

## Research Article

# Systematic Mode Construction of Mixed Teaching from the Perspective of Deep Learning

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Deep learning will be one of the key technologies to promote learning in the next five years. With the rapid advancement of the information era, significant changes in students' learning and thinking patterns have occurred. How to further encourage the development of students' professional skills and innovative capacity has become the focus of society under the influence of the notion of deep learning. With the application of information technology in education, blended learning, as the only key trend mentioned in the new media alliance report for five consecutive years, has injected fresh vitality into the reform of traditional classrooms and laid a foundation for better promoting in-depth learning. Therefore, how to effectively use blended learning to change these phenomena has become an urgent problem to be solved. The goal of this research is to encourage pupils to learn in depth. This study specifies the design idea of a hybrid teaching mode supported by an information environment based on the promotion of high-order thinking capacity. Firstly, this study uses the literature research method to sort out the relevant literature on deep learning and hybrid teaching, which provides a theoretical basis for the later construction. Second, a questionnaire is utilized to assess the existing state of in-depth learning as well as the need for blended teaching. The mixed teaching mode has effectively promoted the development of students' high-level thinking abilities such as autonomous learning, problem-solving, and application innovation; played a positive role in cultivating students' in-depth learning; and finally won the unanimous recognition of students.

## 1. Introduction

Deep learning will be one of the key technologies to promote learning in the next five years, and the methods to promote students' deep learning are put forward, which aims to cultivate students' critical thinking, autonomous learning, and cooperation ability; advocate project-based and problem-based and inquiry learning tasks; and help students achieve critical thinking, problem-solving, and the process of cultivating innovative thinking and other abilities [1]. Although there are many current educational reform situations, most of them pay attention to whether the teaching effect can effectively improve students' performance, and some pay less attention to the improvement of learners' in-depth learning ability such as problem-solving, cooperation, and communication. From the perspective of deep learning, the cultivation of skills and abilities in the twenty-first century has become the focus of deep learning [2]. In

particular, higher vocational students have stronger requirements for learners' practical ability and pay more attention to the transfer and application of learners' knowledge. At present, in the classroom of higher vocational students, learners generally have a state of shallow learning [3]. Through observation, the author finds that learners have no interest in learning, poor learning initiative, low participation in classroom discussion, communication, and other activities and lack problem-solving and application abilities and knowledge. These problems seriously hinder the development of learners. Based on the cultivation of normal students' professional ability and the requirements of in-depth learning ability in the information age, how to change the current situation and promote the in-depth learning of normal students is an urgent problem to be solved [4].

Traditional teaching is a passive process of students receiving knowledge. The role of "speaking" is played by teachers, while the role of "listening" is played by pupils. This

state is the norm in the traditional classroom. Students only ask themselves to remember hard in order to cope with the final exam [5]. Therefore, the learning state of students in the traditional classroom only stays at the shallow stage of “remembering,” lacks interaction with teachers and in-depth thinking on problems, stays at the stage of examination-oriented education, and lacks deep-seated learning to improve their abilities in all aspects. Although some students want to learn knowledge in class or this course and transfer it to real life, due to the learning atmosphere of the whole classroom and the lack of effective guidance from teachers, the in-depth learning of these students is also difficult to achieve and ensure [6]. Relying on the teaching mode of technological transformation, create an intelligent training environment, teach students according to their aptitude, cultivate innovative talents, and promote the development of students’ technical literacy and ability [7]. And with the proposal and development of educational informatization 2.0, the requirements for students not only pay attention to the improvement of performance but also pay more attention to the cultivation of ability. The vision in the era of information education is to innovate teaching mode, improve students’ learning ability, and cultivate innovative talents under the condition of using various new technologies [8].

While combining the advantages of face-to-face teaching and online teaching, hybrid teaching should pay attention not only to students’ mastery of knowledge but also to the development of students’ thinking ability [9]. As the main force and practitioner of teaching reform, teachers need to design a teaching model with strong students’ experience, reintegrate technology and classroom, create an online and offline hybrid teaching model, and effectively give full play to the advantages and role of technology in mobile learning, learning data analysis, and learning personalized records, so as to promote students’ internalization and absorption of knowledge and cultivate students to be happy and eager to learn [10]. In order to improve learners’ high-order thinking and propose ideas for promoting normal students’ in-depth learning in the context of the new era, it is anticipated to promote learners’ in-depth learning in the classroom activities of mixed teaching. In addition, technology is integrated into the traditional classroom to alleviate the depressed learning environment and to improve learning, cooperation, and communication between teachers and students in other areas [11]. It can help students not only master and transfer knowledge in unique teaching techniques but also encourage teachers to produce learning tools for their students.

The structure of this article is organized as follows. The literary works related to this study are presented in Section 2. The systematic mode construction is explained in Section 3. The experimentation and results of the suggested method are presented in Section 4. Finally, Section 5 summarizes the paper’s main points.

## 2. Related Work

In this section, we defined the research status of deep learning and research status of hybrid teaching.

*2.1. Research Status of Deep Learning.* Through reading the literature on deep learning, it is found that there are two kinds of research: one is machine learning in the field of the neural network, and the other is cognitive science in the field of education. This paper mainly carries out relevant research in the field of education. The concept of deep learning was first put forward by American scholars [12]. The origin of this concept is an experiment of reading articles done by these two scholars on students. In this reading, they divided the students into two groups. The experimental results found that one group of students paid more attention to the questions asked by the teacher in the process of reading and did not have a deep understanding of the article but only learned the surface with the questions [13]. In another group of students, they not only can answer the teacher’s questions well but also can connect the learning content with the previous learning content so that the old knowledge can be transferred and applied. Then, according to this experiment, the two scholars put forward relevant concepts and compared deep learning with shallow learning [14]. This concept points out that according to the differences in the construction methods of students’ knowledge, there are obvious differences in the construction results. It defines deep learning as the development of high-level thinking with critical problems and promoting knowledge transfer and construction. In the shallow process, students use mechanical memory, while in the deep process, they study knowledge on the basis of internalization. At the same time, they found that students who use deep learning methods to think can gain efficient learning. On this basis, the researchers have made a deep understanding and development of deep learning [15]. They believe that the current machine learning commonly existing among students belongs to shallow learning, and deep learning belongs to the process of internalization and absorption of knowledge.

In terms of technical support for in-depth learning, many foreign researchers also promote in-depth learning through new teaching modes such as MOOC, SPOC, and microvideo; some researchers use e-learning environments to promote deep learning [16]. The researchers put forward the in-depth learning analysis framework of online education, and it pointed out the online discussion strategies: In terms of promoting deep learning strategies, many studies believe that there is a correlation between deep learning strategies and achievement, and it emphasizes that on the premise of improving learners’ learning effect, we should turn to learner-centered teaching design. Scholars believe that inquiry and ability-based learning can effectively promote learners’ in-depth learning [17]. The subsequent researchers designed the DELC teaching mode from the perspective of teachers. The route is divided into seven stages, as shown in Figure 1. From the four aspects of preliminary preparation, knowledge activation and acquisition, deep processing, and feedback evaluation, we can promote the occurrence of students’ in-depth learning.

Then it introduces the research status in China. In the definition of educational technology in 2004, deep learning was seen as a critical development aim, and Chinese researchers were interested in learning more about it. In 2005,

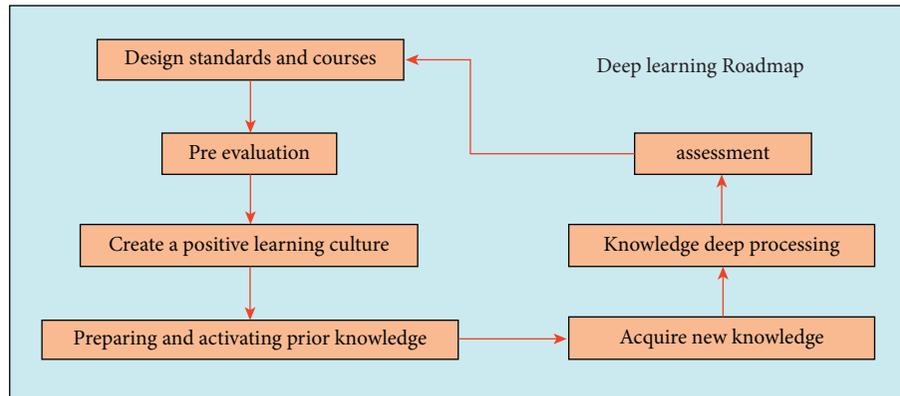


FIGURE 1: Roadmap for deep learning.

relevant scholars published “promoting students’ deep learning” [18]. This paper mainly compares deep and shallow learning in the cognitive field, which puts forward a reference for the further research on deep learning in the cognitive field in China. CNKI conducted an advanced search of the literature published from 2010 to 2019 with “deep learning” as the theme word, and it obtained 2,067 journals and papers on “deep learning” in the field of cognition. Most of the research topics focus on theoretical research, model design, and application. At the level of theoretical research, scholars believe that deep learning is learners’ valuable learning through spontaneous and critical reflection on knowledge [19]. It is believed that deep learning stimulates students’ autonomous learning and problem-solving, cultivates students’ creativity and curiosity, understands the gap and connection between learning content and reality, and clarifies the knowledge and new skills they need to master and solve the problems existing in reality. The above research provides theoretical support for the research of this paper. With the continuous development of deep learning, relevant scholars have made some research on education [20].

There is less research on deep learning in the field of higher education. The author combs and analyzes the literature in this field. The results show that there is more research on deep learning, especially for undergraduates and postgraduates, but less research on students in higher vocational schools [21]. Normal students generally have some problems in their studies, such as low enthusiasm, insufficient interest, and ability, and the phenomenon of shallow learning is more serious. At present, normal students’ in-depth learning has not been widely concerned, which also shows that China’s in-depth learning of normal students’ needs to be further strengthened.

**2.2. Research Status of Hybrid Teaching.** Foreign countries have made some research on mixed teaching in the early twentieth century. So far, foreign research on theory is very rich, and all of them are based on constructivism theory. In addition to theoretical research, there are also many foreign

types of research on the platform, technology, and mobile terminal of hybrid teaching. Moreover, they have always adhered to the focus of research on the teaching mode, the effect of teachers’ teaching, and the effect of students’ learning for a long time. The mixed learning modes [22] are skill-driven mode, attitude-driven mode, and ability-driven mode, as shown in Figure 2.

The skill-driven model is a learning method combining students’ autonomous learning and teachers’ guidance. Teachers and students solve learning problems through face-to-face communication or network communication [23]. This mode is most suitable for the application training of knowledge. The attitude driven model combines the traditional classroom learning and online collaborative learning, integrates the learning content and learning expectation into the learning through face-to-face learning and technical collaborative learning, and requires students to try to practice new behaviors in risk-free situations, such as role-play and evaluation, and communicate through discussion areas, group plans, and so on [24]. The ability-driven model requires students and teachers to acquire tacit knowledge through interaction [25]. In addition to some facts, how to make correct decisions quickly in work needs the assistance of some tacit knowledge. This knowledge usually needs to be taught by teachers, and tacit knowledge should be obtained through the observation of teachers and the communication and interaction with teachers in work and learning.

The four-step design process [26] of blended learning is as follows:

- (1) Identify learning needs.
- (2) Formulate learning plans and evaluation strategies according to learners’ characteristics.
- (3) Build teaching infrastructure and prepare teaching contents.
- (4) Implement the learning plan, track the process, and evaluate the learning results. Using blended learning needs to consider the setting of the learning place, information transmission technology, time control of information transmission, teaching strategy, and

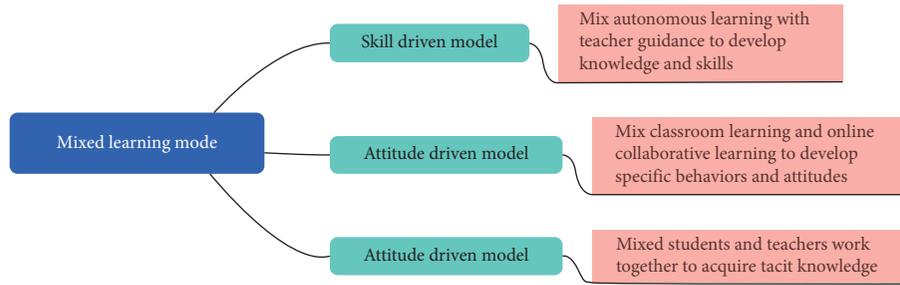


FIGURE 2: Three mixed learning modes.

performance assistance strategy. Only with the cooperation of all elements can blended learning achieve the expected teaching objectives. In short, according to the different characteristics of learners, development norms, learning content characteristics, and business needs, different mixed learning schemes can be designed. Classroom teaching actions encompass students participating in the learning experience in a physical classroom under the supervision of teachers. Classroom teaching activities are an important factor in blended learning. For most students, teachers' direct professional opinions cannot be replaced by other things. Students arrange their study schedules according to their own situation and use the network and resources to study. Autonomous learning increases the design space and function of blended learning. In order to maximize the learning effect, autonomous learning must be based on the principle of instructional design. The learning resources developed according to different teaching design principles have different forms of expression, different effects, and different effects on autonomous learning [27]. The hybrid learning octagonal framework is shown in Figure 3.

Institutional elements refer to the administrative operation, teaching affairs, and student services of enterprises or education and training institutions. Teaching elements refer to the analysis of learning content, learning objectives, students' needs, teaching plans, and teaching strategies. Interface design refers to designing the interface between each element of blended learning and the user. Ensure that students can study smoothly through different information transmission channels. The layout of the interface should consider the content structure [28]. The majority of the evaluation elements are concerned with determining if blended learning is appropriate. The administration of relevant topics in the mixed learning process, such as fundamental design, management of multiple transmission channels, student registration, daily announcements, and so on, is referred to as management components. Resource support refers to the management of various types of resources online and offline to ensure the normal use of students and teachers. When developing blended learning, ethical issues also need to be considered, such as equal opportunities, cultural differences, race, and so on.

### 3. Systematic Mode Construction

This study takes meeting students' needs for blended learning and promoting students' in-depth learning as the starting point. Through the design and implementation of blended teaching, this study explores to improve the shallow learning status of normal learners and provide an effective scheme for improving the cultivation of normal learners' thinking ability.

*3.1. Related Concepts and Theoretical Basis.* The American Research Council divides deep learning into three areas of ability, proposes how to transfer learned knowledge to another scenario, and draws the framework of deep learning ability. The abilities associated with deep learning are shown in Table 1.

In the definition of educational technology, promoting learners' deep learning is regarded as an important goal of educational technology. After that, deep learning has also attracted the attention of educational technology researchers in China. However, there is no clear definition of its concept at home and abroad, and various scholars have their own explanations. Deep learning is to first understand the knowledge, then criticize it in their own way, organically integrate them with the existing cognitive structure, transfer the content they have learned to new problems, and solve problems through the existing knowledge to achieve the purpose of the transfer. Deep learning is not only the ability to understand but also the ability to apply knowledge in specific, so as to achieve the cultivation of high-level abilities such as innovation. Deep learning is to carry out in-depth learning through an active and own point of view. The concept of deep learning exists in the current teaching methods such as problem-based, project-based, and anchored teaching. How to transfer the learners' understanding of the main concepts and academic concepts to the academic field is the core of their ability to master them. Critical thinking and complex problem-solving require learners to use technology and logical reasoning to solve problems. It is more detailed to generate and preserve academic ideas and external elements that can support their own learning and pursue a sense of gain throughout the learning process; the following abilities run throughout the students' learning process. These abilities are not only the abilities required in learning but also applied to the real situation through the transfer of students' abilities, which is

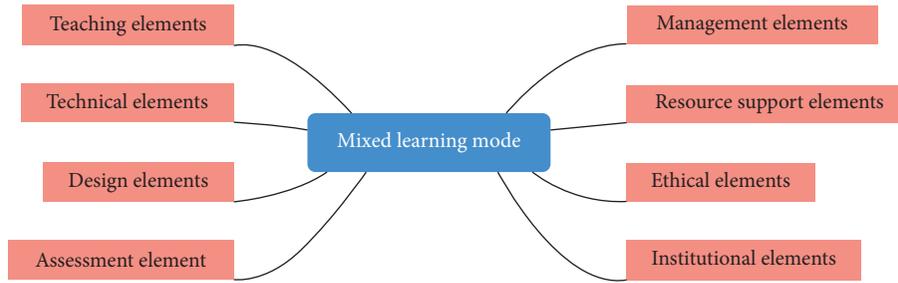


FIGURE 3: Hybrid learning octagonal framework.

TABLE 1: Ability to relate to deep learning.

Attribute	Ability
Cognitive domain	Mastery of in-depth content knowledge Critical thinking and complex problem-solving
Interpersonal field	Collaboration and communication
Self-domain	Ability to learn Academic habits

also very important for the development of students in society in the future. It is an active way of thinking to promote the development of learners at home and abroad with the help of the current critical thinking, so as to promote the development of learners' own knowledge.

By consulting and analyzing the literature, the author understands that the concepts of blended teaching and blended learning are similar, and the former is developed on the basis of the latter. Blended learning is developed and adopted in enterprises at the beginning. Blended teaching is the integration of traditional classrooms and network classrooms. With the progress of education in China, mixed teaching has also been fully developed. From the beginning, blended teaching pays attention to the application of technology in teaching and emphasizes the combination of face-to-face and online teaching. In the later stage, on the premise of using technology and teachers' mixed teaching methods and strategies. This study believes that hybrid teaching is the combination of online platforms and offline teaching, which runs through the whole teaching activities before, during, and after class. At the same time, an online learning platform provides students with various forms of resources, activities, and evaluation methods. With the progress of education in China, mixed teaching has also been fully developed. From the beginning, blended teaching pays attention to the application of technology in teaching and emphasizes the combination of face-to-face and online teaching. On the basis of scholars' research, they distinguish between shallow learning and deep learning at the above six levels, as shown in Figure 4.

Shallow learners are at the level of memory and understanding, while deep learners are at the last four levels. In this study, teachers establish progressive learning tasks around the goal according to the requirements of the goal. In class, teachers teach and answer questions, organize students to cooperate and explore, and deeply understand, apply, analyze, and evaluate knowledge. After class, teachers organize and carry out project exploration and use the learned

knowledge to spread thinking and cultivate students' creative ability. Constructivism holds that knowledge is acquired by learners themselves through active construction, rather than relying on teachers' passive acceptance. Constructivism in the field of cognitive development includes two basic processes: learners stimulate the original knowledge system by learning external things on the basis of their own existing knowledge; if new things can be explained by the existing experience system, learners integrate new things into their existing cognition; if new things cannot be explained by the original knowledge system, learners need to break the current cognition and reintegrate new things, so as to achieve a balanced state.

In this study, in the classroom, teachers throw out content higher than students' current cognitive level, but it is related to students' current cognitive level. Students are in a state of seeming to understand, arousing students' curiosity in the "known" and "unknown" stages, their desire to explore knowledge, and activating students' thinking. Pretest the students before class to ensure that the development level of each member of the group is in the nearest development area. Students at different levels are grouped to ensure that the development level of group members in the group is at the same stage in the process of grouping, so as to facilitate the development of cooperation. While formulating low-, medium-, and high-level tasks, teachers should formulate difficult and challenging learning tasks for students at each stage in their nearest development zone.

*3.2. Construction of Hybrid Teaching Mode to Promote Deep Learning.* In the traditional classroom, teachers master the pace of the classroom, and learners listen passively. This way is difficult to cultivate students' learning abilities. Today, when new technology promotes the development of teaching, the new teaching concept has brought us a new relationship between teachers and students. Under the new relationship, students are the main body and have the right to speak on learning activities. All teaching is carried out around students; as instructors and participants, teachers should understand their needs from the perspective of students. Therefore, when constructing the teaching mode, we should adhere to the concept of student-centered and design all links of teaching from the perspective of students' needs. Specifically, the student-centered teaching model is in line with students' demands for learning, can effectively participate in learning, feel the benefits of learning, and build

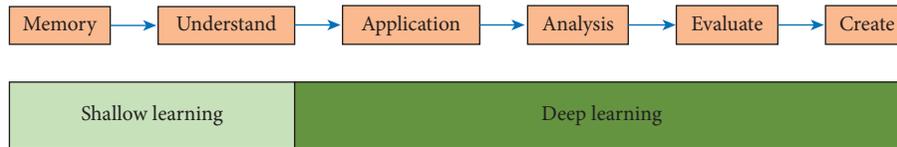


FIGURE 4: Schematic diagram of educational cognitive objectives and deep learning.

the circumstances for deep learning from students themselves.

The importance of communication and interaction in the entire operation cannot be overstated. The formation of good learning outcomes for students and resources is what fosters the orderly progress of the entire teaching mode. Under the mixed teaching, teachers answer questions, dispel doubts, and guide ideas by explaining knowledge; students realize the collision and transmission of ideas through cooperation and discussion, and form a positive learning atmosphere; only when teachers design learning resources suitable for students' development can they promote maximizing the effect of learning assets through optimal interaction between students and capacity building. We should mix online and offline in the creation of this model so that communication and engagement do not cross time and space limits. The structural framework of deep learning is shown in Figure 5.

In today's network environment, learners have more learning platforms and learning resources. Every learner is not only the receiver of information but also the processor of information. As a result, learners in the hybrid teaching mode should adhere to the notion of co-construction and sharing of learning resources. In terms of resource access, students can share their knowledge in many forms in order to broaden their grasp of additional information in textbooks. Teachers can lead pupils to divergent thinking in terms of computation resources, create and design their own works, and learn from each other through mutual display and sharing. Under the guidance of resource construction and sharing, students not only can share the resources created by themselves in class but also share the resources for students to expand their learning outside class. In the process of constructing the mixed teaching model, we should fully consider the learners' learning environment. If we blindly pursue innovation, the idealized teaching model that exists out of the current situation is impractical. It should be carried out according to the students' class environment of the school. The students of a normal university where the author works have mobile phones, and the network and performance of the superior environment can support the implementation of the model. Students' schedule also provides support for pre- and postclass learning. The design idea of the hybrid teaching mode is shown in Figure 6.

The idea of pattern design mainly focuses on two aspects that have an impact on pattern design: on the one hand, it focuses on the design of the development mode of improving students' in-depth learning ability; at the same time, based on the guidance of relevant theories, the teaching process is constructed based on the deep learning route. All

kinds of inquiry tasks mentioned here mainly include autonomy, cooperation, and problem- and project-based tasks. Independent inquiry mainly includes the knowledge and skills of individual independent construction; cooperative inquiry mainly contains more knowledge points and is slightly difficult, which needs to be overcome by cooperation. Problem- and project-based inquiries mainly mean that students have a certain foundation through knowledge construction and internalization before and during class and then achieve a higher level of ability through problem- and project-based learning, so as to expand knowledge and improve ability. On the other hand, it focuses on adding an online learning platform to hybrid teaching. Through the learning data retained in online learning before, during, and after class, the teacher analyzes the existing problems according to the data extracted from the online learning platform and then divides them according to the tasks that students need to do before, during, and after class according to individual learning differences.

The construction of the model needs a certain theoretical basis as support. This study constructs a progressive learning task on the basis of Bloom's educational theory; based on the theory of constructivism, the preclass content of learners is designed to effectively mobilize the enthusiasm of learners to construct knowledge. Under the guidance of connectionism theory, through the effective grouping of learners, team activities are designed in class to promote the transfer of knowledge points and the ability to communicate and cooperate among students. Under the guidance of the zone of proximal development theory, the cooperative inquiry task is designed hierarchically, paying attention to the abilities of learners at different levels and implementing differentiated teaching. Based on improving students' ability to in-depth learning, the goal is launched from three dimensions and runs through the whole teaching process. Through the design of different links, it aims to improve learners' ability in different dimensions, mainly from the following three aspects. In the preclass stage, teachers diagnose the learning situation, and students construct independently. In the class stage, teachers carry out task drives and students internalize knowledge. In the after-school stage, students consolidate through tasks, and teachers analyze the learning situation and data generated in this class. When analyzing each stage, find out the problems of students and timely understand the situation for supervision. Finally, it makes an overall analysis of the total data generated in the three stages to more intuitively understand the students' learning of the whole course content.

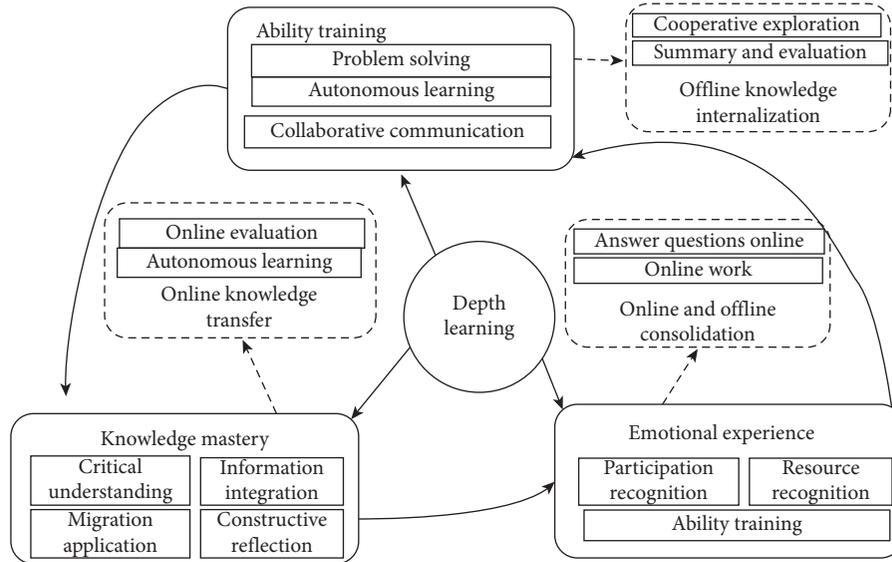


FIGURE 5: The structural framework of deep learning.

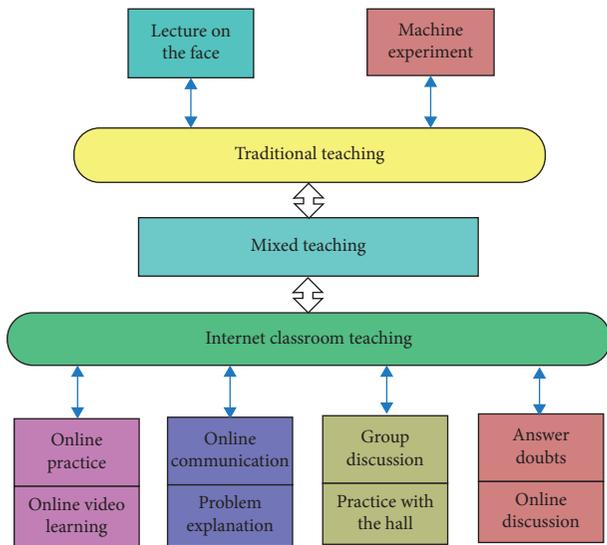


FIGURE 6: Structure diagram of design ideas of hybrid teaching mode.

## 4. Experiments and Results

This survey mostly takes the form of a questionnaire in order to gain a preliminary understanding of students' existing learning situations, as well as their perceptions of and needs for blended learning. Through the analysis of the results of the questionnaire, we can further understand the problems existing in the traditional classroom, students' needs for blended learning, and how teachers should better build a blended teaching model to promote deep learning based on the current situation of students.

**4.1. Presurvey Design and Analysis of Survey Results.** With the help of electronic questionnaires distributed by students through the WeChat class group 10 minutes before class, a total of 99 questionnaires were distributed, with an effective rate of

100%. The survey results of the questionnaire are summarized, and the data are analyzed in detail in the form of charts. Through the survey results, the needs of students are further clarified before the mixed learning design of the experimental class. Students rarely study independently before class, which shows that this link is basically missing before class. The above situation shows that teachers need guidance and supervision in preclass learning. A total of 17% of the students often consolidate after class, and 83% of the students invest less time after class, which shows that the consolidation of students after class also needs the supervision and guidance of teachers. The understanding of the online platform is shown in Figure 7.

The foundation of normal students is uneven. Before designing mixed teaching for students, first, understand the students' understanding of the mixed teaching environment and whether it is easy to carry out teaching. The hybrid teaching environment combines the intelligent (information technology) teaching environment with the traditional teaching environment. As can be seen from Figure 7, 58.33% of the students not only understand it but also have used it for learning before. Around 16.67% of the students knew it, but they did not use it. A total of 25% of the students said they had not contacted the online platform before, so they did not know much about it. According to the results, more than half of the students have used online learning, and 75% of the students know something about online learning. It can be seen that online learning can be accepted by most students, and most students have a certain foundation to promote the smooth development of online learning. Under the concept of smart education, there are many open online learning platforms for teachers and students. Due to the different functions of each platform, ask students about their needs and expectations for the online platform in advance so that students can make better use of the platform for learning. The functional requirements of the learning platform are shown in Figure 8.

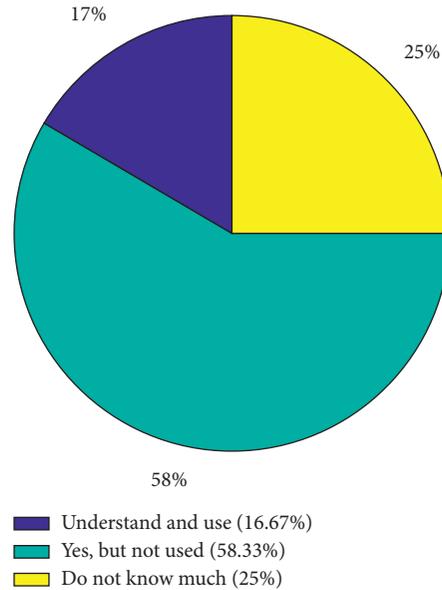


FIGURE 7: Understanding of online platforms.

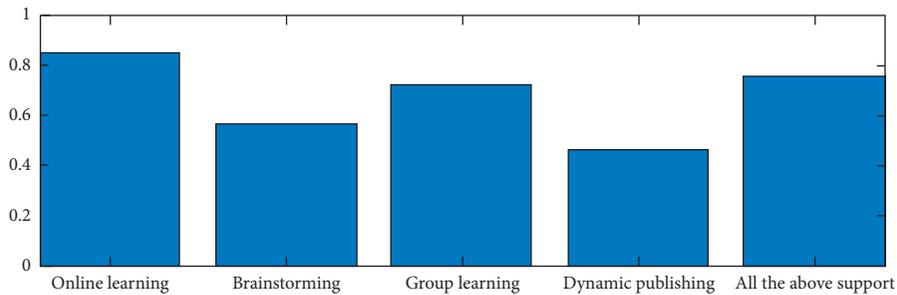


FIGURE 8: Functional requirements of the learning platform.

Under the concept of smart education, there are many open online learning platforms for teachers and students. Due to the different functions of each platform, ask students about their needs and expectations for the online platform in advance so that students can make better use of the platform for learning. Teachers can upload all resources to the platform in advance, and students can study independently according to their own situation.

**4.2. Application Effect Analysis.** The evaluation of students' in-depth learning level is an important index to test the mixed teaching model. This study creates a questionnaire based on existing measures in order to objectively assess students' in-depth learning. The term "reliability" relates to whether the data obtained from the questionnaire analysis are accurate. The author selected 75 people to test the reliability of the questionnaire. The purpose of the test is to verify the students' knowledge of the transfer class at the end of the term, as shown in Table 2.

From the various types of questions in the whole test paper, the average value of the two classes has little difference in the basic type of questions, but the results of the two

classes have gradually opened up in the application type and design type of questions. From the standard deviation of the two classes in various types of questions: in the basic questions, the scores of the students in the two classes are roughly the same. In the applied questions, the scores of the students in the two classes gradually widen the gap compared with those in the basic questions. The scores of the students in the experimental class are relatively stable, and the scores of the control class are relatively not concentrated. In the design questions, the gap between the scores of students in the experimental class and those in the application questions is slightly larger, and the score distribution of students in the control class is more scattered than that in the experimental class. The distribution of the number of people at the thinking level of various questions is shown in Figure 9.

According to the theory of deep learning, students' emotional experience in the learning process is also an important part of promoting deep learning. Students' emotional experience includes students' participation, love, recognition of teaching methods, recognition of learning resources, and recognition of cultivating students' abilities. Most students believe that they have developed their ability

TABLE 2: T-test of the final grade of experimental class and control class.

	Group	Number	Average	Standard deviation	Average error
Score	Experimental class	50	82	4.81	0.8030
	Control class	49	75	8.84	1.4156

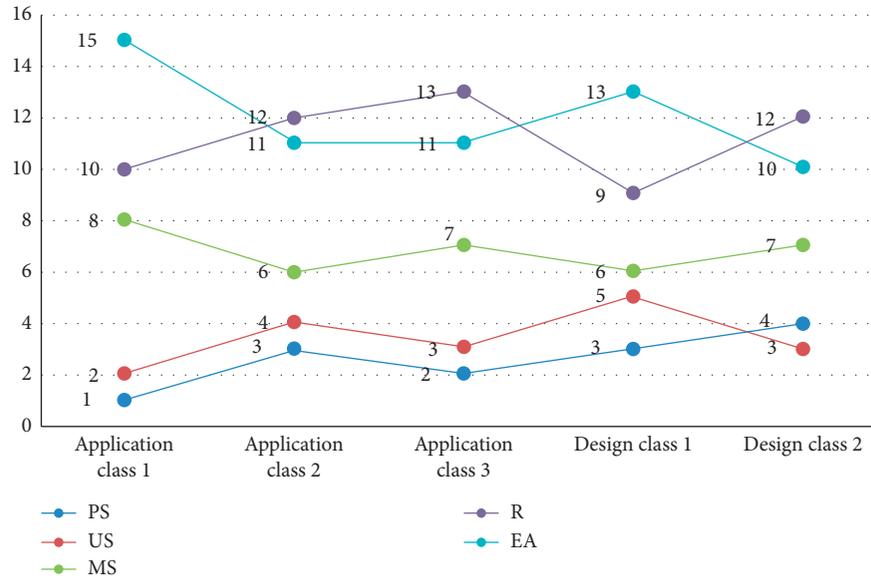


FIGURE 9: Number distribution of thinking levels of various questions.

of autonomous learning before and after class. The learning process during and after class is also conducive to the cultivation of communication and cooperation ability, especially the project learning after class, which has cultivated their team cooperation ability and stimulated their innovative thinking ability.

### 5. Conclusion

On the basis of reading relevant literature, this study carried out the construction of a hybrid teaching mode for the purpose of promoting students' in-depth learning. The author researched a large number of relevant theories of in-depth learning early in the research and gained a thorough understanding of the mixed teaching method. Taking the primary education major of a normal university in Luoyang as the research object, the author designed and issued a questionnaire according to the survey content to provide data support for the follow-up work. According to the survey results, deeply understand the students' current problems in learning and their needs for online learning. This study introduces the concept of a hybrid teaching mode that is aided by a digital landscape and guided by Bloom's educational cognition theory and constructivism, as well as a mobile learning platform.

The construction of the hybrid teaching model to promote deep learning is goal- and ability-oriented. Different goals and abilities are run through before, during, and after class, refining the abilities cultivated in the three dimensions of deep learning: cognitive dimension, interpersonal dimension, and self-dimension. The strategy of progressive

and mutual penetration of class ability can gradually promote the realization of students' in-depth learning. The mixed teaching mode of promoting deep learning constructed by this research can effectively promote the deep learning of normal student students. In the construction of the mixed teaching mode, some research results have been achieved, but there are still some deficiencies in some aspects, mainly including the following: the experiment is only carried out in two classes, and the scope is small. These are technological courses that were chosen for this experiment. There are still some limitations in the application of other courses. In the future, different types of courses will be selected for practical research in order to improve the model. In the context of today's smart education, combined with the smart learning environment of cloud platform, we have innovated the hybrid teaching mode and finally achieved the purpose of promoting students' in-depth learning. Teachers will transition from lecturers to guides for students, students will shift from passive to active learning, and a range of learning tasks will be designed to facilitate knowledge transfer and application.

### Data Availability

The data sets used during the current study are available from the corresponding author on reasonable request.

### Conflicts of Interest

The author declares that there are no conflicts of interest.

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