

University Education Reform in China ----- Facing a New Century

Yuan Dening, Zhang Wenxue, Chen Zhi
Tsinghua University

Abstract

The coming 21st century brings about a revolution in higher education in China. This paper describes four aspects in connection with the reform program in a personnel training model and also brings forth five relationships on optimizing the entire structure of courses. As one of the key universities, Tsinghua University can give a good perspective on higher education in China.

Introduction

In order to promote the education reform program in China, the most significance is to update the concepts about education. The basic reason lies in a series of changes which will take place in China as well as in the world for the next century. From the viewpoint of the development of economy, culture, science and technology at home and abroad, many current concepts about education are confronted with an epochal challenge. This challenge will come from the economy, science, technology and culture. First, China's economic system will be further changed from a planned economy to a socialist market economy, the world economy will further move into one integration, and the competitiveness and variability of economy will be intensified. Under such circumstances, higher education whose stress used to be placed on a narrowed special training must be shifted to the area where adaptability education is emphasized. Second, the development of modern science and technology has greatly speeded up the cycle of the replacement of old knowledge with new one. The time when a person could benefit his whole life from one time education he received at college has gone forever. Educators and education receivers have to proceed from one time education to lifelong education. Therefore, an emphasis of higher education should be placed on "basic training". Third, over the past several centuries in the human civilization process, a special attention was always paid to a training in analyzing a problem into individual factors. After a rather long period of division of disciplines, emerged again a tendency that the different disciplines are coming into integration. The shift of a stress from analysis to integration is a completely new stage in the human civilization, which has far-reaching effect on education. The education will be changed from training specialists to training personnel with comprehensive quality, and the combination of natural science, technological science and humanity will be stressed. This comprehensive education will undoubtedly be a precursor of a comprehensive society. Education reform in universities (mainly the reform in personnel training model, setup of disciplines and curriculum system) should keep up with this trend of epochal development.

Reform Program in a Personnel Training Model

In the view of the current teaching work, in general, “personnel training reform” means to solve these problems about how to raise the standards of education, how to widen a speciality, how to improve students’ quality and how to gear the training to engineering.

Raising the standards of education

Higher education undertakes the task of training backbone elements for a future society. On the whole, college graduates should become high-level personnel, who should care about and have positive effect on the development of a society and a country; and obtain a fairly high competence in a special field. These people are no longer only special personnel with some skills. The “higher-level” here mainly refers to the high social responsibility. The knowledge structure of high level personnel should be composed of three components in general: first, professional knowledge (including academic knowledge and ability in a particular field); second, humanity knowledge (including social science, ability of social contact, organization, and judgment, and ability of leadership); third, conceptual knowledge (including concept of value, ability of decision-making, thoughts of strategies, especially the creative ideas, and ability of putting them into practice). As for managers at different levels, the best structure of above-mentioned knowledge ability should be different. The managers’ knowledge of special skills will be reduced while conceptual knowledge should be increased with their managerial promotion. But, humanity knowledge is of great significance to all the managerial personnel at all levels. With the fast development of modern comprehensive production at a large scale, humanity knowledge is becoming more and more important. In current teaching system, a great attention is paid to the professional skill training, but the teaching contents are too special and narrow, and knowledge system is rather out of date. This problem needs to be solved immediately. Humanity education has been ignored for a rather long time. Recently, this situation in China has been somehow changed. However, an effective humanity education system is far from complete.

As an experiment, a pilot reform program for high level personnel training is carried out in some engineering departments of our university. The training objective is decided according to the three categories. The first category is a program for Master of Engineering including Bachelor of Engineering, i.e. Bachelor and Master combined program, in which the training process will be optimized and the training of “the both ends will be intensified, and the middle will be optimized”. One end refers to strengthening basic education on modern engineering technology and comprehensive personnel quality, and the other end is to enhance the practical engineering training with a macro-concept, including engineering scientific research, comprehensive ability training in designing and the training of comprehensive ability and knowledge in marketing environment, social science, ethics, etc. The main body of a speciality should be restructured, and overall arrangement should be made for the basic training of the undergraduates and ability training of the graduates in order to solve the problem in our undergraduate program that the students have a solid foundation, but lack the ability of research and creativity. The second category is to train the certified professional engineers with a Bachelor degree in architecture, civil engineering and a few engineering departments. The training program will be modified in accordance with the standards of international certified professional engineers. The third category is to train across-discipline comprehensive personnel, and high level personnel who can link with the after-college

education. Comprehensive personnel will be cultivated in different engineering disciplines between engineering and management science, among sciences and between engineering and humanity or social science, through the establishment of cross-disciplines program, double degree program and minor subject program. With the development of remote education technology, continuing education which covers undergraduate program, graduate course program, comprehensive program for the second Bachelor degree and engineering Master's program will become an important model for training high level personnel of all kinds.

Widening a speciality

The widening of specialties is primarily a question of changing educational concept. As our country has already transformed from a planned economy into a market economy, it is indispensable to make corresponding critical changes of the arrangement of original courses which served the planned economy. In ideology, the transformation is from fitting in with vocational training to adapting to the changing social demands; as far as higher engineering education is concerned, emphasis should be laid on the education of fundamental qualifications of modern engineers. Admittedly, considering the reality of schools in our country (different administrative system, different training aims, different levels, different historical background), there will be a period of transition. But the orientation must be clarified and paces should be quickened.

Improving students' quality

Good qualifications of citizens are one of the basic factors to guarantee the prosperity and development of China in the 21st century. As the backbone of society, talents of high level are especially required to have good comprehensive qualities, including political quality, professional quality, cultural quality and physical and psychological quality, which has been universally recognized. At present, the formation of "non-professional" quality needs to be given more attention (maybe the term "non-professional" quality is not quite accurate, and it is expected to be replaced by a better one). For the one thing, the "non-professional" quality is demanded by the society; it is the defect of the education for the other. Take the engineering system for instance, a modern engineering has entered an era of "social engineering". The challenge future engineers are going to confront with is mainly caused by non-engineering factor. What a modern engineer is concerned with is far more than whether a certain project can be completed within certain time, and he also needs to know whether it is economical and what social result it will cause and consider the question of industrial pollution, environment, energy crisis. This is the concept of "great project". The breakthrough or success of a field in scientific research is usually attributed to the non-professional factors. For a long time, the educational concept of narrow special training has been observed, which has been deeply rooted in the students' minds. Quite a few students disregard extracurricular activities, taking them as a waste of time instead. The narrow concept of specialty among the students reflects the extremes of education. The deviation of pure "sense of tool" in education combining with the sense of utilitarianism somewhat lead to the defects of university students. To prevent education from being too much specialized and becoming tools only, and to attach importance to non-professional factors, teachers should make a good start. The multi-functions of education (political, economical, cultural) should be completely realized and practised. To propagate scientific techniques is one of the important functions of education, but it is not all. As is stated above, to spread the right skills of humanity and those of conception is also the main functions of education. The traditional

concept of special training of education should be broken through; the inharmonious relationship between science and humanity and that between profession and non-profession should be changed so that educators would come to a right concept toward professional techniques, the relationship between human beings and nature, human beings and society, and questions like self-development and social development.

Gearing the training to engineering

Facing the basic units and the forefront of the actual field should have been the right orientation of education. However, the reality is that the agriculture majors don't go to the countryside and the engineering majors don't go to the factories. There are many reasons for this situation. As far as education itself is concerned, something needs to be done so that students are willing and brave to go to the first line, i.e., engineering education should solve the problem of facing engineering. In recent years, engineering drill has been weakened for various reasons. The problem could be solved by maintaining the basic position of natural science, mathematics and engineering techniques and greatly emphasizing engineering practice including the education of design, creativity, engineering administration, environment, market, ethics and morality. This is not a simple return to the engineering drill of the 1950s to 1960s. Comprehensive reforming measures should be adopted, such as introducing new engineering master degree, taking the education of bachelors and masters as a whole, cooperating with some big enterprise groups to educate engineering masters, constructing the curriculum system under the concept of "great project", reforming the arrangement of engineering courses with the emphasis on designing and practising.

Optimize the Entire Structure of Courses

The reform of the course structure, content and methods for the teaching system, is the concrete realization to change the mode for the capable people's training, and is the core of teaching reform. It is necessary to analyze and discuss the entire structure of courses in the process of enforcing all kinds of courses' reform. For the problems of entire structure of courses, at present, the five relationships should be carefully investigated as follows.

Section and entirety The entirety optimization of the teaching reform should be more emphasized. In the past, the teaching reform was largely carried out in the older framework of courses for a longer period, which is locally optimized to the each course one by one. Of course, this process is needed and plays an active rule at a specified stage. However, it is not sufficient to remain at the local optimization of courses. Obviously, the total sum of the local optimization of each course is not equal to that of the entire optimization, and maybe disturb the entire optimization under some specified condition. In the whole point of view for training of the capable people, it might be disorder and lower benefits in lack of the course reform of the entire optimization's guidance. Therefore, at present, the main contradiction of the course reform lies in the entity rather than the local, i.e., the prime task of the current course reform is to re-examine and reasonably adjust the over-all curriculums; to determine the status and domain of the each course in the training plan; to add the courses to train the composite quality and enrich novel achievements of science and technology; and to delete the older courses and decrease the out-of-fashioned content. Of course, the focus of the reform should come back to the local course under the premise to straighten out the entire structure of courses, that is to say, the local courses' reform is carried out under the guidance of entire

optimization for courses.

Microscopic and macroscopic The macroscopic should be more stressed. Now our teaching is extraordinarily microscopic. The microscopic and actual knowledge and statement of the phenomenon details take a lot of precious time of the class teaching. But the macroscopic, strategic thought spreading pays less attention in teaching. This microscopic and over-tactic mode for teaching is very unsuitable to train the capable people with the high level who can drive the social development. As a whole, the content of teaching should be transferred from the over-specialized and microscopic to the broad and macroscopic. The over-specialized and over-deep courses, contents in actual details should be greatly selected and dropped out in the current system of courses. Whereas, the contents that spread macroscopic and tactic thoughts as well as ideas should be largely enriched. To teach thinking, method and key point of view in the teaching method should be enormously encouraged to reach the goal “teaching-exercise-examination in the ratio of 1:2:3”.

Inheritance and pioneering The reform, pioneering and development should be emphasized. The current system of teaching, from the curriculums to the structure of courses, has been basically inherited since 1950's college and department adjustment. The founders of many courses were passed away, however, people only inherited the one course by the syllabus and the teaching materials. With the change of age, several parts of the teaching system have been changed more or less, even greatly, however, not fundamentally. In particular, the entity of the structure of courses is not structurally revolutionized. It is necessary to analyze history, sum up the experience and look forward the future. According to the requirement of the mode of the capable people's training in the new stage, the current tasks of teaching reform are to re-examine the inherited system of teaching, extract the essentials and remove the deficiencies from them, then to establish the new type of system of courses which is suitable for the epoch development and conditions in our country. In meantime, the problem between tradition and modern times is related with the new system mentioned above. So-called “tradition and modern times” includes content of teaching and teaching methodology. The traditional teaching mode is shown, in contents, as a kind of “knowledge inheritance” education; in methodology, as a kind of “one-way instillation” teaching. This kind of teaching mode is confronted with the great challenge of modern civilization. The development of modern educational technology, whose symbol is information, certainly brings about great changes in such fields as education theories, education thoughts and views. For this, all of us lack ideological and theoretical preparations. As the modern educational measures come swiftly into the teaching field, a series of new questions, from contents to methods, will be raised, such as the relationship between the traditional teaching methods and the modern teaching measures, the relationship between teachers and the modern teaching measures, the relationship between students and the modern teaching measures, the relationship between teachers and students on the condition of the popularization of modern educational technology and so on. The education study should make good theoretical preparations for the above questions.

Specialized and “non-specialized” knowledge More attention should be paid on “non-specialized” part. The present set of teaching system emphasizes specialties too much, due to the old view of narrow specialization. The teaching system formed in the highly planned economic period is structured backward “or contractively”. That is to say, the setting up of

specialized courses generally depends on the specialties teaching goal, which accordingly decides the earlier technology basis and basic courses. Moreover, the specialties teaching goal is to train relatively specific specialized talents, thus the phenomenon appears: to some degree what the specialties need is what should be learned. Such a “backward” course-planning idea is very influential till now. If fundamental changes are not made, the teaching contents reform of course system is definitely difficult to promote. Let us take the teaching system of technology as an example. The general course structure should be arranged according to the need of training modern engineers. The overall teaching system of contents should develop from the relatively single system, in which the science and technology play an absolutely major role, to the comprehensive system embodying the modern development, which can involve science, technology, economy, culture, moralities, environment, social development and so on. In addition, the position of the traditional “non-specialized” knowledge should be greatly promoted. Some subjects, such as, market and economy, environment and development, the humanities and moralities should be added to the course system. They may be set up independently, or mixed with the other subjects or appeared as special topics.

Basic and “non-basic” knowledge The refinement of basic parts should be emphasized. With the progress of science and technology, more and more new knowledge has appeared, and course subjects and course contents have increased a lot, thus the contradiction between the finite teaching hours of teaching system and the increasingly expansion of course contents is becoming sharper and sharper. To solve the contradiction gradually is not only necessary but also possible. One of the most important solutions is to refine the basic teaching contents. In principle, all the college teaching contents should be basic. Nowadays, the contents of a lot of basic courses are, however, not surely basic. With years passed, textbooks are becoming thicker and thicker, many parts of which are derivative, detailed and applicable. The basic courses (including the theoretical parts and experimental contents) should be fundamental and basic, with no necessity to extend to their application. If every type of subjects can be rechecked to sort out the basic contents, the teaching quality and efficiency will be greatly improved. Accordingly, there is another question that is how to properly deal with the relationship between the basic courses and the specialized courses. As far as the proper role that the two kinds of courses should play is concerned, we think that the previous basic courses should not only or even not mainly serve for the specialties teaching and specialized courses. Instead, the basic knowledge should be mixed with students’ potential and power of understanding to become internalized as students’ scientific and cultural accomplishments, with which students can open new areas and adapt to new careers. The training of the specialized courses which signifies a certain specialized direction and the training of specialties are necessary. However, for many specialties, they are not the bounds of careers, that is to say, specialties are not equal to careers; they are just indispensable “carriers” which can train students’ abilities. With the “carriers”, students can practice their awareness of engineering and capability of engineering.

Authors:

YUAN DENING

Received the B.S.degree in1964 from Tsinghua University, Yuan Dening is the Professor of Education and Vice-director of the Office of Academic Affairs at Tsinghua University.

ZHANG WENXUE

Received the B.S. degree in 1988 and the M.S. degree in 1993, both from Tsinghua University. She is in charge of teaching research at the Office of Academic Affairs and has published some papers.

CHEN ZHI

Received B.S. degree in 1960 from Tsinghua University, Chen Zhi is the Professor of Education and Vice-provost at Tsinghua University.