Exploration and Practice of online teaching mode of operating system course

Wenhua Zhang¹

¹ Shandong Xiehe University, Shandong, 250109, China
Corresponding author’s e-mail: 2726305006@qq.com

Abstract. In the spring of 2020, the Ministry of Education proposed to suspend classes but keep learning and carry out online teaching. In this paper, after analyzing the advantages and disadvantages of online teaching, combined with the ongoing operation system, some ideas of operating system online teaching reform are put forward from three aspects of leading to learn, live to learn in class and after class superintendent. Course evaluation and network teaching platform evaluation pay attention to the usual inspection and evaluation of learning process, which makes the evaluation more reasonable and fair.

1. Introduction
Operating system is a required course for computer related majors, which occupies an important position in the computer teaching system. In the course system of computer, operating system, which is the further extension of hardware and the foundation of learning software well, plays the role of connecting the preceding and the following. It is crucial for students’ professional development in the future. In the spring of 2020, affected by the COVID-19 epidemic, the Ministry of Education proposed to suspend classes but keep learning and carry out comprehensive online teaching. The operating system also carries out online teaching reform with the pace of The Times.

2. Analysis of advantages and disadvantages of online teaching

2.1. Advantages
- The teaching time is free. Students can watch videos at any time on the platform, which is convenient for repeated learning and flexible for learning time[1].
- The teaching space is free. Students can study wherever there is a network which can enable schools to implement the principle of the Ministry of Education to suspend classes but learning.
- The full mobilization of autonomy. Under the epidemic, many resources are freely available. Students can register and choose by themselves, choose the courses they are really interested in. At the same time, the content and schedule of the course should be arranged to be appropriate. After completing a part of the course, students will be encouraged and their subjective initiative will be fully mobilized[2-3].
- Students’ horizons can be broadened. Teachers can fully exploit good resources and share them with students. For students, they can have access to first-class university courses and knowledge in extended fields, and communicate with scholars all over the country, which can greatly broaden students' horizons.
2.2. Disadvantages

- Teachers can't manage the class effectively and students can't discipline themselves. In the traditional teaching process, if some students do little actions or have inattention while listening, the teacher will correct them timely and let them return to normal. But in online teaching, it is not so flexible for classroom management. It is difficult for students to learn online classes autonomously and need to be supervised by their parents.

- Across the screen, teachers cannot empathize with their students. In the traditional teaching process, the more active and enthusiastic the students are, the more active the teachers will be. The more enthusiastic the teacher is, the more students will be affected. There is a screen between teachers and students in the online teaching, which can not convey the enthusiasm of teachers and students.

3. Online teaching practice of operating system courses

We focus on three core areas: student focus, output-oriented (result-oriented), and continuous improvement. In the course teaching, the first focus is on output: how to obtain learning outcomes and how to evaluate learning outcomes. Second, it is student-centered and students take the initiative to learn. Driven by continuous feedback from students, with emphasis on learning outcomes, continuous improvement in teaching and learning processes. Third, multiple assessment, continuous assessment.

3.1. Lesson guide

3.1.1. Description of the course before class.

Before the start of class, the overall situation of the operating system course will be explained to the students, including the teaching content, teaching methods and assessment methods. In particular, the mixed teaching methods, which pay more attention to student-centered and emphasizes results-oriented. At the same time, the online teaching platform is actively used to emphasize the process assessment, so as to encourage students to complete tasks with both quality and quantity and to actively interact with each other. [4].

3.1.2. Teachers upload teaching resources.

Quality resources are the foundation of successful teaching. During the epidemic, many online resources were open to teachers and students free of charge. It was convenient and complicated to find high-quality teaching resources. In the process of finding resources, several principles were followed. First, high-quality teaching resources are suitable for students' current learning situation. According to ability to master knowledge of students, they can choose resources that are easy to understand. Second, there should be some expanded materials. The level of students in a class is not exactly the same, and some students master knowledge quickly and react sensitively. Therefore, it is necessary to provide them with in-depth resources for their study. Third, it’s appropriate to record teaching videos by yourself. Existing resources may not fully meet the teaching requirements, so self-recording videos can be uploaded to the online teaching platform.

Operating system course teaching resources mainly include teaching materials PDF files, courseware, micro-course videos, pictures, topic discussions, topic Banks, examination paper Banks, extracurricular extended reading and so on. Organize these resources in an orderly way according to the teaching schedule and make them into task points so that students can learn independently according to the teacher's schedule. At the same time, the resources are classified into the resources of the online teaching platform for the convenience of students to grasp the course as a whole.

Each micro-course video is in the basic 10-15 minutes, the longest is no more than 20 minutes. The main consideration is that students can concentrate on studying more effectively and are less likely to get tired. At the end of the important and difficult points, there will be a corresponding topic discussion to deepen students' understanding of knowledge. At the same time, there will also be a corresponding quiz to test students' learning effect. After learning the content of a chapter, you will
3.1.3. Issue task notifications and set the context.
Release learning task notice on the online teaching platform before class, and guide students to learn according to the scientific and reasonable progress. Online teaching platform is used to release pre-class questions and guide students to learn under certain problem situations.

3.2. Active learning in class
Effective classroom organization requires careful design of the teaching process in advance. According to the professional talent training program and the three dimensions of cognition (memory understanding, analysis and application, creation and transformation), the course objectives are set as knowledge objectives, ability objectives and quality objectives. And then we'll go into the target elaboration of this video. It mainly adopts the six-step online teaching method: problem introduction -- independent learning -- topic discussion, quiz -- classroom interaction -- summary -- homework consolidation.

3.2.1. Invigorate the classroom atmosphere through activities.
At present, all online teaching platforms have the functions of activities, such as check-in, test, questionnaire, pre-answer and selection. Teachers can make full use of these functions to stimulate students' enthusiasm for participating in activities by setting certain points, and achieve the effect of activating the classroom.

- We used the in-class exercises in the activities of the online teaching platform to test the knowledge points of students' independent learning. The average time is set at 5 minutes, which enables most students to read the questions and make answers. This test will be given a certain class integral, to achieve the effect of inspiring students.
- We make use of the online teaching platform's response function to let students answer questions that need to be expressed. Students are given certain class credits according to the order of first responders. Meanwhile, students are guided to make correct answers to questions. Students who answer correctly or first answer correctly are rewarded with classroom credits again.
- We use the online teaching platform to answer the questions by random or teacher appointed candidates. Combined with QQ group voice or screen sharing together. Practice has shown that when students are unprepared, the results are mediocre. After the election, the students should inform the questions, and leave a certain amount of time for preparation. The students often give better answers, and can give examples and answer in the way of screen sharing. After the activity, the students were evaluated objectively and rewarded or punished.
- The teacher sets up a group task and asks the students to complete a task together. Practice shows that the effect of pre-set grouping is better. Students form groups according to their own wishes and can cooperate with each other to complete the task. Students complete the task and submit the results. The teacher can see the editing of the results. We used comprehensive evaluation (teacher evaluation, in-group evaluation, intergroup evaluation, self-evaluation) to grade the students.
• Teachers assign certain assignments after class by using the homework function of online teaching platform to consolidate the knowledge learned by students. In order to better consolidate the knowledge learned by the students, the students are allowed to answer multiple times and get the highest score. In order to prevent students from forgetting to do their homework when they are busy with other things after class, the school inspector will set up a notice to remind students who do not answer their homework 24 hours before the deadline.

• After each chapter is learned, a chapter test is conducted, and the teacher tests the students with the examination function of the online teaching platform. The questions are randomly selected from the question bank to form a test paper, with an average of 3 people in a set of questions, and the disorderly order of questions and options is set to emphasize that students take the test on time. QQ screen sharing is adopted to interpret error-prone points and comb the key and difficult points of this section or chapter. After explanation, students are asked to cancel silence and then ask and answer the summary of the key and difficult points.

• After class, teacher uses the online teaching platform to issue questionnaires to investigate students' learning status and course satisfaction.

3.2.2. Use of multiple platforms to ensure teaching.
During the epidemic, online teaching has been implemented throughout the country, so it is impossible to guarantee that a single teaching platform can effectively involve all students during normal classes. Besides, different platforms have their own advantages, so multiple platforms can be used to ensure the normal operation of teaching. [6].

3.2.3. Heuristic teaching.
In the teaching process, students can be guided to develop their thinking step by step according to the idea of putting forward a problem, analyzing a problem and solving a problem, so as to find the solution of the problem, and compare with the method in the book. For example, when explaining how to realize mutual exclusion of software, students are guided to think about how to realize it if two people enter the door, but only one can enter at the same time. According to the proposed method, the mutual exclusion method is compared with software to solve the problem [5].

3.2.4. Case study method.
There is a great deal of knowledge in the operating system and the content is abstract. The abstract problem should be instantiated during presentation. For example, when explaining synchronization and mutual exclusion, let the students enumerate real life cases, so as to test whether the students really understand. Secondly, the role of the buffer zone is compared to a reservoir. A reservoir can be built at the junction of a wide river with a large flow and a narrow river with a small flow in order to keep the water flowing and the speed of both rivers. So it's easy for students to understand.

3.2.5. Ideological and Political Theories teaching in All Courses.
"Professional curriculum" ideological and political education is the most central, the most critical and the most difficult to solve. Based on system thinking, with the help of scientific design, the overall planning of various resources, overall planning of various resources, mobilize the enthusiasm of various parties In the teaching, firstly, combine the actual examples in life when the questions are introduced into the course. For example, the implementation of mutually exclusive software, two people want to enter the door at the same time, how to achieve a polite line. Secondly, when the tasks are published, it is emphasized that members of the group cooperate with each other to complete together. It has exercised the students' ability of communication and cooperation. Thirdly, teachers should treat problems dialectically when summarizing knowledge.
3.3. Supervision after class
Effective supervision is indispensable for successful teaching. The notification function of online teaching platform is utilized to set up homework deadline reminders. At the same time, the statistical function of the online teaching platform can be used to count the students with slow progress, warn them and even deduct the class credits. Meanwhile, the students with fast progress and high quality of task completion can be counted and praised or encouraged by class credits.

4. The assessment and evaluation of operating system course
We should follow the four principles of scientific nature, rationality, feasibility and diversity. Diversity has two sides, one is to evaluate the breadth of talent quality; the other is to evaluate the depth of talent quality. It means that the evaluation standard of talent quality is multi-faceted and multi-layered. Generally speaking, the evaluation indicators can be divided into four parts: quality, knowledge, ability and quality. Quality refers to the moral cultivation and professional quality of students. Knowledge refers to the professional knowledge and skills mastered by students. Ability refers to the learning ability, practical ability and adaptability to the environment. Ability is the guarantee of innovation. And quality includes physical and mental quality, as well as relatively quick imagination, reaction ability and so on.

The examination of operating system course is divided into three parts: the usual score (30%), the mid-term score (10%) and the final score (60%). The multi-directional and multi-angle strict assessment makes the assessment more objective, reliable and comprehensive. Combined with the online teaching platform, the daily results are divided into four parts: attendance (10%), reading report (10%), online score (50%) and experimental report (30%).

| Achievement composition (proportion) | Examination item      | Score | Proportion |
|-------------------------------------|-----------------------|-------|------------|
| Process assessment (30%)            | Attendance            | 100   | 10%        |
|                                     | Reading report        | 100   | 10%        |
|                                     | Online score          | 100   | 50%        |
|                                     | Lab report            | 100   | 30%        |
| Mid-term examination (10%)          | Online test           | 100   | 100%       |
| Final assessment (60%)              | Online test           | 100   | 100%       |

Pay attention to the inspection of ordinary links and the assessment of the learning process, so that the assessment tends to be more reasonable and fair. A reading report is a summary or reflection written by students after reading the relevant materials of the course. In addition, a mind map of the learning content is added to the report. Online scores are mainly used to assess students' learning process through online teaching platform, mainly including: homework (40%)-take the average score of all homework; chapter test (10%)-calculate the chapter test of task points and take the average score; course videos (20%)-get full marks for all the videos watched and the score of each video is equally distributed; discussion (10%)-5 points for posting or replying to a discussion, 2 points for an like, and 100 points for the highest; chapter learning times (10%)-50 times is a full mark; classroom interaction (10%)-score 100 points for participating in the activities such as questionnaire, pre-emptive answer, selection, group task and test. The experimental report is a comprehensive evaluation of students' online experiments. The total scores are obtained by recording the scores of each experiment through the online teaching platform.
5. Conclusion
At present, teachers and students use online teaching methods. Students and teachers have mastered the use of many platforms and intelligent teaching tools, and are familiar with the characteristics of online teaching and the construction method of resources, which will provide good opportunities for the reform of traditional classroom teaching. Teachers can design multi-dimensional teaching links according to the characteristics of their courses to ensure that students can follow, learn steadily and ask questions. As long as all teachers firmly establish the education concept of learning effectiveness as the center, let students learn online, online teaching can achieve certain results.

As teachers in colleges and universities, we should grasp the situation of higher education comprehensively, deeply and accurately, actively adapt to the requirements of the new era, devote ourselves to teaching and educating people, be teachers with educational feelings, and do the conscientious work of teaching well. It’s the goal of the online teaching that make students master the knowledge better and faster, improve students’ ability. At present, the comprehensive online teaching is still in the process of constant exploration and progress. From the aspects of course guidance, active classroom learning, after-school supervision and course evaluation, this paper puts forward the operation mechanism of network teaching reform, in order to provide some reference for the implementation of network teaching.

Acknowledgments
Fund project: 2019 university-level teaching reform research project of Shandong Xiehe University, project name: PBL-based Teaching mode reform and Innovation of "Operating System" course, project Number: 2019xh35.

About the author: Wenhua Zhang (1989-), female, born in Jinan, Shandong province, lecturer, master candidate, her research interests are computer information management and application

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