Exploration on the Information Teaching Mode of High School Physics

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Abstract: Information technology has experienced constant development and promoted the progress of various fields since its advent. It is the same in the field of education. This paper explored the information teaching mode of high school physics with the example of high school physics teaching, discussed the feasibility and specific practical measures of information teaching, and provided personal suggestions and ideas for the development of high school physics information teaching.

1. Introduction

In the application of information technology to teaching classes, there are two aspects needing to be noticed: firstly, be aware of the importance of information technology to promoting the development of teaching, and select appropriate technical contents for class teaching contents to realize scientific teaching information; secondly, take advantage of information technology to further enrich class teaching content, increase students' learning interests and fully give play to its functions. In fact, viewing from the entire development trend of teaching, it has become ineviTable to integrate and apply information technology.

2. Importance and trend of information teaching

According to The 13th Five-year Plan for Educational Information issued by the Ministry of Education and Key Points of Education Information Work in 2017 issued by the General Office of the Ministry of Education, the development of information teaching has become an essential part for current education. The teaching methods and contents related with information can better adjust the teaching classes to provide more possibilities for students and satisfy the teaching demands, which is the ineviTable trend and requirement of using information technology for teaching. However, from the aspect of students, new teaching cause emphasizes being oriented with students, and highlights inspiring, encouraging and exercising students' independent learning. And information technology is closely related with modern life. Developing teaching class contents by means of information technology can better meet with students' demands, inspire their learning interest and imagination, help them get better understanding with rather Abstract concepts and form divergent thinking of learning and logic, and realize the optimal and efficient class[1]. As for high school physics, a subject combining theory with practice, the integration with information technology can better explain and manifest some Abstract concepts to help students make the Abstract simplified and the static dynamic, like the learning and understanding with "Newtonian mechanics". In the class of high school physics, further integration of information technology is not only catering to the basic requirements of new teaching, but able to promote the reform of students' learning methods.

What we discussed in the above is analyzing the importance of applying information technology to classes, and its advantages can be explained in the following aspects. Firstly, train students' learning interest; secondly, improve the quality of class teaching; thirdly, expand teaching contents and improve the efficiency; finally, cultivate the awareness of independent learning.

Interest drives students to learn anything. This way, students' ability to learn and remember can get obvious promotion, and they can remember more contents through listening and watching than

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reading and listening. Therefore, the means of information can mobilize students' audio-visual experience, and make them catch more information and contents in the learning process. In addition, applying information technology to students and traditional classes is very original, which can unconsciously stimulate students' curiosity, promote their further and positive learning, and help them gradually form a habit of independent learning.

The texture of teasing is more than the improvement of teaching quality. More importantly, the promotion can help students transform the Abstract theoretical contents into vivid cognition contents, and strengthen their understanding and memory. Before using information, students can just rely on simple textbooks or teachers' teaching. However, students have access to analyzing and understanding by means of words, pictures and videos on the basis of information, so that they can gain a multi-dimensional understanding with knowledge. In addition, students can understand knowledge by combining their own logical thinking with intuitive thinking so as to strengthen the texture of teaching contents and knowledge experience.

The time of teaching is limited, and teachers are supposed to give students more class content within a specified time, and let students master more knowledge in limited class time. Especially for high school physics, maybe the presentation of experiments can take a large part of class, which will reduce the time to understand and explain experiments. Repeated experiments mean the low efficiency in class, but students cannot fully understand teaching content in a class without experiments, so there exists the conflict between learning foundation and content expansion[2].

Independent learning is manifested in positively exploring knowledge and analyzing problems, and students have initiative to explore knowledge and enjoy the interest in learning. And it includes the preview, theoretical learning, review, and finishing homework. Teachers can closely communicate with students by means of social platforms after class, and timely answer students' problems to help students solve the problems existing in the independent learning and become more willing and positive to learn[3].

3. Analysis on the practical integration of information technology and high school physics classroom

3.1 Before class

Before class, teachers instruct students to master independent learning. Teachers can design the content like "to-do list of learning" to provide students with a "learning guidance". Students will have a class group and receive the "to-do list". They are supposed to finish and upload the list, and accomplish the instruction of independent preview. The list can be divided into four parts: the first one is "learning guidance", including students' summary with learning theme and learning methods they can use; the second one is "learning tasks", including students' conclusion with textbook content and notion with key, difficult and doubtful points; the third one is "self-assessment", namely realizing the self test through the exercise in textbooks; and the final one is "reconsideration and suggestion", which means that students can assess their own test result, sort out the problems and questions, and give teachers the feedback[4].

Teachers can create a WeChat official account to provide learning resources and methods, timely communicate and share teaching contents with students, help students gradually form a good habit of positively exploring and asking. Meanwhile, in order to assist students to better finish the preview, teachers can refer to the basic requirements of textbook syllabus, and record and upload some instructive and profound micro-videos to the official account. In the process, students can preview textbook contents and learn some key points to gain a better understanding. For instance, in the learning of Newtonian mechanics, mechanics is an Abstract concept and it cannot be caught by the feeling. Experiments can help understand different definitions and functions of mechanics, and its change under various environmental changes[5].

3.2 In class

After receiving students' feedback with preview condition, teachers can find students' common

and individual problems, and conclude before class to explain and complete contents in class.

It is a waste of teaching resource that teaching the overlapping contents in class, so it should be divided into four parts to realize the deep teaching on the basis of preview. Firstly, teachers can have a summary before class and a systematic explanation with textbook contents in lass, and emphatically analyze students' common problems. The method of question-forms can be used to answer and analyze students' personal questions, and take the personal demands of every student into consideration. Secondly, teachers should comb knowledge points and underscore key and difficult points in the whole teaching content. Students can gain a full understanding and memory through repeated teaching and remembering. Let's still take mechanics as an example, such as make a basic explanation with gravity, elastic force, friction force, resultant force and component force, and then focus on the rather obscure part of the students to do a detailed comb, such as the difference and understanding of sliding friction and static friction. Then, compared with the experimental presentation of micro-course resource before class, the presentation should be made more comprehensive, diversified and derivative. For instance, the motion of matters will change under the action of force. Teachers can watch it by using VR and introducing related experimental three-dimensional model through external VR editing interface. VR technology communicates with virtual situations by means of lively and true scenes, making students get more sensory stimulation and "inner driving force" with physics learning. Also, it can inspire students' learning and create good learning atmosphere[6]. For example, in the teaching of concurrent force, teachers can simulate a scene that a truck loading a wooden box is moving on the straight road. If a car start from static, there is no relative sliding between the carriage and the car surface, but sliding will occur if it suddenly accelerates from the uniform speed or load. Virtual experiments are used to guide students' understanding with mechanical concepts in different situations. Or, teachers can introduce the three-dimensional model to from material data by means of the analogue simulation of ANSYS, and gain a quite comprehensive and true analysis and explanation with the mechanics content. The whole process should be finished under the help of information technology. Students can further change the Abstract theories to imaginative thinking, and deepen the understanding with phenomenons, rules and mechanics concepts. In the preview, students can know the most important and basic content: force is the action of one body on another. In addition, teachers should expand more related contents like the the mechanical analysis of the relevant objects and research on mechanical properties of materials. But these contents are rather complex and difficult, so they are just used for understanding and expanding, not for mastering. Finally, teachers can adopt the method of questioning and interacting to better know students' practical learning condition and check the omission under the premise of treating students as the main body. Then some further interaction surrounding these contents can help students gain a vivid understanding.

3.3 After class

The main learning content after class is reviewing and testing related knowledge. Like the preview, teachers can previously upload some tests for students through online social platform. After students' finishing, teachers can receive the data feedback from the backstage, which can help find and solve problems in next class[7]. In order to better encourage students to have deep exploration and learning, teachers can divide the question pattern into two parts. The one is assessing the basic content, and the other is testing the experimental ability. Physics is the combination of theory and practice. So, besides theoretical assessment, teachers can arrange some experimental homework and ask students to observe and discover, or collect some mechanics phenomenons in life by means of surrounding tools. And students should try to compute the velocity and force, or do some innovative experiments, for example, design some scenes related with frictional force by themselves.

4. Analysis on the effects of applying information to the classroom

4.1 Good effects

The obvious advantage of applying information technology to high school physics classroom is promoting the teaching efficiency, making the teaching more diversified and abundant, inspiring students' learning interest from various aspects, and help students better throw themselves into independent learning. In addition, it has realized the sharing of teaching resources to a great extent, and compensated the difference of teaching effects in traditional class that is due to the difference of teaching staff. Also, it has balanced the regional teaching resources, and directly or indirectly promoted the development of national education.

4.2 Bad effects

The application of information technology may make teachers confused with the key points of classroom. Numerous teachers regard the presentation of information technology as the key point in class, changing information technology from the assistant method to the main body, which is bad for the development of teaching. In addition, some teachers depend on information and online course resources too much, neglecting the most important period-course duration. As a result, students can just understand contents by means of information technology, but their questions are still unsolved, and they cannot form systematic and theoretical knowledge framework. So their knowledge absorption is "shallow going and out"[8]. At last, the application proportion of information technology should be strictly controlled in class, and most teachers' extreme dependence on information technology makes students become the single individual of classroom. They learn by themselves not the team, neglecting the help and importance of cooperation to learning.

5. Conclusions

In conclusion, it is ineviTable to develop information technology in high school physics courses, and in the application, teachers should have a clear control with its function and orientation, and avoid the cart-before-horse condition. Meanwhile, schools should pay more attention to the classroom than adding contents before and after class. The latter can only increase students' learning pressure. Information technology has become the driver for promoting the education.

References

[1] Wang Jun. The exploration of integrating high school physics teaching and information technology [J]. New Campus, 2014(07):199-199.

[2] Xie Yude. Exploration of effective combination of high school physics and information [J]. Chinese Off-campus Education, 2016(02):121-122.

[3] Zhang Yongxi. The application of information technology in physics classroom-taking the example of "horizontal projectile motion"[J]. Physics Teaching In Middle School, 2016(6):51-52.

[4] Xiang Jun and Hong Hetiao. The theory and practice of integrating information technology with high school physics teaching under the new curriculum standard [J]. Education Information, 2015(02):45-46.

[5] Li Jie. Brief discussion on the integration of information technology and high school physics teaching [J]. New Course Guidance, 2017(29):43-44+169.

[6] Gou Zhixing. The organic integration of modern education media with high school physics teaching [J]. ZHONGXUESHENG SHULIHUA(study and research),2014(05):26-26.

[7] Zhong Yongjiang, Zhong Shaochun and Yin Guiping. "Light up" physical experiments with information technology-research on the integration of information technology and physical

experimental course [J]. China Information Technology Education, 2016(1):45-48.

[8] Zhang Jiansheng. Brief discussion on the principles of implementing inquiry teaching in high school physics classroom [J]. The Divine Land, 2014(11):189-189.