

Study on Teaching Strategies in Secondary School Physics under the Perspective of Core Literacy

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Abstract: Taking the perspective of core literacy as the starting point, this thesis discusses in depth the current problems in the teaching of secondary school physics subject and puts forward corresponding countermeasures. By analyzing the problems in teaching resources and conditions, students' interests, integration of core literacy, teachers' teaching level and assessment system, five countermeasures are targeted to optimize hardware facilities, update teaching materials, diversified teaching methods to stimulate interests, teachers' training and enhancement programs, and reform of the assessment system. Through the implementation of these countermeasures, it aims to promote the teaching of secondary school physics subject to better adapt to the needs of contemporary students and promote their comprehensive development.

Keywords: Secondary school physics, Core literacy, Teaching resources, Student interest.

1. Introduction

With the continuous development of society and the rapid change of science and technology, the demand for student training has gradually shifted from pure knowledge transfer to more comprehensive literacy training. As an important part of cultivating students' scientific literacy, the teaching strategy of secondary school physics faces new challenges and opportunities under the perspective of core literacy. With the perspective of core literacy, this thesis aims to study the problems existing in the teaching of secondary school physics and put forward corresponding countermeasures, with a view to promoting the teaching of the subject to better meet the needs of students and promote their comprehensive development.

In the current situation of secondary school physics teaching, it is not difficult to find that the imbalance of teaching resources and conditions, students' lack of interest in physics, the integration of core literacy and the imperfection of the assessment system are becoming more and more prominent. In order to solve these problems, this paper will put forward specific countermeasures in five aspects, namely, enhancing teaching resources and conditions, stimulating students' interest in Physics, improving teachers' teaching level, optimizing the integration of core literacy, and perfecting the assessment system, and explore the feasibility and effectiveness of these countermeasures in practice through in-depth research and analysis.

Through the comprehensive discussion of these aspects, it is hoped that the teaching of secondary school physics will provide some suggestions and insights to meet the demand of today's society for students' comprehensive literacy and better promote the teaching of secondary school physics towards a more comprehensive and in-depth development. The cultivation of core literacy is not only to improve the level of the subject, but also a key link to guide students to realize comprehensive development in knowledge, ability, emotion and other aspects. In this context, through the research of this thesis, we expect to provide some constructive ideas and methods for the teaching of secondary school physics, and to contribute wisdom and strength to the educational reform and

the development of the discipline.

2. Problems

2.1. The current situation of teaching the subject of physics in secondary schools

2.1.1. Teaching resources and conditions

In terms of teaching resources and conditions, many schools face significant imbalances. Some schools lack modern laboratory equipment, library resources, and information technology support, which directly affects the quality of teaching by teachers. The lack of teaching resources limits students' practical experience and in-depth understanding of physical phenomena. There are also differences in the strength and training level of teachers, leading to an uneven distribution of teaching quality and affecting students' learning experience in the subject.

2.1.2. Students' level of interest in the subject of physics

Students' interest level in the subject of physics is generally low, which is related to the traditional teaching mode and the way the subject knowledge is presented. The teaching content lacks of interest and connection with real life, which makes students' cognition of physics stay at the level of theoretical knowledge. In addition, the cognitive bias of the society towards the physics discipline also makes students resistant to this discipline, thinking that physics is a boring and difficult to understand discipline, which affects their interest in the discipline and the enthusiasm of active learning.

2.2. Problems of Integrating Core Literacy in the Physics Subject

2.2.1. Concept and Connotation of Core Literacy

As one of the key concepts of contemporary education, there are a series of challenges to the integration of core literacy in the teaching of secondary school physics subject. First of all, core literacy is not just a simple accumulation of knowledge, but also emphasizes the comprehensive interdisciplinary, intercultural, and inter-temporal abilities that students develop in the process of subject learning. In physics, core literacy includes the cultivation of scientific

thinking, the enhancement of practical problem-solving ability, and the cultivation of the awareness of scientific ethics. However, there is still some ambiguity in teachers' understanding of the specific connotation and meaning of core literacy, which makes it difficult to integrate the cultivation of core literacy in teaching in a targeted manner.

2.2.2. Cognition and Application of Core Literacy in Current Teaching

At present, there are still many problems in the cognition and application of core literacy in the teaching of secondary school physics. On the one hand, some teachers' understanding of core literacy remains in the traditional teaching paradigm, focusing on knowledge transfer and neglecting the cultivation of students' comprehensive literacy. On the other hand, some educational institutions have not yet established a scientific and perfect system for evaluating core literacy, making it difficult to objectively and accurately assess the development of students in core literacy. This makes it difficult to effectively guide students to actively use what they have learned to solve real-world problems in the actual teaching process, which limits the comprehensive development of core literacy in the discipline of physics.

In summary, the integration of core literacy in the teaching of secondary school physics subject is constrained by the lack of conceptual understanding and the lack of application methods and other factors, which requires educators to think deeply and develop corresponding strategies to better promote the comprehensive implementation of core literacy in the physics subject.

2.3. Incomplete Assessment System

2.3.1. Limitations of the Examination and Evaluation System

There are a series of limitations in the current evaluation system of teaching physics subjects in secondary schools, which are mainly manifested in the evaluation of students' comprehensive literacy. First of all, the traditional examination evaluation mainly focuses on the memorization and application of subject knowledge, while ignoring students' performance in practical problem solving, teamwork, innovative thinking and other aspects. This leads to an evaluation system that favors knowledge memorization over practical ability, and fails to comprehensively reflect students' level of development in core literacy. In addition, the prevalence of exam-oriented education also makes students' subject learning goals more narrow, focusing only on exam-oriented needs and lacking in the cultivation of comprehensive literacy.

2.3.2. Assessment Methods of Core Literacy

The assessment of core literacy involves multiple dimensions, including disciplinary competence, scientific thinking, practical problem solving and other aspects. However, the current assessment methods are mainly based on traditional quantitative examinations, making it difficult to reflect the development of students' core literacy comprehensively and objectively. The lack of a scientific, systematic and comprehensive assessment system for core literacy makes it difficult to quantify students' progress and achievements in core literacy in teaching. In addition, the assessment of core literacy is often too homogeneous and lacks diversified assessment tools, making it difficult to truly reflect students' comprehensive abilities at different levels.

Taken together, the imperfection of the assessment system has, to a certain extent, constrained the cultivation and

development of core literacy in secondary school Physics. The future education reform needs to make profound adjustments in the assessment system and introduce more comprehensive and diversified assessment methods to better promote the overall development of students in core literacy.

3. Countermeasures

3.1. Upgrading teaching resources and conditions

3.1.1. Improvement of Hardware Facilities

In order to enhance the effectiveness of teaching the subject of physics in secondary schools, it is necessary to strengthen the improvement of hardware facilities. First of all, schools need to invest in updating laboratory equipment to ensure that students can practice in a good experimental environment and improve their practical hands-on ability. Updating laboratory equipment can also introduce new experimental programs to expand students' experimental experience and enable them to better understand the theoretical knowledge of physics. In addition, the introduction of digital teaching equipment is necessary, such as interactive whiteboards and computer-assisted teaching equipment, to promote a more interesting and innovative approach to teaching.

3.1.2. Updating Textbooks and Teaching Aids

Textbooks are the cornerstone of secondary school physics teaching, so updating textbooks and teaching aids is an important part of improving teaching quality. New textbooks should be closer to students' life and emphasize on cultivating students' practical application of physics. At the same time, the diversity and quality of teaching aids need to be improved to meet the learning needs of different students. The introduction of modern educational tools such as multimedia teaching resources and online learning platforms can help to increase students' interest in learning the subject, expand their knowledge breadth, and promote their deeper understanding and application of the physics knowledge they have learned.

These improvements can provide a better foundation for the teaching of the subject of Physics in secondary schools, enhance students' learning experience in the subject, and motivate them to participate more actively in the learning process. This series of hardware facilities and textbook updating initiatives will help break the constraints of traditional teaching and make it more attractive and practical.

3.2. Stimulating Students' Interest in the Subject of Physics

3.2.1. Variety and Interest in the Curriculum

In order to stimulate students' interest in Physics, it is necessary to inject more variety and interest into the curriculum. Teaching content should be designed to be closer to students' real-life situations by introducing interesting cases, examples and scientific experiments to stimulate students' curiosity and desire for knowledge. Designing interesting classroom activities, such as demonstration of physics experiments and scientific games, can enable students to learn more knowledge in a relaxed atmosphere. In addition, by introducing novel teaching methods, such as reverse classroom and project-based learning, students become more involved, thus enhancing their interest in the subject.

3.2.2. Connection between subject knowledge and practical application

The key lies in establishing the connection between subject

knowledge and practical applications. Teachers should emphasize the application of physics knowledge in daily life and practical engineering, so that students can realize that physics is not only a bunch of abstract theories, but also a powerful tool for solving practical problems. By showing cases of practical application of physics in scientific and technological development, medical application, environmental protection and other aspects, students can be guided to understand the value and significance of the discipline of physics in a deeper way. In addition, activities such as field trips and participation in practical projects are organized to enable students to experience first-hand the important role of physics in social life, thus enhancing their interest in and knowledge of the subject. Through these initiatives, the curriculum of Physics can be made more lively and interesting, stimulate students' interest in learning the subject, and cultivate their strong interest in the subject and their active participation in learning. Such a curriculum design can better meet students' needs in the subject and make the subject of Physics more attractive and practical.

3.3. Enhancement of Teachers' Teaching Standards

3.3.1. Teacher Training and Enhancement Programs

In order to improve the teaching standards of secondary school teachers of physics, it is crucial to develop a systematic teacher training and enhancement program. First, schools and educational institutions should establish regular professional training programs covering the latest physics subject knowledge, teaching theories and educational technologies. The training may also include the concepts and cultivation methods of core literacy, so that teachers can better incorporate the concepts of core literacy education and guide students to all-round development. In addition, an exchange mechanism for teachers of other disciplines is introduced to promote the sharing of interdisciplinary teaching experience and to expand teachers' teaching ideas so that they can be more innovative in teaching.

3.3.2. Innovative teaching methods

To stimulate students' interest in physics, teachers should actively explore and apply innovative teaching methods. Introduce interactive teaching, practical inquiry, group cooperative learning and other ways to make students more actively participate in the learning process of the subject. Modern technological means, such as virtual experiments and online educational resources, are used to expand the means of teaching and improve the diversity and interest of teaching. In addition, teachers are encouraged to actively participate in educational research and teaching reform programs to improve their understanding of the latest developments in the field of education and to stimulate their passion for education. This not only makes teachers more capable of coping with different teaching challenges, but also helps to provide students with a more inspiring and in-depth subject learning experience.

3.4. Optimizing the Integration of Core Literacy

3.4.1. Adjustment of Curriculum Design and Teaching Programs

In order to better integrate core literacy, the curriculum design and teaching plan of secondary school physics need to be adjusted in a targeted way. First, the curriculum structure

should be re-examined to emphasize the cultivation of students' interdisciplinary, innovative thinking and practical problem-solving abilities. Challenging and inspiring tasks are designed to enable students to develop core literacy in the process of solving practical problems. Secondly, adjust the teaching plan and rationalize the time arrangement to ensure that there is sufficient space for in-depth exploration of the various aspects involved in core literacy. At the same time, teachers are encouraged to collaborate across disciplines to integrate core literacy into the teaching of other disciplines, so as to promote the formation of more comprehensive literacy among students.

3.4.2. Methods of Cultivating Students' Core Literacy

Cultivating students' core literacy requires skillful methods to stimulate their comprehensive development. First of all, project-based learning and cooperative learning are used to develop students' teamwork and communication skills. Design interdisciplinary learning tasks so that students can integrate knowledge from different disciplines in practical problems. Secondly, focusing on the development of students' critical thinking and innovation skills, students are guided to understand and apply what they have learned at a deeper level by encouraging questioning, discussion and independent research. In addition, it focuses on personalized education and carries out differentiated training according to students' interests and strengths to stimulate their individual potential. It can enable students to develop their core literacy in a more comprehensive way, not only in the knowledge level, but also in interdisciplinary and practical problem solving. Teachers' flexible adjustments and innovative teaching methods will help provide students with richer and deeper subject learning experiences.

3.5. Improving the Assessment System

3.5.1. Reform of the Examination and Assessment System

In order to better assess students' subject learning, it is necessary to carry out a profound reform of the examination and evaluation system. First of all, the reliance on traditional written tests is gradually reduced, and more open-ended questions, practical problem-solving questions and other test questions that are more capable of examining core literacy are added. Emphasize the evaluation of students' innovative thinking and practical application ability to make the evaluation more comprehensive and closer to the cultivation goal of core literacy. Secondly, a comprehensive evaluation is adopted, combining usual performance, practical ability, teamwork and other dimensions to avoid relying too much on a single test evaluation and to understand the development of students in a more comprehensive way.

3.5.2. Quantitative Assessment Methods of Core Literacy

To establish a scientific and comprehensive assessment method of core literacy, it is necessary to explore and establish a set of quantitative assessment system. First, questionnaires and observation records can be used to collect students' performance and development in core literacy. At the same time, subject literacy profiles should be established to record students' development of core literacy at different levels, forming a mechanism for regular summarization and tracking. Secondly, new assessment tools, such as core literacy examinations and project assessments, are introduced to reflect students' core literacy levels more intuitively through practical exercises and comprehensive competency examinations. This helps to stimulate students' attention to

core literacy and increase the actual impact of core literacy in the teaching of secondary school Physics subject. At the same time, this can also provide teachers with a more scientific and instructive assessment basis, prompting them to guide students' comprehensive development more effectively.

4. Conclusion

In the context of the era of comprehensive literacy training, there is an urgent need for more comprehensive and in-depth reform and development of secondary school physics subject teaching. Through the research of this thesis, the current problems in teaching are analyzed in depth, focusing on teaching resources and conditions, students' interests, the integration of core literacy, teachers' teaching level and assessment system. At the same time, a series of feasible countermeasures are also proposed, aiming to promote the teaching of secondary school physics subject to better meet the needs of contemporary students' comprehensive development.

Optimizing teaching resources and conditions, updating hardware facilities, teaching materials and teaching aids is an important step in improving the teaching environment. To stimulate students' interest in the subject of physics, it is necessary to break the single mode of traditional teaching through diversified and interesting curricula, and linking the knowledge of the subject with its practical application, so that students can find more fun in the subject. Teachers' teaching standards need to be improved through systematic training and enhancement programs, as well as innovative teaching methods, so that they can better adapt to the requirements of modern education.

In terms of the integration of core literacy, adjusting curriculum design and teaching programs to cultivate interdisciplinary and innovative thinking among students is a key component. At the same time, the establishment of quantitative assessment methods is also an inevitable choice to enhance the effectiveness of core literacy training. By reforming the examination and evaluation system and

introducing comprehensive evaluation methods, we can better understand the overall literacy development of students. Ultimately, it is expected that these proposed countermeasures and ideas can become some constructive references for the teaching reform of the secondary school physics discipline, and contribute to the cultivation of more comprehensively literate future citizens and scientific and technological innovators. Only through joint efforts can we build a more scientific and humanized secondary school physics subject education system and cultivate more innovative and internationally competitive students.

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