

Analysis of the Influence of Physics Thinking Method Education on Improving Students' Comprehensive Quality

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Keywords: Physics thinking method; Student comprehensive quality; scientific spirit; Impact analysis

Abstract: It has become an important part of China's education reform and development to comprehensively improve the overall quality of students and promote students' comprehensive and individualized development. With the development of modern science and technology, the functions and functions of physics education have emerged constantly, which has increasingly attracted the attention of educators. As a basic subject, physics has formed an independent and complete method system in the long-term development. It has certain guiding, basic and irreplaceable ways to improve students' scientific and cultural quality and cultivate innovative spirit. This paper first expounds the concept of physics thinking method and the basic concept of students' comprehensive quality, and analyzes the practical significance of physics thinking method education to improve students' comprehensive quality. The implementation of quality education with physics thinking method enables each student to develop in a comprehensive and harmonious way in terms of knowledge, ability and quality. At the same time, the new ideas, new theories and new models of modern education pose new challenges to physics education. The new development of society, economy and science and technology puts new demands on talents. Physics education must face new challenges, adapt to new requirements, advance with the times, develop and innovate, and make unremitting efforts and useful explorations in imparting physics knowledge and cultivating students' comprehensive qualities.

1. Introduction

The improvement of students' comprehensive quality depends on whether the knowledge is extensive and the way of thinking is correct[1]. The physics thinking method plays an irreplaceable role in improving the overall quality of students. This is because every major breakthrough in the development of physics not only brings new areas of physics, new directions, and the rise of interdisciplinary and new technology disciplines[2]. And changed the way people think. "Physics provides the talented people needed for scientific advancement and the use of inventions; physics is an important part of educating chemists, engineers, computer scientists, and other physical science and biomedical scientists component[3]". Based on the teaching philosophy of physics thinking method, this paper explores how to subtly teach physics thinking methods in teaching, improve students' ability to ask questions, analyze problems and solve problems, and play a role in cultivating innovative talents and improving students' comprehensive quality.

2. An Overview of the Relevant Theories on the Education of Physics Thinking Methods and the Improvement of Students' Comprehensive Quality

2.1 Concept of physics thinking method

Scientific thinking is a rational thinking based on facts and logic. The physics thinking method refers to the way and means for the human brain to process and process the perceptual knowledge materials by means of information symbols formed and applied to scientific understanding activities[4]. To a certain extent, the physics learning process is the learning and application process of thinking methods. Several specific thinking methods commonly used in physics research, such as

idealization methods, comparison and analogy methods, divergence and divergence, and conversion and different thinking methods.

2.2 The concept of comprehensive quality of students

2.2.1 Definition of comprehensive quality by education policy

The Ministry of Education's "Basic Education Curriculum Reform Outline" is guided by the spirit of "establishing an evaluation system for promoting students' comprehensive development", which is based on the promotion of teachers' comprehensive attention to the development process of students[5]. Through the interaction of evaluation subjects and the diversification and evaluation of evaluation contents. The dynamism of the process, the establishment of a student development evaluation system, the realization of evaluation incentives and developmental functions, and the promotion of the quality of education and the improvement of the overall quality of students.

Article 12 of the "One Year Outline of National Medium- and Long-Term Education Reform and Development Plan" proposes "to comprehensively improve the overall quality of ordinary high school students[6]. Deepen the curriculum reform, fully implement the curriculum plan, and ensure that students complete the national stipulations of arts and sciences." Learning. Create conditions to offer a variety of elective courses, improve the selectivity of the curriculum, promote students' comprehensive and individualized development. Establish a student development guidance system, and strengthen the guidance of students' ideals, psychology, and academics. It can be seen that the comprehensive quality of education administration to students is such that it promotes the organic integration of moral education, intellectual education, sports and aesthetic education, and makes students become socialist builders and successors of moral, intellectual, and aesthetic development.

2.2.2 Interpretation of academic literature

The content of students' comprehensive quality evaluation mainly includes political theory quality, ideological and moral quality, psychological quality, physical quality, humanistic quality, professional quality and innovative quality in the process of students' comprehensive quality training[7]. It is necessary to strengthen five kinds of consciousness, establish five concepts, and carry out evaluation of comprehensive quality.

Legal science is reasonable. "Mastery of a solid knowledge base, pay attention to the connection between class knowledge and extracurricular life, can apply what you have learned. Have innovative spirit and practical ability[8]. Have healthy thinking and good moral qualities. Actively participate in social practice and volunteer service activities." Master the rich knowledge of science and technology and culture, and have a sense of innovation. Actively participate in stylistic art to promote physical and mental development. Have a correct outlook on life and values."

All of these definitions of the concept of "comprehensive quality" are basically the same in their core content[9]. That is to say, comprehensive quality refers to a person's comprehensive ability literacy such as knowledge level ability, academic research ability, communication and coordination ability, extracurricular activity ability, and on-the-spot resilience(see in Table 1). This study believes that the comprehensive quality of students refers to the various comprehensive quality abilities formed by students in the development process, including the personality quality, ability, professional quality, health quality, psychological quality, role quality and aesthetic quality of the students.

Table 1 The concept of comprehensive quality of students

The concept of comprehensive quality of students	content	Evaluation
The definition of comprehensive quality of education policy	Establish an evaluation system to promote students' all-round development	Interactive, diverse and dynamic
	Promote teachers' overall attention to student development	Incentives and developmental functions
Interpretation of academic literature	Political theory quality, ideological and moral quality, psychological quality, humanity quality, professional quality and innovative quality	Knowledge level ability, academic research ability, communication and coordination ability, extracurricular activity ability, on-the-spot resilience
	Rich knowledge of science and culture and innovation	Correct outlook on life and values

2.3 The Practical Significance of Physics Thinking Method Education to Improve Students' Comprehensive Quality

Physics is a discipline that studies the law of material movement. It contains a rich content of cultivating students' dialectical materialism. Through the education of physics thinking methods, students realize that the world is material and movement is inseparable. The fundamental attribute, the form of material movement, is diverse. The development and change of material movement has its own regularity[10]. These laws can be gradually recognized. People understand and master these laws to actively transform nature. The objects studied by physics, from microscopic particles to celestial movements, make students realize that motion is not an accidental property of matter, but an inseparable fundamental property of matter. Physics studies the forms of various forms of motion, simple mechanical movements, random molecular thermal motions, microscopic particle motions, etc., which enable students to recognize the diversity, infinity of physical motion and the inability to advanced motion patterns. It comes down to the principles of dialectical materialism such as low-level movement patterns (see in Figure 1). All kinds of examples show that teaching through physics thinking can enable students to subtly cultivate the viewpoints and methods of dialectical materialism. This is not only a powerful weapon for scientific research, but also a correct guiding ideology guiding their journey of life. The ability of physics thinking plays a major role in the study of physics. Whether it is the establishment of physical concepts or the discovery of physical laws, or the creation and breakthrough of physical fundamental theory, it is inseparable from the ability to think. In the process of learning basic physics, students play an important role in the analysis, synthesis, induction, deduction and other cultivation of various thinking abilities, laying a solid foundation for the future progress of the step-by-step society.

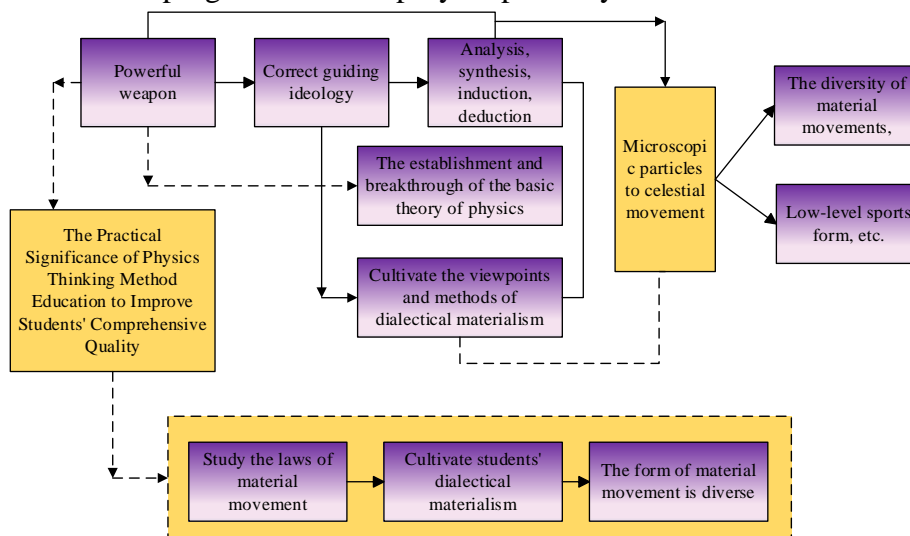


Figure 1 The practical significance of physics thinking method education to improve students' comprehensive quality

3. The Status Quo of the Cultivation of Students' Comprehensive Quality by the Education of Physics Thinking Method

As a basic course of science and engineering colleges, physics is an important basic course for cultivating students' scientific thinking methods and improving students' scientific literacy. At present, due to the limited time of physics courses, usually in the classroom, the teacher first teaches the principles of physics directly to the students, and then demonstrates the experimental operation process to the students. The students repeated the experimental process mechanically, and even after the experiment, they did not even understand the purpose and significance of the course. In the face of boring repetition, students can't feel the joy of learning, let alone the formation of physics scientific thinking methods and the cultivation of scientific literacy. French scientist Descartes said: "The most valuable knowledge is about methodological knowledge." Scientific method education is

an effective way to cultivate students' scientific literacy. However, traditional physics teaching only pays attention to students' study of physics knowledge, ignoring the scientific thinking methods behind physics knowledge. Faced with a large number of formulas and theorems in the physics class, students gradually become fearful and lose interest in physics learning.

The focus of education in the 21st century has shifted from knowledge education to quality education. The education of students to implement scientific thinking methods is an important task of quality education. The scientific methods of learning physics, especially the ideas and methods behind knowledge, can enable students to master the correct working methods and improve their scientific literacy. The physics discipline is the discipline that contains the most scientific methods. Teachers can teach students the ideas and methods of the subject in the teaching process, which can not only stimulate students' interest in learning natural science, improve the quality of classroom teaching, but also cultivate students' scientific literacy and ability to develop and innovate.

4. The specific strategy of physics thinking method education to improve students' comprehensive quality

4.1 Applying Scientific Thinking Method to Cultivate Students' Comprehensive Quality in Physics Teaching

Based on the basic principles of physics and the new development of physics, integrating physics knowledge and high-tech frontier applications, guiding students to understand the frontiers of the discipline and new achievements, new trends, new information, expand knowledge, broaden their horizons, and enable students Can learn scientific knowledge at a higher level. For example, we are in the information age. The mastery of information is the key to success. This involves the storage, transmission, and confidentiality of information. In the physics classroom teaching, we use optical methods, quantum mechanics to process information technology, and development prospects. Expanded the horizons of students. Through the study of students, "As a student, the content of students' learning is more of a theory, and little is known about the movements and applications of physics research. This course has broadened my horizons by understanding the life of physicists and between schools. Disputes and unresolved scientific and technological topics to stimulate students' interest in learning physics, let students learn from them the scientific spirit and scientific thinking methods that they dare to tackle and innovate, so that students not only gain knowledge, but also learn how to acquire knowledge. More importantly, inspired by the innovative scientific thinking, the overall quality of students is improved.

4.2 Combination of physics thinking methods and humanistic spirit

Scientific thinking methods are the inexhaustible motive force for human beings to carry out scientific exploration. Only under the guidance of scientific thinking methods can scientific research continue to make breakthroughs, and science and technology can continue to advance. Physics is the study of the phenomena and laws of nature, and then the creation of science and technology. The humanistic spirit is people-oriented, embodying human dignity and value, mainly including people's beliefs, ideals, personality and morality. Therefore, in order to make physics flourish, it is necessary to combine scientific thinking methods with humanistic spirit in the education of physics. In the process of physics teaching, students are correctly guided to explore and gradually understand the phenomena, characteristics, laws and essential processes of the objective world. Let the students understand the physicist's scientific exploration spirit and their own humanistic spirits, and learn to think in terms of physics thinking. Science contains too much humanity, the humanistic spirit. Science is the product and achievement of the human mind. In the process of combining physical thinking methods with humanistic spirit, we must pay attention to the differences in scientific thinking methods. Different humanistic spirits determine the difference in the spirit of physical science. In the process of combining, the two should focus on learning from each other according to different educational objects, so that the two ways of thinking can work together to effectively improve the overall quality of students.

4.3 Mining the potential of innovation to improve the overall quality of students

Physics is the science of exploring the laws of nature. Its development process involves the hardships of many scientists. The development of physics requires us to explore and not to succumb to the existing state of things we say. Scientific thinking requires that we not only satisfy the understanding of the existing state of things, but also dare to explore the future state of things, dare to challenge new problems, and deepen the understanding of knowledge. Instructing people to fish, using knowledge as a carrier, introducing the research methods of physics frontiers and the creative thinking of physicists in physics teaching, enlightening students' wisdom, cultivating scientific thinking methods, tapping the potential of innovation, and inspiring creativity. spirit. As the students said, "We will certainly provoke the burden of promoting the development of science and technology in the future. It is important to master the current knowledge, but more importantly, it has the physics thinking method and creativity." Let students understand the important role of physics knowledge in various subject areas, understand the intersection and connection between physics and various disciplines, and the role of physics in promoting innovative research, which is to provide students with the ability to innovate in thinking. To help students develop and improve their overall quality.

4.4 Active learning is the main symbol for cultivating students' good qualities

The cultivation of self-learning ability is the advanced level of quality education. Because the knowledge that students learn in school is only a small part after all, in the life journey after graduation, it is necessary to continuously learn new knowledge and master new technology according to actual needs, which must cultivate students' self-learning ability through teaching methods. Strong intellectual curiosity, and strengthening the teaching of basic physics is a key part of cultivating students' self-learning ability, because strong self-learning ability is built on solid basic knowledge, and physics theory is widely used in science and technology. In all aspects of industrial and agricultural production and daily life, physics is the cornerstone of all natural sciences. Students in science and engineering colleges must have a solid basic knowledge of physics in order to develop a group of self-learning skills. Strong, adapt to the needs of social development. The development of science and technology is inseparable from the courage to explore and the strong desire for knowledge of science workers. Students must cultivate this spiritual quality in teaching (see in Figure 2). The process of physics teaching is not only the teaching of scientific knowledge. The achievement of each achievement in physics and the creation of each theory are the result of countless physicists' persistent pursuit, courage to explore, bold imagination, and repeated argumentation. The physics world can stimulate students' curiosity and curiosity. The fascinating deeds and excellent moral character of every scientist in physics are also an important factor affecting the quality of students. Its role is no less than the specific knowledge of science and technology. The accumulation. It has become an important course for cultivating and improving the quality of students. All science and engineering colleges should pay great attention to physics teaching. In the course of physics teaching, it is necessary to cultivate a strong competitive and strong resilience for the society based on the principle of thick foundation, wide caliber, and downplaying professional boundaries, focusing on ability training and improving overall quality.

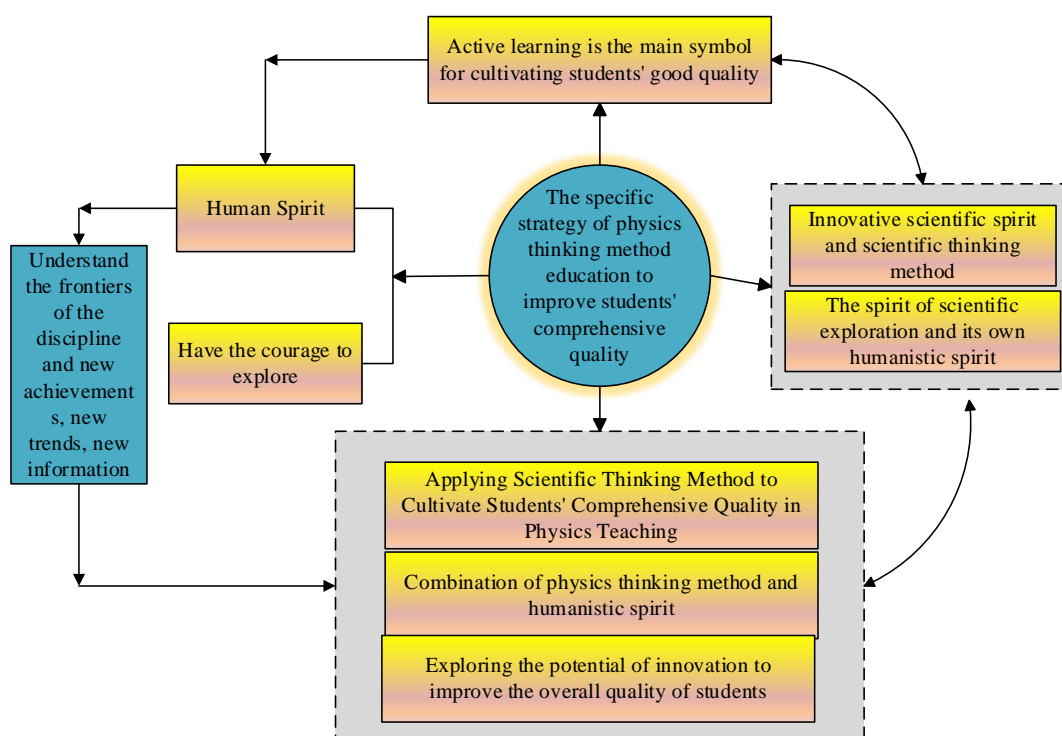


Figure 2 The specific strategy of physics thinking method education to improve students' comprehensive quality

5. Conclusions

In short, it is necessary to integrate the physical thinking methods of cultivating students into the teaching of physics. Physics is the science of exploring the laws of nature. The scientific method of scientific thinking is the scientific spirit. It is an effective tool for exploring the laws of nature. How to educate the physics thinking method in the process of physics education is a major topic in physics teaching. . In the teaching, teachers pay attention to the cultivation of students' scientific thinking methods, guide students to explore scientific thoughts and methods, enable students to develop good scientific thinking habits, have more interest in physical learning, and gradually master and consciously apply scientific thinking methods. Through the discussion of the article, we find that the realization of the improvement of students' comprehensive quality depends on the penetration of the physics thinking method in the education and teaching process, which can help students to enlighten the integration of the knowledge system, so that the purpose of “integration of knowledge and action” can truly become a reality.

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