Journal of International Education and Development
2025, VOL. 9, NO. 8, 249-252
DOI: 10.47297/wspiedWSP2516-250057.20250908

Research and Practice of Junior Middle School Physics Classroom Teaching under the Background of Digital Education

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ABSTRACT
In the wave of educational digitalization, junior high school physics classroom teaching has ushered in an opportunity for transformation. This article explores the application and improvement of technology in junior high school physics classrooms. It expounds the importance of digital empowerment in junior high school physics classrooms, introduces the construction of diverse teaching situations, the optimization of experimental teaching the connection with life phenomena, and the extension of learning boundaries, and demonstrates the practice of digital resource preview, interactive experiments, and digital evaluation, providing a reference for educational digitalization and helping physics education to enter a new stage of high-quality development.

KEYWORDS
Junior high school physics; Classroom teaching; Digital technology

1 Introduction

With the development of the new curriculum reform, multimedia technology is widely used in junior high school physics classrooms, and the digital laboratory has been recognized by teachers and students. Digital teaching transforms teaching content into digital forms and shares and exchanges them through the Internet [1]. Taking junior high school physics teaching as an example, the use of digital technology can develop some teaching advantages, making teaching more interesting and enriching teaching resources. At the same time, the participation of digital technologies (such as smartphones)can also promote students to more fairly and effectively from a certain aspect, so it is also very necessary to study the application and improvement of digital technology in junior high school physics experimental teaching [2]. Paper focuses on its application in junior high school physics classrooms, and provides reference and experience for the digital transformation of education [3].

2 The importance of digital empowerment in middle school physics classrooms

With the development of information technology, the deep integration of information technology and education teaching has become the trend of the times. After the implementation of the "Double Reduction" policy, the role of the classroom has become increasingly important. Due to the strong systematicness and practicality of the physics discipline itself, more modern teaching methods are needed to help students learn effectively [4]. With the help of digital devices, the physics classroom can better adapt to the reception ability and learning habits of students in the new era, making the transmission of knowledge more flexible and vivid, and realizing the simplification and popularization of physical concepts and physical laws. Using digital means to enhance help junior high school physics classroom is an embodiment of informatization, and it is also an important way to promote the comprehensive development of junior high school students and to achieve the individualized development of students.

3 Digital empowerment of junior middle school physics classroom path

3.1 Use digital tools to build a diversified teaching situation.

Digital technology can provide rich and innovative forms for junior high school physics teaching, creating vivid teaching situations for teachers, which can not only stimulate students' interest in inquiry, but also strengthen students' physical cognition. Among them, the diversification of teaching situations can integrate real-life experience with physical knowledge as the carrier, making physical laws specific, in line with students' physical cognition. Therefore, in teaching, digital technology should be flexibly used, for example, multimedia animations, virtual reality VR and other technologies can present complex physical phenomena in a dynamic and intuitive form, allowing students to understand the knowledge points and carry out autonomous inquiry in a specific situation.

3.2 Optimize physical experiment teaching with the help of digital resources

Physics experiments are the core content of junior high school physics teaching, and they play an irreplaceable role in cultivating students' observational ability, hands-on ability, and spirit of inquiry [5]. However, due to limited classroom time and experimental equipment conditions, as well as the complexity of experimental phenomena, many experiments cannot be carried out well in traditional teaching environments, preventing students from gaining a certain perception of physical laws. With the help of digital information technology, physics experiments can also have the advantages of dynamic, visibility, and efficiency, thus improving the efficiency of experimental teaching and providing students with experimental teaching that is as close as possible to real experience.

3.3 Discovering the intrinsic connection between physical knowledge and life phenomena

With the rapid development and popularization of information technology, the new form of physics experiment represented by digital experiments began to gradually enter the classroom. Physics knowledge does not come into being out of thin air. The laws and principles behind it all originate from the operation mechanism of natural things. The laws of physics are derived from natural phenomena and describe the fundamental principles of nature. Therefore, guiding students to explore physical laws from natural phenomena is one of the important tasks of physics education. The integration of digital resources provides teachers with richer means, which can closely integrate the knowledge of physics with the phenomena of life, and stimulate students' desire for exploration and learning enthusiasm. The understanding of physics knowledge can not only stay in books and classrooms. Teachers need to use multimedia resources to connect abstract physical theories with students' familiar life, and let students actively ask questions, and then analyze and explore the reasons to find answers.

3.4 Extend the physical learning boundary by using digital platforms

With the rapid development of educational technology, junior high school physics curriculum teaching has also ushered in new development opportunities. The digital platform has the advantages of abundant resources and convenient communication, breaking the time and space restrictions of traditional classrooms, and can become an important platform for students to learn and explore independently. The extension of physics classroom should not only be reflected in the expansion of knowledge level, but also in the cultivation of students' ability to explore independently. Teachers should make full use of digital platforms, such as educational resources, virtual laboratories, and online discussion communities, to formulate learning tasks, guide students to conduct autonomous learning after class, extend the classroom from fixed physics classrooms to diverse online learning scenarios,and make full use of the rich and diverse digital resources to further expand students' knowledge and help extend the practical application of physics knowledge.

4 The practice of teaching middle school physics in the context of digital education - taking the "Eyes and Glasses" of the people's education press as an example

Under the background of digitalization of education, taking the "Eyes and Glasses" in junior high school physics of People's Education Press as an example it is possible to innovate the classroom teaching mode and improve students' autonomous learning and inquiry abilities through the methods of digital resource integration, interactive experimental design and digital evaluation [6].

4.1 Design of self-study based on digital course resources support

Teachers timely publish preview goals, course content and course resources through UMU learning platform, and students can use mobile phones or tablet computers to scan QR codes to log on to the cloud platform, view "Eyes and Glasses" course resources, and complete preview tasks. After careful production and screening, the course resources published by teachers include：

(1) Eyes--Quotations (accompanied by artistic images of eyes);
(2) National Eye Care Day (Baidu Ba);
(3) Simulation of Eye Image Animation (GeoGebra);
(4) Health Education Brochure for Myopia Prevention and Control in Children and Adolescents;
(5) All-Femtosecond and Half-Femtosecond Surgery to Correct Myopia (Video);
(6) Risks of Corneal Surgery--Overcorrection Phenomenon (Video).

Let students know about the theme of this lesson - protecting the eyes. The course resources in Table 1. form a list of autonomous learning tasks, as shown in.

Table 1 Self-supervised learning tasks

Curriculum resources	Physics knowledge points	Design intent
Proverbs; Sayings of famous people	Eyes	Use cultural content to let students know the function and importance of the eyes, to stimulate interest and lead to thinking.
	Eye imaging situation, normal corneal characteristics	Impart with artistic beauty, promote students to think about the right and wrong imaging, corneal characteristics.
National Eye Care Day materials	Eye care knowledge	Associate life, help students establish awareness of eye protection, and embody the concept of educating people
The structure of the eyeball and other biological knowledge	Eyes; myopia correction and hyperopia correction	Interdisciplinary integration, helping students understand the principles of vision and correction, improving efficiency and cultivating thinking.

4.2 Digital application in interactive inquiry experiment

In the "Exploring the Regulation of the Eye" section, cooperative learning was carried out by combining real experimental equipment with digital tools. Students used optical benches, water lenses, and light screens to capture the changes in imaging when the water lenses were filled with water (thickened) and drained (thinned) through tablet computers (Fig. 1), and uploaded them in real time to the Xiongwei Yi Classroom platform for observation and analysis by their own group and other groups. With the help of Xiongwei Teaching Assistant and Smart Recording and Broadcasting System, the teacher tracked the entire experimental process and guided students to summarize "the effect changes in the thickness of the water lens on focal length and the ability to deflect", and intuitively understand the principle of accommodation of the lens. The application of digital equipment not only makes the experimental phenomena clearer but also supports students to review after class through the video playback function, strengthening their observation and cooperative inquiry abilities.

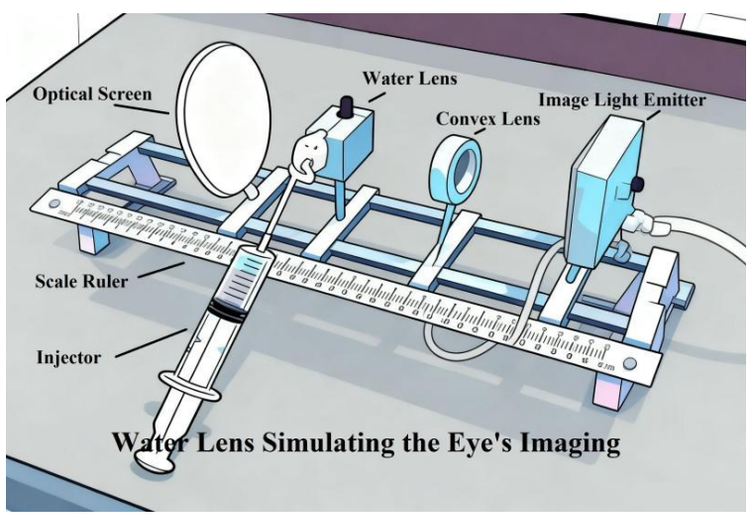

Figure 1 Water lens simulating the eye's imaging

4.3 Digital evaluation to assist precise teaching

Teachers provide learning cases (example questions), and use the Seewo Easy Classroom to push them out, tracking students' learning conditions in the form of data feedback, to achieve the form of education that determines teaching based on learning. Students provide feedback through Seewo Easy Classroom on tablets, and teachers make analysis and evaluation on the comprehensive situation of the questions, such as the participation rate, correct rate, and answering time, to carry out follow-up educational activities in time.

Example: As shown in Figure 2, the left side is the light path diagram of myopia, if the myopia is corrected, the correction method: a concave lens (the dotted box should be filled with lens A or B, please make a choice).

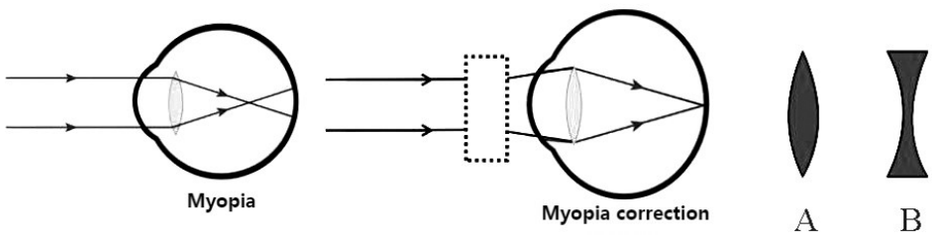

Figure 2 Myopia correction

Through the above practice, the adjustment principle which is difficult to understand visually is displayed intuitively by using information technology, and it is also achieved that students can apply simply while learning independently and in an exploratory way. To some extent, it provides reference for the reform of junior high school physics entity classroom teaching mode.

5 Concluding remarks

To sum up, information technology provides powerful support for the teaching and learning of junior high school physics. By widely applying information resources in the classroom from creating situations to improving experiments, and conducting in-depth mining and expansion, it effectively improves teaching efficiency and can also stimulate students' learning enthusiasm and initiative. Information resources make it possible for physics knowledge points not to be learned simply by listening to the teacher's lecture, but to be integrated into students' learning in a more vivid and flexible way.

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