

# Teaching Exploration and Practice on the Course of “Television Technology”

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**Abstract.** Through a beneficial exploration on the teaching process of *Television Technology* course, we have brought forward the reform thinking and the concrete measure in the aspect of teaching content, teaching means, teaching method, assessment system and practical teaching, innovating the assessment method, and creating the network platform of random test system. Besides, we've put the teaching exploration and reformation into practice to effectively improve the student's ability, perfect the students' knowledge structure and improve the teaching quality, which has got initial results.

## 1. Introduction

“Television Technology” is an important specialized course for students majoring in electronic information, communication engineering, etc., to expand their professional basic knowledge application ability and is also a comprehensive application-oriented course, which closely combines theory with practice [1]. According to the teaching system reform policy and for the purpose of cultivating college innovative talents, we have reformed the teaching content of “Television Technology”, which begins with the basic principle of human vision, and then the principle, law and realization technique and method of image acquisition, coding, transmission, receiving, decoding and display. The contents of digital television principle as well as high definition TV transmission and display technology are substantially increased in this course, while other contents are reduced accordingly. Also, we explore the smart television applied technology and the latest technology of TV in the course to advance with the times. The teaching content of the course includes three major links: analog television principle, digital audio-video technology, and latest TV application technologies such as advanced display technology. The discussion on new technologies around us that arouses great interest of students improves the teaching effect remarkably. Innovating on teaching content of *Television Technology* has become a trend [2]. We have put it into practice and achieved good results.

How to effectively teach and learn such diversified and rich teaching content within limited class hour? How to grasp the boring theory by the student? How to effectively promote different students to timely grasp the knowledge in daily study? How to perfectly combine theory and practice? We have made a beneficial exploration on the improvement of teaching means and teaching method, the innovation of assessment system and the enhancement of practical teaching, and we have made improvement by summarizing experience from practice.

## 2. Course Teaching Exploration and Reform

### 2.1 Optimize Teaching Means by Making Full Use of Multimedia and Network Technology.

“Television Technology” is the application of modern electronics technique and advanced circuit technique in the field of broadcast television, which related to analog circuit, digital circuit, high frequency circuit, large-scale integrated circuit, principle of microcomputer, complete machine, system design and other aspects. However, the disciplines it related to are much more than those. It is related to optical, electrical and acoustic physics as well as vision-related physiology. In terms of information processing, it includes signal generation, analog/digital signal processing, signal transmission, signal reception, signal conversion and display and other processes. In terms of

communication technology, it includes coding and decoding, modulation, transmitting, receiving, demodulation and multiple multimedia technologies. It is the systems engineering model course in the information field, which is very representative [3,4]. Such a diversified and complicated systems engineering course is especially suitable for using flexible multimedia teaching means because every application of television technology is lively and vigorous development of fundamental principle of corresponding discipline. Besides, the application process is concrete and specific, which conforms to the features of computer multimedia teaching, i.e. vivid, intuitive and expressive. All kinds of text, table, form, animation and video in PowerPoint or other software can not only contribute to understanding and acceptance of knowledge, but also raise the student's learning interest, strengthen the students' attention and deepen the student's impression and absorption of knowledge.

It can be said that via a traditional teaching means, electrical schematic diagram analysis, theoretical calculation, logical deduction by reasoning and mathematical formula derivation are difficult to understand and boring. However, vivid demonstration via multimedia will let the students get rid of boring and arouse their interest and thus, their learning enthusiasm will be improved significantly. For example, when it comes to the scanning principle, we use the animation software to make a dynamic image of electron beam scanning, and the television raster will be seen by demonstrating the image from slow to fast. And then the electron beam that is changed over time on its density will form a TV image, and the students will understand at the sight of it. The widespread use of multimedia teaching not only improves the teaching efficiency and increases information content in class, but also greatly reduces blackboard-writing time, saves more time for QA session in class and offers better conditions for interactive teaching. During the teaching process of "Television Technology", we've taken a large effort to make a whole series PPT courseware of more than 900 pages, which is vivid and exquisite. In the courseware, nearly every knowledge point in the whole course is transformed into rich and lively text, table, graph, image, animation and video. The whole series PPT courseware that is available in the school's educational administration system at any time is not only used for classroom teaching, but also used for online study for the student after class. The student may ask questions via internet and also can log in network platform of examination system to test what he has learned. All these have greatly supplemented and expanded the teaching means by modern network technology.

**2.2 Focus on Students' Learning and Guide the Students to Learn this Course through Meaning Construction.** There are a lot of knowledge systems and knowledge key points in the whole course of "Television Technology". Each knowledge point with inevitable factors is closely related to other knowledge. The role of the teacher is not to simply pass on knowledge to the student according to course schedule, but is to help and guide the student to learn and get to know the linkage between knowledge via meaning construction. Otherwise, it will be difficult for the student to construct meaning and the student he taught will only be good at dealing with an exam instead of practical application of knowledge. Meaning construction learning method of constructivism can be well applied in the teaching of "Television Technology" [5].

In order to let the student to engage in the study by meaning construction, we will well arrange the teaching concrete content and enable the student to take interest in the content during the whole teaching process by citing example, putting up a question, creating a situation, or connecting the student's interest with what he has learned. Only when the student is interested in study, he can initiatively and actively absorb the knowledge and make it his own. In the first class of the course, the author will start from an unnoticed question: when you see an object, what specific thing of the object is working on your eyes and enabling you to see it? And it follows other questions. What is the essence of light? What different specialty of lights enables you to see all colors of the colorful world? How difficult to truly reappear an image of a real scene in front of you? Whether we can sacrifice certain fidelity to reappear an image? Thus, the student's interest in television image-forming principle will be aroused.

The application of multimedia courseware in teaching is conducive to enlightening and guiding the student to connect and organize what he has learned step by step, to think and to construct the

knowledge, and enables the student to apply what he has learned to specific environment. When studying the television image-forming principle, we will take the student back to the ‘coarse pixel age’ via *Pixels*, a science fiction film, so as to understand the image composition and the sequence image transmitting principle, and then the scanning method will be introduced to extract pixel and reconstruct image, and finally the fundamental principle of television image transmitting will be introduced. After this process, it will be not difficult to study the color television image-forming principle by using the knowledge of *Colorimetry*. The teaching practice has proven that, the application of constructivism into study is significant and very efficient.

**2.3 Innovate Assessment System and Monitor Teaching Quality in Advance.** In general, the final examination is major assessment for most courses while the assessment at ordinary times takes a little proportion. Actually, it is not conducive for timely monitoring student learning and unable to know what the student has learned in class as early as possible. Therefore, an increased part of score at ordinary time is used for quiz. The quiz is not only conducive to teacher’s timely grasping what the student has learned and absorbed so that teachers can adjust teaching methods and teaching progress in a timely manner [6], but also hastens the student to timely grasp what he has learned at ordinary times and to make up his weakness, and also increases student’s learning motivation. The scores of quiz, experiment homework, classroom performance and final examination may take 30%, 25%, 10% and 35% respectively.

Quizzes will inevitably increase the work burden of teachers and will indeed be difficult to be implemented. After research, we’ve developed an item bank for every unit quiz and put it on the internet. One of important features of this on-line exam system is that it can choose questions randomly, mark examination papers automatically, connect to the school educational management system and record students’ scores directly. It will completely relieve the increased grading burden of teachers and offer the wrong topic distribution in diagram automatically to teacher for analysis. The random test paper made by the random test system can improve the authenticity and effectiveness of scores and prevent cheating. To be more humanized, we are developing a more convenient system that can be logged in via smart phone terminal.

Another measure for innovating assessment system is to establish the classroom performance score item. Rewarded with this score by previewing the knowledge point and lecturing in class, students can promote their study consciousness. Such measure has achieved clear effect in the experimental class.

**2.4 Combine Theory with Practice, Focus on Ability Training and Meet Practical Needs.** Pure theory teaching methods cannot let the student to understand the television theory and related technologies deeply, neither combine theory with practice, nor truly grasp the professional technology, which restricts professional quality training and improvement.

We should show the material object as much as possible in classroom teaching and let the student to have perceptual knowledge. When teaching the principle of television receiver, physical display of a TV set will let the student to have direct understanding of the component of TV set as well as circuit type, function and role of each part. When teaching the principle of circuit operation, the most important thing is signal waveform, which can be taught via physical demonstration or an oscillogram of demonstration courseware. Except the scheduled experiment class, we will open the circuit technology lab to the student at fixed period for the exploration of TV related technology. We will add the maintenance practice by making use of extracurricular time to improve the operational ability of the student. Through the aforementioned measures, we will improve the student’s comprehensive ability as well as proficiency of technology application, cultivate the student’s ability to analyze and solve problems, and achieve the combination of theory and practice.

**2.5 Keep Up with Technical Progress and Adjust the Teaching Content to Meet Social Development Needs.** With rapid development of modern circuit technology, it has already come a digital age and the television technology also keeps developing at tremendous speed. So, at very beginning, we have reformed the teaching content by substantially increasing the content related to high definition digital television, and introduced intelligent TV, OLED TV, Quantum-dot TV and

other cutting-edge technologies with great foresight to broaden the vision of the student and help him keep up with the trend of the times and adapt to social progress.

### 3. Initial Success and Prospect

The reform and exploration on the *Television Technology* course have got initial success. The student has taken great interest in television technology and increased his understanding of *Television Technology*. In addition, the student not only has learned new knowledge and cultivated study methods, but also learned to combine theory with practice and enhanced confidence on their own professional skills and abilities. We will further improve teaching software, supplement and perfect the assessment system and keep innovating teaching system so as to cultivate the comprehensive and innovative talents for social need.

### 4. Summary

In the era that technology and society advance rapidly, it requires to keep reforming and innovating the college teaching system as so to adapt to new situations. Therefore, we need to make exploration and reform on teaching content, teaching means, teaching method, assessment system and practice teaching so as to pursue better teaching effect, improve teaching quality, cultivate the student's comprehensive abilities as well as enable the student to grasp new skill, learn new methods and adapt to the need of social development.

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