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Under Traditional Multimedia Conditions, the Exploration of Immersive Teaching Based on Embodied Cognition in High School Biology Classrooms

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Abstract: With the development of immersive high-tech technologies such as AI, VR, and 3D, contemporary students can no longer satisfy the primary sensory experience brought by multimedia teaching. This article aims to pay attention to the important role of various sense organs in the cognition. In small and medium-sized cities teaching that cannot meet high-tech teaching methods such as AI, VR, 3D, etc., an immersive teaching theory based on embodied cognition is proposed, which advocates the return of the body, the mobilization of various senses, and the use of traditional teaching aids and venues. In the corresponding situation, the role is brought in to generate emotions and resonance, so that the students will be integrated into the classroom for cognition, and the learning efficiency will be improved. And actively tried in the high school biology classroom, and achieved good results from the experimental results.

The current human society is gradually entering the era of emerging technologies such as big data, artificial intelligence, cloud computing, 3D experience, and VR. Among them, the application of 3D and VR technology in some fields creates an immersive virtual environment, which brings a new immersive experience to young people. However, the current singular, repetitive, and mechanized learning model of multimedia teaching has not been able to stimulate the enthusiasm of contemporary young students for learning. It is imperative to explore a classroom education that meets the needs of contemporary students. The characteristic of immersive teaching is to break the traditional teaching's neglect of the body, emphasize the unity of body and mind, immerse in the classroom, consciously interact in the classroom to reach the state of selflessness, improve the enthusiasm of students to participate, and promote students to enter the state of deep learning [1].

1. Traditional Multimedia Teaching and the Status Quo of Biology Classrooms in High Schools in Small and Medium-Sized Cities

(1) The status quo of traditional multimedia teaching

In most of the current classroom teaching, teachers mainly use the methods of making courseware display pictures and videos to arouse students' interest in learning, completely ignoring

the role of students' bodies and surrounding environment in cognition. The classroom is full of singular and mechanized multimedia elements, which often makes students feel exhausted. In the whole learning process, only eyes and ears are involved in cognition, and multi-channel perception is not realized. Compared with the traditional teaching mode, this multimedia teaching mode is just that "human irrigation" has become "machine irrigation" assisted by "human irrigation". The entire multimedia teaching model does not deviate from the standardized class teaching paradigm of the industrial society. Based on the “three centers” principle of the classroom proposed by Herbart, Germany, teachers make PPT based on textbooks to transfer knowledge to students, and students master the professional knowledge instilled by the teacher through memory and repeated practice. Although this class teaching system can save time and cost, the subjectivity and initiative of students are greatly restricted, and the role of body and environment perception in the cognitive process is completely ignored [2]. This generation of young people who have been exposed to 3D and holographic technology to bring immersive experience have a sense of boring this traditional teaching mode, and the classroom efficiency has not been well improved.

(2) The status quo of high school biology classrooms in small and medium-sized cities

Biology is an experimental science that focuses on cultivating scientific research talents with inquiry ability. The traditional "you speak, and I listen" model of multimedia teaching is difficult to stimulate students' inquisitive thinking, and the student's feeling biology is a boring subject with rote memorization of knowledge points. It is difficult for students trained in this mode to adapt to the needs of today's society. How immersive teaching should be applied to high school classrooms in small and medium-sized cities. At present, there are many domestic researches, and the more common one is to use virtual 3D technology to present students with an immersive visual and physical experience environment to enhance learners' sense of physical experience. However, it requires a lot of experience to apply this technology to classrooms in small and medium-sized cities. At present, the operability is not strong.

2. Immersive Teaching Concept Based on Embodied Cognition

(1) Immersive teaching

The term "immersion" originally refers to a state in which an object is wrapped in all aspects when it enters a liquid [3]. Immersive experience refers to the state of focusing on something so that you completely forget yourself. Some scholars have made a new definition of immersive teaching: "The immersive teaching model refers to the skillful use of a variety of teaching methods by educators in the teaching process to stimulate learners' interest in learning. Make learners enter a learning state of immersive experience, thereby improving the level and effectiveness of teaching. "[1]

(2) The theory of embodied cognition

The embodied cognition of the new research paradigm was originally based on the critique of the traditional cognition of leaving the body [1]. The book "Phenomenology of Perception" pointed out that "the body is not an object, it is a natural subject. I am my body [4]". The morphological structure of the body, sensory system, motor system and nervous system all affect people's cognitive process. This view has been recognized by most researchers [5]. Lawrence Shapiro mentioned three points of view: conceptualization, substitution and constitutionalization[6]. Conceptualize that the structure of the body determines the content of the mind. Different bodies produce different ways of thinking. Substitution believes that cognition depends on the interaction between the body and the environment, and the three of cognition, body, and environment are a

whole. Constitutionalization believes that part of the body or the environment is the constituent element of cognition. The embodied theory emphasizes the role of body structure and the interaction between the body and the environment in cognition.

(3) Immersive teaching based on embodied cognition theory

Immersive teaching aims to use flexible teaching methods in the classroom to create an immersive, vivid and intuitive learning environment for learners, support learners' perception of multiple channels, and allow the body to interact with the environment to achieve a sense of immersion. This is consistent with the theory of embodied cognition. This form of teaching includes the layout of classrooms, the choice of learning places, the use of VR and other technologies to create a virtual and real environment, the setting of game links, and the participation of students in role-playing. The purpose is to fully mobilize the various structures of the student's body to participate in cognition, and the interaction between the body and the environment so that the student enters a learning state of immersive experience.

High school classrooms in small and medium-sized cities may use VR technology to achieve immersive teaching, which is too costly. Use existing resources to create scenarios, design more game links, and don't stick to the class teaching system, which is low cost and highly maneuverable. There are three characteristics of this immersive teaching. 1. Flexible and changeable teaching organization: Give back the body and space to the students. Classes are not necessarily to fix students in their seats, but to actively create an environment related to the teaching content, liberate the students' bodies, allow the students' bodies to interact with the environment, and participate in cognition together. 2. The changing role of teachers: From the original indoctrinator to the designer of various scenarios and games, as well as the observer and recorder of various physical reactions during the student activity experience. Students change from passive recipients to classroom experiencers. 3. The evaluation system is not a monotonous paper-and-pencil test. It is possible to observe and record the physical behavior of students in the process of students participating in activities, feedback of perception after the activity, and so on.

3. The realization of Immersive Teaching Concepts Based on Embodied Cognition in High School Biology Classrooms in Small and Medium-Sized Cities

The immersive teaching organization is more flexible and open. Classes can be organized from three aspects: outdoor or laboratory experiment exploration, role-playing games for creating scenarios, and group discussion mode. Outdoor or laboratory experimental exploration, for example: the scenes of certain courses in high school can be seen in real life. At this time, our study space can choose to be outdoors instead of necessarily in the classroom. Take the high school biology "Characteristics of the population" lesson as an example: This section aims to introduce the concept of population, population density, population birth rate and death rate, migration rate and migration rate, age composition and sex ratio and other knowledge points. Population is a macro concept that can be seen. If the traditional multimedia teaching is to explain to a few pictures or videos, and ignore the interactive feelings of the students' bodies and the environment, this kind of cognition is not deep. So, I set the learning scene of this class in a place full of plants in the school. Through the interactive experience of the students' body and the environment and the communication assistance between the students, the multi-channel sense organs of the body are used to investigate the population density of certain plants and animals. Learn to apply the method of population density and understand the significance of investigating population density to the ecological balance of the entire planet. After a month, organize the students to come to the same

place to investigate the population density of the same species of plants and animals, analyze the causes of these changes in statistical data, and discuss with each other to draw conclusions. Create a situational role-playing game: The synthesis and transportation of secreted proteins can be used to arrange the walls of the classroom as cell membranes before class to free up the space in the middle of the classroom. Use paper boxes to make ribosomes, endoplasmic reticulum, Golgi apparatus, and mitochondria in the middle of the classroom. Let some students act as amino acids, and some students act as the energy produced by mitochondria to interpret the entire process of protein synthesis and secretion. At the same time, using multimedia to let students play the dubbing of the whole process. Group discussion mode: For example, in the section of the flow mosaic model of biofilms, the entire inquiry process is very boring. We can use the form of question strings to let the students discuss and exchange in groups to answer the corresponding questions on their own. During the whole process, students are allowed to communicate with each other, mobilize the students' bodies, and try their best to achieve the unity of mind and body.

Piaget once pointed out that children's knowledge comes from practical activities. In activities, children act on objects through body movements, and develop experience in the process of contacting the subject and object. The embodied cognition theory also inherits this view [7]. This time we created an embodiment of the teaching environment. Arrange a learning scene that is consistent with the learning content and present the changing process of things that cannot be observed in reality in an intuitive and realistic form. Set up a game plot that conforms to the task of teaching content. Let students do tasks, experience game plots, take on roles, and fully mobilize students' multi-channel participation such as vision, hearing, and touch. Let students consciously interact in the game to reach the state of selflessness.

4. Analysis of the Effects of Traditional Multimedia Teaching and Immersive Teaching

Multiple classes at the same level are divided into two groups, A and B. When the same teaching content is carried out, group A conducts traditional multimedia teaching, and group B conducts immersive teaching. Timely test after class, delayed test (Test after one week) and random question and answer on a certain knowledge point. The results are shown in Table 1.

Table 1: Comparison Table of Traditional multimedia teaching And Immersive teaching effect

	Number of students	Average of Test without delay		Average of Delay Test	
		Written Test	Oral Test	Written Test	Oral Test
Group A	125	75.2	70%	60.6	45%
Group B	130	81.4	95%	77.2	85%

This table shows that, the average score of immersive teaching increased 16% compared with the traditional method (75.2 increase to 81.4), and the accuracy rate of Q & A increased 25% (70% increase to 90%); the written average of Delay Test decreased 14.6 (Group A) and 8.2 (Group B), and the oral test accuracy of Delay decreased 25% (Group A) and 10% (Group B).this means that immersion has a positive effect on achieving efficient classrooms. With the improvement of performance, the in-depth knowledge of mastery has also improved.

5. Conclusion

Aiming at the current high school students' sense of boredom in traditional multimedia teaching, this paper proposes a method based on embodied immersion teaching. Under the objective background that primary and secondary schools cannot use 3D and VR technology to bring

immersive experience, this method uses flexible organizational forms, equal and interactive teacher-student relations, and active real-time evaluation to bring a concrete immersive experience. It also proposes a good teaching method for improving students' cognition of high school biology knowledge. This teaching method also has certain promotion value in other subjects and other stages of teaching.

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