Project Teaching Design of "Mobile Communication Network Optimization" Based on Information Teaching Methods

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Abstract: Some Opinions of the Ministry of Education on Comprehensively Improving the Teaching Quality of Higher Vocational Education Points out That Curriculum Construction and Reform Are the Core of Improving the Teaching Quality, As Well As the Key and Difficult Points of Teaching Reform. the Course of Mobile Communication Network Optimization is a Model of Perfect Combination of Teaching Process and Working Process. Adopting Project-Teaching Model Can Greatly Improve the Teaching Quality and Strengthen the Connotation Construction of Higher Vocational Colleges. in This Paper, We Use Information-Teaching Methods to Design the Project-Based Teaching of "Mobile Communication Network Optimization", So As to Achieve the Purpose of Students' Independent Learning and Undertaking Network Optimization after Graduation.

1. Introduction

In recent years, China's mobile communication industry has made great progress, with a net increase of 439000 4G base stations in 2018, a total of 3.72 million 4G base stations and a total of 6.48 million mobile communication base stations[1]. In order to make the huge base station system play the best role and let users have the best network experience, network optimization personnel are required to test, analyze and propose optimization scheme for mobile communication network. Based on this, many vocational colleges in our country have set up the course of "mobile communication network optimization", but the traditional teaching method has little effect, and students still need to participate in training before going to work. What kind of teaching method can we use to combine teaching with post? This paper combines the course content with the actual work position, the project leader of the teacher simulation network excellent company and the members of the student simulation project team, integrates each step of the actual work into the teaching, uploads the teaching resources by using the blue ink cloud class, allocates tasks, students study in fragments in their spare time, and completes all the preparatory work of the project in advance.

2. Course Overall Design

The overall design of the course mainly includes the design of course objective, course content, ability training project, schedule, The first lesson overview, assessment scheme, teaching materials, reference materials, tool materials, common terms in Chinese and English, etc.

2.1 Course Goal Design

The curriculum goal design should focus on the professional post ability, combine with the actual needs of the post, truly reflect the professional ability and professional core ability requirements of the future employment of students, and accommodate the knowledge system that the curriculum should contain. The overall goal of the course is that through the learning of this course, students can have the ability to adapt to the post and summarize the whole. The overall goal is composed of ability goal, knowledge goal and quality development goal.

The overall goal of mobile communication network optimization course is: students can use network optimization test software to carry out LTE network single station verification and cluster optimization test, analyze test data, write network optimization test report, put forward feasible,

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economic and reliable optimization plan; develop lifelong learning habits, have the spirit of unity and cooperation and good language expression ability.

The ability goal is mainly composed of mobile object structure. What kind of ability can be achieved through the course learning, such as making a reasonable test route, testing the base station voice service, etc.

The knowledge goal is to master the application knowledge system of the system through course learning, such as: describe LTE network structure, convert LTE frequency and frequency point, master LTE random access process, etc.

The quality goal mainly embodies the eight professional core abilities of quality education in China, such as being good at communication and coordination with people, forming the habit of lifelong learning, etc[2].

2.2 Course Content Design

The course content design mainly divides the whole course into three to five items, and the title of the item should adopt subject predicate structure. The item should be easy to difficult and gradually deepened. According to the course content, divide the class hours reasonably and cover the theoretical knowledge in each item. As shown in Table 1.

Table 1 Course Content Allocation.

Course content (module)	Module name	Class hour
LTE network structure, spectrum division, LTE key technology, LTE protocol hierarchy, LTE frame structure, LTE physical channel	LTE test software operation	8
System message, UE working mode and status, LTE bearing and classification, cell search and random access, boot attachment and service request, LTE voice service solution, coverage problem classification, coverage problem optimization method, random access signaling process, analysis thinking of connection rate	LTE single station verification	18
Basic performance indexes, paging and tau processes, dedicated bearer processes, LTE mobility management, cell selection, cell reselection, basic concepts of handover, handover related parameters, and optimization ideas of handover problems	Optimization of mobile LTE cluster in Education Park	22

Table 2 Example of Ability Training Project Design

Serial number	Module name	Module task	Capability objectives to be achieved	Relevant supporting knowledge	Training methods, means and steps	Result
2	LTE single station verification	2.2 Test mobile LTE voice service	Be able to conduct voice service test; Be able to record test data.	Master the steps and skills of LTE voice business test; Master the method of recording test data; Understand the process of cell search and random access; Understand the process of power on attachment and business request; Master LTE voice business solutions; Master the random access signaling process; Familiar with the analysis of the connection rate.	Step 1 Pre class situation check Intern network optimization engineer to report the completion of extracurricular work and determine the methods and steps of voice test; Comments and analysis among project teams; preliminary assessment by project leader. Step 2 Complete the task Intern network optimization engineer to conduct on-site voice business test. Step 3 Discuss the completion of tasks Team member 1 shows the results, explains the voice business test methods and test data, and each team evaluates each other; The person in charge of the project shall put forward precautions, guide and answer questions; The project leader shall conduct on-site assessment. The intern Network Optimization Engineer summarizes the opinions, conducts on-site test and submits the voice business test data. For the submitted test data, the project leader shall conduct the result assessment. Step 4 Assign the next task Collect the test equipment, consult the network optimization instruction manual, determine the LTE data service test steps of the mechanical and electrical building, and record the data service test data.	Voice service test data

2.3 Ability Training Project Design

Ability training project design is to subdivide each project into two or four class hours as a project task. Each project task includes the ability objectives to be achieved, relevant supporting knowledge, training methods, means and steps. Students who complete the task need to submit the results that can be displayed.The design of ability training program is shown in Table 2.

3. Curriculum Unit Design

Curriculum unit design is to make each task concrete and adopt six step teaching method, including information, planning, decision-making, implementation, inspection and evaluation[3]. The information stage is an important stage for project team members to look up data and get familiar with theoretical knowledge according to assigned tasks. It is also the main stage for training students' self-learning ability. The planning stage is a stage for project team to plan according to assigned tasks, such as test path planning and personnel allocation planning. The decision-making stage is to confirm the test plan according to tasks The implementation is the most important part of the course, which is the stage where students are the main body and complete specific tasks to collect test data; the inspection stage is an important stage where students report, learn from each other, learn from each other, and improve their abilities; the evaluation and assessment stage is an important stage where teachers are the main body and focus on finding highlights and rewards, which is an important stage to improve students' self-confidence. The design of ability training program is shown in Table 3.

Table 3 Example of Course Unit Design

<table>
<tr><td colspan="8">Course Title: 2.2 test LTE voice business (2 class hours)</td></tr>
<tr><td>Teaching class</td><td colspan="2"></td><td>Class time</td><td colspan="2"></td><td>Place of class</td><td></td></tr>
<tr><td>Instructional objective</td><td colspan="7">Master LTE voice service test steps;
Master the voice business record test data method;
Students can conduct voice business test.</td></tr>
<tr><td>Teaching objectives</td><td colspan="2">Capability goal</td><td colspan="2">Knowledge goal</td><td colspan="3">Quality objectives</td></tr>
<tr><td></td><td colspan="2">□ Ability to access data;
□ Ability to analyze and solve problems;
□ Test the capability of LTE voice service;
□ Ability to record LTE test data.</td><td colspan="2">□ Understand LTE voice business solutions;
□ Familiar with random access signaling process;
□ Master LTE voice service test steps;
□ Master the voice business record test data method.</td><td colspan="3">□ Cultivate the awareness of operating according to the standard;
□ Form the ability of communication and coordination with people;
□ Develop the ability to independently consult and digest data;
□ Form a good team work atmosphere.</td></tr>
<tr><td>Tasks and cases</td><td colspan="7">Tasks:
□ Test the voice service of LTE base station;
□ Keep test records.
Case:
□ Network Optimization Engineer of * * * company inspected and accepted China Mobile LTE base station located in Sichuan Information Technology Institute.</td></tr>
<tr><td>Key difficulties and Solutions</td><td colspan="7">Key points:
□ LTE voice service test steps, random access signaling process.
Difficulty:
□ LTE voice service test steps
Solutions:
□ Students look up the materials to find out the theoretical knowledge related to voice business;
□ Student teams communicate and discuss with each other, complete tasks and improve abilities through cooperation.
□ The teacher guides the students in the process of testing, comments in the inspection, guides the students to complete the work tasks one by one, and enables the students to master the technology and knowledge points.</td></tr>
<tr><td>Reference material</td><td colspan="7">□ LTE air interface technology and performance, edited by Zhang Xincheng, Tian Tao, Zhou Xiaojin, etc., published by people's post and Telecommunications Press, 2009, version: 1.
□ LTE wireless network optimization practice, edited by Zhang Shouguo, Zhang Jianguo, Li Shuhai and Shen Baohua, published by people's post and Telecommunications Press in 2014, version: 1.
□ China communication network: http://www.c114.net
□ Mobile communication network: http://www.mscbsc.com</td></tr>
<tr><td>Tools and materials</td><td colspan="7">Notebook computer,test cell phone,test software,dongle,engineering parameters,electronic map</td></tr>
<tr><td>Serial number</td><td>Step name</td><td>Content of courses</td><td>Teacher activity</td><td>Student activity</td><td>Time allocation</td><td>Tools and materials</td><td>In class /</td></tr>
</table>

					(Minute)		out of class
1	Assignment task	□ Distribute the engineering parameters of the test base station; □ Ask the students to check and accept the voice service bearing function of the new base station; □ Ask students to report to the next class in groups.	Teaching	Listen and record	/	Assignment, multimedia, work parameter table	In class
2	Information	Refer to the performance indicators of single station optimization, random access signaling process, equipment and operation steps required for voice service test, LTE voice service solution, random access signaling process and voice service test steps.	Guidance and communication	Reading, thinking, discussing and analyzing	/	Notebook computers, networks, books	outside class
3	Planing	□ Clarify the LTE voice solution of China Mobile and understand the CSFB process; □ Define the voice service test steps; □ Make sure the test data records are kept.	Guidance and communication	Draw up a plan	/	Notebook computers, networks, books	outside class
4	Policy decision	□ Determine the optimization steps; □ Division of labor among students in the group.	Guidance and communication	Determining steps	/	Notebook computers, networks, books	outside class
5	Implementation	Each group carries out field test and saves test data	Observation, guidance, recording and analysis	Testing, recording and communication	17	Notebook computer, test cell phone, test software, dongle, work parameter, electronic map	In class
6	Inspect	Check and evaluate the students among groups; checks and evaluates the report; The teacher demonstrates the test process and data records.	Listening, recording and lecturing	Listening, speaking, communicating and recording	15	Notebook computer, QQ group	In class
7	Evaluation and assessment	□ The teacher evaluates the completion of the task and evaluates the task.	Evaluation and assessment	Listening	10	Notebook computer,assessment form	In class
8	Summary	□ Summary of knowledge points; □ Summarize the cognitive level mastery degree of knowledge and skills of middle school students in this work process.	Teaching and communication	Listening, record and communicate	8	Notebook computer	In class
9	Assignment task	2.3 Test LTE data service	Teaching	Listening and record	5	Notebook computer,test cell phone, test software, dongle, work parameter,elec	In class

						tronic map	
After class experience							

4. Information Teaching Design

At present, information-based teaching can be carried out by using platforms such as learning general and blue ink cloud classes, and curriculum resources corresponding to tasks can be uploaded to the network platform. Each resource corresponds to each task, so that students can use their spare time for fragmented learning, and test and evaluate students' learning situation through test activities. Students can obtain corresponding experience in learning and testing, but experience also Is one of the important indicators in the assessment. In this way, students can learn the uploaded resources autonomously in their spare time and improve their learning initiative.

Upload class tasks in advance, and students complete information, plans and decisions in advance in their spare time. Teachers only need to make simple requirements for the tasks in class, and students can implement the tasks according to the requirements. In this way, the classroom turns, the teacher's role becomes a director, the student's role becomes an actor, and the main actor on the stage becomes a student rather than a teacher.

5. Conclusion

The course of “mobile communication network optimization” is closely combined with the actual work. The project-based teaching method can effectively enhance students' interest in learning, and perfectly connect the theoretical knowledge with the actual work. The use of information-based means to assist, but also make students' interest in learning. However, to implement project-based teaching, teachers are required to be familiar with the actual work positions corresponding to the curriculum, and it is better to have worked in the corresponding positions. Because the use of information-based teaching means requires a lot of spare time for students, each class should not use more than three courses of project-based teaching at the same time.

References

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