

An Analysis of the Hybrid Course Teaching Model for "Logistics System Simulation"

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Abstract

Owing to the rapid advancement of information technology, the proportion of hybrid teaching models combining online and offline elements in higher education has been increasing annually. This paper investigates the application of blended learning in the curriculum, providing solutions grounded in an analysis of the characteristics of the "Logistics System Simulation" course. Additionally, it offers novel recommendations for enhancing instructional quality.

Keywords

Blended learning; Practical plan; school reform; system simulation.

1. Introduction

In addition to providing a new dimension for the current pedagogy of logistics engineering and management, internet-plus education has introduced innovative teaching modalities such as the flipped classroom and online micro-classes. The seamless integration of online and traditional classroom instruction into an "online"+"offline" format is referred to as blended learning. Relevant studies have demonstrated the following: based on the "MOOC+Rain Classroom" blended learning model, it has been found that this approach significantly enhances students' academic performance in selected courses^[1]; The blended learning model can flexibly facilitate both offline and online teaching, making it suitable for smart logistics courses^[2]; By promoting communication and interaction between instructors and students, class participation can be substantially increased^[3]; Blended learning also positively influences students' interest and initiative in learning^[4]. One of the primary research questions is how to optimally leverage the advantages of both offline and online teaching methods to transform traditional teaching models.

Commencing with the three phases of pre-class, in-class, and post-class, the "Logistics System Simulation" course integrates micro-course modules, specialized instruction, and intensive education models to establish an innovative teaching paradigm. This approach is facilitated by the institution's online teaching platform.

2. Construction of innovative system for blended learning mode

To establish a new educational ecosystem for "Logistics System Simulation" that integrates online and offline self-directed learning, it is essential to fully implement a student-centered teaching approach. This will facilitate the advancement of the teaching process and enable college students to transition from passive recipients to active participants in their learning and critical thinking processes.

The rapid advancement of new information technologies, such as the Internet, has significantly impacted multiple areas including higher education, teaching philosophy, the educational system, and teaching models. At the core of online instruction is the concept of "teacher-guided independent student learning." The teaching approach based on "Internet Plus Education" integrates extensive use of Internet technologies and services into the course learning process.

Firstly, it is essential to ensure the quality of both "offline" and "online" course development. Optimizing course materials is a critical component of curriculum building for online instruction, requiring continuous, dynamic oversight and enhancement to maintain high standards in online education. Teachers should focus on curriculum design, prepare thoroughly for pre-class assignments, and develop detailed and meticulous online lesson plans. Additionally, they should enhance interaction and communication between students and teachers during online classes, emphasize students' learning outcomes after class, and provide ample opportunities for independent learning. Secondly, consider the effectiveness of students' learning of course material. Elevate students' learning needs by assigning experimental tasks and activities for each chapter based on the course content available on the learning platform. Instructors can master the course material and effectively improve students' self-directed learning capacity by analyzing student learning records on the online platform to identify areas where students' self-learning processes may be lacking.

3. The Application of Blended Teaching Mode in the Course of "Logistics System Simulation"

The learning objectives of the "Logistics System Simulation" course encompass modeling and simulating manufacturing and logistics systems, introducing widely-used computer simulation software, and exploring issues related to modeling, simulation, and application in these systems. The hybrid classroom for "Logistics System Simulation" is structured around three core components: technical aspects, process design, and environmental factors. The teaching methodology of this course is built upon three process stages: pre-class preparation, in-class instruction, and post-class evaluation. The specific concepts are as follows:

3.1. Advance your fundamental understanding before class

The online learning environment serves as the platform for developing the "Logistics System Simulation" course. The teaching team meticulously curates and organizes a diverse array of course-related materials designed to stimulate students' interest and engagement. Prior to each "Logistics System Simulation" session, key knowledge points are provided for independent study, with all instructional materials being uploaded to the online learning platform. To ensure comprehensive support for students' self-directed learning and understanding before class, the platform offers an extensive range of multimedia resources, including videos, presentations, documents, case studies, and experimental modules.

Course teaching videos facilitate the delivery of fundamental knowledge that is easy to learn and understand, adhering to the technical standards of micro-movies and Flash-based interactive animations. Through online teaching platforms, students can access a wealth of diverse learning resources and engage in self-directed pre-study. The platform also enables meaningful interactions between instructors and students, as well as among students themselves. To enhance communication, a discussion board for the "Logistics System Simulation" course has been established.

3.2. Implementing interactive teaching in the classroom

Students utilized the online teaching platform to independently study and master the foundational concepts of the lesson before class. To facilitate interactive teaching between students and teachers, the teacher focused on addressing learning challenges encountered by students during their independent study and emphasized problem discussion and communication in class. In the "Logistics System Simulation" classroom, based on students' understanding of logistics simulation software fundamentals, the teacher discussed the experimental model for the simulation software experiment section. The teacher provided a comprehensive analysis and explanation of the modeling process, simulation procedures, and

optimization results of each simulation experiment conducted by students using logistics simulation software.

3.3. Consolidate knowledge after class

Use online teaching platforms to administer online tests or give relevant homework after class. On the school's online teaching platform, the key concepts and simulation model modeling process are shown as Flash animations. Students can also access learning resources like knowledge sorting and model analysis to study on their own after class. Teachers reinforce the consolidation of pertinent knowledge by offering assistance and Q&A via interactive platforms.

4. Creating a practical teaching plan in mixed modes for "Logistics System Simulation"

The course of "Logistics System Simulation" should select a reasonable teaching mode based on the actual situation, as shown in Figure 1. In order to create an open teaching environment, the specific adoption model is as follows:

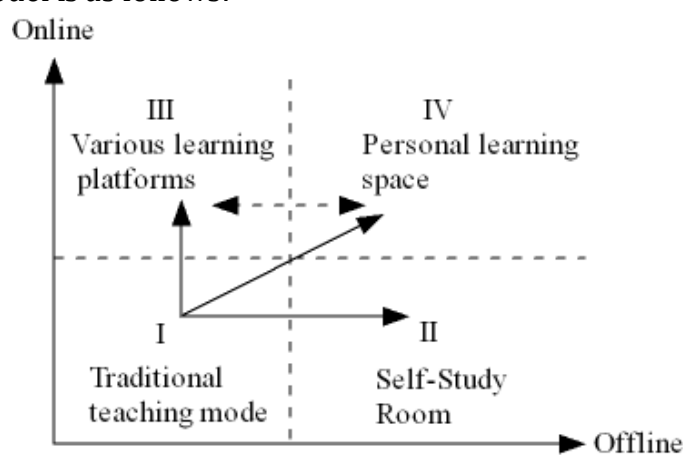


Figure 1. Schematic Diagram of Teaching Mode Relationship

4.1. Course study style I → III

With online teaching platforms, instructors can give students assignments for their courses ahead of time. Students can share their learning ideas, experiences, and processes on the learning platform once they have finished self-studying the course material. This improves classroom interaction and guarantees the caliber of online instruction. Instructors use PowerPoint, audio, and video to deliver lectures in the classroom. Students can see their attendance status in real time by using the sign-in attendance feature. Teachers are free to pose questions, administer tests, and engage in other class activities.

4.2. Course study style I → II + IV

Instructors have the option to pre-upload recorded videos or course materials to the learning platform so that students can study on their own. Students can access course materials, watch instructional videos, and more after logging into their own learning area. To improve students' comprehension and retention of the course information, teachers can also upload exercises, discussion questions, and experiments on the online teaching material platform after class. Students can grasp the material they have learnt and set learning objectives based on their unique circumstances in this way. Although the location, time, and space restrictions for this learning style are somewhat lax, students must possess strong self-management and self-motivation skills.

4.3. Course study style I→III+IV

Utilizing the learning platform as a means of bridging the gap between in-class instruction and individual learning, delivering course material to students via the platform, or pre-recording course videos and putting them online, followed by practice exercises. Students can ask questions about the course material in their own learning environment, and teachers will respond. Teachers also give students tailored explanations of the material based on their completion level.

4.4. Learning mode for interactive courses

Online teaching platforms enable educators to issue course learning reminders before class sessions commence. Students can access uploaded courseware materials for self-directed study and familiarize themselves with the lesson's teaching strategies and learning objectives through the platform. During pre-class online previews, students can select lessons based on their foundational knowledge and learning capacity. To facilitate focused in-class explanations, teachers utilize the platform to monitor and evaluate students' understanding of various concepts. The discussion section of the learning platform facilitates idea exchange and addresses specific queries between teachers and students. Teachers may also assign relevant discussion topics to enhance students' comprehension of challenging material. Upon completing each course section, instructors use pre-designed assignments to assess learning outcomes. Through online systems, students can submit assignments or lab reports and provide feedback on teaching methods to continuously improve the course. Teachers can assign and review homework using the grading module.

The use of post class testing on learning platforms can be used to verify teaching effectiveness, identify students' learning weaknesses, and understand their true reactions through classroom teaching. By strengthening the organic integration of "offline" and "online" teaching modes, the advantages of the two teaching modes can be complemented. According to the difficulty level of the course learning content, it can be divided into three categories, and the specific implementation methods are shown in Figure 2.

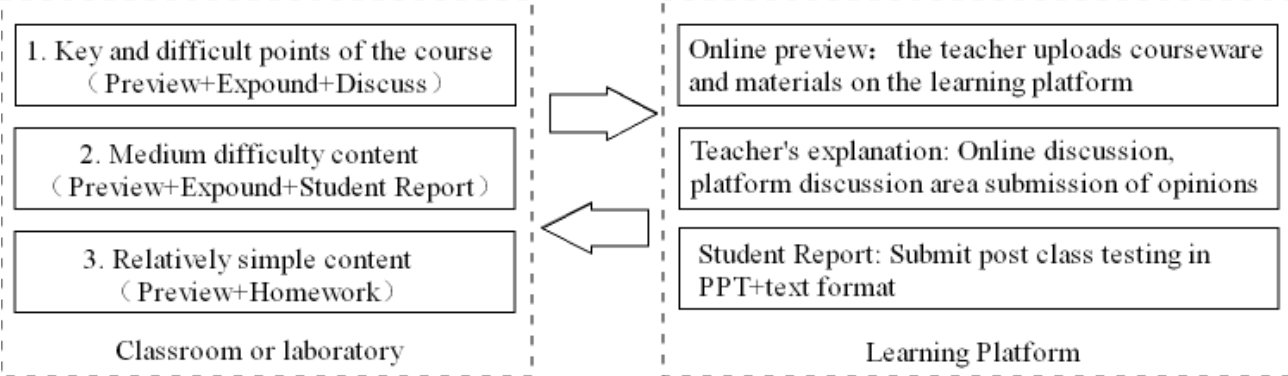


Figure 2. The Interactive Mode

Based on the four fundamental forms described above, Table 1 presents five common teaching modes: MOOC+SPOC+Online Flipped Classroom, SPOC+Online Flipped Classroom, Video Open Courses/Resource Sharing Courses+Online Guidance, Teaching Material Sharing+Online Guidance, and "1+U+S" collaborative cross-school teaching mode.

Table 1: Five Typical Teaching Modes

Typical teaching mode	Content
The "1+U+S" collaborative cross-school teaching model	Cross regional and cross school online open courses "1 (course)+U (university)+S (student group)"

MOOC+SPOC+Online Flipped Classroom	Combining student-centered open online courses with targeted online courses
SPOC+Online Flipped Classroom	Students are the primary focus of targeted online teaching courses
Video Open Courses/Resource Sharing Courses+Online Guidance	The teacher's online teaching is the main focus, with Q&A as a supplement
Teaching Material Sharing+Online Guidance	Students mainly self learn online, with teachers answering questions as a supplement

5. Conclusion

Universities can collaborate effectively by mobilizing and coordinating diverse resources, leveraging online course alliances and platforms, curating a wide range of high-quality course materials, and jointly developing and distributing professional courses. Additionally, they can provide comprehensive support services. To facilitate collaborative lesson planning and interactive teaching, instructors should fully utilize online teaching platforms to redesign the instructional design, teaching process, course organization structure, and learning performance evaluation framework of the "Logistics System Simulation" course. This will ensure students have access to premier online learning materials, personalized learning support services, and guidance for in-depth learning.

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