

STRUCTURE AND CULTIVATION OF THE KNOWLEDGE AND ABILITIES OF STUDENTS OF HIGHER VOCATIONAL TECHNICAL EDUCATION

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Abstract: This paper puts forward the constitution module for the knowledge and ability structure that students of higher vocational education should have. It sets forth at the full some basic principles that the basic knowledge the students of higher vocational education should master ought to be limited to no more than enough for their future use while their special skills and knowledge should be advanced, practical and their humane knowledge should be rich and extensive. It also suggests certain measures for the cultivation of their comprehensive practical abilities and the dialectical relationship between knowledge and ability which leads to the conclusion that equal stress should be put on both of them.

A. An Account of Our Raising the Question

With the development of national economy and society, the wide application of high and new technology, the rapid development of the third industry, and the breaking-up and compounding of the original vocational posts, a lot of hi-tech-related vocational posts have been created, the technical content and intelligence level of which are becoming higher and higher, as a result of which society has raised even higher requirements of those to be employed in both their knowledge and abilities. In such a case, the technical talent from secondary vocational schools is no longer able to meet the requirements and qualified for the posts. On the other hand, the talent cultivated by institutions of higher learning, which have long been pursuing the subject-centred cultivation module, is neither able to adapt himself to the front-line requirements of production, construction, service and management. As a result, great efforts must be made to develop the higher vocational education so as to turn out various talent able to meet the requirements at different levels. The higher vocational education in our country started its life in 1985, and the Vocational Education Law formally went into effect in September 1996, since which time the higher vocational education has established its legal place. The three-reforms-and-one-compensation policy suggested by the National Education Ministry to boom the higher vocational education began to be tried in more than 20 provinces and municipalities in 1998, when 110,000 students were enrolled.

And universities and colleges of undergraduate course in our country also began launch pilot projects in higher vocational education from 1999. As far as the speciality offering, teaching plan making, coursebook selecting, and the practice of teaching plans are concerned, however, they are all still in the experimental phase of being studied, practised, reformed and established. Up to now, a perfect cultivation module has not yet been formed.

In order to adapt to the requirements of the knowledge-economic age and the information society, the present paper of ours suggests a constitution module for the knowledge structure of the students of higher vocational education, and some cultivating approaches and measures to intensify the cultivation of their creative and practical abilities, so as to promote the rapid development of science and technology and economic construction in our country.

B. The composition of the Knowledge-and-Ability Structure of Students of Higher Vocational Education

Knowledge is a general term which is used to refer to the understanding and experiences of man gained in the practice of his transforming the objective world, and which has been organized and classified into various subjects, while the ability refers to man's comprehensive application of his knowledge, which is the subjective conditions enabling man to be equal to his work. The study of the science of talent has proven that knowledge is the basis of one's ability, while one's ability is the representation of his knowledge. Only when one has a good and systematic command of much knowledge, can he develop and heighten his ability. On the contrary, without knowledge, the cultivation of one's ability would come to nothing. Therefore, to develop one's ability, he must first acquire sufficient knowledge. On the other hand, however the accumulation of one's knowledge does not necessarily mean the natural improvement of one's ability, that is, one's knowledge is not equal to his ability. Just as the old saying goes, pedants may gain high scores but show low abilities. Thus, school education should aim at not only teaching students much knowledge but also leading and driving students to turn their knowledge into abilities in the course of learning their knowledge, which are of even greater importance. And the improvement of their abilities will, in turn, provide the necessary conditions to facilitate their acquiring new knowledge and expanding their knowledge range. From the above-mentioned, it is not difficult to see that knowledge and ability are inseparably interconnected and complementary to each other, and can reinforce each other. They are different from each other but related to each other. Neither of them can replace the other. Thus it can be concluded that higher vocational education in our country should be geared to the needs of the modernization construction, the world and the future, based on which the necessary basic knowledge to be taught to the students should be limited to no more than is required while their special skills and knowledge should be advanced and practical and their humane knowledge should be rich and extensive, all of which make up the basic principles for the cultivation of the technical application abilities of the students of higher vocational education, upon which, the design of the students' quality structure in knowledge and ability, and their cultivation plans should be based. In our opinion, the students of higher vocational education should be equipped with four kinds of knowledge and six abilities.

The four kinds of knowledge should include: 1. factual knowledge which tells people "what it is"; 2. principle knowledge which tells people "why"; 3. skill knowledge which tells people "how" such as techniques, skills, methods and keys; and 4. manpower knowledge which tells about who will be involved and whom to cooperate with, and which actually refers to the knowledge and ability of administration.

The five abilities refer to 1. the creative ability; 2. the thinking ability which means the ability to turn out new ideas, to find out and solve problems and to think about and analyse problems according to various symbols and images; 3. the ability to acquire and make use of knowledge and information; 4. the ability to make rational use of and dominate various resources such as time, expenses, equipment, manpower, etc. 5. the ability to properly deal with interpersonal relationships, which will enable them to efficiently cooperate with others, and work together with people of different backgrounds; and 6. the ability to learn all one's life.

C. Reorganizing the Teaching and Learning Structure and Optimizing the Teaching Plan

Teaching plans are blueprints for the cultivation of students, which have to focus their attention on the requirements of the development of social economy and the developing trend of

the specific special fields, and which will enable the students to occupy a proper position in the labour market with their stored knowledge and learned skills. Owing to that, the relationship between basic theory and professional knowledge has to be properly dealt with when the course structure is reorganized. Greater stress should be put on the proper orientation for the cultivation of talent and his application abilities. What's more, the students should also be equipped with proper sustainable developing abilities, fine vocational morality and devotion spirit.

When forming the course framework for higher vocational education, we must try our best to stick to the right orientation, emphasize practice, show the comprehensive features and gear it to the future.

(1) We must firmly stick to the socialist orientation. When teaching the "two courses", we must put greater stress on combining theory with practice so as to improve their practicality and efficiency. A good job must be done of the political and ideological education and the specialized education must be combined with the ideological education. In the course of specialized education, a good job must also be done of their specialized spiritual and moral education.

(2) Great stress must be put on practice. The practice time for each speciality at school must be normalized. It must be ensured that half of their three-year studies at school must be spent on practice, experimentation, social investigations etc. , which will be arranged for them by school. In the meantime, the course practice scope must also be expanded, with part of the teaching content of the basic courses for specialized courses taught in the lab, and part of it taught at the site so as to intensify their perceptual knowledge and help them form a positive professional orientation. As far English teaching is concerned, the training of their listening and oral expression abilities must be strengthened. As for their computer knowledge and application competence, they will be required to pass the national computer grade tests.

(3) All the courses must be synthesized. Because the higher vocational education aims chiefly at the cultivation of the technical application talent, the synthesization of different courses are of even greater importance. The synthesization should be performed at two levels: one is reflected in the specialized courses, which means establishing the specialized course module centering around special skills. In the specialized module, most of the courses will be short-period ones, with the long-period courses strictly limited, the timely tests made of the efficiency of the courses being taught and the training requirements in the specialized module made clear, so as to achieve the interacting effects of the skill training and knowledge teaching. The other is reflected in the common courses, which means establishing the course module centering around quality education and intensifying both ideological and specialized education, both of which aim at combining humane education with science education, theory teaching with practice teaching, and basic education with advanced education.

(4) Put into practice the policy of the "three orientations" ,and develop the students' quality in an all-round way. At present, special stress should be put on the improvement of the students' future-oriented quality. To realize this objective, we must pay attention to three respects: the first one is to strengthen their study of foreign languages by combining foreign languages learning with their vocational requirements, with great stress placed on the cultivation of their foreign language application ability related to their future work; the second one is to intensify the teaching of basic computer knowledge. In the future society, no members, if they don't know how to operate and use computers and develop computer software, can bear important responsibilities for social

development; the third one is to expand the psychological teaching content. The pressure brought about by competition in the future society will be a new problem man has to face, in which case the adaptability of the students to society and their life must be strengthened. The teaching module for the three-year vocational education in our institute is shown below:

The proportion between theory teaching and practice teaching will be 1:0.8. Among the theory teaching part, the two-course education module will take up 9.4%; foreign languages teaching module 12.2%; physical culture module 4.9%; cultural quality module 4.2%; computer module 6.6%; natural sciences module 10.7%; basic courses module for specialized courses 27.56%; specialized courses module 24.6%. With practice teaching, basic experiment module will take up 8%; specialized basic experiment module 14.5%; specialized experiment module 18.5%; the concentrated practice links 59%.

The operation of the teaching plans for higher vocational education has its own characteristics, owing to which three synchronizations must be stuck to in the course of making course plans. Firstly, the adjustment of the course plan must be synchronized with the deepening of people's ideological understanding. Secondly, the adjustment of the course plan must be synchronized with the deepening of teaching reform. And thirdly, the adjustment of the teaching plan must be synchronized with the improvement of teachers' qualities.

D. Strengthening the Cultivation of Their Practical Abilities

The most important feature of higher vocational education lies in the cultivation of students' better practical abilities. However, how can we turn out talent with both comparatively better practical abilities and outstanding knowledge-creating abilities to meet the requirements called for by the knowledge-economic times? We think the study and reform of the following links should be emphasized and intensified.

1. Turning verification into application in the course of practice teaching

With the cultivation objective of higher vocational education taken into account, we should, when leading students in doing experiments, turn verifying experiments into application experiments according to the specific characteristics of the students, which means the students should be made not only to skillfully master the methods and skills of a certain experiment but also to know what else the experiment can do and how to make use of it. In this way, the students' view will be widened, their creative inspiration will be activated, and their knowledge-creating sense and creative thinking will be developed. For example, in the viscosity experiment of lubricating oil when the verifying method was adopted as the experimental method, students used to be asked to verify the result through experiments after they had been given the standard oil and informed of its viscosity value. However, if we reform the experimental method by changing the standard oil into used oil, and asking the students to find out the viscosity value of the used oil for themselves in the same experimental conditions, to determine the quality of the lubricating oil according to the change of its viscosity values, and further to decide whether the lubricating oil can be used any longer, what will the students learn from the experiment? From it, they will actually know how to gain accurate and reliable data for their use and management of oil for mechanical equipment according to their own analysis of its physical and chemical targets. This kind of experiment can also enable them to analyse the causes of the lowering in the quality of the oil, and find out the specific spots which cause the lowering so as to provide a scientific basis for the trouble-shooting and maintenance of machines.

2. Turning visiting into exchanging in the cognitive practice

The cognitive practice is an important and integral part of practice teaching links, which aims at making the students realize the objective world through the reflection of their brain on the objective world, and which belongs to the perceptual stage of cognition. This stage aims at involving the students in their vocational fields as early as possible so as to strengthen their interest in learning their specialized courses and awaken their knowledge-seeking desire, which will surely help them change from passive receiving of knowledge to active gaining of knowledge.

Generally speaking, the process of the cognitive practice used to be nothing but a superficial-understanding-gaining visiting process. To change this situation, the guidance teacher has to go to society, make wide investigations and work out scientific and rational practice outlines when selecting practice units. Detailed plans should be carefully made to invite technical leaders and experts to give reports on special topics, who will introduce to the students their important work posts and the making links of their typical workpieces. During the reports, the students and their masters should be given sufficient time to discuss and exchange their ideas so as to make the students able to know the all-round requirements of the key posts on the talent in knowledge, skills and quality. Thus, the ability of the students to find out and gain knowledge in practice will be actively developed.

3. Turning the passiveness into mutual compensation in production practice

The production practice will be performed in this way: students will play the main role, their masters will work as the main guides and their teacher will serve as the bridge between the students and their masters. The masters are rich in practical experience and operation skills but short of theoretical knowledge and lateral exchange of information, in which case some of their key processes or methods may be out of date. However, on the contrary, their weak points may be just the strong points of their students and the new processes, methods and techniques needed by their key technology might be the ones the teacher is good at. If a good job is done of the coordination by the teacher in a rational way, the effect of mutual benefit may be gained. Let's take for example the production practice in machinery repairs. When fixing the cylinder jacket of the internal combustion engine the masters usually still use the traditional fixing method, which means that they will first put wooden blocks under the end of the air cylinder and then strike with a hammer. This kind of traditional fixing method will result in poor fixing quality, owing to which the method was dropped off long ago from the new modern internal combustion engine repair processes and replaced by a new fixing process, in which the surface of the cylinder jacket will be coated with machine oil after the water-proof ring is fixed, and then it will be pushed in place manually. The new fixing process can ensure good fixing quality and also save much time and labour.

4. Changing from one certificate to more certificates in the certification system.

Our higher vocational education will put into practice the multi-certificate system, which means the students will be required to take part in various vocational skill tests and appraisals according to the various vocational skill norms specified by the labour or social security sectors concerned, about which we have made clear and detailed specifications in our teaching plans, and as a result of which the students will be able to get their corresponding vocational qualifications certificates as well as schooling certificates at their graduation.

All the courses and teaching content will be normalized according to the national unified vocational skill standards and the vocational skill appraising specifications. Both teaching and learning will be organized according to the requirements respectively related to basic skills, specialized skills and relevant skills. The students will be required to have a good command of at

least a foreign language and the operation of computers and other modern office equipment, and to be equipped with their corresponding vocational abilities so as to lay a fine foundation for their successfully gaining their "employment passes". To realize this objective, we have actively created the necessary conditions for them, by which we mean that our institute has already had a vocational skill appraisal institute, one of the national computer grade test points and a driver training centre established in our institute, our applications for all of which have already been approved by the Provincial Labor and Social Security Departments and the Test Centre of the National Education Ministry. Now, we have been authorized to test and appraise the vocational skills for 8 posts such as engineering survey, architectural decoration, and computer grade tests, as a result of which part of our students will be able to get their driving licenses and other certificates at their graduation, which will surely facilitate their employment after their graduation.

Practice teaching is the life-line of the higher vocational education and the key to the cultivation of students' comprehensive abilities and qualities. Facing the challenge of the knowledge economy of the 21st century, we must be clear about the developing situation, firmly grasp the opportunities, intensify the practice teaching links, and strengthen the engineering practice training so as to lay a solid foundation for the rapid development of the knowledge economy in our country.

As a type of higher education, the higher vocational education started its life quite late in our country. As a result, we have only made some primary study of and a basic exploration into what kind of knowledge and abilities our students should be equipped with, and how their practical abilities can be strengthened and their creative spirit can be developed. We have just built up some of our own features in school-running modules, which are no doubt far from perfect, and still leave much to be desired. We sincerely hope to share our experience with our broad colleagues and we are determined to make even greater efforts to search for an efficient way for the rapid development of the higher vocational education in our country.

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