

Research on Information-based Teaching Model of “Signal and System”

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Abstract. The pattern of information-based teaching is the inevitable requirement of information society reflected in education, which is the effective way for the development of higher education informatization. This paper discussed the concept and characteristics of the information teaching model, on the basis of analyzing the characteristics of signal and system course, described the application of information teaching model in signal and system course from all aspects of lessons including before class, in class and after class.

Introduction

With the growing popularity of the Internet and the rapid development and progress of computer, communications and other key technologies, the current world is undergoing a revolutionary change. Human society is changed from the industrial age into the information age. Information will be the first factor of production, in order to build the knowledge economy, informatization is the innovative carrier and knowledge is the foundation. At the same time, all areas of society has undergone comprehensive and profound changes by the influence of informatization. Reflected on education, the ministry of education established education information strategic position. In 2012, the ministry of education issued the "Decade of Education Informatization Development Plan (2011–2020)", demanded to promote the deep integration of information technology and higher education and innovated training model. The ministry of education proposed to make use of advanced networks and information technology to integrate resources, and to build advanced, efficient and practical education information infrastructure, develop resource-sharing mechanisms for higher education and promote the teaching experiment platform and other information construction. All kinds of local universities and military academies have changed the thoughts of education ideas and adjusted the direction of the education, and actively participated in higher education development.

As a professional basic course, "Signal and System" course occupies a central role in the curriculum system of communication major and electronic and information major. Meanwhile, in order to adapt to the requirements of the new era of professional talents, more and more majors began to open "Signal and System" course. Considering "Signal and System" course abstract to understand and so many formulas and concepts in it, many teachers made a series of discussion and study on teaching model and method of the course. Nevertheless, the early attempts and efforts still can not avoid the teacher-centered model. Under the background of rapid development of modern science and technology, the new signal processing theory and method is developing without end, the contradiction between

human knowledge and personal learning ability and time is becoming increasingly acute. This requires the full use of information technology tools. With the new teaching ideas and concepts, the information model is integrated into the course, in order to improve students' interest in learning and teaching effect.

The Information Teaching Model and its Features

Information teaching model is not only the inheritance to the traditional teaching, but also is the exploration and construction process for teaching new model under the technical environment. This model is the integration process of the composition of all kinds of teaching models and application conditions. The teachers are practitioners and creators of model. The rich and changeable practice situation is the source of teaching model innovation. The information technology provides a rich resource, tools, and exchanges and cooperation platform for the development of teaching model. It can be described as: using a variety of information technology, take the students as the center, the students give full play to their initiative and enthusiasm, build the meaning for current knowledge and use what they have learned to solve practical problems in learning environments, such as situation, cooperation and conversation which are created by teachers. In this teaching model, students, teachers, teaching information and the information environment form a stable system of modern teaching by interrelated with each other.

The heart of the information teaching model is to give full play to students' initiative, enthusiasm and creativity in the learning process, so that the students in the learning process become the main body and the active builders for knowledge, rather than passive recipients and the object of knowledge given by external stimulation. Teachers' status is changed from the traditional teaching mode of dominant to the information-based teaching organizer, instructor and students learning helpers. The characteristics of the information teaching model can be divided into the following several aspects:

Rich and Colorful Teaching Resources

With the aid of information technology represented by computer network and multimedia, various teaching resources can be developed including pictures, sounds, video, and based on virtual technology, teachers and textbooks are no longer the only source of knowledge. The classroom is not the only place can be learned through learning resource sharing, students can take advantages of the network to access a variety of teaching resources quickly in order to expand the knowledge structure and capacity according to their own needs.

Flexible and Diverse Forms of Teaching

Based on the student-centered teaching thoughts, teaching process is transforming from a single teaching model to a variety of teaching model mixed. According to the different students' learning needs, and the characteristics of the teaching content, different models can be respectively adopted, such as task driven, individual counseling, discussion-based teaching type and so on. The different models can improve the students' interest in learning and can also cultivate abilities for dealing with the information and application of information.

Independent Interactive Way of Teaching

The traditional teaching model is a transfer - accept type teaching. The one-sided emphasis is on the students' digestion and understanding of knowledge, and neglected the

subjective initiative and the cultivation of creative thinking. Information teaching breaks the shackles of traditional teaching model, and makes flexible communication between students and teachers, students and students. It is realized the deep communication in teaching process, and also good for arousing the students' thinking, the cultivation of personality and creativity. Cognitive and practical experience in the process of teaching is emphasized in order to process the final result of assessment.

Open and Efficient Teaching System

Using modern information technology to build and develop teaching environment for students' initiative, enthusiasm and creativity is the key of information teaching. As an important part of the whole teaching resources, open and efficient teaching system effectively broke the limit of time and space, students can flexibly arrange their own learning practice, and also can choose their own learning content according to the professional, interests and hobbies. It saves manpower and material resources in the education sectors greatly. In addition, open sharing of the system also provides the guarantee for education fairness, achieves all-round modernization of compulsory education.

Information Teaching Model in the Application of "Signal and System" Course

Education is a kind of important and complex social activities. From the viewpoint of system theory, teachers, students, teaching information and the information environment factors interact with each other to form an organic entirety in the information teaching system.

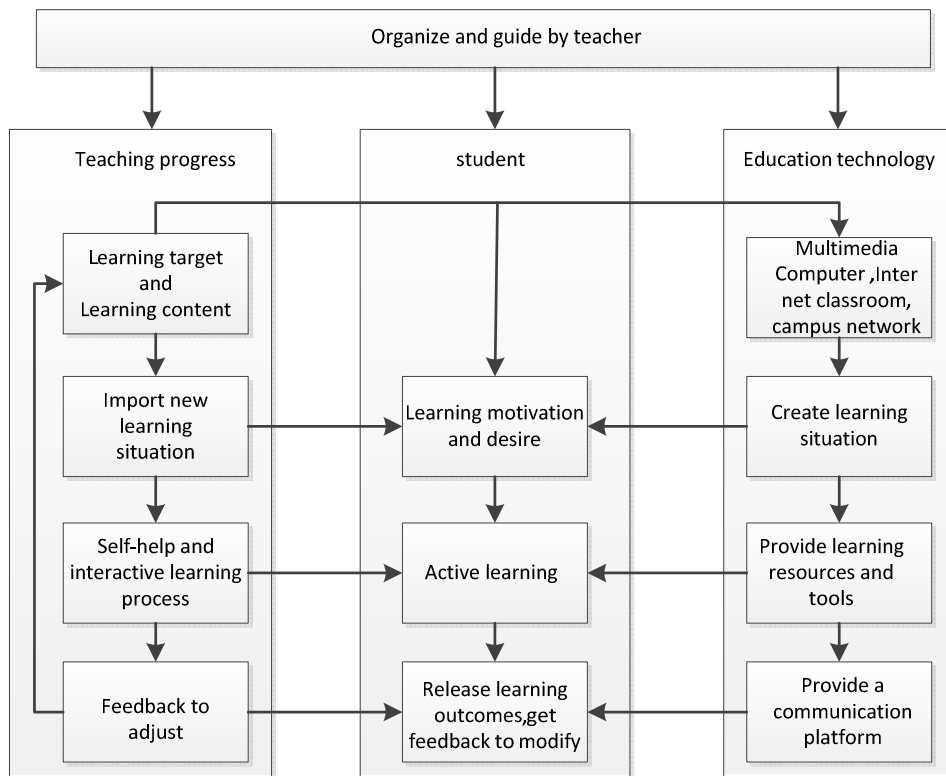


Figure 1. structure of information teaching system.

Structure is shown in figure 1. Information model of signal and system course use the information technology and network technology to help students to get better understanding of the related concepts and analysis method for signal processing and system analysis, finally realizes the transformation and transition from knowledge to ability. Information teaching model in the application of signal and system course can be illustrated from several parts above the figure 1.

Abundant Teaching Resources for Preview before Class

The information in classroom teaching is increasing in consequence of the rapid development of science and technology, and the pace of classroom teaching is also speed up. In order to better digest the learning form classes, preparation is becoming a very important link. Teachers according to the teaching contents design preview task, record lessons and publish on the learning platform which provides materials for students to preview. Attention to the content design, problems are derived from the engineering application, which is used to driven learning purpose and interest.

Flexible Forms of Teaching in Class

Many kind of models can be mixed in class, such as problem heuristic, exploratory, task driven teaching and autonomous learning. For example, in the signal analysis method of transform domain, in order to explore the connection between the time domain characteristics and transform domain characteristics, the nature of the signal transformation is organized, which can be learned by autonomous learning based on problems. Another example, according to the content of the sampling theorem, designs for mobile phone communication as the background, puts forward the problem of how to transform the analog signal to digital signal, leads to the necessity of sampling, further analysis of sampling signal spectrum characteristics, summarizes the sampling criterion. With interlocking problems, gradually guides the students to summarize the content of the sampling theorem, and finally back to the engineering application with the guide of theoretical analysis.

Open Teaching System for the Review after Class

Signal and system course due to its abstract content and use many characteristics of mathematics knowledge, is considered a difficult course to learn by students' generally reflection. Therefore in the process of learning, students will have some problems at any time. Open platform provides convenient platform for timely communication between teachers and students. According to problems which are feedback from students, teachers can add learning materials to the point; provide the answers and one-on-one tutoring. Teachers can assign extracurricular learning tasks in addition besides the in-class assignment on the teaching platform. According to the completion of the students, the dynamic comprehensive evaluation is given for students' learning situation.

Virtual Technology Open New Forms and Contents of the Experiments

Traditional experimental teaching due to the outdated teaching content and the shortcoming of high cost has been unable to meet the task under the new situation of experimental teaching. Virtual simulation experiment teaching takes the fully reflection of the subject characteristics and requirements as the starting point, and injects new content for the experimental teaching. It can realize the function which real experiments does not have or difficult to finish. Flash, Labview, Matlab, and Pspice software can be used for signal and

system experiment. Demonstration experiments can be designed by using the Flash characteristics of image vivid, interactive and easy development, validation experiments and comprehensive experiments can be developed by Labview and Matlab software with the characteristics of powerful calculate library functions, self-designed experiment can be designed by Pspice software advanced in powerful capacity for simulation and interaction.

Summary

Modern science and technology is developing by leaps and bounds. We can not prevent mutual cross and fusion of disciplines. "Signal and system", the most basic concept in the modern science and technology is widely penetrating into each subject areas of technology. In the face of training goal of high-quality information technology talents, higher requirements is put forward for teaching quality of signal and system course. In the face of serious teaching task, information-based teaching model becomes the key to improve the teaching effect in the new situation. On the teaching content, information teaching model can clear students learning needs and keep up with the development of science and technology trends. It can also break the limit of time and space formally, so that teaching effect and efficiency is improved evidently. In a word, the information teaching model has significant advantages and represents the direction of the reform and development of teaching model. It is not only a course teaching requirements under the background of informatization, but also the inevitable requirement of higher education in informatization process.

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