



Research and Practice of Linux Course Teaching Using the “Self-Exploration + Blog” Mode

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Abstract. In view of the fact that the existing Linux course teaching ignores the instrumentality of Linux content, the timeliness of teaching materials, and the forgetting of human, this paper fully and reasonably combines independent inquiry and blog in the three links of pre-course, course and post-course. This teaching method allows teachers to guide students to master Linux content, and students can also obtain the ability of analyze and solve problems. In a comparative teaching experiment, the passing rate of the experimental group using the teaching model of this paper was 21.7% higher than that of the control group using the traditional teaching mode, and the excellent rate was 13.42% higher; One year after the end of the course, students in the experimental group can quickly regain knowledge. In summary, this teaching mode has better teaching effect than the traditional teaching mode.

Keywords: Linux · operating system · technology Blog · independent inquiry

1 Introduction

Linux, as an operating system with the property of free software, is widely used in servers, desktop platforms, or network data throughput management, or provides users with a programming design environment. Linux courses have strong operability, and the course content is timely. How to do a good job in the teaching of Linux courses and find a balance between the teaching methods of teachers and the learning of students is the direction of efforts for the vast number of Linux education workers.

The ultimate goal of Linux course teaching is to deliver high-quality Linux talents to the market and serve the market. To achieve this goal, many literatures have conducted related research. Based on their accreditation in engineering education, Zhao Weihua [1] improved the teaching quality of the operating systems course through reverse design of the course content, student-centered approaches, assessment of learning outcomes, and implementation of the PDCA cycle mechanism. Wang Shuai [2] improved students' understanding of the ROS operating system by leveraging research projects and professional systems to create corresponding experimental platforms. Wu Shuquan [3] focused

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on the practicality and operability of the Linux course, innovated the teaching content, used open-source teaching software as a platform, and adopted the PBL teaching model and flexible experimental methods. Zhao Xieqiu [4] addressed the weaknesses in Linux teaching, such as a weak basic curriculum and outdated experimental platforms, by implementing the “Internet + Education” model to promote the transformation of Linux teaching.

Previous studies have achieved certain results, but they focused more on the content system of teaching and the use of experimental platforms, while rarely considering the three important characteristics of Linux teaching: first, the Linux course content includes a large number of tool-oriented applications, and the applications themselves involve many configuration parameters, which is unrealistic for students to master and remember in class; second, Linux versions are constantly being updated, and it is common for the versions used in textbooks to lag behind current versions; third, and most importantly, human forgetting increases with time [5], and previous research on Linux teaching activities basically stops after the course ends, especially when the time span is large, students have basically forgotten their Linux-related knowledge. To address these problems, this article proposes to use technical blogs as a carrier and guide students to master Linux-related knowledge through independent exploration, thereby enhancing students’ literacy and abilities.

2 Teaching Analysis and Teaching Strategies

The Linux course is divided into two parts: theoretical teaching (22 h) and practical teaching (26 h), in which the content of the five major areas of Linux basics, basic applications, network applications, and system management should be taught to the students within 48 h. During the teaching process, teachers also need to further expand their teaching to inspire students to apply theory to specific practice with divergent thinking and achieve the goal of improving students’ comprehensive literacy.

Based on the characteristics of the Linux course and the above requirements, this article analyzes the difficulties that may be encountered in the teaching process and provides corresponding solutions.

The first issue is the issue of timeliness. Linux has developed to the point where it has spawned distribution versions such as Ubuntu, RedHat, and Centos, each of which has its own iterative versions of the system and the software that runs on it. Faced with an operating system that updates so quickly, it is essential for teachers to design teaching content that keeps up with the times, and textbooks, which have long cycles from writing to printing, are obviously unable to meet the requirements of timeliness. Moreover, if teachers teach according to the textbook, there is a possibility of failure. Therefore, when designing their teaching, teachers need to incorporate the latest Linux-related content into their teaching in order to help students keep up with the times.

Secondly, there are issues regarding the tool-based nature of the content and human memory characteristics. In the five major sections of Linux, the basic section requires students to become proficient in its usage, and they can memorize the knowledge through a large number of practical applications. For other sections, the content focuses on actual needs and does not require students to master them thoroughly; instead, they should be

able to implement them when necessary, hence the strong tool-based nature of this part of the content. Furthermore, the amount of knowledge that humans forget increases over time, and tool-based knowledge that is not frequently used is likely to be forgotten. Therefore, in addition to helping students understand and master the content, teachers should also assist students in quickly retrieving this type of knowledge after a long interval of time.

Finally, there is the issue of students' application ability. The ultimate goal of Linux theoretical and practical teaching is practical application. However, actual application scenarios are often much more complex than simulated scenarios in class. Therefore, it is crucial to teach students to learn independently, analyze problems, seek solutions, and solve problems during the learning process.

The method employed in this paper to address the issues is to leverage abundant online resources, especially technical blogs. Prior to class, students can preview the materials through these blogs, solve problems and build applications using them during class, and then revisit the knowledge points after class. Moreover, in class, instructors can guide students to analyze problems and seek solutions by using error messages and other related information, thus fostering their abilities to think independently and solve problems on their own, and ultimately enabling them to truly master the knowledge of Linux.

3 “Self-Exploration + Blog” Mode

In the teaching process, a combination of experimental method, lecture method, and inquiry-based teaching method was employed in this study. Using technology blogs as a medium, various application-related problems were designed during the experiment process to inspire students to think, analyze using debugging tools, seek solutions, solve problems, and summarize their experiences, thus forming a self-exploration and independent problem-solving mindset.

3.1 Before the Course

For teachers, the use of blogs allows them to find the latest technology and integrate it into their teaching content during the preparation process, enabling students to be exposed to the newest technology. Given the fast iteration rate of Linux, utilizing technology blogs is a great way to prepare for class. After completing the preparation, teachers can publish some materials that can be used for student preview in advance on the blog and share them with the student group. For the content that can only be disclosed in class, the scheduled release function of the blog can be used to ensure timely publication during class time.

For students, they can engage in preview activities through the pre-released preview blogs posted by the teacher, and they can also search other technology blogs for answers to any questions they do not understand during the preview process.

3.2 During Class

The course session is the key component of this model, where teachers and students will fully utilize the blog to facilitate knowledge learning and exploration, aiming to maximize the effectiveness of the learning process.

At the beginning of the class, the teacher introduces the theme of the session and informs the students of the tasks to be completed in a task-driven manner. At the same time, the teacher reminds the students that the key tutorials have been published on the blog for reference. This model also places great demands on the quality of the teacher's blog content. When preparing for the class, the teacher should appropriately grasp the level of detail of the tutorials. For key and difficult points, the teacher can provide some incorrect configurations, allowing students to independently explore the answers in the wrong environment, which is beneficial for students to strengthen their understanding of key and difficult content. It can be seen that in this model, the teacher is no longer just teaching from start to finish, but allocating more exploration time to the students. In this case, the teacher has more time to observe and has the opportunity to use a "one-on-one" approach to answer students' questions and solve their difficulties.

After the students attend the class, they can start exploring and learning once they receive the tasks assigned by the teacher. For any knowledge they do not understand, or even when encountering traps set by the teacher, students can refer to the key tutorials released by the teacher or proactively search for technical blogs to solve the problems [6]. During the process of seeking answers, the teacher should guide the students to use the information obtained from problem-solving and debugging feedback to find answers, thus improving their problem-solving ability. After completing all the tasks, students have gained a better understanding of the knowledge taught in class, and may even have their own experiences. At this point, they can create their own tutorials and summary experiences, and publish them on the blog.

3.3 After Class

After the class, it is necessary for the teacher to review the blogs published by the students in a timely manner, provide feedback and suggestions, and help the students master the knowledge and improve their blogs. For students, technical blogs can serve as reference materials in the form of a tool book for a long time, and they can be consulted online at any time. Even if the knowledge is forgotten after a long time, relevant knowledge can be quickly picked up through blogs. In addition, students' blogs are published online, and if the content is of high quality, they can receive feedback from other netizens, which is conducive to stimulating students' interest in knowledge in this area [7].

4 Teaching Effectiveness and Course Evaluation

In order to verify the effectiveness of the proposed teaching model, the author conducted an experiment with the 19th Communication Engineering class, which consisted of 53 students, using the teaching method described in the article as the experimental group. At the same time, the 19th Internet of Things class, consisting of 60 students, was used as the control group and taught using traditional teaching methods.

Table 1. Course grade pass rate and excellence rate

	Experimental group	Control group
Pass rate (≥ 60)	71.70%	50.00%
Excellence rate (≥ 85)	15.09%	1.67%

After the course ended, the grades of the two classes were statistically analyzed. As shown in Table 1, the experimental group had higher passing rates and excellent rates than the control group.

According to the distribution statistics in Fig. 1, the experimental group was mainly concentrated in the 50–60 point range for each segment below 60 points, while the control group was more concentrated in the 40–50 point range. For each segment above 60 points, the experimental group had a higher proportion than the control group, especially in the high score segment (above 90 points), where the experimental group had 3 students and the control group had 1 student. Overall, the experimental group performed better than the control group in both the low score range and the high score range. This score distribution demonstrates that the teaching method adopted in the article is more effective than traditional methods. Students are able to internalize knowledge better and improve their analytical abilities to solve real-world problems, achieving the goal of course teaching.

To further understand the ability of students to review knowledge after a long interval using two different teaching methods, five students from each group who had not been in contact with Linux within one year after the end of the course were selected to complete specific tasks, and the time spent on completing the experiments was recorded. The final results showed that the students in the experimental group took an average of 15 min, while those in the control group took an average of 27 min. The main reason for this difference was that the students in the experimental group had the ability to

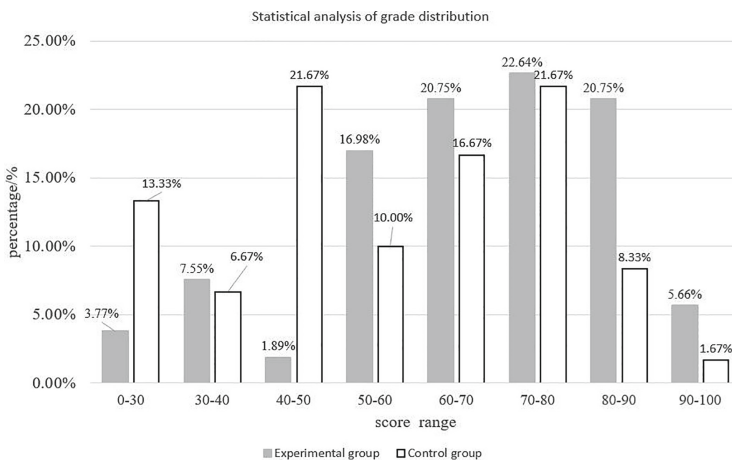


Fig. 1. Statistics of final course grades distribution

independently seek solutions when errors occurred, and they could quickly complete the configuration based on the blog established during the course. In contrast, the students in the control group had to spend a lot of time searching for suitable tutorials online. Moreover, after one year, there were updates to the versions of Linux, and new errors occurred, which the students had basically forgotten how to resolve, and could only rely on their remaining experience to troubleshoot. Through comparison, it further illustrates that the teaching method proposed in the article can enhance students' ability to analyze and solve problems and can quickly help them recall knowledge.

5 Conclusions

Combining independent inquiry and blogging is a way to improve teaching compared to traditional teaching methods, and it presents a challenge for both students and teachers. Teachers must transform from being lecturers of knowledge points to guides of knowledge, while students must have their own thinking and must master the ability to solve problems independently. In this study and practice of Linux course experimental teaching, we achieved certain teaching effects. Students were able to develop their independent inquiry skills while internalizing knowledge and enhancing their ability to learn for life.

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