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Research on the Practice of Large Unit Teaching Design of Information Technology in Junior High School based on Design Thinking Orientation

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Abstract: The discipline of information technology has the characteristics of rapid development and dynamic updates, requiring teachers to constantly innovate teaching concepts and teaching models. Design thinking, as an innovative thinking method, has broad application prospects in information technology teaching. This article proposes teaching design strategies based on design thinking orientation theory to address the problems in the teaching design of junior high school information technology units. These strategies include constructing real-life situations, guiding students to think, encouraging diverse expressions, and emphasizing process evaluation. The aim is to provide new ideas and practical references for information technology teaching in junior high school.

Keywords: design thinking, junior high school, information technology, large unit teaching design, practical research

Introduction

With the rapid development of information technology, information technology education plays an important role in cultivating students' digital literacy, computational thinking, and innovation abilities. The *Information Technology Curriculum Standards for Ordinary High Schools* issued by the Ministry of Education in 2018 clearly stated the need to promote the deep integration of information technology and subject teaching, and cultivate students' ability to analyze and solve problems using information technology.[1] The new curriculum standards have put forward higher requirements for information technology teaching, requiring teachers to constantly update their teaching concepts and optimize their teaching designs to meet the needs of talent cultivation in the information age.

1. The importance of large unit teaching design of information technology in junior high school based on design thinking

1.1 Beneficial for cultivating students' innovative thinking

Design thinking is an innovative way of thinking that is student-centered and based on empathy. It emphasizes starting from the user's perspective, continuously optimizing design solutions through observation, defining problems, brainstorming, rapid prototyping, and other methods, ultimately obtaining innovative solutions that meet user needs. Introducing design thinking into middle school information technology teaching is beneficial for cultivating students' abilities of empathy, divergent thinking, and comprehensive application, and stimulating their innovative potential. For example, in the teaching of the "Information and Information Technology" unit,[2] teachers can guide students to start from real-life scenarios, think about how to use information technology to solve practical problems in life, and encourage

students to come up with various creative ideas, and finally form feasible design solutions. This helps students establish innovative awareness and enhance their problem-solving abilities.

1.2 Beneficial for enhancing students' interest in learning

Compared to traditional knowledge imparting teaching, design thinking based teaching places more emphasis on students' subjectivity and participation. Students are no longer passive recipients, but actively participate in teaching activities and become the masters of learning. Teachers create an open, democratic, and equal learning environment for students, encouraging them to have the courage to try and question, and inspiring their enthusiasm for learning. At the same time, teachers guide students to apply the knowledge they have learned to practice, solve real-life problems, enhance their sense of achievement, and increase their interest in learning. For example, when teaching "Fundamentals of Computer Networks",[3] teachers can organize students to hold a campus web design competition, allowing students to use their knowledge to design campus websites and showcase and comment on them within the class. This project-based learning helps to stimulate students' learning enthusiasm and improve learning outcomes.

1.3 Beneficial for cultivating core competencies in disciplines

Information technology is a highly practical discipline that requires students to possess four core competencies: digital learning and innovation, computational thinking, digital problem-solving, and information social responsibility. Teaching based on design thinking perfectly meets the requirements for cultivating these four core competencies. For example, in the unit of "Information Resource Management", teachers guide students to analyze the threats to personal information security in the information age, explore how to strengthen personal information protection, and enhance students' awareness of information social responsibility. In the unit of "Fundamentals of Computer Networks",[4] teachers guide students to master basic concepts such as network protocols and IP addresses, and exercise their ability to analyze and solve network problems using computational thinking. All of these are conducive to the formation and development of students' core competencies.

2. Problems in the large unit teaching design of information technology in junior high school based on design thinking

2.1 Fragmentation of teaching content and insufficient systematicity

At present, many schools' information technology textbooks are still arranged in a list of knowledge points, lacking overall design and internal connections. This leads to fragmented and scattered teaching content, which is not conducive to students forming a complete knowledge system. The knowledge points that students learn are disconnected from real life, which cannot stimulate their interest in learning and is not conducive to cultivating their ability to apply knowledge to solve practical problems. Therefore, it is urgent to strengthen the design of large unit teaching, integrate scattered knowledge points into several thematic units, enhance the systematicity and relevance of teaching content, guide students to integrate and form a complete knowledge framework.

2.2 Single teaching methods and lack of innovation

Traditional information technology classrooms mostly use lecture methods, with teachers explaining and demonstrating, and students passively accepting. This kind of "cramming" teaching neglects students' subjectivity, restricts their creativity, and is not conducive to the cultivation of students' innovative ability. Students lack opportunities for hands-on practice and collaborative communication, making it difficult for them to internalize theoretical knowledge into their own abilities. Therefore, it is necessary for teachers to innovate teaching models and integrate multiple teaching methods, such as project-based teaching, cooperative learning, inquiry learning, etc., to provide students with more opportunities for hands-on practice and mutual communication, and to cultivate students' innovative thinking and practical abilities.

2.3 Single evaluation method, emphasizing results over process

At present, the evaluation of information technology teaching mostly adopts the form of final exams, emphasizing the examination of knowledge and neglecting the evaluation of abilities and qualities. This result oriented evaluation method can easily lead to students' exam oriented mentality, which is not conducive to their comprehensive development. Students passively learn in order to cope with exams, losing their initiative and creativity in learning. Therefore, it is necessary to reform the evaluation mode, establish a diversified evaluation system, focus on the evaluation of the learning process, pay attention to students' performance in problem-solving, innovative design, etc., guide students to enjoy the learning process, and improve learning efficiency.

3. Strategies for the large unit teaching design of information technology in junior high school based on design thinking

3.1 Building real scenarios to inspire learning interest

In information technology teaching, designing realistic learning scenarios is crucial for stimulating students' interest in learning. Teachers should stand from the perspective of students, carefully design teaching scenarios that are close to their daily lives based on their life experiences, cognitive characteristics, and interests, so that students can feel the close connection between the knowledge they have learned and real life, thereby improving their initiative and enthusiasm for learning.

For example, when teaching the content of "information representation", teachers can design a scenario where a student wants to pass on a secret to a friend, but is worried that it will be cracked by others. How can encoding be used to ensure information security? Faced with this interesting and challenging question, students' curiosity was instantly ignited, and they started brainstorming, proposing various strange encryption schemes. The classroom atmosphere suddenly became lively. Teachers timely guide students to use their knowledge of binary and ASCII codes to design scientific and reasonable encryption schemes. Through hands-on practice, students deepen their understanding of the knowledge and improve their ability to apply it to solve practical problems. Situational introduction makes boring knowledge vivid and interesting, allowing students to complete learning in a relaxed and enjoyable manner, and gain knowledge and skills.

For example, when teaching the "Introduction to Computer Networks" unit, teachers can ask students to share their experiences of using computer networks in daily life, such as online learning, shopping, socializing, etc., to guide students to think about: what convenience does the network bring to our learning and life? What are the inconveniences when the internet is disconnected? Students speak freely and express their own opinions. Teacher raises another question: Why does internet disconnection affect so many applications? How do computers achieve network interconnection? Students explore the composition and working principles of networks with these questions, thinking more actively and learning more deeply, unconsciously mastering the relevant knowledge of computer networks.

3.2 Guiding students to think and cultivate problem awareness

Design thinking is an innovative thinking model guided by problem-solving, with the core being the ability to identify and solve problems. In information technology teaching, teachers should guide students to actively discover, analyze, and solve problems, and exercise students' keen problem awareness and meticulous thinking ability.

Conventional teaching often involves teachers directly telling students concepts, principles, and methods, with students passively accepting and rarely actively thinking. Over time, students develop the habit of lazy thinking of "feeding what they eat". In response to this situation, teachers need to change the traditional cramming teaching model to a heuristic and exploratory teaching approach, encouraging students to ask and question questions.

For example, when learning the module of "Entering the Internet", the teacher does not simply teach the concept, composition and functions of the Internet, but first asks students to share their experience and feelings of using the Internet at ordinary times, and asks: Why can't the web page open sometimes? What should I do if the internet speed suddenly

slows down? Students take these questions to read materials and search for information, greatly enhancing their initiative in thinking. When encountering something they don't understand, students will consciously ask questions instead of passively waiting for the teacher to explain. Under the guidance of teachers, students' problem awareness continues to strengthen, and they learn to learn and master methods.

3.3 Encouraging diverse expression to develop innovative capabilities

An important characteristic of design thinking is to express design concepts and plans in multiple ways. Brainstorming, creating mind maps, sketching concepts, and creating prototypes are common ways of expression. Through diversified expression, we can visually present abstract design concepts in our minds, allowing team members to understand design intentions, provide feedback, and promote continuous optimization and improvement of design solutions.

Information technology teaching aims to cultivate students' innovative abilities, and an important aspect is to encourage them to express their learning insights and creative ideas in diverse ways. Drawing, charts, animations, videos, web pages, etc. can all become carriers for students to express themselves. Through diverse expression, on the one hand, students can find the most suitable way of expression for themselves and stimulate their interest in expression; On the other hand, students can discover problems and optimize solutions through different forms of expression, and their innovation ability is developed unconsciously.

For example, in the learning of the "Posting Information" unit, teachers guide students to create personal blogs to showcase their own style and share their learning life in a unique way. Students unleash infinite creativity, some create illustrated electronic picture books, some record fun videos, some design cool animations, some develop interactive web pages... During the process of conception and production, students' creative thinking and hands-on abilities are fully exercised.

Excellent works can also be displayed and shared in the class and grade, with classmates coming and going, commenting on each other, and learning from each other's strengths and weaknesses. In peer evaluation, students learn to put themselves in others' shoes, examine their own and others' works with an appreciative and critical perspective, clarify improvement directions through reflection, and continuously improve in practice. This open and interactive learning atmosphere fully stimulates and unleashes students' creativity and innovative potential.

3.4 Emphasizing process evaluation to promote the improvement of comprehensive literacy

Process evaluation runs through the entire teaching process, dynamically recording students' learning status and growth trajectory through various methods such as classroom observation, homework analysis, and student self-evaluation and peer evaluation. For example, in the teaching of the "problem-solving" unit, teachers assign students to group and study the problems in campus information construction, and propose improvement plans. Teachers should not only evaluate the feasibility of the plan, but also pay attention to students' thinking and efforts in problem analysis, team collaboration, and plan design. Which group is good at identifying problems? Which group dares to question and argue? Which group is brave enough to try innovation? These are the key points of evaluation.

Developmental evaluation focuses on students' future development and examines their growth from the perspective of career planning. Each student has their own unique interests, hobbies, and potential for development. Evaluation should be tailored to their individual needs, helping students recognize their strengths, identify their weaknesses, and gain confidence and motivation to make progress. For example, in the "Programming" unit of study, Zhang was very interested in programming and even self studied Python after class, developing classroom games; And Li has a passion for art and design, writing cool interfaces for programs. When evaluating, the teacher not only affirmed Zhang's spirit of research, but also appreciated Li's creative talent, encouraging them to continue to deepen their respective fields of expertise, learn from each other's strengths and weaknesses in collaboration, and make progress together.

4. Conclusion

The reform of the large unit teaching design of information technology in junior high school based on design thinking is a necessary path to conform to the development trend of information technology education and cultivate students' innovation ability. Teachers should establish a scientific educational philosophy, optimize teaching design, and create a learning environment for students to explore, create, and share. They can also stimulate students' interest in real-life situations, cultivate their thinking through problem exploration, develop their innovation ability through diverse expressions, and promote improvement through process evaluation.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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