

Research on the role of non-intelligence factors in the process of physics learning

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Abstract: With the progress of the times and the development of science and technology, the scientific and technological competition and economic competition at home and abroad are increasingly fierce. In order to improve the international competitiveness, the development of education and the cultivation of high-quality talents have become the top priority. Since the reform and opening up, the organization and the state have proposed to improve the quality of the whole nation as a fundamental task. Because quality education puts forward to promote the all-round development of students as the key point, people gradually realize that in order to cultivate high-quality talents, the role of non-intelligent factors in the learning process is playing an increasingly important role. Many educators have also carried out a series of studies on the role of non-intelligent factors in the learning process. Based on the development of education at home and abroad, this paper studies the role of non-intellectual factors by combining physics with the characteristics of students' physical and mental development and focusing on students' learning process.

Keywords: non-intellectual factors, physics learning, role

1. Introduction

Human learning is a long-term and complex process. It is an important way for us to constantly develop ourselves. It will be affected by many factors. Especially since the beginning of the 21st century, many parents and teachers have focused on the development of intelligence while ignoring the role of non-intelligence factors in the process of learning in the pursuit of achievement and efficiency. Non-intellectual factors have increasingly attracted the attention of experts. It is urgent for us to study the role of non-intelligent factors in the process of physics learning.

Early studies on non-intellectual factors were gradually denied in the 1950s. For example, d.w. bray's "some problems in the study of genius" attributed human success to the combination of personality, ability and environment, not the result of a single factor acting alone. In recent years, many experts have studied and analyzed the role of intellectual and non-intellectual factors in the learning process. According to Zhu Bei's article "Research on the development of non-intellectual factors of young students", through the research and comparison of ordinary college students and excellent students of the Chinese Academy of Sciences, she found that those excellent college students could sit quietly at their desks and read for several hours in the hot summer regardless of their physical fatigue. It can also be seen that excellent students can resist external interference and have strong willpower.

In the new situation of education reform, high school teaching puts forward higher requirements for the standard of physics. The research on the role of non-intelligence factors in the process of physics learning can be more effective in physics learning, so as to create a good foundation for the development of future education in China. Non-intelligence factors mainly include interest, willpower, personality and learning motivation, etc^[1]. This paper focuses on the role of these aspects in the process of physics learning

2. Characteristics of physics and analysis of factors affecting students' learning

2.1 Characteristics of Physics

Physics is of great significance in the curriculum structure of middle school. It is an important part and can have an important impact on students' physical and mental development. With the rapid development of economy and the improvement of educational resources, the reform of education is also

constantly advancing. The physics curriculum standard puts forward higher requirements for middle school physics teaching. This proves the importance of physics to us.

Physics originates from our life and is applied to our life. It is a discipline closely connected with our daily life. It is a natural science with energy, matter, time and space as its main research objects and their respective properties and mutual relations as its main content. Broadly speaking, physics is a discipline dedicated to exploring and analyzing the phenomena of nature and understanding the laws of nature.

Physics is a natural science, and its main content is to study and explore the laws of nature, the basic movement forms of matter, the basic structure of matter and the law of interaction between substances^[2].

Physics has the characteristics of strong logic, abstraction and precision, which requires students to cultivate rigorous logical thinking, understand and use some idealized models, and observe, analyze, summarize, sort and summarize through hands-on experimental operations. Physics is a subject closely linked with mathematics, which often requires a lot of calculation, so it is necessary to transform physical problems into mathematical problems, and use mathematical thinking and methods to solve problems.

2.2 Analysis of factors affecting students' learning

Quality education clearly emphasizes that students are the main body of learning activities, the master of learning activities and independent people. There are no two identical leaves in the world, and so are students. To study the role of non-intelligent factors in the process of physics learning, we must first understand the subject of learning activities. Each student has his own unique characteristics and is an independent person who exists outside the will of the teacher. As a unique activity of human beings, learning activities are easily affected by various factors, and learning activities themselves have the characteristics of long-term and complexity. There are many factors that affect students' learning process, such as students' attention to learning, the atmosphere of learning environment, teachers' teaching level, and students' personality characteristics. We are used to dividing these factors affecting students' learning into five categories: physiological factors, family factors, social factors, psychological factors and teacher factors, while educators are used to dividing these factors into two categories: external factors and internal factors.

Internal factors refer to students' own factors such as the degree of intellectual development, learning ability and strategies, cognitive structure, personality preference, and personal growth factors such as the gradualness of learning, the impact of stress events in life on personal cognition and learning ability. Internal factors include non-intellectual factors and intellectual factors. Relatively speaking, non-intelligence factors and intelligence factors mainly include the hobbies, interests, motivation, will and character of the learning subject.

External factors refer to the moderation of parents' expectations, the consistency of parents' attitudes towards children's behavior, the impact of husband and wife relationship on children's learning, the atmosphere of the family, the material support that the family can provide for children's learning, domestic violence and other family factors, and whether sufficient attention and care are given to students, whether students can be attracted by teachers' teaching style, and whether the desire of learning subjects to seek knowledge can be met through teachers' professional knowledge, Teachers' personality charm, personal prestige and other educator factors, as well as partner factors and social factors.

3. The role of non-intelligence factors in physics learning

In our daily life, each of US's personality, hobbies and will have an important impact on our work and study, and even play a decisive role. Fact research has proved that in the process of learning, in order to achieve a good learning effect, we cannot rely solely on intellectual factors, and non-intellectual factors also play an inestimable role. Although non-intelligence factors do not directly participate in the specific operation of learning activities, without the role of non-intelligence, the operational role of intelligence factors cannot be implemented; Similarly, if there is no operational role of intellectual factors, non-intellectual factors can not function normally. Therefore, intelligence and non-intelligence are interdependent and inseparable. Non-intelligent factors mainly affect the learning process through interest, motivation, will and personality. The specific functions are reflected in the following functions.

Orientation and guidance function. All human activities are directed and purposeful. In the process of learning, the so-called directional function means that learning has certain directionality and directionality. Directional function often plays a role through interest and will in non-intellectual factors.

Learning is a single boring and sad process, which needs to constantly overcome difficulties and work hard^[3]. Therefore, from this process, we can constantly surpass ourselves, stimulate our potential and obtain happiness beyond ourselves, and the pillar that has always supported our happy learning is interest. As the saying goes, "the success of learning is a combination of clear learning significance, strong interest in learning and hard work", "interest is the best teacher". It can be seen that only students are interested in what they are learning and keep working in the direction of their interest can they reap success. Today's world is full of all kinds of temptations. Students at the current stage often lack the ability to judge, which requires strong willpower to support students to move forward in the direction they are interested in. It can be seen that interest and willpower in non-intellectual factors play the role of orientation and guidance.

Every subject is of interest, and so is physics. Physics comes from our daily life and is closely related to the things around us, so the interest in physics comes from our life^[4]. As an educator, we should dig out the physical knowledge in life, and combine the physical knowledge with life to stimulate students' interest and let students experience the fun of learning. For example, when talking about reference systems and sports, you can use the poem of walking on both sides of the towering green mountains in the middle reaches of the Xiaozhupai River as an example to throw out to students why do you say that the green mountains move backward? At this time, the students immediately discussed it with interest. Another example is that when learning electromagnetic induction, students' interest can be aroused through experiments. A closed circuit is formed by a closed wire and a small bulb. When there is no power supply, the students are asked whether the small bulb will emit light, and then the teacher uses a magnet to demonstrate. If the small bulb is on, it will arouse students' great desire to explore and seek knowledge, thus stimulating students' interest in physics learning

Power function. Motivation is the source of all forces and the main force to promote the development of career, learning and life^[5]. When we were primary school students, we didn't have clear plans and goals for the future, and we were at an ignorant stage. However, we will find that some parents will encourage their children to study hard by making promises to their children. In terms of teachers, teachers will also stimulate students' motivation to study well through a variety of reward methods, such as students with good academic performance will be rewarded with certificates or stationery. It can be seen that the motivation in the non-intelligent factors has a dynamic function, constantly urging us to move forward, driving us to move forward towards our goals, and providing a steady stream of power for the boring study and life. In the process of physics learning, only the interest in physics is not enough. Many physics content can not stimulate students' interest in learning through interesting experiments. This is what we call physics interesting, but also boring and difficult to understand. For example, we all know that when two objects are in contact with each other, they will be affected by a force. When we are learning the electric field force, the point charges far away in the vacuum can also interact. This requires the introduction of a new concept of electric field, which is a special substance around the charge. For the convenience of calculation and understanding, we also introduced the concept of electric field line. In fact, electric field line does not exist in practice. This makes the content more abstract and difficult to understand. At this time, we rely on our strong motivation to provide us with the motivation to continue learning. It can be seen that non-intelligent factors have dynamic function in the process of physics learning.

Adjustment function. As the saying goes, "it is never too old to learn". Learning activities are a long-term process. From the perspective of the whole process, different learning stages have different learning contents, which requires us to constantly adjust our learning methods and plans. From the perspective of society, with the development of the times and the progress of science and technology, the requirements of society for individuals have also changed. In order to adapt to the pace of society and not be left behind by the times, it requires us to constantly adjust our knowledge system and learn some content conducive to our own development^[6]. From a personal perspective, everyone is unique and has different learning habits, interests and goals. We should adjust our learning process according to our own characteristics to make full and efficient use of time to achieve twice the result with half the effort. From the perspective of learning subjects, students need to learn a lot of subjects every day, such as Chinese, mathematics, English, physics and chemistry, and so on. Each subject is interconnected but has great differences. When we finish one lesson, we need to actively adjust our thinking to study the next lesson. These all need our non-intellectual factors to play a regulatory role in the middle. The research scope of physics is very broad. From the vast universe to tiny microscopic particles, the research contents are also very different, mainly including mechanics, heat, electromagnetism, optics and quantum mechanics, and each content has its own characteristics. For example, mechanics is a subject that studies the mechanical motion and interaction of objects. Although the content of this part is relatively easy to understand and close to our lives, it often needs us to analyze and solve it with the help of mathematical tools. Optics can

be observed, analyzed and summarized through experiments. Quantum mechanics and electromagnetics are more abstract and difficult to understand. We often need to use some idealized models to help us solve problems. Due to the different contents of the research, the learning methods and the difficulty of understanding are also different, which requires us to actively adjust our learning methods to adapt to the characteristics of different plates. It can be seen that non-intellectual factors have a regulating effect, which is realized through a variety of factors.

Enhanced functionality. Marx once said that there is no flat road on the road of science. Only those who take pains to climb along the cliff can hope to reach the brilliant starting point. There are also various difficulties in the learning process. For example, in the objective aspect, the influence of bad learning atmosphere, the difficulty of the course and the lack of learning materials will affect our learning efficiency. On the subjective side, lack of self-confidence, lack of interest in subjects, and personal laziness and degeneration will also have an important impact on learning. Facts have proved that students who are lively and outgoing, confident and sunny, and actively communicate with teachers are often easier to achieve good results than students who lack self-confidence. Under the influence of these subjective and objective factors, it is inevitable to shake the determination to study hard and forge ahead, but it is often the strong willed students who finally succeed. Will is the psychological process of clarifying one's own goal, making plans according to one's own goal, adjusting behavior, so as to achieve the expected goal. It can be seen that strong willpower can strengthen our determination to forge ahead and face difficulties.

Infection function. Learning activities are boring, and long-term learning will reduce the excitement of the cerebral cortex for learning. Over time, it will produce the interest of weariness and lose interest in learning. In this way, the efficiency of learning will be greatly reduced. But the motivation, interest, will, emotion and character of learning will have an infectious effect on boring learning, especially emotion[7]. Emotion is an individual's attitude towards this objective thing and the corresponding inner experience, which includes some experiences and expressions such as joy, anger, sadness, joy, hate, hate, worry and so on. Emotional activities are divided into positive emotions, such as happiness, happiness, joy, love, etc., or negative emotions, such as sadness, pain, sadness, etc. Emotion has the characteristics of tendentiousness and effectiveness. Tendentiousness refers to what a person's emotion points to and is caused by; Efficacy refers to the function of emotion to encourage people to move towards their goals. It is also because of the tendentiousness and effectiveness of emotion that emotion has infectious function for the learning process. Tao Xingzhi, a famous educator, once gave a speech at Wuhan University. In order to make the speech lively and interesting, Mr. Tao made such an experiment. During the speech, he brought a cock and a handful of rice. His aim is to let the cock eat the handful of rice. At first, he put rice on the table and tried to force the cock to eat rice according to its head. As a result, the cock struggled hard but didn't eat rice. Then Mr. Tao Xingzhi tried to put rice directly into the cock's mouth, but the cock still refused to eat rice. At last, when Mr. Tao Xingzhi put both rice and rooster on the table, people found that the rooster who refused to eat rice in any way at first was actually pecking rice on his own initiative. Mr. Tao Xingzhi's speech made us understand that students are like cocks, and students' learning activities are like cocks eating rice. Teachers should not force knowledge into students. Only when students are willing to accept knowledge will this knowledge become students' own knowledge, otherwise this knowledge will be returned to teachers sooner or later. This is the same reason that we often say that those who know are not as good as those who are good, and those who are good are not as good as those who are happy. It can be seen that non-intellectual factors have infectious function in the process of learning.

Create functionality. Usually what we call a person's ability is actually a person's creativity. The premise of social development is strong creativity. The development of productive forces and the progress of social civilization are based on creativity. The early "exam oriented education" in China not only seriously hindered the cultivation and development of creativity, but also had a profound impact on the development speed of science and technology in China. The purpose of learning and knowing the world is not to know the world for the purpose of knowing the world, but to transform and create the world by using the experience. The core concept of modern education is to transform learning activities into creative activities. The core of transforming learning activities into creative activities lies in the cultivation of creative ability. Quality education also puts forward the concept of education with the core of cultivating students' creative ability. The cultivation of creative ability should run through early childhood education and compulsory education, and cultivate the ability of daring to innovate and innovative thinking from an early age^[8]. Non-intellectual factors are the important psychological factors to cultivate and stimulate creative ability.

Compensatory effect. Einstein once said, "good character and steel will are more important than mere

knowledge and erudition. Intellectual maturity largely depends on character, which is often beyond people's understanding." it can be seen that good character has a certain compensatory effect. From life to physics, from physics to life. Physics is closely related to our life and originated from our daily life. If you want to learn physics well, you should be good at observing life and be curious about life. It is also said that non-intellectual factors have the function of compensation. Research shows that even if a person has good intellectual factors, but also has some bad non-intellectual factors, such as laziness, weak will, timidity, arrogance and so on, it will often produce some results with half the effort in the end. On the contrary, even those who have bad intellectual factors but have outstanding non-intellectual factors such as diligence, optimism, self-confidence, decisiveness and courage will often get twice the result with half the effort in the end. It can be seen that good non-intelligence factors have a compensatory effect. From the perspective of physics, physics is an experimental science. Some laws and essence of nature are not automatically displayed in front of us. Some laws and conclusions are often obtained through experiments. The acquisition of experiments is not easy once or twice. It often requires a large number of experiments and then summarizes the laws. The process of reaching a conclusion requires us to have keen observation and the excellent qualities of being diligent, studious and resolute. It can be seen that non-intelligent factors play a compensatory role in the process of physics learning.

Intellectual function. With the change and progress of society, people's learning objectives have also changed. The main purpose of traditional learning activities is to master the current historical experience of mankind. In the current information age of knowledge explosion, talent quality structure is not only physical factors, but also the development of intellectual factors. The reserve of knowledge is the premise and basis for the development of intelligence, but the existing research results show that knowledge and intelligence are not a simple physical relationship, and it is not that the more knowledge accumulated, the higher intelligence will be developed, which also needs non-intelligence factors to play a certain driving role. Only when students actively accept and master knowledge, can knowledge be transformed into the development of intelligence to a certain extent. It can be seen that non-intellectual factors exist as the dynamic medium of knowledge and intelligence, and have the function of educating intelligence.

4. Cultivation of excellent non-intelligence factors

In the process of physics learning, the effect of learning does not depend solely on the role of intellectual factors. Non-intellectual factors also play a very important role in the process of physics learning, such as motivation, infection, adjustment, infection, intellectual education, creation and compensation. In the process of learning, we should fully cultivate excellent non-intelligence factors. The stimulation and cultivation of non-intellectual factors mainly depend on teachers, which can be cultivated in the following aspects.

Stimulate students' learning motivation and guide students to set up correct learning goals. Learning motivation can play a driving role in the learning process. Teachers are the guides, organizers and regulators in teaching activities, so they should actively guide students and stimulate their learning motivation, so that students can change from "I want to learn" to "I want to learn"^[9]. For example, teachers can guide students to set periodic learning goals, and reward and punish them, so that students can clarify their learning goals, so as to stimulate students' learning motivation.

Develop characteristic classroom and cultivate students' interest in learning^[10]. Interest is the best teacher. In the learning process, interest plays a role of orientation and guidance. Only students are interested in learning and are willing to take the initiative to learn can they achieve good results. Interest in physics is not innate. Teachers can cultivate students' interest in learning by developing characteristic classes.

Strengthen will training and cultivate students' strong willpower. In the process of learning, strong willpower has a strengthening effect. In daily teaching activities, teachers should appropriately carry out some collective activities that are conducive to strengthening willpower. In the process of activities, teachers should take the way of encouragement and encouragement to exercise and strengthen students' willpower, and cultivate students' good habits of bravely facing difficulties and not flinching back. Through collective activities, students can also improve their restraint ability and consciousness with the help of collective restraint and solidarity.

5. Conclusions

Physics plays an important role both today and in the future. This paper analyzes the learning process

of physics by analyzing the interest, motivation, character, will and emotion of non-intelligent factors, and finally comes to the conclusion that it has seven major functions, including motivation, infection, adjustment, creation, intellectual education and compensation, And from the aspect of teachers' teaching activities, this paper puts forward the ways to cultivate excellent non-intelligence factors.

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