

Cultivating Students' Autonomous Learning Ability in Secondary School Physics Teaching—A Case Study of Dongshan Middle School in Meixian, Guangdong

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Abstract: In secondary school physics teaching, cultivating students' autonomous learning ability is crucial. This article takes Dongshan Middle School in Meixian, Guangdong as an example and conducts an in-depth investigation into the current status of cultivating students' autonomous learning ability in secondary school physics teaching through questionnaires and interviews. The research found that while most students have a certain level of autonomous learning awareness, there are still some issues in practical implementation, such as imperfect educational system, outdated teaching methods, the need for improvement in students' learning attitudes, and lack of resource support. In response to these issues, this article proposes corresponding measures, including improving the educational system, updating teaching methods, correcting students' learning attitudes, and enriching educational resources. These measures contribute to enhancing students' autonomous learning ability and promoting effective implementation of secondary school physics teaching.

Keywords: Autonomous learning ability; Teaching methods; Learning attitudes; Educational resources

Introduction

With the continuous deepening of educational reform, secondary school physics teaching increasingly emphasizes the cultivation of students' autonomous learning ability. Autonomous learning ability refers to the capability of students to actively, systematically, and effectively learn during the learning process, which is of significant importance to students' personal growth. This article takes Dongshan Middle School in Meixian, Guangdong as an example, conducting an in-depth investigation into the current status of cultivating students' autonomous learning ability in secondary school physics teaching and proposing a series of solutions. These include improving the educational system, introducing diversified evaluation methods, updating teaching methods, actively cooperating with external organizations, and providing more educational resource support. These measures contribute to enhancing students' autonomous learning ability, promoting effective implementation of secondary school physics teaching, and driving further reform in the education sector.

1. The Importance of Cultivating Students' Autonomous Learning Ability

(1) Enhancing students' comprehensive quality Cultivating students' autonomous learning ability contributes to enhancing their comprehensive quality. This ability cultivation is not only related to the physics discipline itself but also involves students' overall literacy, including logical thinking, critical thinking, and problem-solving abilities. Through autonomous learning, students can better grasp knowledge, enhance problem-solving abilities, and strengthen innovative consciousness and practical skills.

(2) Cultivating students' lifelong learning ability The cultivation of autonomous learning ability contributes to fostering students' lifelong learning ability. In the era of informatization, knowledge is being updated at an accelerated pace, and students need to possess the consciousness and ability for lifelong learning to adapt to the constantly changing social and professional demands. By

cultivating students' autonomous learning ability during secondary school, a solid foundation can be laid for their future learning and career development.

(3) Improving students' academic performance and interest Autonomous learning ability contributes to improving students' academic performance and interest. Through autonomous learning, students can achieve a deeper understanding of physics knowledge and improve academic performance. Meanwhile, autonomous learning can stimulate students' interest and love for the physics discipline, making them more willing to actively participate in the learning process rather than passively receiving education. The cultivation of autonomous learning ability contributes to improving students' academic achievements and cultivating their interest in the discipline.

2. Current Status of Cultivating Students' Autonomous Learning Ability in Secondary School Physics Teaching

(1) Research subjects This article focuses on the students of Dongshan Middle School in Meixian, Guangdong, and collects data through the distribution of 400 questionnaires, with 280 valid responses, and interviews with selected teachers and students to understand their views and opinions. This detailed research design helps in-depth understanding of the current status of cultivating students' autonomous learning ability in secondary school physics teaching.

(2) Research methods This article adopts questionnaire surveys and interviews, which complement each other and provide a comprehensive understanding of students' and teachers' perspectives and experiences. The questionnaire survey mainly investigates students' learning attitudes, learning methods, and learning resources to provide support for quantitative data, while interviews mainly understand teachers' teaching methods and educational resources, providing in-depth information for qualitative data.

3. Problems in Cultivating Students' Autonomous Learning Ability in Secondary School Physics Teaching

(1) Imperfect educational system There are still some imperfections in the current educational system in secondary school physics education. One notable issue is the singularity of the evaluation methods. In the current educational system, students' evaluation mainly relies on examination scores. This singular evaluation method leads to students excessively focusing on exam-taking skills rather than deep understanding of knowledge and the cultivation of application abilities. Students often concentrate on how to obtain good grades in exams, rather than truly understanding and applying the knowledge they have learned. In this situation, the cultivation of students' autonomous learning ability is hindered to a certain extent. Furthermore, overemphasis on exam scores also brings pressure to teachers. Because the evaluation methods in the educational system mainly rely on exam scores, teachers tend to focus more on teaching exam-taking skills and overlook the cultivation of students' autonomous learning ability and innovative thinking. In this case, teachers feel restricted and find it challenging to adopt more innovative and diverse teaching methods to stimulate students' learning interest and initiative. To improve this issue, it may be considered to implement diversified evaluation methods. Apart from exam scores, various evaluation methods such as project assignments, oral presentations, and practical operations could be introduced to comprehensively assess students' learning achievements. Such diversified evaluation methods contribute to better reflecting students' autonomous learning ability and comprehensive quality, instead of merely their exam-taking skills.

(2) Outdated teaching methods Traditional secondary school physics teaching often adopts traditional teaching methods, such as the "spoon-feeding" educational approach. In this approach, teachers play the role of knowledge transmitters, and students passively receive information. This teaching method has some issues, one of which is neglecting students' subjectivity and personalized needs. Under this traditional teaching mode, students perceive education as unidirectional, lacking interaction and participation. They become bored and resistant to the physics discipline because the classroom becomes dull. Additionally, this teaching method also struggles to stimulate students' learning interest and initiative, as students do not have sufficient opportunities to participate in classroom discussions and practical activities. To improve this issue, teachers can consider using more innovative and diverse teaching methods. For example, the flipped classroom model allows students to independently study relevant knowledge before class and then engage in

discussions and practices in the classroom. Group discussions and case studies can also stimulate students' thinking and cultivate their autonomous learning ability. Using these more flexible and diverse teaching methods can encourage students to actively participate in the learning process, thereby improving their learning effectiveness and satisfaction.

4. Lack of Resource Support

In physics education at the secondary school level, cultivating students' ability for self-directed learning requires sufficient resource support, including experimental equipment, books, and other materials. These resources can help students practice and develop a deep understanding of physics concepts while expanding their learning horizons. However, some schools are unable to provide sufficient resource support due to budget constraints or other reasons. This lack of resources can hinder the improvement of students' ability for self-directed learning. For example, a lack of experimental equipment can prevent students from conducting experiments and observations, which limits their understanding of physics principles. Similarly, a shortage of books and materials can restrict students' knowledge expansion and independent research. To address this issue, schools can consider increasing investment in educational resources, such as buying more experimental equipment, expanding the library's collection of physics books, and providing online learning platforms. In addition, schools can establish partnerships with companies, research institutions, and others to jointly conduct physics practical activities and research projects, providing students with more opportunities for practice and resource support.

5. Measures for Cultivating Students' Ability for Self-Directed Learning in Physics Education at the Secondary School Level

5.1 Improving the Educational System

To improve the educational system in physics education at the secondary school level and cultivate students' ability for self-directed learning, schools can take a series of measures. First, they can introduce diversified evaluation methods, such as project assignments, oral reports, and practical operations, to replace the single evaluation method that relies solely on test scores. This will help to comprehensively evaluate students' learning outcomes, emphasizing their practical application abilities, innovative potentials, and problem-solving skills. Second, establishing incentive mechanisms is crucial. Schools can set up scholarships, award honorary titles, or adopt other incentive measures to encourage students to actively participate in extracurricular physics practical activities and innovation competitions. This not only helps to improve students' academic motivation but also cultivates their awareness of self-directed learning and innovative thinking. Establishing incentive mechanisms can also create a positive learning atmosphere, encouraging students to be more proactive in learning and enhancing their ability for self-directed learning.

5.2 Updating Teaching Methods

To improve the effectiveness of physics education at the secondary school level and cultivate students' ability for self-directed learning, teachers should actively adopt innovative teaching methods. One of these is the flipped classroom model, which encourages students to independently study relevant knowledge before class and then participate in interactive discussions and practices in the classroom. This method not only improves student engagement but also stimulates their interest in active learning and questioning. In addition, using group discussions and case studies is also an effective method that encourages students to work together to solve problems in group projects or real cases, cultivating their ability for self-directed learning and cooperation. Teachers can also make full use of information technology tools such as online learning platforms and multimedia teaching software to provide more teaching resources and opportunities for interactive learning, thereby enhancing students' learning experience and ability for self-directed learning. These innovative methods will help to stimulate students' academic enthusiasm, improve their comprehensive qualities, and enhance their ability for self-directed learning.

5.3 Correcting Students' Learning Attitudes

To improve students' learning attitudes, teachers need to establish effective communication channels with students actively. Understanding students' learning needs and difficulties is crucial, which can be achieved through close interaction with students, individualized guidance, and feedback mechanisms. By establishing good communication relationships with students, teachers

can have a deeper understanding of their academic needs, provide timely personalized guidance and support, help them overcome difficulties, and improve their learning outcomes. In addition, schools can also regularly hold knowledge lectures and practical activities related to the physics subject to broaden students' perspectives on the subject, enhance their interest and understanding of physics. These activities provide students with opportunities related to actual application, helping them better understand physics principles while stimulating their interest and enthusiasm for learning. Through active communication and rich academic activities, teachers and schools can jointly promote students' active participation in learning, cultivate more positive attitudes towards learning, and enhance their ability for self-directed learning.

6. Conclusion

To enhance the self-directed learning ability of secondary school students, physics education at the secondary school level needs to address the issues within the educational system. This includes adopting diversified evaluation methods and establishing incentive mechanisms. Additionally, updating teaching methods to enhance students' interest and engagement, encouraging innovative educational methods such as flipped classrooms, group discussions, and case studies, is essential for cultivating students' self-directed learning ability. Furthermore, it is crucial to correct students' learning attitudes through strengthened communication, personalized guidance, and support, as well as regularly conducting knowledge lectures and practical activities to increase students' interest in the subject of physics. Finally, schools need to increase investment in educational resources, including purchasing experimental equipment, updating library materials, and establishing partnerships with external institutions to provide more practical opportunities and resource support, promoting the effective implementation of physics education at the secondary school level.

References:

- [1] Liang, D. (2023). A brief discussion on the cultivation strategies of students' self-directed learning ability in junior high school physics teaching. *Problem Solving Research in Mathematics, Physics and Chemistry*, 23, 106-108.
- [2] Zhao, J. (2022). Cultivation of students' self-directed learning ability in junior high school physics teaching. *Problem Solving Research in Mathematics, Physics and Chemistry*, 29, 71-73.
- [3] Zhao, P. (2022). Cultivating students' self-directed learning ability in junior high school physics teaching. *Teaching Management and Educational Research*, 7(10), 92-93.
- [4] Lin, J., Hu, Z., Zhu, D., et al. (2022). Cultivation of student innovation practice ability assisted by QR code technology - taking university physics experimental classes as carriers. *China Modern Educational Equipment*, 5, 3.
- [5] Liang, J. (2022). Cultivation of student abilities in physics education. *Journal Name*, 6.
- [6] Zhang, M. (2022). Cultivation strategies for students' thinking ability in high school physics teaching. *Inside and Outside the Classroom (Junior High School Research)*, S02, 3.