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Cultivation of Students' Innovation Ability in Middle school Physics Teaching

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Abstract

In order to achieve the strategic goal of " Develop the Country through Science and Education", the state vigorously promotes the overall quality education of students. How to cultivate the high-quality talents needed by the country, and how to make students have the ability to innovate and practice, has become a prominent issue in the middle school education. For secondary school students who are in the stage of innovative initiation, by mapping the educational ideas of basic physics, building a new model to adapt to the innovation of physics teaching, and proposing strategies for specific physics teaching, we can make them adapt to the practical ability of social development as early as possible. We try to stimulate students' innovative ability in physics teaching, making some interesting small experiments, and exchange with other professionals to summarize the lessons learned in the research process, so as to promote each other's growth and form a more perfect thinking system. Priority is given to encouraging creative and thoughtful outcomes to lead the construction of the blueprint of the future innovative country.

Keywords

Innovation, Physics Teaching, Physics Experiment.

1. Introduction

1.1. The Necessity of Innovation

With the trend of knowledge economy development, knowledge innovation has hit every nation or country, and the party that lags behind will be abandoned with time passing by, so the core of development lies in innovation, and the country must keep innovating if it wants to develop.

Innovation is the soul of a country, and it has become the inexhaustible power needed by the Communist Party and the country to cultivate talents. With the development of the times, innovation has become an national topic and be discussed across the whole country, both in work and study or in daily life, and a hot issue of national concern, how to innovate to improve the level of strengthening the country and enriching the people. Nowadays, to become a person with innovation ability and standard is the direction that every citizen should strive for, so that people can live in great happiness, and the future development of the motherland will be promising.

With the advent of the new era of rapid development of the Internet, innovation has not only affected education and teaching but has now been integrated into all aspects of people's lives, and the public has witnessed the historic leap of innovation.

1.2. The Current Situation of Innovation Education

Under the general conditions of innovation education both domestic and abroad, the current situation and trend of innovation education for students in middle school physics is analyzed in the light of the actual situation of education in China.

1.2.1 The Recent Status of Innovation Education Domestic and Abroad

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The year 2020 is a new chapter of technological innovation. Educational innovation has laid down the general direction of global educational reform. Due to the fierce competition in technology domestically and abroad, the core technology is in the hands of only a few people, and the world pattern has thus changed, and relevant experts and scholars and have conducted extensive and profound discussions and researches on it. China can only vigorously develop the national innovation culture, education and science and technology closely integrated, so as to lay a good foundation for the technological renewal in the school flourishing education.

1.2.2 The History and Current Situation of Cultivating Students' Innovation Ability in Physics Teaching in China

Although the examination-based education implemented by the country has brought a somewhat heavy burden to children and missed the budding period of innovative consciousness, it could adapt to the pace of economic development at that time and laid a solid theoretical foundation for the cultivation of innovative ability. The pace of education reform in China has never stopped, and the development of coordinated economy has not satisfied the needs of the people, but focused on cultivating innovative talents in line with the trend of the times. Perhaps some residual problems have not yet been solved, but the students' ability of hands-on practical operation has been improved rapidly. On the whole, the situation of education and teaching reform is bright, and under such a teaching environment, physics, as the subject with the most active innovation factor, is bound to emerge a large number of new senior talents.

1.3. Main Contents and Arrangement of this Paper

Modern technology has brought people a convenient life, and this paper makes the public gradually realize the importance of innovation for the development of the country and its people. The lack of educational innovation has always been the primary problem to be solved in the development of education in China, looking at the future development trend of innovation as a whole, and then analyzing how to specifically cultivate the innovation ability of middle school students in physics teaching. Among them, examples are given to analyze the actual situation in the physics education to generalize and explain, and finally this paper concludes the significance of learning the innovative ability of middle school students in practice.

2. Difficulties, Conditions and Requirements for Cultivating Innovative Abilities in Middle School Physics Teaching

2.1. Difficulties in the Development of Innovative Skills

The country's development of innovative abilities in middle school students is influenced not only by the history since ancient times, but also by the need to eliminate resistance to action arising from the process of the physics curriculum. Therefore, innovation does not happen overnight, but requires constant accumulation and a strong belief in the meaningfulness of the innovative life.

2.1.1 Conceptual Resistance

The Chinese people have an indelible mark, which comes from the long history and culture deposited in China and the baptism of time and years, and also creates the Chinese people's leisurely and relaxed life posture. However, deeply influenced by the mainstream culture of Confucianism in Chinese history, Chinese people have gradually developed a conservative and closed style of dealing with the world in the middle way, and the folk proverb "people are afraid of being famous and pigs are afraid of being fat" reflects that the Chinese people are not a nation that encourages innovation and do not recognize the importance of innovation and miss the opportunity.

2.1.2 Resistance to Action

Innovation is a process that requires a large investment of resources, and innovation generates the most friction. It is extremely challenging to make experimental equipment manufacturing and production management, professional lectures by teachers, and independent research by students self-contained and accessible. The Ministry of Education is trying to close the gap between urban education every year, which has invested and made a lot of effort to make physics teaching experiments really work, but the pace also need to speed up.

2.2. Conditions for the Development of Innovation Skills

Innovation requires a solid foundation, because there is no free lunch, and we need to learn from the experience of our predecessors and be bold and careful in order to be one step closer to the fruits of innovation.

Seize the opportunity and meet the challenge at the same time. Information is opportunity, opportunity brings development, and development is innovation. We need to have rich knowledge and enough experience to grasp the opportunity of innovation when it comes. Facing the era of information explosion, with good innovation resources and mechanisms are tapped, sensitive information and perseverance can make innovation go further in the development of physics education and teaching. Learn the spirit of Yugong Yishan, so that the power to focus on a point, the early learning will be confused and burnout, to believe that the accumulation of power will eventually be dark, continuous attempts to learn the spirit of opportunity and mapping, let go of the bold courage to face the challenge in order to gradually create the conditions for innovation.

3. Cultivation of Creative Ability in Middle School Physics Classroom Teaching

3.1. Innovative Physics Teaching Model and Cultivation of Creative Thinking

3.1.1 Correct Use of Imitation Innovation

The development of innovation goes through many hurdles, testing the degree of optimization of knowledge and the execution of behavior, so imitation is the beginning and the basis of the creation and development of innovation. The relationship between imitation and innovation is not only the mutual interaction, but also the accumulation of knowledge and experience in the process of imitation, which promotes the development of innovation, and it can be said that without the realization of imitation and innovation, there would be no thriving innovation today.

Imitation and innovation are two parallel lines, but there is a transition of imitation and innovation in between, and we should learn to implement innovation on the basis of imitation. In order to understand the essence of other people's design, teachers must let students know the details through experiments, so that they can really understand the differences and be inspired to summarize their experience.

There are many imitators who know how to imitate, but few of them are able to play their real role. The right teaching mode for teachers to imitate and innovate is to explore students' potential, break the original framework, and establish new systems. The most optimal condition for imitation is the behavior of advanced thinking patterns with extreme rationality. To achieve the optimal condition, we must gradually accumulate experience and find the right method for ourselves in order to achieve the effect of success with half the effort.

3.1.2 Focus on Independent Innovation and Cultivate Creative Thinking

The ability of autonomous innovation is the ability of people to break the past, accept and change new things, which mainly includes the attitude and character in the innovative spirit and thinking.

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The spirit of innovation is a necessary condition for the successful implementation of creativity and invention, including confidence, courage and determination to change on the one hand, and the perfect integration of perceptiveness, independent thinking patterns and accurate judgment on the other.

The process of formation of thought patterns is a very comprehensive exploration. Perceptual imagination and careful perception are the prerequisites for extended thinking, and the explosion of curiosity and exploration is the embodiment of focused thinking, which is enriched by its flexibility, spatial openness, dialectic, novelty and independence.

3.2. Development of Creative Abilities in Classroom Teaching

3.2.1 Flexibility of Thinking Process

(1) In the classroom as much as possible to expand the children's flexible thinking is a key part of the teacher's heuristic teaching, not bound to the mechanical supplementation of a knowledge point and a single emphasis, but to let them have their own understanding of knowledge. For example, the explanation of the topic should be a full range of inspiration to remind them to change their thinking in time, so that they can learn to find the best solution to their own problems.

(2) Simulate a Real Classroom with Multiple Problem Solving Mindset

The teacher can have two kinds of ideas to guide students to solve the problem, the first kind of solution is tedious but logical and clear for them to understand, the second kind of solution is very simple but the choice of reference is very important. Teach students that the choice of reference is different from the steps of solving the problem, so that they can not only develop the habit of expanding their ideas to solve the problem flexibly, but also combine their own characteristics and needs to choose different solutions so that they can better understand the knowledge.

3.2.2 Openness of Thinking Space

The creation of thinking space is originally challenging for students, and breaking the relatively closed and inherent thinking pattern plus the integration of additional innovative inspiration factors undoubtedly amplifies the inherent basis of human thinking. Openness in the creation of thinking space requires an all-round open mind of the close connections between the burdens of things, and thinking about recombining and stitching together the relevant connections between things to gradually form a clear framework.

3.2.3 Novelty of Thinking Outcomes

Out of the box, challenge the rules, expand thinking, get rid of the constraints of inertia thinking mode. Overcome the shackles of thinking in accordance with the past, leaving behind the fixed patterns of books, forming a stable state of development in the process of continuous repetition, boldly establishing their own multicolor thinking, thinking in three dimensions, taking the water is boiling thinking and branching two ideas.

3.3. Collective and Cooperative Innovation

Our social life, as long as the existence of people necessarily need to cooperate and communicate no absolute existence can still be called normal, and deal with the collective relationship and can harmoniously carry out cooperation is very necessary to enhance the creation of maximum value, innovation is inseparable from the team building efforts. For example, the discussion group arranged by the teacher in the classroom is to let students realize the advantages of collective cooperation and innovation, and the students can finish the solution of the blind spot knowledge through cooperation and communication in the face of the knowledge main focus that may generate doubts in the class, which are the shining points of collective cooperation and innovation.

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4. Cultivating Students' Creative Ability in Physics Fun Experiments

4.1. The Importance of Physics Experiment Teaching

The subject of physics is not only a simple integration of knowledge, but also requires the accumulation of hands-on practice. Without hands-on experience, it is impossible to understand the essentials and the subtle changes of variables, much less to conduct deeper investigations, and the innovative ability will stagnate to the detriment of future development.

Cultivating students' self-confidence and charisma is an important prerequisite for their physical and mental development, so that they can be inspired to create in a happy way. We need to make the boring classroom lectures lively and vivid, together with more systematic integration of knowledge, which can meet their sense of need and accomplishment for learning.

4.2. Examples of Interesting Small Experiments Can Stimulate Students' Creative Potential

Through the demonstration of experiments, students can observe the interest and questions, and learn the theoretical knowledge with curiosity.

Students can better understand the basic knowledge of physics through personal nuance, in addition to mastering theoretical knowledge in the experiment teachers should also focus on the application of experimental methods skills, remind students to accumulate more experimental methods, to get ready for innovative experimental investigations.

4.3. The Importance of Developing Students' Creative Abilities in Practice

Want to play the role of the initiative of students should put students in the first place and give them equal respect, to implement the strengthening of the physics classroom lecture construction, to supply rich nutritional content for the success of students. Practice is all human consciousness self behavior, or a student to develop a comprehensive quality of the key, the combination of theoretical knowledge and practical activities, in order to provide the country with a constant stream of quality innovative personnel. Many middle school students should improve their creative spirit and their ability to practice, but are forced to do so by various factors that now hinder their growing pace. Therefore, if the country wants to truly cultivate a generation of superb talents with innovative practical skills, it must not only engage in formalism, but also put some institutions and ideas into practical practice. While struggling to exercise their own practical skills, they should also work together to cultivate a large number of new generation of talents with real innovative spirit and practical skills.

5. Conclusion

In this paper, we have elaborated insights on the improvement of students' innovative abilities through innovative models of physics teaching and inquiry experiments, and proposed some instructive ideas and new concepts, which are very beneficial to the development of students' innovative thinking, and innovation can drive our continuous development and progress. Therefore, innovation has a vital role in all of the students' future growth.

Overall the significance of enhancing students' sense of innovation in middle school physics education is self-evident, and focusing on more research on how to enable students to achieve high levels of innovation, bring into play their creative potential and unique personalities, and promote quality development of their creative abilities is a top priority for our future educational development.

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