Research on Innovative Teaching Reform of Mobile Communication Course in Applied Undergraduate Education

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Abstract: Currently, with the rapid construction of 5G base stations and the rapid growth of 5G terminal connections in China, mobile communication users have surged. This has prompted applied undergraduate students majoring in communication engineering to face more urgent needs. As an important course in the field of communication engineering, mobile communication plays an important role in the development of students' abilities. Therefore, this study focuses on the problems in the teaching of the mobile communication course for applied undergraduate students. Through optimizing teaching content, adopting diversified teaching methods, and practicing with dual teachers, mobile communication content is integrated throughout the entire teaching process. This can stimulate students' interest in learning and promote the development of their comprehensive abilities.

Keywords: Applied Undergraduate Program; Mobile Communications; Teaching Innovation Reform

1. Introduction

With the widespread application of mobile communication technology in modern society, the importance of studying the course of *Mobile Communication* is becoming increasingly prominent. This not only affects the employment of undergraduate communication engineering students, but also affects their career development direction in this field. The course of *Mobile Communication* not only has the characteristics of rapid transformation, but also covers theoretical and applied knowledge such as analog electronic technology, digital electronic technology, random signal processing, information theory and coding theory. The learning difficulty of students is relatively high; at the same time, traditional teaching methods cannot meet their learning needs for mobile communication technology, which cannot help students understand and master the working principles and practical applications of mobile communication systems from a holistic perspective. Therefore, in order to promote the development of mobile communication course teaching, this paper will innovate and reform the teaching of the mobile communication course from the perspective of applied undergraduate colleges. This is beneficial for the course to better meet the educational needs of applied undergraduate institutions.

2. Problems in the Teaching of *Mobile Communication* Course for Applied Undergraduate Students

2.1 The Knowledge Points are Cumbersome and Complex, and the Teaching Content is Outdated

At present, the textbook content of the *Mobile Communication* course in China mainly includes mobile communication system architecture, wireless channel transmission technology, mobile communication network access, and basic principles of mobile communication protocols. These contents are mostly theoretical concepts and very abstract. Moreover, there are many professional terms and English abbreviations directly translated from foreign languages in the content, which is not conducive to students engaging in systematic learning. [1] In addition, the course content of *Mobile Communication* mainly introduces the first three generations of mobile communication technology, with little content on 4G and 5G. It is not conducive to students learning the latest communication technology.

2.2 The Teaching Method is Too Monotonous and Difficult to Attract Students' Interest

The current mobile communication course mainly adopts a teaching method of "lecture+PowerPoint", lacking modern teaching tools and techniques. As a highly

technological field, if traditional teaching methods are still used in mobile communication classrooms, the value of modern technological tools cannot be fully realized. This will make students feel disconnected from their actual development and lose interest in learning. In addition, there is a problem of insufficient interactivity in teaching methods. The current teaching curriculum focuses on one-way knowledge transfer, lacking active interaction between teachers and students. This is not conducive to students asking questions, sharing experiences, improving their participation and deep understanding of the course, and affecting their learning experience. In addition, the lack of interaction and cooperation among students is not conducive to cultivating their teamwork spirit and cooperation ability. Finally, each student has a different learning style and interest. However, the teaching of the mobile communication course lacks personalized teaching methods, which cannot meet the needs of different students. This can easily make students feel dull and uninteresting in the long-term learning process, thereby reducing their learning enthusiasm.

2.3 The Teaching Schedule is Compact, and the Teaching Practice is Weak

The *Mobile Communication* course has rich content and requires a longer teaching period to complete the teaching. But the current course schedule for *Mobile Communications* only has 30 class hours, with 3 periods in every Wednesday. This will result in insufficient presentation of knowledge points, and students will not be able to deeply understand the core concepts of the course. For example, a deep understanding of wireless network protocols typically requires a detailed explanation of their protocol layers, data transmission processes, and security considerations. However, due to limited class schedule, these key concepts can only be briefly covered. This leads to students only being exposed to shallow information, making it difficult to deeply understand the principles and practical applications behind it. In addition, applied undergraduate colleges have relatively limited educational resources, insufficient investment in teaching practice, and have not yet established a mobile communication training platform. This is not conducive to the implementation of teaching practice, resulting in students being unable to convert theoretical knowledge into practical skills, and affecting the development of their ability to solve practical problems in the field of mobile communication.

2.4 The Teaching Assessment Method is Single and Cannot Fully Reflect Students' Abilities

At present, the assessment method for the *Mobile Communication* course in applied undergraduate programs mainly adopts the traditional written test assessment, with the written test score accounting for 80% of the total score. This single assessment method is not conducive to comprehensive evaluation of students. Specifically, as a highly applied discipline, mobile communication requires students to possess practical operation and problem-solving abilities. However, written exams mainly focus on theoretical knowledge assessment, which cannot fully reflect the relevant abilities of students; Secondly, there is a lack of assessment methods for actual projects or comprehensive tasks. The practical application in the field of mobile communication is strong. If students only pass the written test, they may only focus on the theoretical knowledge in the textbook and neglect practical application, which cannot accurately evaluate their comprehensive application ability. Finally, teamwork and communication skills are crucial in mobile communication work. However, traditional exam methods are difficult to evaluate students' collaborative abilities and communication skills within a team.

3. Innovative Reform Strategies for Teaching Mobile Communication Course in Applied Undergraduate Education

3.1 To Revise the Teaching Curriculum Outline and Optimize Teaching Content

To address the issues with the teaching content of the *Mobile Communication* course, the teaching outline can be revised to include knowledge points on the latest mobile communication technologies such as 4G and 5G, such as emerging technologies such as millimeter wave communication and D2D technology. While, teachers should explain it based on the current practical application situation, and pay attention to keeping up with the development trend of communication

technology. Course content should also be updated in a timely manner to enable students to better understand the development trends of the industry. [2] Secondly, the content of the textbook can be optimized by incorporating more practical cases and application scenarios. By introducing real communication engineering cases, students can have a more intuitive understanding of the practical application of theoretical knowledge and stimulate their interest in learning. Once again, teachers should explain and sinicize the professional terminology and English abbreviations of the course, and add detailed Chinese explanations, charts, examples, etc. This makes it easier for students to understand concepts, avoid getting stuck in barriers to understanding professional terminology, and thus improve learning efficiency. Finally, industry university cooperation should be promoted. Schools should invite industry experts and practitioners to regularly hold lectures and share their practical experiences. It can help students gain a deeper understanding of industry needs and trends, in order to prepare for their career.

3.2 To Adopt Diverse Teaching Methods to Stimulate Students' Interest in Learning

Firstly, schools can introduce modern teaching tools and technologies, such as virtual laboratories, simulation software, etc. It can enhance the practicality and interactivity of the classroom. Teachers can use simulation software to demonstrate wireless channel transmission technology, so that students can experience the process of signal transmission in a virtual environment, thereby making classroom content more vivid. Secondly, teachers adopt more interactive teaching methods, such as case analysis, group discussions, and student reports. It enables students to participate in the problem-solving process. Teachers should also encourage students to host reports, share different perspectives, improve their ability to express and communicate, and cultivate their awareness of active learning. Thirdly, modern technological means should be combined and multimedia assisted teaching should be adopted; Teachers can introduce videos, simulation software, online resources, etc., to make the classroom more vivid and intuitive. For example, playing lecture videos from industry experts can guide students to understand the challenges and development trends facing the industry, and stimulate their curiosity about the mobile communication field. Fourthly, teachers should introduce personalized teaching methods, and provide personalized tutoring to students based on their learning styles and interests, in order to better meet the learning needs of different students.

3.3 To Reasonably Arrange Teaching Time and Introduce the Practice of "Dual Teacher Team"

Firstly, the course structure should be optimized, with a focus on highlighting core knowledge points to ensure that students can have a deep understanding of key concepts within the limited class hours. At the same time, teachers should carefully design the teaching outline and provide more targeted explanations of key content such as the protocol hierarchy, data transmission process, and security considerations of wireless network protocols within limited class hours. In addition, a blended learning model can be adopted, combining face-to-face and online learning platforms to expand learning channels. For example, by providing online materials and video tutorials through "Rain Classroom", students can delve deeper into relevant knowledge outside of the classroom; During face-to-face teaching, students are more focused on learning key knowledge, promoting their deep understanding; [3] Secondly, adjust the number of class hours appropriately, increasing from the original 30 class hours to 40 class hours. In addition, schools should establish the school-enterprise cooperation mechanism. By collaborating with mobile communication companies, hiring enterprise engineers to participate in school lectures and forming a "dual teacher team" with school teachers, practical work experience and the latest concepts and methods are brought into the classroom to make up for the shortcomings of teachers in school; [4] Finally, universities and enterprises jointly build practical bases and introduce industry resources to build mobile communication training platforms. It aims to provide students with opportunities to participate in practical projects and improve their practical skills.

3.4 To Reform Curriculum Evaluation Methods and Strengthen Process Based

Assessment and Evaluation

Firstly, teachers introduce an evaluation of actual projects in the course evaluation. Teachers design project tasks related to practical scenarios, requiring students to apply their learned knowledge to solve practical problems in team collaboration. On this basis, teachers conduct a phased evaluation of the project. Evaluation should cover project planning, implementation, problem-solving, and other aspects to gain a more comprehensive understanding of students' performance in practice; Secondly, teachers should adopt diversified assessment methods. In addition to traditional written tests, various forms of assessment can also be added, such as practical operation assessment, group discussions, and practical reports. It can comprehensively assess students' theoretical knowledge, practical skills, etc., and achieve the evaluation of their multifaceted abilities; Once again, teachers should increase the evaluation indicators for the results of the competition. Teachers also can incorporate the competition results into the credit statistics system to encourage students to actively participate in various competitions, such as the "Datang Cup" National College Student Mobile Communication Technology Competition. While, teachers should evaluate the students' comprehensive abilities such as teamwork and communication skills based on their actual performance in the competition; [5] Finally, teachers should establish a student self-learning file. They guide students to independently record their personal learning process, experiences from participating in projects, problems encountered, and solutions, and form personal learning records. Then, teachers can regularly review the files to understand students' learning attitudes and self-directed learning situations, and provide guidance and assistance.

4. Conclusion

With the arrival of the 5G era, the traditional course content of Mobile Communication can no longer adapt to the current teaching environment. Therefore, innovative teaching in the mobile communication course is imperative. By revising the teaching syllabus, improving teaching content, and reforming evaluation methods, innovative measures can provide students with a broader disciplinary perspective and diverse learning methods. Furthermore, it aims to cultivate more competitive professional talents and drive the development of the mobile communication industry.

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