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## Research and Practice of Blended Teaching under the Background of First-class Undergraduate Courses Construction

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### Abstract

*China's higher education teaching reform continues to deepen, proposing the construction of a batch of first-class undergraduate courses that cultivate innovative, composite, and applied talents to meet the requirements of the new era, and constructing a high-quality talent training system. Curriculum is the core element of talent cultivation, and the quality of curriculum directly determines the quality of talent cultivation. In this context, China's colleges and universities are actively exploring the path of education and teaching reform, thinking about how to strengthen the curriculum construction of their own schools and continuously improve the quality of talent cultivation. The blended online and offline teaching mode can effectively solve the problems of traditional offline classroom teaching mode, expand and extend the new connotation of classroom teaching, and promote the overall level of the school's curriculum construction. This article takes the teaching of the compulsory course 'Fundamentals of University Computer Science' in colleges and universities as an example to explain the curriculum construction and teaching practice strategies of implementing online and offline blended teaching under the background of first-class undergraduate courses construction.*

**Keywords:** *Blended Teaching, First-class Undergraduate Courses, Online and Offline, Curriculum Construction*

With China's economy entering a stage of high-quality development, a large number of talents are needed in all walks of life. As a base for talent cultivation, colleges and universities are increasingly demanding the quality of talent cultivation in society. In order to adapt to the development needs of higher education in the new era and meet the urgent demand for high-quality talents in society, the teaching reform of higher education in China is deepening continuously. In October 2019, the Ministry of Education of the People's Republic of China issued the 'Implementation Opinions of the Ministry of Education on the Construction of First-class Undergraduate Courses', proposing the construction of a batch of first-class undergraduate courses that meet the requirements of the new era by cultivating innovative, composite, and applied talents, in order to form a first-class undergraduate course system with Chinese characteristics and world level, and to build a higher level talent cultivation system. Curriculum is the core element of talent cultivation, and the quality of curriculum directly determines the quality of talent cultivation (Ministry of Education of the People's Republic of China, 2019) . At present, the traditional face-to-face one-way transmission classroom teaching mode cannot meet the needs of high-quality talent cultivation and the requirements of first-class undergraduate courses construction. Various colleges and universities are actively exploring the path of education and teaching reform, changing inefficient education and teaching methods, thinking about how to create first-class undergraduate courses, and continuously improving the quality of talent cultivation. The rapid development of modern information, Internet, and multimedia technologies has provided strong technical support for the innovative development of teaching methods in colleges and universities (Tang, 2021). The blended teaching mode has achieved an organic combination of online and offline teaching, and has achieved good results in practical teaching. In view of this, under the background of constructing first-class undergraduate courses, exploring and innovating blended online and offline teaching has important research significance and practical value for China's colleges and universities to better construct undergraduate courses and improve talent cultivation levels.

### **1.0 The Connotation Of Blended Teaching**

Blended teaching, also known as blended learning, was initially proposed by Cooney et al. (Cooney et al., 2000) in research on preschool education. Over the next decade, theoretical and empirical research on it abroad developed rapidly. The widely accepted view regarding blended teaching is Curtis Bunker's definition of a combination of face-to-face teaching and online learning (Wu & Chen, 2017).

The development of blended learning has been accompanied by changes in the teaching environment and the development of information technology. From the beginning of the 21st century to the present, it is generally believed that the development of blended teaching has experienced three stages: the first stage is the application of technology, the second stage is the integration of technology, the third stage is the 'Internet plus' stage (Meng et al., 2021) .

The first stage was from the late 1990s to 2006. At this stage, blended teaching, as a transitional approach between traditional classroom teaching and online teaching, was regarded as an auxiliary teaching method for online teaching.

The second stage was from 2007 to 2013. At this stage, blended teaching was really separated from traditional classroom teaching and online teaching as an independent teaching mode. It was no longer a partial replacement for traditional classroom face-to-face teaching or an

auxiliary form of online teaching, but rather focused on blended learning that combines offline classroom teaching with online teaching, resulting in changes in teaching effectiveness.

The third stage has been ongoing since 2013. At this stage, the Internet and mobile technology are developing rapidly, and the connotation of blended teaching has new development. The blended teaching mode integrates information technologies such as mobile terminals and the internet to create a student-centered online and offline teaching environment. It can utilize information technology supported teaching platforms based on the needs of curriculum construction and the needs of teachers and students, integrate the advantages of online and offline teaching, optimize and combine various teaching elements, achieve intelligent, precise, and personalized teaching modes, and provide students with personalized learning experiences (Ge & Wang, 2020).

The research on blended teaching in China began in 2003, when scholars Zhu Zhiting and Meng Qi first introduced blended teaching to China (Zhu & Meng, 2003). In recent years, the theory of blended teaching has received sufficient attention in the field of higher education in China. Since 2009, there has been a significant growth trend in related research (Zheng, 2018). After more than 20 years of development, researchers, educators, governments and educational institutions have reached a basic consensus that blended teaching will become the 'New Normal' of future education (Feng et al., 2018). The blended teaching model meets the needs of talent cultivation in colleges and universities under the new situation and is in line with the trend of higher education reform (Zhang et al., 2021). Currently, blended learning has become the main form of teaching mode reform in China's colleges and universities, and is also a hot spot of teaching research in colleges and universities (Ge & Wang, 2020).

## **2.0 Construction of First-class Undergraduate Courses**

In order to implement the fundamental task of cultivating morality and cultivating talents, and to deeply explore the ideological and political education elements contained in various courses and teaching methods, the Ministry of Education of China requires the comprehensive development of first-class undergraduate courses construction, the establishment of new concepts in curriculum construction, the promotion of curriculum reform and innovation, the implementation of scientific curriculum evaluation, strict curriculum management, strengthening grassroots teaching organizations, improving teachers' teaching abilities, and improving the quality oriented curriculum construction incentive mechanism, form a multi-type and diversified teaching content and curriculum system. We need to establish a student-centered, output oriented, and continuous improvement concept, enhance the high-level nature of the curriculum, highlight the innovation of the curriculum, and increase the challenge of the curriculum. China's colleges and universities should strengthen curriculum construction with a goal-oriented approach, based on the needs of economic and social development and talent cultivation goals, optimize and reconstruct teaching content and curriculum system, and set a new benchmark for curriculum construction. And colleges and universities should focus on the construction of new engineering, new medical, new agriculture, and new humanities, reflecting the integration of interdisciplinary thinking, industrial technology and disciplinary theory, cross disciplinary ability, and multidisciplinary project practice, and developing a first-class undergraduate specialization to cultivate innovative and versatile talents. We also need to serve regional economic and social development, deepen the integration of industry and education in

collaborative education, and build a batch of first-class undergraduate courses to cultivate applied talents (Ministry of Education of the People's Republic of China, 2019).

A first-class undergraduate course should have characteristics such as wide application, large audience, fast content change, and strong practicality (Li et al., 2021). The construction of first-class undergraduate courses has undergone changes in terms of concept, content, and methods. In terms of content, it embodies high-quality requirements of high order, innovation, and challenge. In terms of curriculum format, it reflects the deep integration of new technologies with education and teaching. In terms of curriculum standards, it reflects the diversity and innovative development of reform, as well as the characteristic development and diversified innovation tailored to the school and local conditions (Shen, 2020). Based on the school's educational positioning and talent cultivation goals, we aim to build first-class undergraduate courses that meet the needs of innovative, composite, and applied talent cultivation in different types of universities, including online, offline, blended online and offline, virtual simulation experimental teaching, and social practice, to achieve full coverage of first-class undergraduate courses construction in different types of universities. In the construction of the first-class undergraduate courses in China's colleges and universities, we should insist on the training of talents as the center, take the modern teaching concept as the guide, take the optimization of teaching content as the core, take the innovation of teaching mode as the means, take the development of research-type teaching team as the foundation, take the modern information technology as the support, change the educational and teaching concept, promote the organic integration of ideological and political education and all kinds of courses teaching, construct an integrated curriculum system of curriculum teaching objectives, curriculum structure and curriculum implementation mode, and strive to train high-quality applied talents with social responsibility, innovative spirit and practical ability for the development of local economy and society, so as to adapt to the development of local economy and society.

### **3.0 Construction and Practice of Online and Offline Blended Teaching Courses**

All colleges and universities should actively explore innovative educational and teaching models, deepen educational and teaching reform, improve the quality of courses and promote the construction of first-class undergraduate courses. According to the orientation of running a school and the goal of cultivating talents, the first-class undergraduate courses of different course categories are planned and classified. These courses include ideological and political theory courses, public basic courses, professional basic courses, professional courses and general courses and other independent undergraduate theoretical courses, experimental courses and social practice courses. According to the construction standard of the first-class undergraduate course, we should strengthen the construction of all kinds of courses in schools, cultivate teaching effects, give full play to the characteristics of courses, and construct the construction system of the first-class courses at the national, provincial and school levels, improve the overall level of curriculum development in schools. We should promote the integration of modern information technology and education and teaching, adopt online and offline blended teaching mode, fully reflect the advanced and interactive teaching methods, and actively guide students to carry out inquiry-based and personalized learning. This paper takes the teaching of the compulsory course 'Fundamentals of University Computer Science' in colleges and universities as an example to explain the curriculum construction and teaching

practice strategies of implementing online and offline blended teaching under the background of first-class undergraduate courses construction.

### **3.1 Teaching Objectives**

The curriculum objectives should be based on local economic and social development needs and talent cultivation goals, optimize and reconstruct teaching content and curriculum system, integrate ideological and political elements into the curriculum, strengthen the classroom design, fully utilize Internet technology, integrate online and offline teaching resources, take students as the center, stimulate students' learning interest and motivation, and improve their ability to analyze and solve problems, and further enhance students' learning effectiveness (Liu et al., 2022).

The course 'Fundamentals of University Computer Science' is a compulsory general (public) basic course for all non-computer majors in colleges and universities. It is a course aimed at cultivating students' information literacy and application innovation ability. It shoulders the important mission of cultivating basic computer knowledge, basic skills and computational thinking, and the task of cultivating interdisciplinary computer innovation ability of college students in the new era. The content focuses on the basic knowledge, concepts, and operational skills of computers, emphasizing the use of commonly used system and application software, as well as training in computational thinking, while also taking into account cutting-edge knowledge in the field of computer applications.

Through the teaching of this course, we have achieved the following teaching objectives:

1. To enable students to master the basic computer knowledge and basic operating skills necessary for work, study and life in the information society, and to grasp computer-related concepts and computer operating techniques systematically and correctly.
2. To enable students to master the operation of the computer under the network environment and the use of common applications.
3. To enable students to acquire and exchange information on the internet, and to consciously draw on and introduce some concepts, techniques and methods of computer science in their respective majors, ability to use computers at a high level to understand and deal with problems that may arise in the application of computers to specialized fields.
4. Combining the development of computer technology with the achievements of China's technological development into ideological and political elements, so that students establish national feelings, strong national consciousness, craftsmanship, safety education and social responsibility, strengthen self-confidence in China's scientific and technological development and cultivate patriotism.

### **3.2 Design of Blended Teaching Model**

According to the 'Implementation Opinions of the Ministry of Education on the Construction of First-class Undergraduate Courses', it is required to carry out the construction of online and offline blended first-class courses. Online and offline blended first-class courses mainly refer to the use of appropriate digital teaching tools based on MOOCs, exclusive online courses (SPOCs), or other online courses, combined with the actual situation of the school, to transform the internal courses, and arrange 20% -50% of the teaching time to implement students' online self-learning, By organically combining offline teaching with flipped classrooms and blended

teaching, we aim to create a blended "golden course" that integrates online courses with our school's classroom teaching (Ministry of Education of the People's Republic of China, 2019). The online and offline blended teaching mode is designed to meet students' personalized learning needs and ability development, and the ultimate goal is to cultivate students' information literacy and application innovation ability. According to the teaching objectives, we start with the course teaching design. Based on the teaching characteristics of the course and following the cognitive laws of students' learning, the course content is systematically organized, the theoretical knowledge framework is clarified, the knowledge points are reconstructed and segmented, reasonable teaching activity scenarios are created, and a relatively complete online teaching module library is constructed to meet the individual needs of students at different levels, creating an organic learning environment that integrates online and offline for students. Each teaching goal has a corresponding teaching activity, and the supervisor permeates the entire teaching process (Wu, 2019). Online and offline blended teaching is a student-centered teaching ecology that combines classroom teaching with personalized learning to form a model of active learning, autonomous learning and interactive learning. Through several teaching links, such as pre-class learning, online independent learning, classroom key and difficult points explanation, online and offline in-depth discussion, process assessment and teaching evaluation, it changes the traditional 'teacher-lecturing' mode to 'student-independent learning' mode, cultivates students' learning interest and independent learning ability, and exercises students' independent thinking ability. So as to obtain the optimal learning effect. (Liu et al., 2022; Chen et al., 2021).

The school formulates implementation measures and provides hardware guarantee, technical support and incentive policies for carrying out blended teaching. Build a teaching platform, give full play to the role of school smart classroom, and provide convenience for teachers to make online teaching resources. Teachers establish an integrated curriculum system of online and offline teaching. Organic integration of pre-class, classroom and after-class teaching links, set up the corresponding teaching activities, to achieve the expected implementation effect. Before class, the teacher makes teaching resources and designs teaching, allocates the online and offline teaching hours, publishes teaching resources and learning tasks on the online platform, and carries out pre-class exercises for students. The students preview the lesson, prepare discussion materials, and complete exercises before class. The online teaching process takes students as the main body and the teacher as the auxiliary. The teachers organize online discussion, in-class test to test students' learning effect, and answers questions for students through live broadcasting and other forms. Students take part in online learning, interactive discussions and complete tests. In the offline teaching process, the teacher takes the lead, explains the importance and difficulty of knowledge points, organizes group discussions, displays students' learning results, practices teaching cases, and adjusts teaching strategies according to teaching feedback. In this section, students participate in group discussion, report their learning results and give feedback on the online learning effect. After class, the teacher will review students' homework, feedback the results, optimize the teaching content, and conduct teaching reflection through teaching evaluation. Students should complete homework, carry out extended learning, participate in learning evaluation, and actively participate in extracurricular practice and inquiry activities. The teacher constantly sums up teaching experience, improves the teaching design of each link, and further improves the teaching level.

Through personalized and inquiry-based independent learning, students can achieve the course learning objectives, and promote their own advanced learning ability, and lay a solid foundation for the subsequent study and work.

The design process of the online and offline blended teaching model is shown in Figure 1.

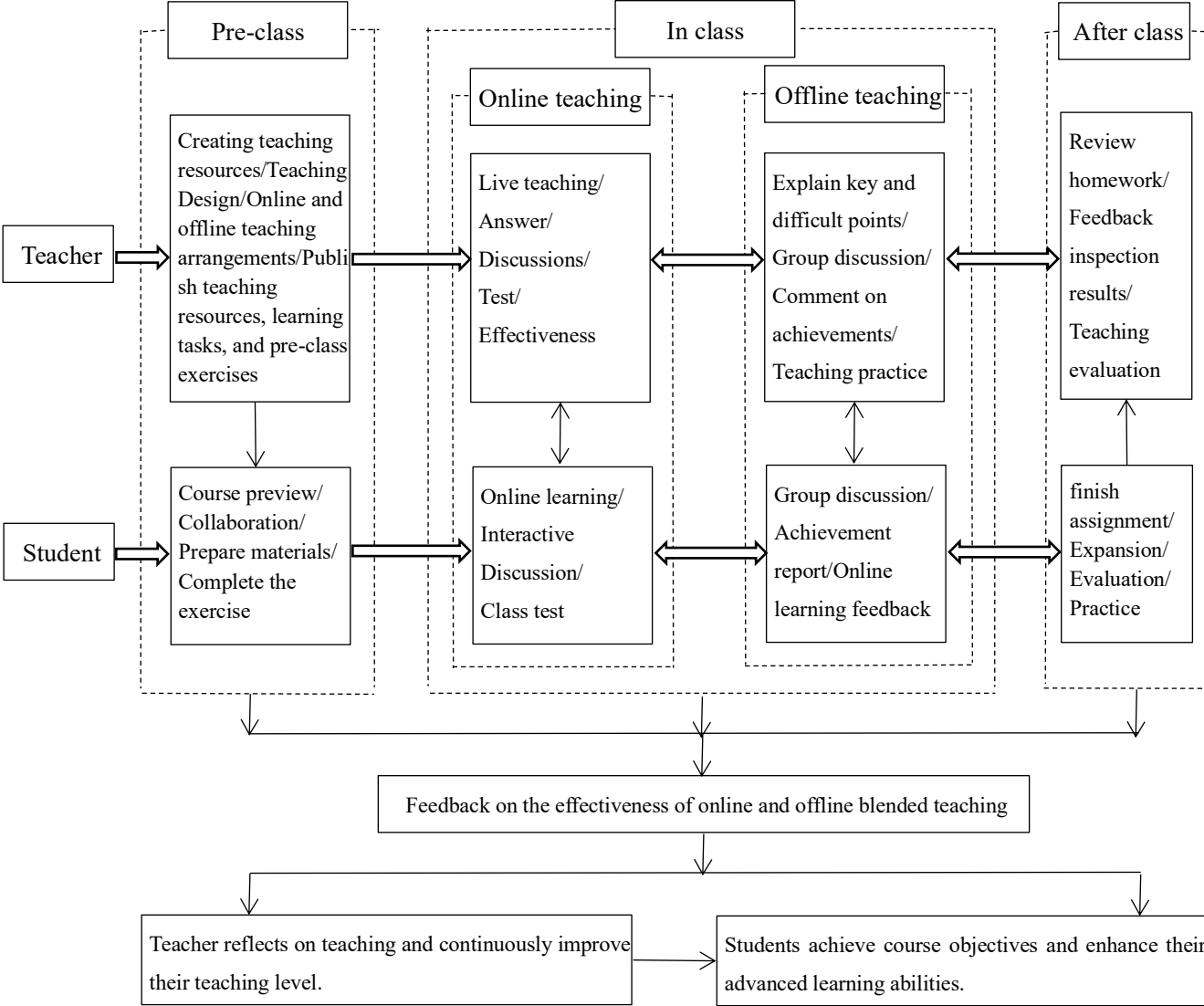


Figure 1 Design flow chart of online and offline blended teaching mode

### 3.3 Blended Course Teaching Design

The course content should comply with the growth laws of students, optimize and reconstruct the course system based on the cutting-edge dynamics of the subject, the needs of economic and social development, and talent cultivation goals, update and adjust the course syllabus and teaching plan in a timely manner, and ensure that the course supports the professional talent cultivation goals and graduation requirements. When designing blended teaching courses, we should focus on the following aspects.

1. The integration of online and offline teaching should be fully considered. The entire online design framework should organically combine online learning tasks with offline teaching activities based on students' individual needs. Each teaching segment should have

corresponding teaching design.

2. To ensure the effectiveness of offline teaching, online teaching hours should not be too long, and should be set to account for about 30% of the total semester hours. In order to enable students to fully understand the nature of the course and teaching arrangements, the first class is generally arranged as offline teaching, and students are informed of the semester teaching calendar and class precautions.

3. Online teaching resources can be China's colleges and university MOOC resources, or teachers can create their own courses on the school's teaching resource platform. Online teaching resources should include teaching syllabus, knowledge guidance, lecture videos, PPT courseware, analysis of key and difficult points, assignments, classroom tests, exams, knowledge expansion, peer evaluation, discussion areas, etc. By doing so, the entire online learning process can be achieved, including online learning, self testing, exams, homework submission, evaluation, discussion, and Q&A, while also constructing corresponding offline student learning experiential activities.

4. When making videos, teachers should make full use of modern information technology, multimedia, Internet and mobile technology. To ensure video quality, teachers can record and broadcast through the school's educational technology center, information network center, and professional recording rooms such as smart classrooms. Considering the convenience and attractiveness of smartphone learning, videos are generally micro videos. Based on classroom teaching tasks, suitable micro video courseware is created, with 1-2 micro videos for each knowledge point, and the video duration is generally 5-15 minutes. Teachers also need to scientifically design recording scripts for different teaching tasks and use relevant professional software to complete the recording work. And we can leverage subtitles and effects functions to fully leverage the advantages of micro videos, stimulate students' enthusiasm for learning, and improve the effectiveness of blended learning (Deng & Hu, 2022).

5. Teaching design should incorporate multiple elements of ideological and political education in the curriculum. The ideological and political orientation of the curriculum can include moral cultivation, social responsibility, patriotism, national consciousness, innovation spirit, craftsmanship spirit, reverence for life, safety education, etc. These ideologies are conveyed to students through online and offline hybrid courses (Yang et al., 2022).

The course 'Fundamentals of University Computer Science' has a total of 2 credits and 32 class hours (including experimental and practical teaching). The teaching calendar is arranged for 10 class hours of online teaching and 22 class hours of offline teaching. The online and offline blended teaching content and class hours allocation are shown in Table 1.

Table 1: Teaching Contents and Class Hours Allocation



S/N	Content	Total class hours	Online teaching		Offline teaching	
			Class hours	Content	Class hours	Content
1	Computer Basics	2	1	Introduction to computer, principle of computer, main performance indexes of microcomputer	1	Numbering and coding, main components of a microcomputer
2	Chinese WINDOWS 10 operating system	2	1	Operating system overview, basic operation of Windows 10	1	File management, system setup
3	WPS text	10	3	Document basic operation, document editing, review documents, print documents, collaboration and sharing, peer review works	7	Experiment: WPS text basic operation, form and application, text mixed application, text advanced operation, learning results show: A small newspaper
4	WPS form	10	3	Workbook basics, data editing, formatting, data security, and printing worksheets	7	Use formula, data analysis, data chart, experiment: Table Operation Foundation, table formula and sequence use, function use, table chart making, table database operation
5	WPS demo	4	1	Basic functions, working environment and basic concepts, playing effect, peer evaluation works	3	Make a multimedia presentation, visual effects, animation effects, experiments: WPS Demonstration of the basic operation, demonstration comprehensive application, learning results show: Group PPT introduction
6	Computer network	2	0.5	The basic concept of computer network, the basic composition of computer network, computer virus	1.5	Internet basics, information security, Experimentation: Windows 10 Network configuration and remote desktop
7	Information Technology Basics	2	0.5	History of Technology, foundation of multimedia technology,	1.5	Domestic substitution, new generation of information technology integration development, new generation of

				information retrieval, generation information technology	new of		computer trends, Network Foundation	development experiments: Application
<b>Total</b>		<b>32</b>	<b>10</b>			<b>22</b>		

22 class hours of offline teaching are arranged in the school's computer multimedia classrooms. The functional structure of offline teaching is shown in Figure 2. 10 class hours of online teaching are arranged on the online teaching platform which is a school teaching resource platform, and its functional structure design is shown in Figure 3. Teachers can use online teaching platforms, combined with Chinese MOOC resources, to build online teaching resources, upload teaching outlines, PPT courseware, micro videos, teaching calendars, practice questions, test questions, etc.

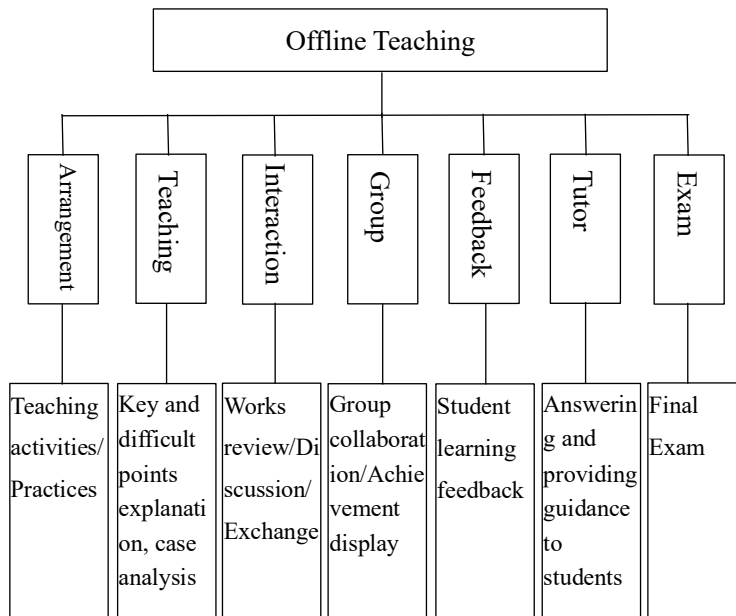


Figure 2 Functional Structure of Offline Teaching

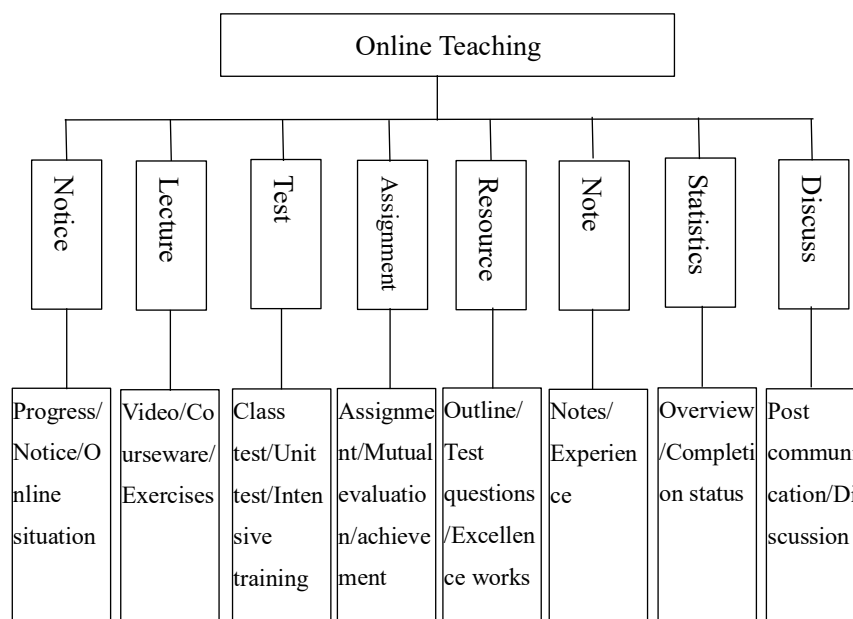


Figure 3 Functional Structure of Online Teaching Platform

The micro video can be recorded through the school's smart classroom. Students engage in online learning through computer and smartphone mobile online teaching platforms. The online and offline discussion groups and learning achievement reporting groups of the student class are divided into groups by the teacher and the class monitor. Teachers use a variety of teaching methods to complement each other when teaching online and offline, such as problem-oriented method, task driven method, case method, discussion teaching method, simulation method, etc., and integrate ideological and political education into the curriculum during teaching. Students use a variety of learning methods to infiltrate each other, such as the combination of learning and thinking, induction and summary, participation and interaction, cooperative learning, and combination of learning and application (Yu et al., 2020).

### 3.4 Evaluation of Blended Course Teaching

A diversified evaluation system for online and offline blended teaching needs to be constructed to improve the supervision and assessment of the teaching quality of blended courses, and effectively test the teaching quality of teachers and the learning effectiveness of students.

1. The evaluation of Teachers' curriculum teaching is carried out in the form of student evaluation, expert peer evaluation, supervised class attendance, faculty and school evaluation (Cao, 2023).

2. In the assessment and evaluation of students' courses, it is necessary to strengthen the evaluation of students' learning both in and out of the classroom, online and offline, strengthen the examination of reading volume and reading ability, and enhance the breadth of course learning. We need to strengthen research-based and project-based learning, enrich homework evaluation methods such as inquiry based, paper based, and report defense, and enhance the

depth of course learning. We also need to strengthen non-standard and comprehensive evaluations to enhance the challenge of course learning (Ministry of Education of the People's Republic of China, 2019).

3. The assessment and evaluation of student courses adopts a combination of process evaluation, formative evaluation, and summative evaluation (Cao, 2023). Process evaluation mainly tests students' ability to solve complex problems, including questioning, searching for information, defense, group collaboration, and other abilities. Formative evaluation mainly examines students' classroom participation, including online teaching attendance, classroom attendance rate, interactive discussions, and achievement display. The summative evaluation mainly tests students' comprehensive, analytical, and evaluative abilities.

The assessment and evaluation of the course 'Fundamentals of University Computer Science' consists of four parts: pre-class, online teaching, offline classroom, and post class evaluations. The total score of the course consists of three major parts: the final score accounts for 50%, the online score accounts for 30%, and the offline score accounts for 20%. The online score is evaluated by the platform based on the comprehensive performance of students in various online stages, including watching videos, conducting in class tests, practicing, interactive discussions, peer evaluations, assignments, etc. Offline score is assessed by the teacher according to students' performance in class, including attendance, group collaboration, learning achievement display, experiment, etc. The teacher dynamically tracks and records students' learning trajectories through teaching platforms, incorporating their online and offline performance into the evaluation process, and comprehensively assessing students' learning abilities.

The course 'Fundamentals of University Computer Science' was recognized as a provincial-level first-class online and offline course in 2021. Since the implementation of blended online and offline teaching, this course has achieved significant teaching results. Practice has proven that through the implementation of blended online and offline teaching, the teaching mode of teachers has been innovated, their information technology capabilities have been further enhanced, their teaching level has been further improved, and the direction of professional development has become clearer. The online and offline blended teaching mode has stimulated students' interest in learning, improved their self-learning ability, and enabled them to deeply learn course knowledge and proficiently master skills. It improves students' ability of expression, communication, collaboration and critical thinking. This teaching model also expands students' knowledge and perspective, promoting the improvement of their advanced learning abilities.

#### **4.0 Conclusion**

Under the background of first-class undergraduate curriculum construction, China's colleges and universities adhere to the goal-oriented, optimize the teaching content, restructure the curriculum system, and strengthen the curriculum construction. The construction of digital campuses has been actively promoted, network infrastructure has been improved, and the level of information application in schools has significantly improved. These promote the implementation of teaching information management in the school. Colleges and universities should strengthen the training of teachers' information technology skills and improve their information literacy. Perfect digital campus facilities, deep integration of information technology and educational teaching, provide technical support for teachers to implement mixed online and offline teaching, and create a good teaching environment. A fully functional online teaching platform, rich curriculum resources and, open and shared high-quality teaching resources provide students with a convenient learning and communication platform, promoting the improvement of their advanced learning abilities. Education and teaching models are being reformed and innovated, relying on internet information technology, giving full play to the advantages of online and offline teaching, and improving the effect of education and teaching. Colleges and universities should stimulate students' learning motivation and professional interest, and focus on cultivating a team of innovative, compound and application-oriented talents to adapt to the society. Colleges and universities should strengthen the policy incentive, improve the assessment mechanism, in order to stimulate the enthusiasm of teachers' teaching reform. The combination of online and offline teaching mode adopted by colleges and universities can effectively solve the problems existing in the traditional offline classroom teaching mode, expand and extend the new connotation of classroom teaching, promote the improvement of the overall construction level of the school curriculum, and play an important role in the realization of high quality development of the school.

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