

Exploration of Curriculum Reform of Mobile Communication Technology for Application-Oriented Universities

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Abstract. *Mobile Communication Technology* is one of the most important professional courses of communication engineering specialty. Traditional teaching patterns from ordinary universities are not suitable for application-oriented universities. To improve the teaching quality of this course, unsuitable points are analyzed in this paper, and countermeasures are proposed as exploration of curriculum reform. The reform involves many aspects including teaching objectives, content, methods, materials and practice, different measures are proposed respectively.

Introduction

Mobile Communication Technology is an important specialized course of communication specialty, delivering full knowledge about mobile communication from working procedures of mobile terminals to the procedures of mobile networks. As mobile communications become more and more important for social life, the course has gained much more attention than the past. Many research and explorations have been done to improve its teaching quality [1-6]. Some reform is proposed based on the current communication networks [5], while some improve the course by establishing curriculum group [6].

Application-oriented universities are different from ordinary ones. Compared to the latter, they have three outstanding features [7]. First, they pay more attention on cultivation of application ability although they still take basic knowledge seriously, so that students could go on with postgraduate study. Second, they cultivate students based on social needs, outputting talents accordingly. Third, the students there are mostly weak in study, especially weak in theoretical study. *Mobile Communication Technology* contains tremendous concepts, principles and technologies. For a long time, it was taught with the same mode as ordinary universities which emphasize theories and technologies. This mode is neither consistent with the cultivation-purpose of application-oriented universities nor suitable for the students.

For this, problems of traditional mode in the application-oriented universities have been analyzed in this paper, and an exploration with countermeasures of curriculum reform is proposed based on the analysis.

Problem Analysis

Content is hard

According to a survey that we did in application-oriented universities, most of the students feel hard learning *Mobile Communication Technology*. That is because *Mobile Communication Technology* is a theoretical course with complex concepts, principles and technologies. In contrast, students of application-oriented high schools are weak at theoretical study. So they feel hard. Especially for the technologies of system level, they feel too complex to understand.

Class is boring

As *Mobile Communication Technology* is mainly composed of theoretical knowledge, theoretical concepts and principles are shown one by one, by PPT or on blackboard in traditional teaching mode, making students feel tired and boring. According to the survey, 85% students in application-oriented universities cannot prevent their mind from wandering in class and nearly half of the students cannot state what they have learned after class. The teaching quality is embarrassed.

Textbook is backward

Mobile communication technologies develop fast, four generations have been updated in the last 30 years, and the newest 5G is coming near although 4G communication network has just been implemented. However, contrasts to the technologies, textbooks have been updated slowly. For example, when 4G has been popularized in reality, the textbook still treats 4G as one of the future networks. For application-oriented universities, they cultivate talents consistent with social needs. The backward situation of textbooks will lag the cultivation behind the social need.

Practice is inadequate

Cultivating students with better application ability is an important characteristic of application-oriented universities. However, the practice training in traditional teaching mode is inadequate for application-oriented universities. In traditional teaching mode, mobile communication test box is the main experimental equipment. It can support experiments about mobile terminals, e.g. transmitting/receiving, modulation/demodulation, and spreading/de-spreading. But it cannot support system cognition experiments. In this case, it is hard for the students to understand communication networks from system level.

Countermeasures

Under the support of Beijing Municipal Education Commission, explorations have been done to improve the teaching qualities of *Mobile Communication Technology*. Based on the problems of traditional teaching mode, curriculum reform was carried out and the countermeasures of the reform are as shown in Fig.1.

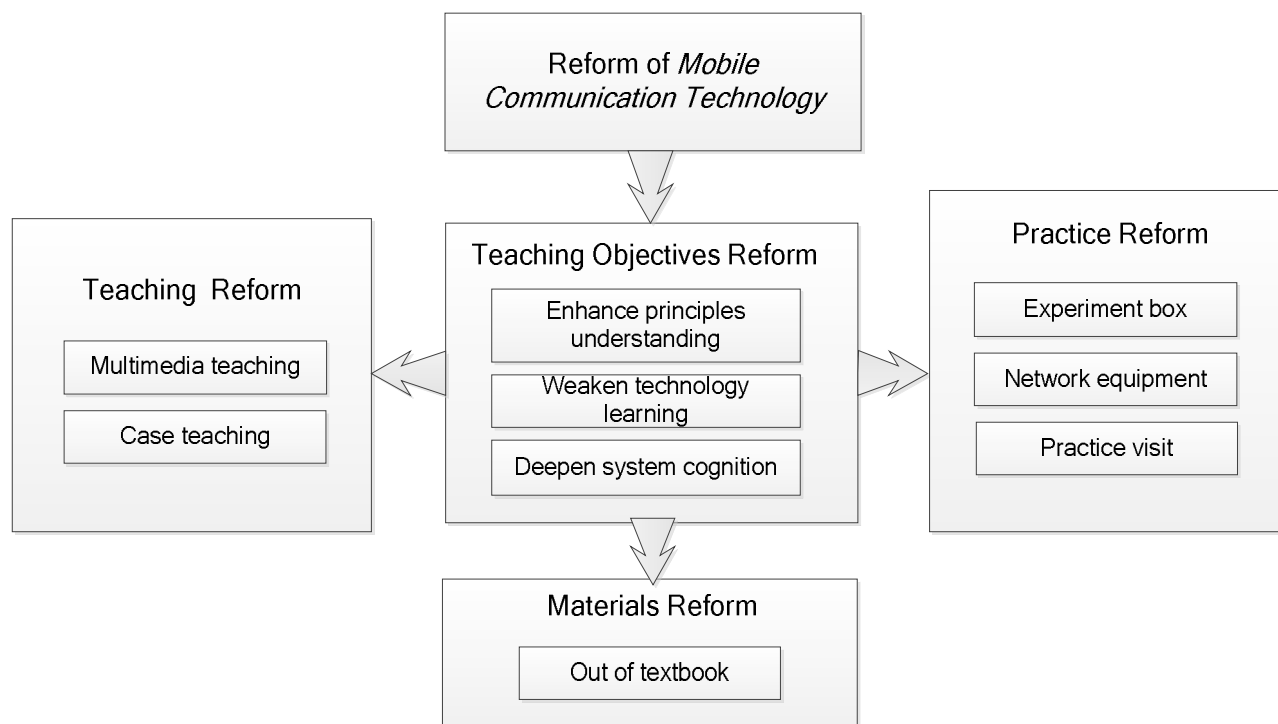


Fig.1 Reform process of *Mobile Communication Technology*

Teaching objective Reform

In order to make the teaching objective of Mobile Communication Technology more suitable for application-oriented universities, we have adjusted the teaching objectives in the following four aspects.

(1) Enhance Principle Understanding

Although communication technologies are developing fast, but the basic principles are little changed. No matter to proceed onto graduate studies or to work, the principles are both extremely necessary for the students. So within the limited class hours, the principle teaching should be taken

seriously with sufficient class hours.

(2) Weaken technique details learning

As communication technologies develops fast, it is hard to follow the lead, so we choose to teach the necessity, principle, defect and development trend of key technologies, not the realization details of certain technology.

(3) Deepen System Cognition

Different from *Communication Principles*, *Mobile Communication Technology* delivers knowledge of mobile communication system from system level which is more complex yet more applicable. In order to improve application ability of the talents, we treat system knowledge as another import part of the course. We demand students knowing about system composition of mobile networks, about how conversations realized, about the process of surfing on line by mobile equipments, etc. to deepen the cognition about mobile communication system.

Teaching Method Reform

To make *Mobile Communication Technology* learning less boring, case teaching is enhanced in the curriculum reform. Cases are selected elaborately from the actual life, and used to arouse the curiosity of students to learn, to help students to understand or to guide them to apply. With this method, the content becomes interesting and easier to understand.

Besides, videos, news, articles, as long as relative to the class, are encouraged to be shared in class. That is another good way to make the class less boring.

Teaching Materials Reform

Considering the textbooks of *Mobile Communication Technology* can hardly keep pace with the development of technology, countermeasures are proposed to resolve this problem. Firstly, we divide the content of the course into three sections and utilize different materials for each section. The first section is about basic concept and principles of mobile communication. This section we choose classical textbook as the basic teaching material. The second section is about mobile communication system. In this section, materials from Internet and other books will be selected, as supplement to the textbook. The third section is about the developing trends of mobile communications. The materials of this section should be up to date, so they are derived from the Internet or news for most.

Practice Reform

For the practice section of *Mobile Communication Technology*, three forms of practice are used to improve the quality of the practice education. The first one is based on the traditional mobile communication experimental box. The experimental box is used to do traditional experiments, like transmitting/receiving, modulation/demodulation, spreading/de-spreading and signal flows happened at mobile terminals. The second form is aiming at system training of mobile networks. Some core equipments like switchboard have been purchased to help students understand how mobile system works, and how the equipments functions. As it is impractical for most universities to establish an integrated mobile system or make their experimental equipments keep space with the business, so the third form is proposed. It is practice visit to the telecom operators to practice or observe the business system in reality.

Conclusion

Traditional teaching mode of *Mobile Communication Technology* is not suitable for application-oriented universities. We concluded the unsuitable points, and made a curriculum reform accordingly. Countermeasures were proposed on teaching objectives, teaching methods, teaching materials, and practice training. These measures conform to the specialty education objectives of application-oriented universities. After a seminar's experiment, the teaching effect shows that with the new teaching mode, students' learning enthusiasm for Mobile Communication Technology increases, and their test scores of theoretical knowledge and practical experiment both get improved.

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