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Analysis of the Essence of Blended Learning—A Dual Perspective Based on Embodiment Theory and Technological Environment

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Abstract: The blended learning that students need is not merely a simple mix of technologies, but rather the creation of a truly highly engaging, personalized learning experience. The implementation of blended learning emphasizes a student-centered approach, focusing on knowledge construction, supporting interpersonal interaction, requiring teachers to provide external resources, and offering technical and human support; social interaction among learners supports self-directed learning in online learning environments; it is an open, blended form of learning. Therefore, this paper re-examines the characteristics, attributes, and essence of blended learning from the dual perspectives of embodied cognition theory and technological environments. It discusses the embodied, contextual, generative, and dynamic characteristics of blended learning under the framework of embodied cognition theory, and reflects on phenomena such as the technological infiltration of learning environments and the emotional deficit in online learning under the “dual-teacher classroom” model. Based on these dual perspectives, this paper explores the essence of blended learning and provides appropriate learning design ideas for teachers implementing blended learning.

1. Introduction

Blended learning is the personalized appeal of learners in an online learning environment. Fallon believes that synchronous online learning is centralized learning. In the same field as teachers and students can enhance their sense of participation in learning and spread more real-time information, but students do not have enough time to think deeply about other people's views. [1] Hrastinski conducted a comparative study on asynchronous online learning and synchronous online learning, and found that asynchronous online learning has the advantages of delay, freedom and more communication opportunities. That is, when students or teachers and students communicate on a certain issue, they do not need to respond immediately, nor do they have to be online at the same time. Students can get enough time to think deeply.[2]Therefore, large-scale online learning in hybrid learning flexibly adopts two online learning forms: "synchronous + asynchronous" to assist "synchronous" with "asynchronous" to promote students' deep thinking. Online learning faces many challenges, including teachers, students, learning resources, teaching equipment, etc. One of the main ways to deal with this challenge is to conduct personalized education, that is, to match the teaching

content, learning methods and learners' knowledge, abilities, preferences and cognitive levels, so that the two are connected and adapted together without being disconnected, and combine the advantages of online teaching and offline learning. Therefore, hybrid teaching emphasizes the learners' full participation, and also requires students to master certain technical abilities, which is the key to achieving hybrid learning.

2. The Embodied Cognitive Characteristics of Blended Learning

Blended learning features embodiment, contextuality, generativity and dynamism. Compared with traditional cognitivism that holds the view of the separation of mind and body, the embodied cognition theory emphasizes the dependence of cognition on the body. The body is the medium through which we interact with the world. When we exchange information with the outside world, it is constrained by the body, such as the psychological and physiological aspects. The formation of cognition is not merely an internal activity of the brain, but rather it is generated and developed through the interdependence of the brain and the body in specific social practices, in real-time and stressful activities.[3] From the perspective of embodied cognition, the characteristics of blended learning include embodiment, contextuality, generativity and dynamism, among which embodiment is the core and an important distinction from other traditional cognitivism.[4]Therefore, from the perspective of the embodied cognition theory, blended learning should be an embodied learning process. It continues the features of the embodied cognition theory, requiring students to have an active learning motivation, emphasizing the full participation of the cognitive individual, and constructing their cognitive structure through interaction with the external teaching context, promoting the development of higher-order thinking skills. It is a meaningful learning process.

2.1. The Embodiment of Blended Learning

Blended learning embodies experientiality, meaning cognition is not an abstract mental activity isolated within the brain but highly dependent on the body's physiological characteristics, neural structures, and modes of activity. It also involves the embedding of bodily sensations, experiences, and other empirical dimensions. The body is the subject of perception, perception is the body's fundamental skill, and cognition is the perceptual experience formed through the interaction between the body and the external environment. As a multisensory receptor, different ways of bodily participation lead to different cognitive outcomes.[5] For example, learners use the body as a medium to perceive information, influencing their cognitive processes of the external learning environment. The body serves as an interface for interacting with learning content, where knowledge acquisition is the result of continuous interaction between the cognitive individual and the external learning environment. The body also acts as a "probe" triggering cognitive processes, making learning a process where physiological experiences activate psychological sensations.

The "perception-action" system is a learning mechanism for the operation of embodied features in hybrid learning. The entire system can be attributed to the cognitive individual's perception of the external world, the effective interaction between the cognitive individual and the learning content. It emphasizes the positive perception of learners, that is, active learning will only occur when the learner produces correct performance in the "perception-action" cycle. The multi-channel perception of information by cognitive individuals is the perception link of the "perception-action" system. The perception link is of great significance to hybrid learning. It will not only affect learners' perception of the external environment, but also determine the generation and development of learners' cognition.[6] Multi-channel perception, that is, cognitive individuals as multi-sensory receptors, and their body's multi-sensory channels are the communication medium between the individual and the external environment, including kinesthetics, touch, vision, hearing, smell, etc., among which about 65% of

the received external information passes through the visual channel, 20% passes through the auditory channel, 10% passes through the tactile channel, and 2% passes through the taste channel.[7] These channels not only act in the information perception stage, but also in the interaction of perceived results, and even processing and application links. From the perspective of cognizing individuals' multi-information perception channels, hybrid learning should support the design and presentation of learning content in a multi-media and multi-form manner, helping learners perceive learning content from various channels. For example, for abstract concepts, visualization technology, multimedia technology and even tactile simulation technology can be used to synchronize multiple perception channels of the body. By integrating the feedback information obtained from each channel, learners can form more accurate, comprehensive and vivid cognitive results for cognitive objects. In addition, multi-channel perception is also conducive to promoting the transfer and application of knowledge, that is, promoting learners to simulate the physical state of cognition when it occurs in new situations and recall the corresponding things and their meanings. The effective interaction of cognitive individuals with learning content is the interactive link of the "perception-action" system. Embodimental theory believes that the acquisition of knowledge is not the result of processing operations on abstract symbols in the brain, but the perceptual experience formed by learners in the process of continuous interaction between their "perception-action" system and the learning environment, that is, cognition.[8] To this end, blended learning should support learners to use their bodies to interact naturally with the learning content. This interaction includes both non-contact interaction based on vision and hearing, such as dynamically adjusting the presentation of learning content through language or expressions; and also includes contact interaction based on kinesthetic and touching, manipulating, and previewing learning content through body movements or gestures.

2.2. Situationality of blended learning

Blended learning is characterized by a multi-situational experience. Embodimental theory believes that individuals construct cognitive structures in the interaction with the external environment, so cognition can only be transferred to the constructed cognition when cognition is in the real environment. The situationality emphasized by embodied cognition reflects the criticism of the objective universality and inevitable validity of cognition by embodied cognition. This is also a denial of information processing theory, which means that cognition is formed by the interaction between the individual and the outside world in actual situations. At this time, the physical conditions are not only affected by the individual themselves, but the external environment also plays a role in cognizing individuals. For example, external cultural tendencies, social atmosphere, technical support, etc. have an impact on the individual's positive perception, and cognition is formed in the interaction between this actual environment and the individual. According to the perspective of embodied cognition, the situation has important significance in embodied learning. In hybrid learning, the learning content needs to be presented in specific situations, such as real places, practical activities, social and cultural related to the formation or application of the learning content. This means that students need to achieve better learning results in specific learning situations, so situational design of learning content is necessary, mainly including interesting design of learning content and multimodal design of learning environment.

2.3. The Generativity and Dynamism of Blended Learning

Mixed learning has the characteristics of generability and motivation. The blended learning process is dynamically changing, mainly adapting to the learner's actual situation, and is based on the subject's physical experience and situational interaction.[9] The generative and dynamic nature of hybrid learning make hybrid learning activities a dynamic system. The learner's cognition in hybrid

learning is constantly generated in an embodied manner. The cognitive development process is consistent with the characteristics of the dynamic system, that is, the current state determines the future state, and what plays a role in the current state is the learner's active state. The relationship between physical experience and knowledge understanding and acquisition is also reflected in the generative and dynamic nature of mixed learning; active physical performance can more stimulate learners to acquire experience in the external world, thereby converting them into their own knowledge. The interaction between the body and the external environment in the current state affects the accumulation of knowledge in the future state, which is also a kind of generative learning.

From the perspective of generative learning, the learning goals in hybrid learning are not predetermined, but should be naturally generated during the learning process based on the interaction between learners, teachers and environments. The learning goals generated in this case meet the expectations of all parties and are a reasonable learning goal; and the learning process is gradually generated in the continuous clarity of the learning goals. In the process of change, learners can choose a learning method that suits them and understand their learning style. Big data technology provides a visual basis for the dynamics and generative nature of hybrid learning. Through big data technology, the learners' various states in the learning process are marked, especially the panoramic map reproduction of various positive states in interaction with the external environment, which helps explore the development mechanism of knowledge accumulation and acquisition in the interaction between learners and the external environment, and helps educators to obtain the degree of impact of the environment on learners' knowledge acquisition when studying environmental variables, and provide the most suitable environment for learners. At the same time, through the supply of the environment, learners' personalized cognitive development paths are guaranteed. This development path is not fixed, but is constantly changing and dynamically generated according to the specific learning process, becoming a tendency factor adapting to learners.

3. The "Dual-Teacher Classroom" Attribute of Blended Learning

"Dual-teacher classroom" (including both the model of online lecturers + offline tutoring teachers, as well as the model of AI intelligent teachers + human teachers) is not only a representative model of hybrid teaching, but also an intuitive experience of students' mixed learning. The purpose of hybrid learning in the "dual-teacher classroom" stage is no longer satisfied with the development and utilization of online teaching platforms and digital teaching resources, and pays more attention to leveraging the dual classroom advantages of the unity of online teaching and offline teaching. Online classrooms use online teaching platforms as carriers to present numerous online teaching resources on the platform in the form of text, images, audio, etc. for learners to browse and learn; using big data technology to provide learners with a suitable technical support environment.[10]In this technical environment, it is essential to learn to use technology. This not only requires teachers to have information technology capabilities, but also requires students to master certain technical capabilities. Otherwise, they will be separated from the classroom learning process. This technical ability is not only a simple computer or software operation step, but also a student's computer thinking, the ability to use technology to solve problems and optimize learning efficiency.

3.1. Human-Machine Collaborative Learning in the "Dual-Teacher Classroom"

In the "dual-teacher classroom", there are not only "human-machine collaboration" teaching scenarios, but also "human-machine collaboration" learning scenarios. In this scenario, learning with machines is a basic information ability that learners need to master, and the application of technology is also a basic key point in core literacy. [11]The "human-machine collaborative" learning scenario is the main manifestation of the "dual-teacher classroom". It combines online learning with learning in

traditional classrooms, gives full play to the advantages of both, and creates a "online" + "offline" hybrid learning, which in turn promotes students' deep learning. Online mainly focuses on traditional teaching, so that students can master systematic knowledge; offline focuses on students' knowledge transformation, creates a high-fidelity learning environment for them, combines the knowledge learned in class with practice, and deepens the acquisition and understanding of knowledge. Whether it is online or offline learning, it aims to cultivate students' problem solving, high-level thinking and the formation of core literacy. Under the current smart education concept, the "human-machine collaboration" learning scenario is also pursuing a higher level, namely the smart learning environment. The emergence of artificial intelligence education robots has gradually changed the functions of teachers in the "dual-teacher classroom". Some teaching tasks have been transferred to "AI intelligent teachers", such as traditional classroom teaching, learning situation recording and analysis, class management, problem reply, homework correction, resource creation, etc., which is more conducive to students' personalized learning; and the key to the "human-machine collaboration" learning scenario lies in the diversity of learning forms, the boundlessness of the learning content and learning environment, and the appropriateness of the learning methods.

3.2. Emotional Experience in the "Dual-Teacher Classroom"

In the "dual-teacher classroom", there are not only "human-machine collaboration" teaching scenarios, but also "human-machine collaboration" learning scenarios. In this scenario, learning with machines is a basic information ability that learners need to master, and the application of technology is also a basic key point in core literacy. The "human-machine collaborative" learning scenario is the main manifestation of the "dual-teacher classroom". It combines online learning with learning in traditional classrooms, gives full play to the advantages of both, and creates a "online" + "offline" hybrid learning, which in turn promotes students' deep learning. Online mainly focuses on traditional teaching, so that students can master systematic knowledge; offline focuses on students' knowledge transformation, creates a high-fidelity learning environment for them, combines the knowledge learned in class with practice, and deepens the acquisition and understanding of knowledge. Whether it is online or offline learning, it aims to cultivate students' problem solving, high-level thinking and the formation of core literacy. Under the current smart education concept, the "human-machine collaboration" learning scenario is also pursuing a higher level, namely the smart learning environment. The emergence of artificial intelligence education robots has gradually changed the functions of teachers in the "dual-teacher classroom". Some teaching tasks have been transferred to "AI intelligent teachers", such as traditional classroom teaching, learning situation recording and analysis, class management, problem reply, homework correction, resource creation, etc., which is more conducive to students' personalized learning; and the key to the "human-machine collaboration" learning scenario lies in the diversity of learning forms, the boundlessness of the learning content and learning environment, and the appropriateness of the learning methods.

4. Conclusion

Technological environments enable blended learning, but student-centered attention ensures its application and development. From embodied cognition, blended learning design should reflect embodiment, situatedness, generativity, and dynamism. From the "dual-teacher classroom," it requires human-machine collaboration skills. From its essence, balancing personalized and large-scale online learning is key.

This paper re-examines blended learning's embodied features, dual-teacher attributes, methods, and essence, offering design insights for student cognition, adaptation, and optimal implementation.

References

[1] Falloon,G.(2011)Making the Connection: Moore's Theory of Transactional Distance and Its Relevance to the Use of a Virtual Classroom in Postgraduate Online Teacher Education. Journal of Research on Technology in Education, 43(3), 187-209.
[2] Hrastinski, S.(2008)Asynchronous and Synchronous e-Learning:A Study of Asynchronous and Synchronous e-learning Methods Discovered that Each Supports Different Purposes. Educause Quarterly,31(4),51-55.
[3] Wang Jing, Chen Weidong. (2016)A Re-examination of the Essence of Blended Learning from the Perspective of Embodied Cognition. Journal of Distance Education, 34(05): 68-74.
[4] Hu Wannian, Ye Haosheng. (2013)Research Progress of Embodied Cognition in Chinese Psychological Circle. Journal of Dialectics of Nature, 35(6): 111-115, 124.
[5] Meng Wei. (2007)Embodiment, Cognitive Science and the Development of Traditional Theories of Meaning. Minds and Machines, (01): 114-121.
[6]Tang Peipei, Ye Haosheng. (2012)The Body as a Subject: From Disembodied Cognition to Embodied Cognition. Psychological Research, 5(3): 3-8.
[7] Zhang Jingwei, Su Huili. (2021)Knowledge Extension and Existence Contraction of Remote Presence: An Ontological Interpretation of Online Education. Open Education Research,27(01): 65-70.
[8] Zhao Ruibin, Fan Wenxiang, et al. (2020)Construction of Embodied Mixed Reality Learning Environment (EMRLE) and Design of Learning Activities. Journal of Distance Education, 38(05): 44-51.
[9] Jiao Caizhen. (2020)The Significance of Embodied Cognition Theory in Teaching Methodology. Journal of Northwest Normal University (Social Sciences Edition),57(04): 36-44.
[10] Zhang Runzhi, Liang Yao.(2021)Some Thoughts on Promoting Blended Teaching of Ideological and Political Theory Courses. Ideological and Theoretical Education, (01) : 65-69.
[11] Wang Shichong, Fang Haiguang, et al.(2019) Research on the New "Dual-Teacher Classroom" Supported by Artificial Intelligence Educational Robots: Also on the "Human-Machine Collaboration" Teaching Design and Future Prospects. Journal of Distance Education, 37 (02) : 25-32.