Quality

High school biology classroom is faced with a significant obstacle in the journey of core literacy cultivation, the disconnection between teaching content and core literacy requirements. The traditional teaching mode pays too much attention to the impartation of knowledge and the polishing of test-taking skills, which leads to the "cramming" of biology classroom and neglects the all-round shaping of students' core quality. Under this teaching model, although students have accumulated a large amount of biological knowledge, they have lost their direction in the process of scientific inquiry, their innovative thinking is inhibited by the pressure of taking exams, and the cultivation of social responsibility is almost ignored. This disconnect not only limits students' overall development, but also leads to a lack of independent inquiry, innovative thinking and social responsibility when dealing with complex problems in the real world. As a bridge connecting nature and society, biology teaching should not only pay attention to imparted knowledge, but also pay attention to the cultivation of students' practical ability, scientific accomplishment and humanistic feelings. The current teaching model is unable to meet these needs, resulting in students who perform well in exams but have difficulty applying what they have learned to solve problems in real life. The consequences of this situation are profound, not only affecting the long-term development of students, but also weakening the essential function of education. How to break the barrier between the teaching content and the core quality requirements and realize the organic combination of knowledge imparting and ability cultivation has become an important problem to be solved urgently in the biology classroom of senior high school.

3.2 Insufficient Teaching Resources and Teachers

In the process of cultivating students' core quality, biology classroom in high school faces the dual challenge of insufficient teaching resources and teachers. The lack of resources has become a major bottleneck restricting the teaching effect. Due to limited funds, it is difficult for some schools to equip themselves with sufficient biological experiment equipment and rich teaching materials, which directly limits the breadth and depth of practical teaching. Students lack hands-on practice opportunities, resulting in the training of practical ability is blocked, the development of core literacy is difficult to fully implement. The lack of hardware resources also makes it difficult to show the vitality of biology classroom, which weakens students' learning interest and enthusiasm. The shortage of teachers is also an important factor affecting the quality of teaching. Teachers are the leaders of teaching activities, but at present, some high school biology teachers do not have a deep understanding of the core quality, and lack of targeted teaching strategies and methods. This makes it difficult for teachers to effectively guide students to conduct in-depth inquiry in teaching, which affects the cultivation of students' innovative thinking and critical thinking. Some teachers also face difficulties in the improvement of professional quality and teaching skills, and it is difficult to meet the new requirements of core quality training, which further affects the teaching effect. The lack of resources and teachers not only limits the effectiveness of teaching, but also hinders the comprehensive promotion and implementation of core literacy in the classroom.

3.3 Students' Initiative and Participation Are Not High

In the stage of knowledge exploration in high school biology class, students should be the most dazzling protagonist, but in reality, students' initiative and participation are often not high. The traditional teaching mode is like an invisible wall, which places the teacher in the center of imparting knowledge, while the student is marginalized into a passive role. This one-way knowledge transfer method not only deprives students of the right to think actively and explore bravely, but also stifles creativity and imagination to a certain extent. Students without initiative, like ships without sails, can hardly sail freely in the ocean of knowledge. Often satisfied with the surface of knowledge memory, but unwilling to deeply explore the principles and logic behind it. This kind of shallow way of learning, naturally can not make a deep understanding and perception of biological knowledge, more difficult to flexibly apply the knowledge in real life. Low participation also exacerbates the problem. When students become the "silent majority" in the classroom, their voices and ideas are ignored, and their interests and passions are dissipated, which may eventually lead to boredom and rejection of the biology subject. This not only affects the personal development of students, but also goes against the original intention and mission of education.

4. The Strategy of Optimizing the Cultivation of Core Literacy in High School Biology Classroom

4.1 Innovation of Teaching Content and Methods

In high school biology class, innovative teaching content and method is the key to cultivate students' core quality. Teachers are not only knowledge imparting, but also deep diggers and rearrangers of teaching materials. According to the core literacy framework, we should sort out the context of biological knowledge, strengthen the connection between disciplines, build a multi-dimensional knowledge system, and help students form a complete scientific concept. Keeping up with the pace of The Times, the latest scientific research results and social hot topics are integrated into the classroom, which not only enriches the teaching content, but also stimulates students' thirst for knowledge and the spirit of exploration, making the classroom an important bridge connecting theory and practice, present and future. In terms of teaching methods, the traditional irrigation teaching is no longer suitable for today's educational needs. Teachers should adopt modern teaching strategies such as problem-oriented and project-based learning to guide students to start from problems, actively explore and cooperate to solve them, so as to exercise scientific inquiry ability and innovative thinking in practice.

Flipped classroom, as an innovative teaching model, subverts the traditional classroom structure. Students master basic knowledge through independent learning outside of class, and classroom time is devoted to in-depth discussion and problem solving, which not only improves learning efficiency, but also deepens students' understanding of knowledge. The application of information technology adds a lot of color to the classroom. Multimedia teaching makes abstract biological concepts concrete, and virtual laboratory provides students with a safe and convenient experiment platform. Through these technical means, classroom teaching becomes more intuitive and vivid, which helps students deepen their understanding in practice and comprehensively improve their comprehensive literacy. To sum up, the combination of innovative content and methods has brought new vitality to high school biology classroom and effectively promoted the cultivation of students' core literacy.

4.2 Strengthen Teacher Training and Resource Construction

In high school biology classroom, teacher training and resource construction are the important pillars of core literacy training. Teacher training is the key to improve teaching quality and cultivate students' core quality effectively. Schools should establish a regular training mechanism and regularly invite experts and scholars in the field of biology to deeply interpret the connotation and teaching requirements of core literacy through special lectures, case analysis, teaching observation and other methods. This can not only help teachers deepen their understanding of core literacy, but also provide advanced teaching concepts and methods, so that teachers can be more innovative in teaching and ensure the implementation and promotion of core literacy training. The construction of teaching resources is also an indispensable part. Schools should increase investment in hardware facilities such as biology laboratories, libraries and online learning platforms to ensure advanced and perfect teaching and learning environments for teachers and students.

Actively integrate and develop high-quality teaching resources, such as the production of high-quality teaching videos, courseware, the establishment of a rich question bank and case bank, forming a systematic resource bank. These resources not only provide strong support for teachers' teaching, but also broaden the way for students to learn independently, helping students to further consolidate and expand their knowledge outside of the classroom. By strengthening teacher training, the professional quality and teaching ability of teachers have been comprehensively improved, and the core quality-oriented teaching method can be better implemented. Through the construction of teaching resources, students have more abundant learning resources and better learning conditions, thus stimulating their interest in learning and the spirit of inquiry, and promoting the comprehensive development of core qualities. The organic combination of teacher training and resource construction has built a solid foundation for the cultivation of core literacy in senior biology classroom, and brought the quality of education to a new level.

4.3 Stimulate Students' Interest and Enhance Their Participation

In high school biology class, stimulating students' interest and enhancing their participation is the core driving force to promote the cultivation of core literacy. Teachers should carefully design teaching links and use creative teaching situations such as simulated ecosystems and role playing to make the class lively and interesting and quickly attract students' attention. These situations not only ignite students' curiosity and desire to explore, but also promote the transformation from passive acceptance of knowledge to active participation, enhancing the enthusiasm and initiative of learning. The diversification of evaluation methods is also an important means to enhance students' participation. On the basis of the traditional teacher evaluation, the system of student self-evaluation and mutual evaluation is introduced to make the evaluation process more comprehensive and just. This not only helps students better understand themselves and enhance their sense of responsibility, but also enhances their self-confidence and sense of achievement through the positive feedback mechanism, thus further stimulating their learning motivation.

Extracurricular practical activities are also an important way to stimulate students' interest. Encouraging students to go out of the classroom and participate in extracurricular scientific research activities and social practices not only helps to consolidate the knowledge learned in the classroom, but also enables students to exercise innovative thinking, critical thinking and social responsibility in the process of solving practical problems. These practical activities provide students with the opportunity to apply theoretical knowledge to the real world, leading to a better understanding and mastery of subject knowledge, while improving comprehensive literacy. Stimulating students' interest and enhancing their participation are the key links to optimize the cultivation of core literacy in high school biology class. Teachers need to constantly explore and innovate in teaching

practice, adopt more flexible and diversified teaching strategies, stimulate students' learning enthusiasm, guide active participation, and finally realize the comprehensive improvement of students' core literacy. Through this process, students can not only make academic progress, but also achieve all-round development in thought and ability, laying a solid foundation for future study and life.

5. Conclusion

Although the high school biology classroom has the characteristics of interdisciplinary integration, practical inquiry and bioethics in the cultivation of core qualities, it faces the challenges of disjointed content, lack of resources and low participation of students. In order to cope with these problems, it is necessary to innovate teaching, integrate the latest scientific research results, adopt modern teaching strategies and information technology, strengthen teacher training, improve teacher literacy, increase resource investment, stimulate students' interest in learning, and increase participation through diversified teaching and practical activities. The implementation of these strategies will greatly promote the effectiveness of core literacy training in high school biology classes, lay a solid foundation for students' all-round development, and help them grow into responsible and responsible future pillars of society.

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