Curriculum and Teaching Methodology (2023)
Clausius Scientific Press, Canada

DOI: 10.23977/curtm.2023.060410
ISSN 2616-2261 Vol. 6 Num. 4

The Application of Hybrid Teaching Mode under the Guidance of Deep Learning Theory in Courses of Artificial Intelligence

Yiyang Sun*, Shuxi Chen, Yan Wang, Kai Yang, Chunhua Lin

School of Computer and Information Engineering, Nantong Institute of Technology University, Yongxing Road No. 211, Nantong, China
**Corresponding author*

Keywords: Deep learning, Hybrid learning mode, Information teaching technology, Effective learning, Artificial intelligence

Abstract: At present, improving students' core literacy is the focus of classroom teaching. For this reason, all kinds of schools at all levels have carried out teaching practice exploration, but the effect is not obvious. It is difficult to achieve the goal of cultivating students' core literacy. The reason is that classroom teaching practice lacks "depth". Deep learning is a kind of immersive learning method. It is a kind of high-level learning. It is an important way to cultivate students' core quality. Based on this, taking the course of artificial intelligence as an example, this paper first combs the connotation of deep learning and the characteristics of classroom teaching; then, guided by the theory of deep learning, aiming at cultivating students' core literacy, the article adopts the online and offline mixed teaching mode. We construct the mixed teaching mode under the perspective of deep learning from the aspects of teaching links, teacher-student activities, teaching evaluation, resources and tools, etc; Finally, the article takes the professional course of artificial intelligence as an example to carry out a teaching quasi-experiment, which comprehensively verifies the promotion effect of the teaching mode on students' in-depth learning from the two dimensions of learning process and learning results, in order to enrich the relevant research of the hybrid teaching mode, provide reference for the efficient development of the hybrid teaching, and help students cultivate their core literacy. From the perspective of teaching effect, the deep learning theory has solved the problem of shallow learning in the current mixed teaching to a certain extent, promoted the effective learning of learners, and formed an innovative learning idea.

1. Introduction

Nowadays, how to improve students' core literacy has become the focus of attention around the world. In recent years, China has gradually taken cultivating students' core literacy as the focus of education reform, and has issued corresponding policies for this purpose. In April 2022, we clarified the specific requirements for the cultivation of new people in the era of compulsory education, and emphasizing the cultivation of students' core qualities required for lifelong

development and social development. In October of the same year, "develop quality education" is proposed, which further highlights the importance of cultivating students' core literacy.

As the main position of education reform, the classroom is also the key place to implement the development of students' core literacy [1]. At present, online and offline hybrid teaching is one of the common teaching modes. It greatly improves classroom efficiency. However, through literature review and field research, it is found that the current mixed teaching mode has problems such as formalization, modularization and mechanization. It leads to the lack of opportunities for students to improve their innovative thinking ability and comprehensive ability to solve practical problems in life. There is no obvious improvement in the learning effect of students [2].

Artificial intelligence is the specialty of the college of computer and information engineering, and various teaching modes are still being explored. It is necessary to find suitable teaching modes to achieve better teaching effects, so as to achieve the purpose of professional talent training. Integrate the theory of deep learning with hybrid teaching, take the hybrid learning mode as the guiding theory of constructing the framework of learning system, take the deeper learning cycle (DELC) as the practical guidance of carrying out the hybrid teaching, reasonably combine the traditional teaching and online teaching, so as to promote the effective learning of learners, achieve the purpose of deep learning, and form the teaching mode of AI professional courses [3-4]. Improve the teaching effect in an all-round way, improve the taste of school running, and promote the common development of teachers and students.

2. Research Status

2.1. Research Status of Deep Learning

The concept of deep learning was first put forward by American scholars Ference Marton and Roger Saljo in 1976 in the paper "Essential Difference of Learning: Results and Processes" [5]. According to the level of cognitive dimension, learning is divided into deep learning and shallow learning. In 2005, the study of deep learning officially entered China. Professor Li of Shanghai Normal University formally put forward the concept of deep learning in the article "Promoting students' deep learning". He believes that deep learning is a kind of understanding based on which learners can critically learn new ideas and knowledge, then integrate them into the original cognitive structure [6]. Be able to connect with many ideas and transfer existing knowledge to new learning situations, so as to make decisions and solve problems. At present, this theory is still recognized by most scholars.

2.2. Research Status of Hybrid Teaching Mode

Hybrid teaching originated from the blended learning theory that appeared abroad at the end of the 20th century. He Kekang, professor of Beijing Normal University, introduced the concept of blended teaching into China for the first time in 2003 [7]. Although academic circles have different definitions of "mixed" approach, it is basically nothing more than the integration of different learning theories, learning environment, learning methods, learning resources, learning participants, and so on.

At present, many scholars regard hybrid teaching theory as the leading theory in the in-depth development stage of China's education informatization. To sum up its basic point of view, hybrid teaching is to combine the advantages of traditional teaching methods with the advantages of online teaching. Only by giving full play to the leading role of teachers in guiding, enlightening and monitoring the teaching process, and fully reflecting the initiative, enthusiasm and creativity of students as the main body of the learning process, can we obtain the best learning results.

2.3. The Trend of Hybrid Teaching Mode under the Guidance of Deep Learning Theory

The application research of hybrid teaching mode under the guidance of deep learning theory in the course of artificial intelligence specialty aims at improving the effectiveness of teaching. We deeply study and understand the theory of deep learning in the field of learning science. According to the curriculum outline of AI specialty, widely collect and sort out effective teaching methods, integrate teaching resources, design reasonable teaching evaluation mode, clarify ideas, scientific reference, practice comparison, focus on innovation. So that, to explore a set of more systematic and effective teaching modes that adapt to the teaching practice of AI professional courses and promote the harmonious development of students.

3. Role of Hybrid Teaching Mode in Teaching

3.1. Diversified Teaching Mode

Hybrid teaching mainly refers to the combination of online and offline teaching scenes. It not only has the advantages of traditional online teaching mode, but also integrates many advantages of online teaching. The teaching process is no longer limited to the classroom. We arrange online and offline teaching content reasonably. Two-way extension of breadth and depth through the Internet. The diversified teaching mode can better improve the quality of application-oriented undergraduate teaching.

3.2. Improve the Effect of Industry-education Integration

The integration of production and teaching is an important way for our college to improve students' problem-solving ability. The integration of production and teaching requires that excellent practical teaching resources be absorbed from the computer industry to improve students' hands-on ability. Through mixed teaching, students are easier to establish practical links with enterprises. Students can detailed analysis of the actual application cases of enterprises can effectively improve the skills of computer students in the integration of theory and practice.

3.3. Integrate and Optimize Various Teaching Resources

In the context of information technology, compared with traditional offline teaching resources, online education teaching resources are more abundant. Integrating online and offline teaching resources based on talent training programs and curriculum education and teaching objectives can better help students sort out professional curriculum knowledge, strengthen professional skills, and facilitate students to build their own knowledge system.

3.4. Effectively Meet Students' Learning Needs

Under the situation of more and more information, the limitations of traditional offline classroom teaching are gradually revealed, which can no longer meet the needs of students' knowledge acquisition. Hybrid teaching mode transfers part of learning to online, so that, students can acquire knowledge independently and meet the growing knowledge needs of students. On the other hand, fragmented learning can help students improve their learning efficiency.

4. Application of Hybrid Teaching Mode under Guidance of Deep Learning Theory

From the perspective of teachers, the deep learning route includes: designing standards and

curriculum, pre-evaluation, creating a positive learning culture, preparing and activating advanced knowledge, acquiring new knowledge, in-depth processing knowledge, and evaluating students' learning [8]. The deep learning route is shown in Figure 1.

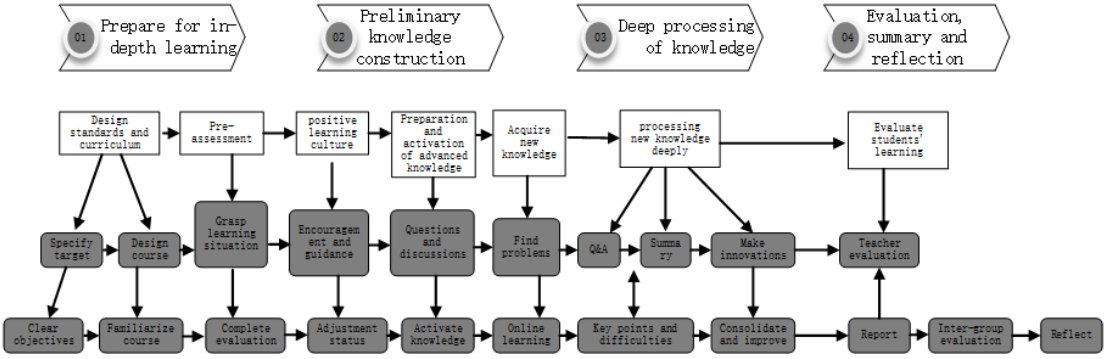

Figure 1: Deeper Learning Cycle

4.1. Utilization, Development and Integration of Effective Teaching Resources

Teaching resources are the basis of each course. Hybrid teaching is mainly a combination of online and offline teaching mode. Offline course resources mainly focus on textbooks and courseware. The textbook is selected by the course group after detailed reading and comparison. In the process of teaching, it is advocated to “use teaching materials” instead of “teaching materials”. In addition, we organize teachers to conduct in-depth development of teaching materials. Online teaching resources mainly include video, micro-course, knowledge point summary, etc. We adopt a combination of extensive collection and innovation and self-control to build a teaching resource library with curriculum characteristics [9].

4.2. Reasonable Teaching Mode

The traditional teaching mode is teacher-centered and student-centered learning. This paper constructs an equal teaching relationship between teachers and students, and forms a new teaching model with students as the main body. The hybrid teaching model under the guidance of the deep learning theory proposed in this paper will be based on Bloom's taxonomy of educational objectives [10], constructivist theory, and situated cognition theory. We take the DELC as the practical guidance for carrying out blended learning. Specific teaching steps include:

(1) Assessing students' existing structure, which includes students' existing knowledge system and experience. We encourage students to construct their own cognitive schema through assimilation, adaptation and balance in life and learning. Furthermore, various emotions and experiences gained in the process of schema construction. In the process of in-depth teaching, teachers understand students' existing knowledge through pretest and analyze students' "recent development zone". The way we improve students' cognition in different levels in the setting of teaching task list. We make full use of the former structure to guide teaching in a positive way and achieve in-depth teaching [11].

(2) Designing teaching content. We combine theory and practice in course design. On the premise of the overall design of the whole course, we design the project module for the teaching content. At the same time, design meaningful and in-depth teaching questions. Reshaping students’ knowledge schema by online preemptive answering or classroom questioning. Finally, adopting diversified teaching evaluation methods, which includes process and attitude assessment.

(3) Building a learning community. We encourage students to realize their innovative ability in practical work, encourage teacher-learner interaction vs learner-learner interaction through online

education and teaching platform. So as to achieve the function of reflection and promote in-depth learning.

(4) Creating a positive learning atmosphere. Deep learning requires students to reprocess and contextualize their knowledge. Under the hybrid teaching mode, students can obtain more situational learning opportunities through the integrated and optimized online teaching resources of teachers.

(5) Evaluation and detection.

4.3. Students' In-depth Learning Methods

The characteristics of simple learning are mechanical memory, passive learning, exam-oriented education, low-level thinking and lack of reflection, which is differ from deep learning. Deep learning is characterized by memory based on understanding. Learning is the active learning of one's own needs, which has clear objectives. When we learn, we may pay attention to the connection between new and old knowledge. Deep learning links the course content with real life and pay attention to application. Deep learning is a kind of advanced thinking and a process of continuous reflection. This learning mode can promote students to achieve higher order thinking and is conducive to the construction of difficult knowledge. The knowledge and skills acquired by students will also be better understood, maintained and applied for a long time.

4.4. Effective Learning Effect Evaluation System

Diversified evaluation methods and process sustainability are the guarantee of in-depth learning.

5. Conclusion

Based on the demand of current social development for the cultivation of application-oriented undergraduate talents, the author applies online and offline hybrid teaching in the teaching of artificial intelligence. We transfer knowledge in the way that students are accustomed to acquiring knowledge, and help students build their own knowledge schema. We carefully designed scenarios to enable students to conduct in-depth learning in task projects, then update their own knowledge base. Finally, the students' learning effects are comprehensively evaluated through various evaluation methods. Practice has proved that the hybrid teaching mode has promoted the cultivation of students' cooperative ability and the improvement of their innovative ability. The deep integration of information technology and classroom teaching has great value for promoting students' deep learning.

Acknowledgements

This work is sponsored by: (1) the project of philosophy and social science research in colleges and universities in Jiangsu Province under Grant No.2022SJYB1758; (2) the college students' innovation and entrepreneurship training program of Nantong Institute of technology in 2022 under Grant No.XDC2022075, XDC2022077; (3) the project of basic scientific (natural science) research in colleges and universities in Jiangsu Province under Grant No.22KJB520032.

References

[1] Zheng Wei, Liu Yuexia. Deep learning: teaching improvement based on core literacy. Education Research, 2018, (11): 56-60.

[2] Meng Junzhen. The application of research-oriented concept in advanced learning of online courses. University

Education, 2022, No.142 (04): 21-23.
[3] Zhang Zhengren, Yang Juan, Yin Pengfei. Effective path of hybrid teaching in colleges and universities to promote deep learning. Journal of Teacher Education, 2023, 10 (02): 98-105.
[4] Li Huan, Wu Di, Zhu Sha, et al. Research on the construction and application of smart classroom teaching mode in the perspective of deep learning. Modern Education Technology, 2023, 33 (02): 61-70.
[5] Ference Marton, Roger Saljo. Essential Difference of Learning: Results and Processes, 1976.
[6] He Ling, Li Jiahou. Promoting students' deep learning. Modern Teaching, 2005 (05): 29-30.
[7] He Kekang. Looking at the new development of educational technology theory from Blending Learning. Research on Audio-visual Education, 2004 (03): 1-6.
[8] Eric J, Le A N. Seven powerful strategies for deep learning. Shanghai: East China Normal University Press, 2010.
[9] Yang Hui. Research on the application model of deep learning in the mixed learning environment. China Adult Education, 2019 (23): 3-8.
[10] Lorin Anderson. Bloom's Taxonomy of Educational Objectives. Beijing: Foreign Language Teaching and Research Press, 2009.
[11] Wang Zhiyan. Research on the design and practice of promoting students' in-depth learning under the mixed teaching mode. Industry and Information Education, 2022 (11): 4-7.