Approach and Practice for Communication Principle Course Based on Application Type Talent

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Abstract. With today communication technology rapid development, people completely step into an information times. In comparison with social requirement, there is heavily out of touch and weakness for curriculum teaching of communication principle. This becomes an important topic for the researchers and scholars in communication field. This paper firstly analyzes the phenomenon and problem on this course teaching. Then according to the application talent educating target, conducts the approach and design on course materials, teaching model, practical ability, and evaluation mechanism etc. aspects. Finally provides one new cutting type teaching system which meets modern communication development based on the curriculum practice. This analysis and idea is of great reference significance and helpful to scholars further study in field.

Introduction

With stepping 21 century, people come into complete new digital times. The communication technology greatly develops from earlier telephone switching system to all digital mobile communication system, internet system, Internet of things system and so on. The content and format of communication develop into multimedia message, e-pay, mobile video, interactive game, social media, and mobile GPS etc. from former voice, SMS, email and fax. The communication message quantity reaches exponential growth. The speed rate achieves T pbs level from earlier M pbs. Wireless speed rate increases 100 M pbs in 2013 from 1 K pbs in 1980’s [1]. All of that is far beyond scientist expectation. Modern communication theory research is behind the times development.

In the same, communication course teaching in university lags modern developing pace. There is big difference from existed course materials, teaching method to educating target etc. Hence this paper firstly conducts analysis on the phenomenon; secondly focuses the research on course materials and contents; then discusses teaching model and method that meet the modern features; later explores this course theory and application combination point. Finally designs a new ability examination method and offers N+1 comprehensive process evaluation mechanism. This paper idea must be helpful reference to improve university communication course teaching research and development.

Analysis Teaching Current Situation

The communication principle course is of very important effect among the electrons engineering, information communication, network engineering and IOT engineering etc. undergraduate majors. It is a necessary course as well. However if learning this course well, student should complete Advanced mathematics, Electronic circuit, Digital logic circuit, Signal process, Probability theory, Information theory etc. basic courses in advance. Thus student can master this course theory and technology knowledge. Furthermore student can better learn major courses in later. It bears key function between the preceding and the following.

Generally the domestic universities provide this course since 1970. Most of universities mainly teach communication basic system and technology theory [2]. No matter which content and teaching model, it is almost used to today. There is big gap for today communication quick development. At present, there are general teaching phenomenon and issue as following discussion.
Single Teaching Mode

Currently most of teaching mode in communication principle course uses the mode formed in 1980’s. The teaching content is an outmoded material, teaching idea is behind, teaching method is single, student’s practical ability is weakness. The combination degree is extremely low between learnt knowledge and today technology development. This mode is difficult to meet modern communication technology requirement. It is not helpful to train student general application ability and to become application technology type talent whom enterprise need [2].

Outmoded Teaching Materials

Today universities generally use Chongxin Fan written Communication Principle book by National Defense Industry Press (2012) and Zhigang Cao finished Communication Principle and Application book by Higher Education Press (2105). These two books are comprehensive basic theory teaching material. This is more suitable for pre-graduate and student researching in theory in future. But it is not main direction for majority of undergraduate students. As far as Cao’s book, the content of basic theory occupies total 9 sections which contain a lot of derived formulas in advanced mathematics. These contents extremely decrease attractive force for student learning. Moreover this book total reaches 550 pages plus which is very difficult to use in limited class hour of one semester [3]. There is obvious gap between teaching material and actual situation.

Meager Teaching Method

Generally teacher adopts the PPT method to introduce book knowledge. This is pretty good method for knowledge imparting by multimedia computer. However this single teaching method is difficult to improve student learning activity by introducing PPT in class, arranging homework class over, submitting exercises in next class. Facing all students with a smart mobile phone today, they hardly concentrate their attention on listen during lecture.

Deficient Educational Resource

At present each university conducts the teaching adjustment, teaching resource is inefficient as the following aspects. The first, teaching hours are pressed. The class hour decreases to 64 hours or 48 hours today from 96 hours in 1970’s for one semester [4]. The contradiction becomes obvious between much teaching content and decreasing class hour. How to complete teaching task and get ideal teaching effect, it is very big issue. The second, the teacher resource is not enough. Keynote teacher in this course not only needs consolidation theory base, but is of rich practical application experience. The lack of expert teachers and teaching behind practice must result in student no interest for lectures and poor practical ability. The third, lab usually is simple and backward. The majority of university basically depends on the Matlab and System View tool for their experiment contents. These lab contents are dull for the most students. It is difficult to link their communication phone tool for each day used.

Backward Examination Method.

For communication principle course, usually its examination type is peacetime test paper and final close examination paper. This traditional examination method focuses on checking student theory mastering degree and result in student rote learning, cannot digesting, as well as student poor practical ability. Meanwhile cultivates student inertial thinking that complete this course only if pass this final examination. Thus produces mechanical learning method for poor performance in peacetime and trying hard in final exam.

As above discussions, the communication principle course is as important major basic course, it not only faces current puzzled teaching situation, but meets extremely challenge for improving teaching level. It becomes a key hot point in the communication field.
Approach and Design Course Teaching

As far as current educational situation, this paper thinks that application type undergraduate university should focus on itself physical truth, design curriculum system structure linking with target for training application type talent. Moreover it should be conducted in all education and teaching process. As key teaching reform program, after practice in two classes for communication principle course and one class for near field wireless communication course, this paper conducts a lot of useful approaches for improving teaching level.

Ability Based, Training Application Technology Type Talent

Facing rapidly developing communication technology, the undergraduate school should set training application talent as main target. Regarding to the statistics, there are 70% more average quantity of general universities graduate who directly enter enterprise and company after their study phase, while only 30% less graduates will go on their study for master degree [5]. For most people, what is the enterprise expectation and requirement for new employee? This paper gets the feedback from both internship company and practical base as below: The first, the applied knowledge and hands-on operation ability; The second, good written ability including technique investigation report and design solution; The third, pretty good communication ability; The fourth, team work ability. It is obvious seen that university’s target is training the application type talent for enterprise. Therefore following the direction, this paper divides this target into concrete operational items showing as table 1.

| Table 1. Ability divided items. |
|-------------------------------|----------------|
| Major Ability                 | Table Column Head |
| ✗                            | ✗            | ✗         | ✗         | ✗         | ✗     | ✗          | ✗          |

Here major ability contains system solution, system test, application project based on communication principle course. There is alternative choice based on different major course. As far as comprehensive ability, it includes expression communication, team work and global view as necessary items. By this ability divided, it is easier to focus on key points, thus realizes the training application type talent.

Combining Actuality, Choice Cutting Type Teaching Material.

As above section discussion, there are disadvantages in current teaching material including much theory, many formulas deduction, and less application combination etc. That results in student listening without attention and teacher speaking without passion. This is extremely contradiction in current teaching course. Therefore, the paper spent much time to approach in program practice. About teaching book choice, it bases on the book but not limit it. At first, choosing Jianshuang Cui written Modern Communication Technology Introduction by Machinery Industry Press is as main teaching book, meanwhile Fan’s and Cao’s book above mentioned are as reference books. The minor students who will go on studying for master degree must complete the relative sections in reference book. Then by e-file PPT, teacher cuts and edits teaching contents, thus lists all outline of key point contents must mastered as figure 1.
1 represents Communication Sys. Model, 2 is two key theorems covering Sampling theorem and Shannon theorem, 3 means three important transmission methods like one/ two way, Serial / parallel, and Same / asynchronous transmission. 4 shows four basic techniques including Sample, Code, Modulation and Multiplexing technique, 5 is five application systems such as Switching Sys. Optical Fiber Sys. Sat. / Microwave Sys. Mobile Sys. and Multimedia Sys. In this way, the teaching content selects the essential without dross, simplifies key knowledge scope. All of that makes student to easily grasp the lines of key knowledge. It is helpful their learning motivation and focus.

Enriching Teaching Means and Methods

Since 1990’s, the universities in developed country have began communication principle course reform and discussion for training application type talent to meet industry high speed development. The reform main purpose is adopting interactive learn and case-based teaching new methods. The essence of reform is to improve the attraction in class, has student actively involves in learning process as well as educates them practical and innovative ability [2]. This paper conducts initial practice by modern teaching means. As compared with former method, it produces a pretty good effect.

*Changing one speaking mode, becoming interactive teaching and learning.* Teacher divides one class into 6 groups ( 5-6 persons / group). Each group steps on the platform offering their section summary by PPT after teacher completing one section introduction. The activity time is 8 minutes including group summary and A&Q two periods. Teacher only provides final reviewing and guiding after student activity. Thus it not only training student self-summary, team work, and expressing etc ability, but also activating class atmosphere.

*Case introducing, module teaching.* As above discussion, student difficultly remembers all theories because of its abstract and boring in book. Practice proves people want to remember one strange thing, the most effective way is analogy as a familiar thing. In teaching practice, teacher usually provides analogy speaking. For example, when introducing “Sample Theorem “, offering “cut bread” and “speed biscuit “examples. When explaining “channel modulation tech.”, providing “constructing tridimensional express road “and so on. It is helpful student memory for lecture knowledge points. In addition, this paper divides entire course content into four modules. In each module teaching, teacher designs one example for actual leading communication company in global. The company introduction covers its products, technique, system and support applications as well as construction organization and work position. It both helps student combining the theory knowledge and actual case application, and broadens their international view. It gains universal welcome among students.

*Building extracurricular interactive platform.* Today each student has one smart phone with hands in 24 hours. How to use this condition for extracurricular teaching? In this practice, teacher has some useful attempts. Teacher sets a QQ group with students. This group has several functions: 1) teacher assigns expansibility knowledge point, discussion topic, and home task; 2) student can communicate with teacher in anytime and anywhere when facing some learning issues; 3) teacher provides personal advice when student has private problem. The result is greatly shortens the distance between student and teacher, expands the interactive space and time. Teaching and consulting can be completely conducted. In the same way, teacher provides all of teaching outline, teaching schedule, teaching
solution etc. to student by BB platform. It is helpful student timely and completely seeing course
details and progress. Moreover it enhances student’s ability on initiative and plan aspect.

Enhancing Practice, Combining Knowledge and Application.

In teaching practice, there are two aspects enhancing student hands-on ability. Firstly by
communication lab, conducts basic experiments to help them further understanding key technique
point and have some basic analysis ability [6]. As far as four teaching modules, each module is
equipped with one experiment by Matlab system from signal processing technique, modulation
technique, simulation system construction, and communication model design. After each experiment,
student must offer their conclusion linking with book knowledge point. Meanwhile provide 1-2
actual examples for this technique by report. Secondly by task type, teacher arranges them entering
practical base – ZTE company for visiting, listening, experience, and operating in application
environment. According to actual communication system and message, each one must finish one’s
task project report. Thus it makes their design report with concrete substance in paper and initiates
student learning interest. Moreover trains student comprehensive application ability [7].

Project Originated, Adopting N+1 Process Evaluation Mechanism.

Currently most of examination type is final examination as main evaluation in undergraduate school.
This traditional type focuses on student memory for mastering theory knowledge. It is useless to
develop their practical ability. Hence in this teaching practice, it sets project based as guidance and
abandons traditional form for course pass with once examination. This paper designs one new type
mechanism of N+1 process evaluation as figure 2. In this mechanism, it is composed of total five
parts (N has 4 items). Among system, group PPT introduction after each section is 15 %, experiments
of lab occupies 15%, team design report has 15% ratio, class exercise and student application report
covers 25%, and 1 is final examination contains for 30% point.

![Figure 2. Process evaluation items.](image)

This mechanism not only covers teaching content in class, but practical content in company and lab.
There are both personal items and team work item. Meanwhile team design report and task
application report are as important ability evaluation. By this practice, the universal feedback from
student is increase of freedom, reduction of final exam burden, and releasing various potential
abilities. It has been proved by practice that is an effective and scientific comprehensive evaluation
mechanism.

Summary

As far as communication principle course, it is long term and comprehensive process for training
student application and innovation ability. Moreover it should be contained in entire education
process. This course must be set on the innovative education system base. Meanwhile scholars and
researcher should conduct constant exploration, and find out new method and new theory in
innovative education process [8].

From teaching practice, this paper analyzes the existed situation for this course, meanwhile
proposes training communication talent target. Then paper discusses the teaching materials and
design new teaching methods based on the interactive mode, module teaching, and extracurricular
platform. Later provides an idea for practical application. Finally puts forward to a comprehensive evaluation mechanism. All of that gains better result from practice program. This paper has certain significance of interpretation for scholar further research in this field. In same way, it has actual value and reference significance for other major curriculum construction.

References


