

# Online Blending Learning Model of School-Enterprise Cooperation and Course Certificate Integration During the COVID-19 Epidemic

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**Abstract:** The outbreak of COVID-19 in 2020 has brought unprecedented challenges to school education, but it has also brought new opportunities to online education. How to quickly switch from the traditional classroom to online live class, how to organize the construction and teaching implementation of online courses, how to make use of high-quality teaching resources to quickly build online courses, and how to guarantee the teaching quality of online courses are all urgent problems to be solved in the development of online teaching in the emergency period. Taking the construction and teaching of practical network technology as an example, this paper describes how to use the high quality training resources of cooperation between schools and enterprises to build a new type of online Blending Learning mode of course certificate fusion. As the goal of the course, the online video learning resource library is built by enterprise training video. Through students' online autonomous learning and knowledge point learning summary through the form of thinking map, teachers' online interactive live explanation, answering questions and evaluation at a fixed time can better control the teaching quality of the course, and carry out experimental operation training and consolidation exercises after class. From the current course operation, the course really realizes the student-centered learning, and the teaching effect is good.

**Keywords:** COVID-19 Epidemic, Course Certificate Integration, Blending Learning, BOPPPS, Online Interactive Live Classes

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## 1. Introduction

Since January 2020, the new coronavirus epidemic has been raging all over the world. In order to control the spread of the epidemic, governments have shut down classes and isolated residents at home, which has brought unprecedented challenges to traditional school education. However, the online education model based on Internet and information technology has experienced the mature period of technology, and it is now enough to support students to study online at home, and online education has thus been greatly popularized. The whole course online teaching has brought great pressure to the teacher, the course construction task is heavy, how to guarantee the teaching quality, how to carry on the teaching design, how to make better use of all kinds of teaching platform and teaching resources, these are all the problems

that must be solved to carry out the online education and carry on the online course construction.

Traditional Blending Learning [1] combined with the advantages of online and offline learning to promote students' autonomous learning, offline teaching can not be carried out during the epidemic period, how to combine online self-study and online interactive live courses to achieve the original online and offline Blending Learning effect..

## 2. Learning Theory

### 2.1. Blending Learning

Throughout the development of learning theory, it is not an alternative development relationship, but a relationship of inheritance, sublation and development. Behaviorism emphasizes explicit behavior and objective stimulation.

Cognitiveism [2] emphasizes the original cognitive structure of the subject and the change of the hidden cognitive structure behind explicit behavior, while Constructivism [3] emphasizes the multifaceted nature of knowledge, self-construction, construction process and construction results in the specific environment.

Blending Learning [4] is not a new teaching method or theory, but with the deepening of educational informatization, it has gradually gained universal attention. Nowadays, college MOOC [5], flipping classroom [6], SPOC [7] and so on become popular, and Blending Learning becomes the most suitable teaching mode in the Internet+ era.

The so-called Blending Learning [8-11] is to combine the advantages of the traditional learning style with the advantages of the e-Learning (that is, digital or networked learning), so that the cognitive style of the students will change, and the teaching mode, teaching strategy and role of the teachers will also change. This kind of change is not only a formal change, but also on the basis of analyzing students' needs, teaching contents and actual teaching environment, making full use of the complementary advantages of online teaching and classroom teaching to improve students' cognitive effect. Blending Learning emphasizes the application of appropriate learning techniques at the right time to achieve the best learning goals.

## 2.2. BOPPPS Classroom Teaching Model

BOPPPS [12-14] effective teaching method divides classroom teaching into six teaching structures: introduction (Bridge-in), learning goal (Objective/Outcome), pre-test (Pre-assessment), participatory learning (Participatory Learning), post-test (Post-assessment) and summary (Summary). BOPPPS is an effective method for teachers to carry out pre-class teaching design and organize classroom teaching in class.

Bridge in: warm body, introduction, this part is the first step to attract students into the classroom, need teachers to design a topic to introduce the main content of the course. Can be a story that happens to oneself, because own story can attract students more, students all have a curiosity, want to know how their teachers deal with these problems.

Objectives: the teaching goal, the study goal, this stage teacher needs to assign the study goal to the student, is advantageous to the student in the study process clear through this study may complete what content, can understand, the memory, the operation, the appraisal or the creation.

Pte-Assessment: the pre-test, this stage let the teacher know how the students before the mixed learning content preview, whether completed all the teaching links.

Participatory Learning: participatory learning for students, this section is mainly organized by teachers for participatory learning for students, including: group discussion, debate competitions, simulation training, PBL and other models of participatory teaching activities. At this stage, the teacher needs to "take the students to tango ", as introduced by the teacher, to give the students clear teaching goals, let them

participate and reflect, and learn more in " hypnosis ".

Post-Assessment: post-test, after the completion of classroom teaching needs to evaluate the students' learning effect test, and this post-test should not be the same as the pre-test, need to be difficult to improve, students in this stage can understand their grasp of classroom teaching objectives, if there are imperfections can continue to maintain interaction with teachers in the later teaching summary.

Summary: classroom summary is a more important link in the classroom, because this link can bring back the students' " heart ", the teacher should avoid the bias, the teacher mainly reviews the key difficulties in the classroom, it is best to use some concise and easy to remember words summary, so that students can review in time, there are problems raised on the spot. When summing up, the teacher can not add new content.

## 3. Online Blending Learning Design and Practice of Course Certificate Integration

The Blending Learning design under the Internet environment includes five main links: learning situation analysis and curriculum orientation, constructive learning environment design, curriculum resource construction, learning strategy and classroom teaching organization, teaching evaluation and quality control.

### 3.1. Situation Analysis and Course Orientation

No matter what teaching methods and Learning methods are adopted, the analysis of learning situation is the starting point of teaching design, and the determination of curriculum goal orientation is also the fundamental basis of subsequent curriculum design.

The course of practical network technology is the core course and compulsory course of Wenzhou computer network technology specialty. The course aims to enable students to learn the principles and practical skills of network architecture, network protocol and network device configuration.

At the secondary vocational level, the teaching students have learned the basic knowledge of network system configuration and Cisco's network equipment configuration. In order to keep the students learning fresh and enhance the learning effect, combined with the current share of data communication products in the Chinese market, the course plans to set up relevant contents Huawei network equipment configuration management.

According to the characteristics of vocational education and the needs of students, the teaching goal of this course is to hope that students can master the basic configuration of network architecture, TCP/IP protocols, routers, switches, network security equipment, and master the basic erection and equipment configuration ability of setting up a network of small and medium-sized enterprises. facilitate students to obtain the Huawei

HCIA-Routing & Switching certification.

### 3.2. Constructive Learning Environment Design

The course is taught in the form of live online, self-study experiment, offline tutoring examination and final certification examination.

Online learning uses the college's unified online learning platform to publish learning tasks and organize learning; QQ learning groups are used for extracurricular tutoring and teacher-student interaction, and Tencent courses and other live broadcast platforms are used as the basic means of online interactive teaching. Using the form of course teaching team, a number of teachers division of labor and cooperation, respectively responsible for curriculum organization, content explanation and online and offline question and answer guidance work.

Network technology is the course of practical operation class, which needs the support of corresponding experimental environment equipment, which poses a new challenge to the development of online education. Because of the company cooperation relationship, the course can use the eNSP (Enterprise Network Simulation Platform) network simulator provided by Huawei company to carry out the corresponding experimental teaching.

The online learning platform takes advantage of the cutting-edge technology to lead the classroom teaching innovation. It fully relates to the existing classroom hardware and covers a variety of classroom intelligent teaching modes. It supports various forms of access, such as Web browsers and mobile APPs, so that students can study anytime and anywhere. Looks like figure 1.

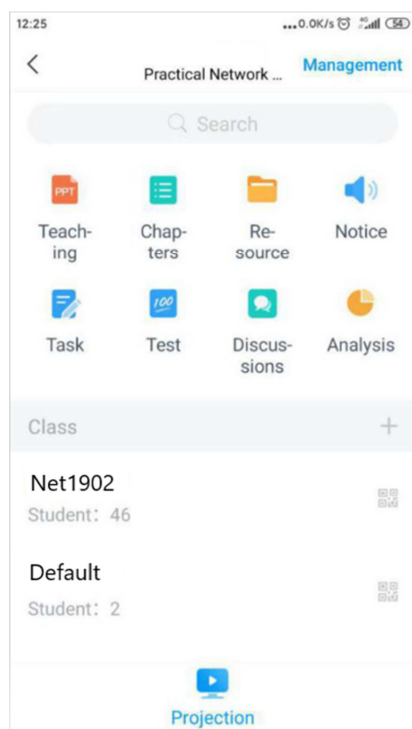


Figure 1. The Mobile APP of the online learning platform

### 3.3. Curriculum Resources Construction

The course adopts the way of school-enterprise cooperation course certificate integration [15-16], and combines the certification standard of Huawei certification HCIA R&S to set up the corresponding learning content and experimental task. By using the authorization of the cooperative enterprise, the quality training video and experimental documents related to Huawei certification are introduced into the classroom for students to learn independently.

In our class, the video and lab recourse sponsored by the training company are uploaded to the online learning platform which let students learning the corresponding parts individually.

The recourse list is in figure 2 which coded in Chinese, these include the basis of Huawei VRP Operation system, the OSI seven-layer network reference model, TCP/IP four-layer model etc.

CH4 HCIA Routing&Switching			
4.1	Huawei Training Videos	<input checked="" type="checkbox"/>	
4.2	Basis of Huawei devices	<input checked="" type="checkbox"/>	
4.3	Telnet/SSH Remote connection	<input checked="" type="checkbox"/>	
4.4	VRP System and configuration	<input checked="" type="checkbox"/>	
4.5	FTP services	<input checked="" type="checkbox"/>	
4.6	OSI/RM and TCP/IP	<input checked="" type="checkbox"/>	78%
4.7	MAC address	<input checked="" type="checkbox"/>	84%
4.8	IP address	<input checked="" type="checkbox"/>	84%
4.9	IP Subnet	<input checked="" type="checkbox"/>	80%
4.10	VLSM and CIDR	<input checked="" type="checkbox"/>	86%
4.11	ARP protocol	<input checked="" type="checkbox"/>	
4.12	TCP/UDP	<input checked="" type="checkbox"/>	67%
4.13	Data Transfer	<input checked="" type="checkbox"/>	58%
4.14	Route and OSPF	<input checked="" type="checkbox"/>	52%

Figure 2. The Learning Resources of the course.

Each section contains a learning video and instructions for the experiment. With the support of the learning platform, each student's learning record can be well tracked, The progress bar after the title of each section reflects the progress of the whole class. Click the corresponding progress bar to further see the details of students' completion in this section.

### 3.4. Learning Strategies and Teaching Organization

As illustrated by figure 3, The online Blending Learning is divided into three stages. The first stage is the online self-study stage, which adopts the form of training video to self-study, and provides the self-study summary of the mind map version as required; the second stage uses the online interactive live classroom instead of the traditional offline classroom; the third stage is the online after-class consolidation exercise, completes the time-consuming experiment operation exercise. Three according to the course knowledge point iterative convergence, spiral rise. BOPPPS teaching mode is adopted in the online interactive live classroom, and the teacher determines whether the students

complete the study of the relevant content through the pre-class test in the online interactive live classroom. Classroom instructional design can design and organize students for participatory learning.



Figure 3. There are three figures illustrated here.

### 3.5. Teaching Evaluation and Quality Control

The evaluation of classroom teaching is based on the learning performance of the above three links. Because the part of knowledge teaching in teaching design has been put into the online self-study link, the online learning behavior data (such as watching video, discussing, thinking map summary) will be used as the evaluation basis for students' online self-study. Answer the questions in the video that are difficult to be answered by the students in the classroom on the spot, so that the students can check whether they watch the video themselves. Online interactive live classroom with simple test questions or interactive discussions to test students online learning situation, urge students before class video self-study. The practice and consolidation of the experiment operation link as the homework after class can further promote the students to master the knowledge points.

As a result, we have designed a whole set of quality evaluation programs, each link has a certain proportion of the results into the comprehensive results of the course, and the final students to participate in the Huawei HCIA-R&S of the textual research target results are also included. Finally, the quality control of the teaching process is completed through the division of labor and cooperation of many teachers in the course group.

## 4. Summary

Using the enterprise certification training resources of school-enterprise cooperation, constructing a constructive learning platform, combining with careful curriculum design and good curriculum teaching organization and teaching quality evaluation, The online Blending Learning mode of school-enterprise cooperation course certificate has achieved good results in the course teaching of practical network technology during the epidemic period, and has a good reference effect on the teaching of other courses and teachers.

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