Research on Smart Classrooms of Information Technology in High Schools in Northern Guangdong Under the Guidance of the UbD Concept

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Abstract: With the development of informatization education, smart classrooms have gradually become the trend of high school information technology teaching. The core of the Understanding by Design (UbD) concept lies in "understanding" and emphasizes backward design, which can provide a new direction for the development of smart classrooms in high school information technology and effectively improve teaching effectiveness. From the perspective of smart classrooms of information technology in high schools in northern Guangdong, this paper analyzes the significance of integrating the UbD concept and proposes specific practical strategies, aiming to effectively improve curriculum quality, help students understand information technology knowledge, cultivate their application abilities, and provide a reference for subsequent information technology smart classrooms.

Keywords: UbD concept; Northern Guangdong; High school information technology; Smart classroom

1. Introduction

Against the backdrop of the digital age, information technology is widely applied in various fields, imposing stricter requirements on the information literacy of talents. High school information technology courses shoulder the mission of cultivating students' information literacy, and improving their curriculum quality plays an important role. Smart classrooms can accelerate the intelligent and personalized development of teaching with the help of information technology, injecting vitality into high school information technology teaching. The UbD concept was proposed by Grant Wiggins and Jay McTighe. Taking "understanding" as the goal, this concept divides expected learning outcomes through backward design, then determines appropriate assessment criteria, and designs learning activities. The integration of the UbD concept and smart classrooms of high school information technology can effectively improve teaching activities, help students understand and apply

information technology knowledge, and cultivate high-quality talents meeting the needs of the times.

2. Significance of integrating the UbD concept into smart classrooms of high school information technology

2.1. Enhance students' in-depth understanding of information technology knowledge

The UbD concept takes "understanding" as the core. Its integration with information technology teaching emphasizes that students grasp the connotation and value of information technology knowledge. In a smart classroom environment, teachers can use rich digital resources such as animations and videos to encourage students to actively explore the essence of information technology knowledge [1]. For example, when teaching content related to computer network principles, animation demonstrations can be used to show the transmission of data in the network, thereby truly helping students understand concepts such as network protocols and IP addresses, and enabling them to gain a deeper understanding of the knowledge.

2.2. Cultivate students' information technology application abilities and innovative thinking

The UbD concept values the improvement of students' knowledge transfer and application skills, helping them apply the learned information technology to solve practical problems. Smart classrooms can also provide students with a broad space where they can effectively carry out practical operations through online programming platforms, data analysis tools, etc. [2] Under the guidance of the UbD concept, teachers can design challenging tasks to encourage students to apply their learned knowledge to solve corresponding problems, effectively cultivating their innovative thinking. For example, when teaching content related to database management, teachers can design campus information management system projects, encouraging students to work in groups on system design, maintenance and other activities. In project practice, students can give play to their innovative thinking and improve system functions.

2.3. Promote precision and personalization in information technology teaching

Smart classrooms can collect students' real-time data, such as learning progress and learning behaviors, with the help of big data and artificial intelligence technologies. The UbD concept emphasizes student-centeredness and pays attention to students' knowledge learning needs and differences, enabling flexible analysis of students' learning data so that teachers can understand each student's situation and promote the realization of precise teaching [3]. For students with learning difficulties, teachers can provide personalized tutoring. For top-performing students, teachers can set extended tasks to meet their differentiated needs and promote the common progress of all students.

2.4. Promote the reform of high school information technology teaching in Northern Guangdong

In northern Guangdong, there is an imbalance in the informatization development of education, and the teaching methods and concepts of some schools are relatively traditional. The integration of the UbD concept and smart classrooms of high school information technology can provide new ideas for the innovation of information technology teaching [4].

3. Practical strategies for smart classrooms of information technology in high schools in Northern Guangdong under the guidance of the UbD concept

3.1. Backward design based on the UbD concept

Firstly, attach importance to setting expected learning outcomes. Teachers need to clarify the goals that students should achieve in high school information technology courses, which involve not only the mastery of knowledge and skills but also emphasize students' understanding of information technology concepts and actively cultivate their application skills [5]. For example, when teaching the basic unit of artificial intelligence, the expected outcomes can be set as students understanding the concept and application fields of artificial intelligence and using simple artificial intelligence algorithms to solve practical problems. Teachers can also combine the actual situation of northern Guangdong and relevant curriculum standards to ensure the clarity and achievability of expected outcomes.

Secondly, set assessment criteria according to expected outcomes. Teachers can design accurate assessment forms to evaluate students' achievements, and the specific assessment evidence should include students' homework, test scores, and classroom performance [6]. Regarding students' knowledge learning outcomes, teachers should not only pay attention to their mastery of knowledge but also cultivate their ability to understand and apply knowledge. For example, when assessing students' learning outcomes of basic artificial intelligence, teachers can not only use tests to judge students' understanding of basic concepts, but also encourage students to complete artificial intelligence projects, such as designing image classifiers and use the project completion status to evaluate their knowledge application skills.

3.2. Utilize smart classroom technology to support teaching implementation

Firstly, actively create teaching scenarios. Smart classrooms of high school information technology can use multimedia, virtual reality and other technologies to create vivid teaching scenarios and enhance students' interest in knowledge learning. From the perspective of information technology teaching, teachers can use relevant technologies to design scenarios related to teaching content [7]. For example, when teaching content related to information security, teachers can use virtual technology to simulate hacker attack scenarios, allowing students to have an immersive experience, understand the significance of information security protection, and guide them to think about how to ensure information security, thereby enhancing their enthusiasm for knowledge exploration. The creation of teaching scenarios can help students understand information technology knowledge and encourage them to actively engage in learning.

Secondly, promote the realization of personalized learning. Smart classrooms can provide personalized support based on students' data and characteristics. Teachers can use smart classroom analysis systems to understand students' knowledge, learning progress and mastery, and provide them with high-quality personalized learning resources. For example, for students with slow learning progress, the system mainly recommends basic knowledge explanation content. For students with spare capacity, the system mainly recommends extended content to meet their interest in knowledge exploration [8]. At the same time, smart classrooms allow students to freely choose learning content. Students can flexibly arrange their learning time according to their own interests, improving the flexibility of the curriculum.

Thirdly, promote teacher-student and student-student interaction. Smart classrooms provide a variety of interaction methods such as online discussions, real-time Q&A, and group collaboration, which can promote interactive communication between teachers and students and among students. In high school information technology teaching, teachers can use the interactive functions of smart classrooms to organize students to

conduct discussions and cooperative learning [9]. For example, when learning "database design," teachers can divide students into groups and let them complete a database design project together through an online collaboration platform. Group members can conduct real-time communication, division of labor, and cooperation on the platform to jointly solve problems encountered in the project. Teachers can real-time understand the group's discussion progress and project development through the platform and provide timely guidance and feedback. Through teacher-student and student-student interaction, students' teamwork spirit and communication skills can be cultivated, and learning effectiveness can be improved.

3.3. Improve the teaching evaluation system

Firstly, attach importance to the diversification of evaluation subjects, including teacher evaluation, student self-evaluation and mutual evaluation. Among them, teacher evaluation should follow the principles of comprehensiveness and objectivity to judge students' knowledge learning process and outcomes, and pay attention to their learning attitudes and methods [10]. Student self-evaluation enables students to reflect on and evaluate their own learning process and outcomes, clarify their strengths and weaknesses, and set clear directions for improvement. Student mutual evaluation can strengthen communication and cooperation among students, allowing them to obtain suggestions from peers, thereby conducting targeted learning and improving learning effectiveness.

Secondly, focus on the application of diverse evaluation methods. Teachers can combine formative and summative evaluations. Formative evaluation mainly uses data such as classroom performance and homework to understand students' learning situation, providing a basis for curriculum optimization [11]. Summative evaluation mainly objectively assesses students' knowledge and learning outcomes through examinations, project presentations, etc. At the same time, performance evaluation and other methods can be used to comprehensively and objectively judge students' information technology literacy.

Thirdly, teachers need to provide timely feedback on evaluation results to students to help them understand their own learning situation and identify existing problems. Based on the evaluation results, teachers can provide students with personalized opinions and guidance, helping them adjust their learning methods and effectively improve their learning outcomes [12]. At the same time, evaluation results can provide a basis for teachers to adjust and improve teaching. Teachers can adjust teaching designs and strategies according to the evaluation results to effectively improve teaching quality. For example, if a student has an insufficient understanding of certain knowledge, teachers can focus on explaining and guiding that knowledge to cultivate students' literacy in a targeted manner.

3.4. Strengthen teacher training and professional development

Firstly, schools can carry out training on the UbD concept and smart classroom technology. In order to better infiltrate the UbD concept into smart classrooms of high school information technology, it is necessary to attach importance to teacher training and improve teachers' quality. The training content specifically includes the basic principles of the UbD concept and backward teaching design skills. Through training activities, teachers can understand the value of the UbD concept and become familiar with the application of various technologies and tools in smart classrooms [13]. Specific training methods can combine online and offline approaches, encouraging experts and scholars to give lectures, and guiding teachers to participate in practical operations and case analysis to effectively improve their professional quality.

Secondly, establish a teacher professional learning community to promote communication and cooperation

among teachers. Teachers can share teaching experience, teaching resources and teaching achievements in the community, and jointly discuss problems encountered in teaching and their solutions [14]. Thirdly, actively advocate teachers to conduct in-depth teaching reflection and continuous improvement. Teachers should persistently reflect on their teaching practice, systematically sort out and summarize valuable experiences and profound lessons accumulated in the teaching process, keenly identify various explicit or implicit problems in teaching, and quickly take effective measures for targeted improvement and optimization. In the specific implementation of teaching activities, teachers can use various methods such as keeping detailed teaching logs and extensively collecting and carefully analyzing students' feedback to comprehensively and accurately understand the actual effect of their teaching and the specific situation of students' learning [15].

3.5. Practical case of UbD strategy: Teaching of "Data Visualization and Local Agricultural Data Analysis in Northern Guangdong"

Combining the regional characteristics of abundant agricultural resources in northern Guangdong (such as characteristic agricultural products like Heyuan citrus and Shaoguan tea), taking the "Data and Data Processing" unit of high school information technology as an example, the smart classroom teaching practice under the UbD concept is carried out. Firstly, determine expected learning outcomes. Combining the "General High School Information Technology Curriculum Standards" and the needs of agricultural development in northern Guangdong, set core literacy expected goals: information awareness, computational thinking, digital learning and innovation, and information social responsibility. Secondly, design assessment evidence. Adopt a dual-track assessment of "formative + summative" to ensure coverage of knowledge, understanding and application abilities.

(1) Activity 1: Scenario Introduction (5 minutes). Use the "VR Resource Library" of the smart classroom to play VR videos, present real cases, and trigger students' thinking.

(2) Activity 2: Knowledge Exploration (10 minutes). Through the "micro-lectures + online quizzes" module of the smart classroom, push micro-lectures on data visualization principles, and students complete immediate quizzes after independent learning.

(3) Activity 3: Practical Operation (15 minutes). Adopt "heterogeneous grouping" and use the "group collaboration platform" of the smart classroom to complete tasks.

(4) Activity 4: Outcome Optimization and Presentation (10 minutes). Based on the peer evaluation function of works in the smart classroom, after groups upload visualization works, students conduct mutual evaluation according to the assessment scale provided by teachers.

4. Conclusion

In summary, the integration of the UbD concept and smart classrooms of high school information technology can promote teaching innovation, help students understand information technology knowledge, cultivate their information technology application skills, and improve the level of precise teaching. From the perspective of curriculum teaching practice, teachers can use the UbD concept for backward teaching design, rely on smart classroom technology to promote the smooth development of teaching, build a sound teaching evaluation system, and escort students' growth. Through the implementation of practical strategies, the advantages of the UbD concept and smart classrooms can be brought into play, effectively improving the quality of information technology teaching and cultivating talents meeting the needs of the times.

Disclosure statement

The author declares no conflict of interest.

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