

## Retraction

# Retracted: Research on the Application of Blended Teaching Mode with “Deep Learning” Orientation

### Security and Communication Networks

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article’s content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

### References

- [1] J. Zhao, J. Lu, X. Zou, and Z. Zhu, “Research on the Application of Blended Teaching Mode with “Deep Learning” Orientation,” *Security and Communication Networks*, vol. 2022, Article ID 4128995, 7 pages, 2022.

## Research Article

# Research on the Application of Blended Teaching Mode with “Deep Learning” Orientation

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When combined with deep learning theory and blended learning characteristics, the author develops a blended teaching mode centered on “deep learning.” A blended teaching mode centered on “deep learning” is developed, and the professional course of “Personal Finance” at a higher vocational college in Jiangsu Province is used to demonstrate and apply the method. According to studies, teachers can effectively promote students’ deep learning by utilizing information teaching resources in a blended “online + offline” mode of instruction. The research shows that teachers can create a meaningful learning environment, stimulate students’ enthusiasm for autonomous learning, guide students to complete the construction of knowledge meaning, deepen the transmission and application of knowledge, solve practical problems, effectively promote students’ in-depth learning, and design a variety of evaluation methods to assist this process. The study of learning environment can stimulate students’ enthusiasm for autonomous learning, guide students to complete the construction of knowledge significance, strengthen knowledge transfer and application to practical problems, develop a variety of evaluation methods, and help students reflect on their learning gains.

## 1. Introduction

In the Education Informatization 2.0 Action Plan, it is emphasized that intelligent information technology should be deeply integrated into the whole teaching process to optimize the teaching organization and improve the teaching effect [1]. The hybrid teaching mode realizes the deep integration of intelligent information technology and course teaching, and stimulates students’ autonomous learning through the organic combination of “Online + offline.” This includes guiding students’ in-depth learning and realizing their in-depth learning ability. Both domestic and international scholars have conducted research on blended teaching models, mainly focusing on the theoretical framework, design and implementation, and evaluation of the effectiveness of blended teaching at the course level. Regarding the theoretical framework, the theoretical model of inquiry learning communities consists of three basic elements (cognitive presence, social presence, and instructional presence) created by Garrison, Anderson,

and Archer in 2001 was considered to be an effective theory of blended learning and teaching. Deep and meaningful learning experiences were created through three elements operating together [2]. In terms of design implementation, the use of task-based and collaborative teaching and learning approaches in blended learning models is considered an effective blended learning and teaching strategy. For example, Luo [3] introduces task-driven teaching methods in blended learning, emphasizing “doing by learning, learning by doing,” allowing students to learn, internalize knowledge, and improve their practice abilities in the process of collaborative exploration and task completion [3]. In terms of effect evaluation, scholars have built a blended teaching quality evaluation index system to test the effect of blended teaching. For example, Li and Hang [4] constructed a two-part blended teaching evaluation system with process evaluation (preclass learning, classroom activities, and postclass learning) and summative evaluation (group debriefing and final test) [4]. Though the research results of blended teaching are relatively abundant, there is a lack of

research on the application of blended teaching with the goal of cultivating students' deep learning ability in practical teaching applications, especially in vocational education courses. Therefore, how to integrate intelligent information technology to carry out blended teaching and promote students' deep learning is a key issue to promote the teaching reform of vocational education courses and improve the quality of talent training.

In view of this, this study takes the personal finance course of financial service and management major in a higher vocational college in Jiangsu Province as an example to explore the construction of a hybrid teaching model for "deep learning," and has carried out practical application. The classroom teaching reform project won the first prize in the teaching ability competition of Jiangsu Province, which provides experience for the vocational education curriculum teaching reform guided by "deep learning," helps to revitalize the classroom and effectively promote students' deep learning.

## 2. Theoretical Foundation

The concept of "deep learning" was first introduced in the field of education by American scholars Marton and Saljo [5]. According to their opinion, compared to shallow learning with passive learning, mechanical memorization and lack of reflection, deep learners pursue active learning and transfer application to practice based on their understanding of what they have learned, emphasizing critical and higher-order thinking. The domestic research on deep learning started in 2005, when Professor He and Li [6] first mentioned the concept of deep learning in his published paper. According to his opinion, deep learning means that learners critically learn new knowledge and transfer it to a new situation on the basis of understanding and make decisions and solve problems [6]. According to An [7], shallow learning focuses on the cognitive level of "knowing and understanding," while deep learning should focus on the higher-order cognitive level of "applying, analyzing, evaluating, and creating" [7]. Guo [8] believes that deep learning under the perspective of pedagogy is students' knowledge under the guidance of teachers, emphasizing deeper learning of knowledge layer by layer, profound participation of teachers in learning, and deep involvement of students in learning [8]. Li and Gao [9] argue that the learning outcomes of students' high level of competence require teachers to design deep understanding-based learning approaches with high cognitive and volitional engagement to achieve [9]. It is thus clear that students' deep learning needs to be built on the basis of teachers' deep guidance. Teachers can cultivate students' critical and creative high-level thinking by using heuristic methods (such as driving and inquiry teaching methods), guide them to explore problems cooperatively, actively build knowledge systems, and realize knowledge transfer and application.

Combining with deep learning theory, teachers should play a leading role in teaching vocational education courses and build a "deep learning"-oriented blended teaching model, with the goal of cultivating students' higher-order

abilities of independent learning, communication and collaboration, problem-solving, and critical and creative higher-order thinking, and integrating intelligent information technology to carry out blended teaching and explore the deep learning route for students to solve higher-order tasks on the basis of knowledge mastery.

## 3. The Construction of Blended Teaching Mode with "Deep Learning" Orientation

The "deep learning"-oriented blended teaching mode is based on the online intelligent teaching platform and other information-based teaching resources, through the "online + offline" blended teaching, guided by the deep learning theory, with the purpose of cultivating students' higher-order thinking and higher-order ability. The teacher creates a meaningful learning atmosphere, stimulates students' enthusiasm for independent learning, guides students to complete the meaningful construction of knowledge, deepens the transfer of knowledge to solve real problems, and designs multiple evaluation methods to help students reflect deeply on their learning gains and promote deep learning (see Figure 1).

*3.1. Reorganize Teaching Contents and Guide Students to Critically Construct Knowledge System.* Deep learning emphasizes meaningful learning and makes the whole learning process a good learning experience for students. Among them, teachers should restructure the teaching contents, change the knowledge-based to skill-based teaching contents arrangement mode, and set the teaching contents into project tasks. This includes further subdividing the project tasks into learning subtasks. Moreover, these learning subtasks should be arranged from easy to difficult, and then each learning subtask should be further broken down into problem chains [10]. Through the task-driven and problem-inquiry teaching content setting, students' learning initiative is mobilized, making the learning process meaningful, and under the guidance of teachers, the newly acquired knowledge is critically integrated into the existing knowledge system by deepening the learning knowledge layer by layer, establishing the connection between the old and new knowledge, and completing the meaningful construction of knowledge for further migration application to solve real problems [11]. Dang [12] confirmed the standards and methods for the construction of online and offline hybrid teaching mode through the analysis of teaching front-end needs, and then helped students get familiar with and master the methods of in-depth learning by enriching teaching activities, and finally set up project-based teaching to consolidate students' in-depth learning ability with highly simulated practical behavior [12].

*3.2. Reset the Teaching Context and Guide Students to Collaboratively Explore Authentic Problems.* The development of deep learning skills focuses on the application of knowledge to solve real problems based on students' understanding and mastery, so that students can experience a

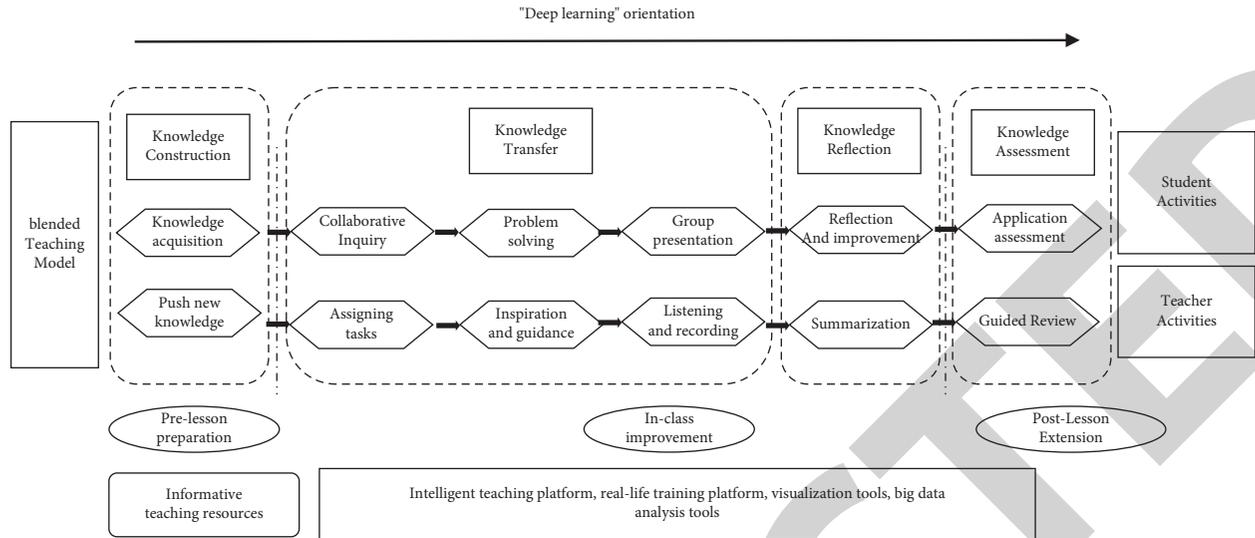


FIGURE 1: Blended teaching mode oriented by “deep learning.”

sense of gain in solving problems. Moreover, teachers should recreate teaching situations that allow students to apply their knowledge to solve real problems in different teaching scenarios. Under the guidance of the teacher, students work in groups to explore the learning subtasks, give solutions, and ask each group to present their solutions. After each group’s presentation, an intergroup exchange is arranged to evaluate the strengths and weaknesses of the solutions. Afterward, the teacher listens to the records and then summarizes and gives new application scenarios for students to explore on their own after class to further deepen and improve the constructed knowledge system. By designing teaching situations to promote in-depth learning, teachers can guide students to actively experience and deepen the transfer and application of knowledge and the cooperative exploration of real problems. This includes transforming students from a shallow learning state of mechanical memorization and simple copying to a deep learning state of cognitive understanding and transferable application.

**3.3. Reconstructing Teaching Evaluation and Guiding Students to Reflect Deeply on the Learning Process.** Teaching evaluation is to help students make value judgments on the constructed knowledge system and the process of knowledge application. To make students reflect deeply on their learning effectiveness and adjust their learning strategies in time, teachers should reconstruct teaching evaluation and build a diversified and process-oriented teaching evaluation system. From the three dimensions of internalizing knowledge, mastering skills and developing literacy, the stage assessment is conducted with the program output of each learning subtask.

On the evaluation subject, including students, head teachers, and business counselors, the whole teaching process is evaluated through the mutual evaluation of teachers and students, as well as the joint evaluation of business counselors and head teachers.

Through the results of real-time evaluation and timely feedback, teachers and students jointly pay attention to the problems that exist in the feedback of the learning process, teachers adjust their teaching strategies in time, and students continuously correct their learning status, so as to improve the learning effect of deep learning.

#### 4. The Application of Blended Teaching Mode with “Deep Learning” Orientation

The course “Personal Finance” is a core course of financial services and management in senior high school. The course emphasizes application and practicality, focusing on financial planning for families. The course is intended to improve students’ working thinking and analytical ability to work in future financial management positions and customize financial planning solutions for clients. Therefore, the objective of this course is to train financial planners who know how to manage money, plan well, and conduct themselves. Taking this course as an example, the application of blended teaching mode oriented to “deep learning” is discussed.

##### 4.1. Teaching Design Oriented to Enhance Deep Learning Ability

**4.1.1. Reorganize Teaching Contents and Guide Students to Critically Construct the Knowledge System of Financial Planning.** According to the “1234” rule of family asset allocation, family assets are divided into four accounts, based on which teachers reorganize the teaching content into four major projects, which are Project 1 (open source and save money), Project 2 (save for a rainy day), Project 3 (wealth accumulation), and Project 4 (life inheritance), and each project is decomposed into different learning subtasks according to the workflow of financial planning, and then each learning subtask is refined to sort out the related problems and link the related problems into a problem chain (see Figure 2). The task-driven reorganization of the

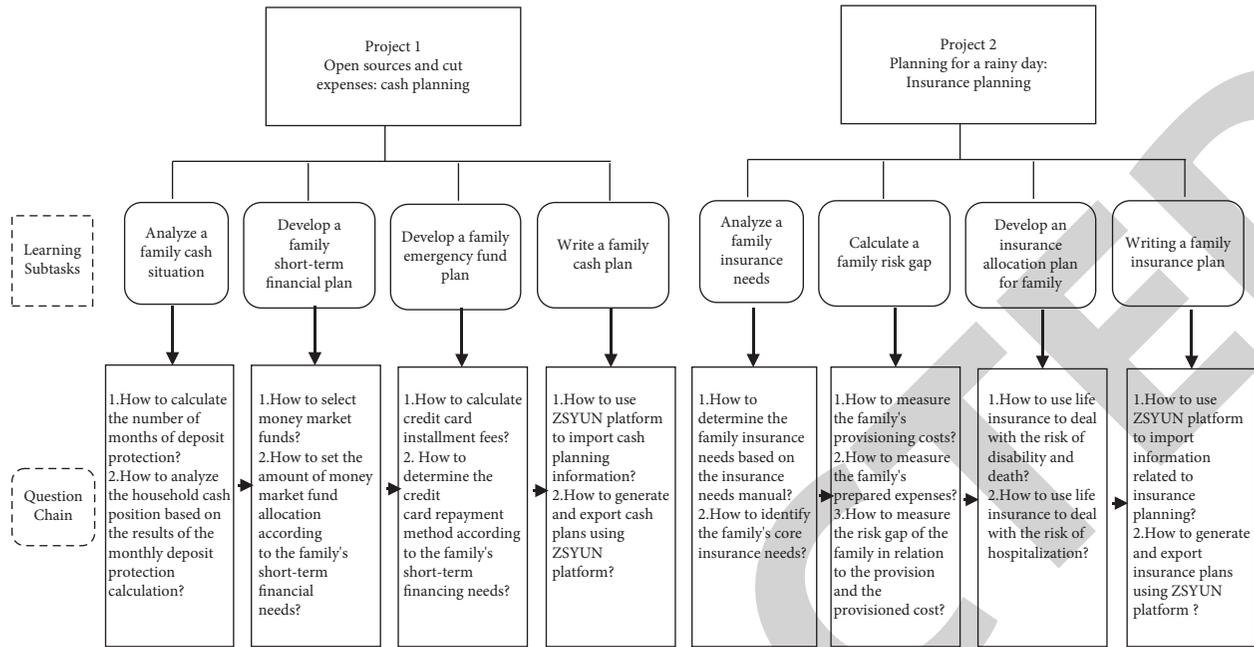


FIGURE 2: The reorganized teaching content of personal finance (due to the limitation of space, the learning subtasks and problem chains of project 3 and project 4 are not listed in detail in the figure).

teaching content of the personal finance course and the problem-solving seminars are designed to help students critically construct the knowledge system of financial planning and prepare for the development of subsequent financial planning programs.

*4.1.2. Resetting the Teaching Context and Guiding Students to Cooperate in Customizing Financial Planning Solutions.* According to the family life cycle theory, the family financial life cycle includes five stages from single to family aging. The instructor sets up different teaching situations based on this theory, has students work in groups to find real family cases in different life cycles, and continues to collaborate throughout the semester to customize a financial planning plan involving these four major items for the family. Students will transfer and apply their initial financial planning knowledge system, customize their financial planning plan according to the family's actual financial needs, financial goals, and financial situation, and present it in groups. The purpose of the plan exercise is to reset the teaching environment of personal finance course, cultivate students' ability to form the working mentality of a financial planner, and customize the financial plan of a real family through group cooperation.

*4.1.3. Reconstruct Teaching Evaluation to Guide Students to Reflect Deeply on Financial Planning Strategies.* In addition, the teacher conducts two in-class and two out-of-class financial planning customization activities to promote diversified and process-oriented course evaluation. In the classroom enhancement phase, students can work in groups to customize financial planning solutions for real families they are looking for. In the postclassroom extension phase,

the instructor conducts a "Put yourself in the shoes of others" financial planning activity, allowing students to explore their own financial planning solutions for their own families to deepen their understanding of the knowledge system they have built up. The corporate mentor and the lecturer jointly evaluate the students' financial planning plans, provide timely feedback to the students, and guide them to reflect on their financial planning strategies to promote the growth of teaching and learning. The purpose of reconstructing the teaching evaluation of Personal Finance course with continuous attention is to trigger teachers and students to pay attention to the learning process together through the results of real-time evaluation and timely feedback, to further motivate students to learn deeply and explore actively, to continuously improve the initially constructed knowledge system of financial planning, and to strengthen students' working thinking and customization ability of financial planning.

*4.2. Teaching Implementation with Blended Teaching Mode.* Based on the talent-training program of financial service and management and the curriculum standard of personal finance, the teaching implementation is divided into three parts: before class, during class, and after class, based on the teaching design oriented to enhance the deep learning ability. The whole teaching implementation process is guided by deep learning theory. With the purpose of cultivating students' higher-order thinking and higher-order ability, the six-step teaching method of self-learning new knowledge (before class), setting tasks (during class), exploring problems (during class), demonstrating in groups (during class), summarizing and improving (during class), and do financial planning for your family (after class) are

applied as the carrier of the blended teaching mode. The tasks are interlocked and progressed step by step. As a result, students can make a leap from shallow learning to deep learning through the deep learning route of knowledge construction, knowledge transfer, knowledge reflection, and knowledge assessment. In this paper, we take the implementation of the two lessons of “Developing a housing loan plan” in subproject 1 (housing planning) of project 3 as an example (see Figure 3) to present the implementation process.

*4.2.1. Self-Learning before Class.* Teachers can push new self-study tasks on the smart teaching platform before class and ask students to study the mortgage policy and complete preclass quizzes independently to build the knowledge system of housing planning. Teachers can also issue group collaboration tasks, requiring students to conduct loan record interviews with real families they are looking for in groups, so as to prepare knowledge for the formulation of housing loan schemes.

*4.2.2. In-Class Offline Enhancement Ability.* The in-class enhancement stage includes four parts: assignment, inquiry questions, group presentation, and summary enhancement. The teacher can post a grouping task for customizing a home loan solution and break that task into problems such as choosing a mortgage option and measuring the mortgage amount. The teacher can then guide students through a problem workshop to consider how to choose a loan option for their family based on the mortgage policy and further explore how to use the smart mortgage calculator to measure the amount of the family’s mortgage. After solving the above problems, students work in groups to customize the housing loan plan for their families on the imitation training platform and present the report, and arrange inter-group communication after each group presentation to evaluate the advantages and disadvantages of the housing loan plan.

*4.2.3. Postlesson Online and Offline Knowledge Expansion.* In the postlesson extension stage, the teacher assigns a financial planning activity of “Put yourself in the shoes of others” and asks students to plan a housing loan plan for their own families and conducts a knowledge assessment to test students’ mastery of the workflow and financial tools involved in customizing a housing loan plan on the one hand, and to enhance students’ sense of responsibility on the other hand, so that they can think about financial planning for their own families from a professional perspective. On the other hand, the students’ sense of responsibility is raised, so that they can think about financial planning for their own families and assume family responsibilities. The students’ learning process forms a complete closed loop of “receiving tasks—learning by doing—problem discussion—optimizing solutions—reflecting and summarizing,” which achieves the teaching objectives of knowledge understanding and cognition, and transferring and applying. The goal is to achieve the teaching of knowledge understanding and application.

*4.3. Teaching Effect of Blended Teaching Mode with “Deep Learning” Orientation.* In order to test the teaching effect of teaching reform, two parallel classes of Financial Service and Management majors in the fall semester of 2020 were selected for the course “Personal Finance.” Among them, class 1901 of Financial Service and Management is the experimental class, which adopts the “deep learning” oriented blended teaching mode. The class of Financial Services and Management 1902 is the control class, which adopts the lecture-based teaching mode and conducts the comparison experiment of teaching reform. After the course, the results of the two classes were compared and analyzed (see Figure 4), which show that the average score of the experimental class was 85.55 and the average score of the control class was 68.4, indicating that the teaching effect of “deep learning” oriented was better.

Through the implementation of this teaching mode, students’ knowledge mastery, ability development, and professionalism were improved in the following four aspects:

- (1) By integrating and connecting teaching materials, students developed a “cognitive” financial planning system.

Through in-depth study of the teaching content of the course and its reorganization based on projects and tasks, teachers guide students in the experimental class to memorize and understand knowledge in a situational and relevant way. This can help students develop the knowledge base required for financial planning and promote knowledge transfer in the follow-up teaching process.

- (2) By exploring and resolving real-world problems, students cultivated “mindful” financial planning thinking.

The financial planning learning subtask is oriented around common financial planning problems and is connected by problems. Students in the experimental class are guided through the problem exploration process to develop the working mindset necessary for financial planning, to develop an accurate grasp of families’ financial needs, to make connections between what they have learned and the context, and to combine what they have learned about financial management to assist families in setting reasonable financial goals based on their financial needs.

- (3) Through task-based in-depth learning, students develop a culture of “fun learning” in financial planning.

To successfully complete the financial planning learning subtask, which requires students in the experimental class to allocate financial tools to families, they must first understand the characteristics of financial tools and family situations in order to apply them flexibly. As a result, it avoids the superficial state of “rigid application” during the learning process. Additionally, new financial products are introduced on a regular basis, and financial policies are adjusted and changed on a regular basis.

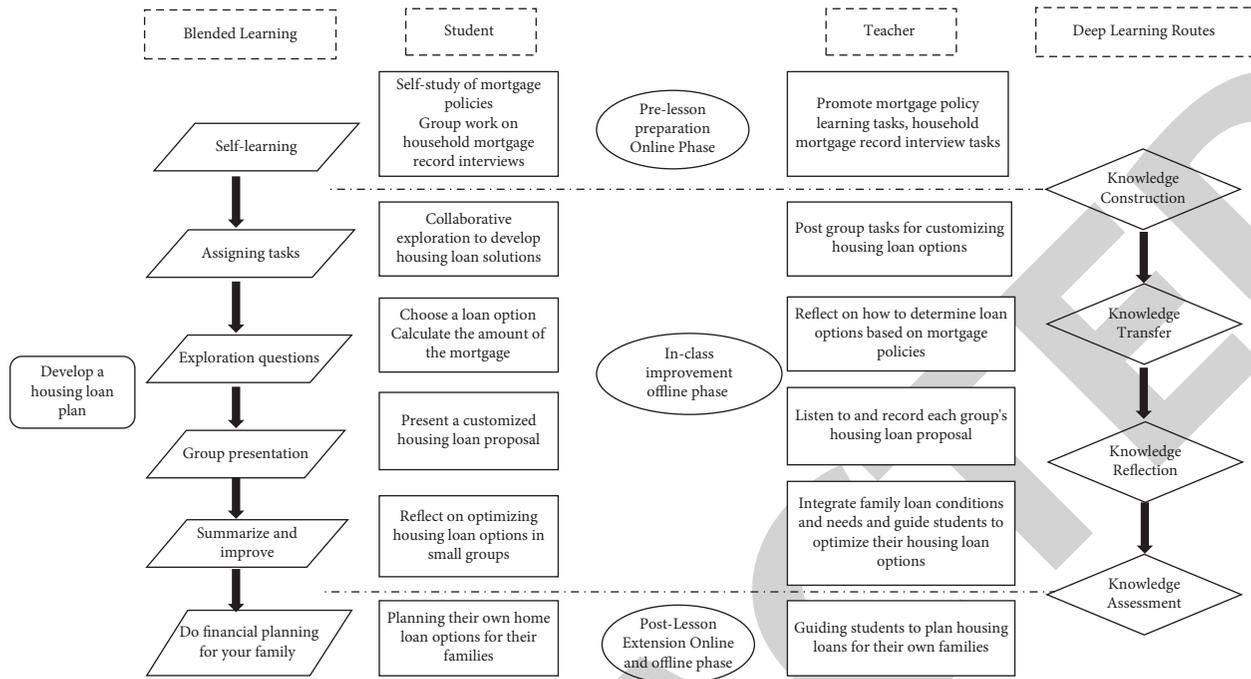


FIGURE 3: Implementation process of the “customized housing loan plan” blended teaching.

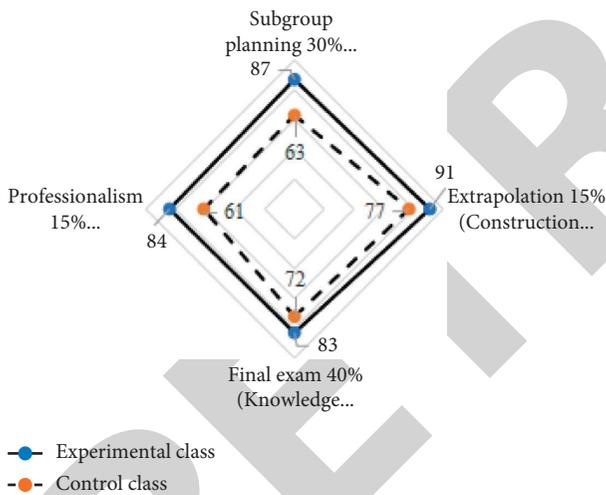


FIGURE 4: Comparison of multidimensional teaching evaluation.

To make prudent financial tool allocations, students have developed the habit of constantly learning and staying current on financial developments.

- (4) Through the transfer and application of internalized knowledge, students strengthen their ability to conduct “sound analysis” of financial planning.

Whether students in the experimental class are customizing financial planning solutions for real families in class or thinking about financial planning solutions for their own families in postclass extensions, they are able to transfer and apply the knowledge system they have developed. Through in-depth analysis and repeated calculation, students can develop effective financial planning solutions and

hone the high-level analysis, calculation, and integration skills required for financial planning.

### 5. Conclusion

This paper aims to explore the characteristics of deep learning theory and hybrid teaching model. Through the implementation of the mixed teaching mode with “deep learning” as the core in the vocational education curriculum, we hope to cultivate students’ high-level thinking and ability from the perspective of deep learning theory, including the use of depth learning theory to guide students’ high-level thinking and ability. Teachers create a meaningful learning environment, stimulate students’ enthusiasm for autonomous learning, guide students to complete the process of knowledge construction, deepen knowledge transfer and application to practical problems, and develop a variety of evaluation methods to help students deeply reflect on their learning achievements. This course adopts the mixed mode of “Online + offline” and “combination of teaching and doing,” and combines online intelligent teaching platform and other information-based teaching resources. This helps to reform vocational education teaching, revitalize the classroom, and effectively promote students’ in-depth learning. However, the research on the implementation of this teaching reform is still in its infancy. Therefore, we must constantly improve and optimize in the future teaching practice to promote the effective implementation of “deep learning” oriented teaching in higher vocational colleges.

### Data Availability

The data underlying the results presented in the study are included within the manuscript.

## Conflicts of Interest

The authors declare that there are no conflicts of interest.

## Authors' Contributions

All authors have seen the manuscript and approved to submit to your journal.

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