

Technical Education in the Changing World

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In Ukraine with the population of 52 mln. There 1.5 mln. Students, 30 % of which are the students of various kinds of higher technical establishments. There are 50 such institutions. The largest of them is the National technical University of Ukraine or Kiev Polytechnic Institute (about 30 thousand students) which celebrated its Centenary in September of 1998.

Simultaneously with tremendous changes of all the elements of the Ukrainian society the educational system is changing as well.

On the turn of the centuries the thoughts about the future of technical education are the cause of serious concern of all those involved in bringing up technical elite both in so-called industrialized countries and post-soviet block countries. I would like to take this opportunity of addressing you and express some ideas regarding the trends and concepts of technical education in Ukraine in the rapidly changing world.

Today, the countries of the world are developing in drastically non-uniform way. For the former Soviet Union countries it has already become the axiom that the so-called industrialized countries are on the priority basis developing fundamental and natural sciences and education and by following this way they are creating the most up-to-date technological basis. The countries which by some reasons do not follow the same way are becoming the users and consumers of old technologies and this leads to the situation when they find themselves in the group of dependent countries becoming raw adjuncts and ecological dumps.

Today Ukraine tries to follow the first way, using the achievements of our scientists, engineers and technicians, especially, in fundamental sciences (mathematics, physics, biology) and in some applied fields such as space exploration, nuclear physics, cybernetics, medicine and some others.

Taking into consideration the drawbacks of technical education of the previous years and after analyzing the status and place of technical education in the modern world we can state that the goal of technical education is to a great extent to ensure the progress of the society and show new ways of its positive development, of bringing up the person who will combine the best moral characteristics and features along with physical fitness and high level of education.

So, the main goals of higher technical school may be divided into the following groups:

1. Social objectives;
2. Organizational-structural targets;
3. Scientific development purposes;
4. Educational aims and purposes connected with methods of teaching improvement.

1. To achieve social objectives it is of primary importance to believe and make the governmental authorities believe in the necessity and importance of higher technical education in future. It is well-known that the credo of the industrialized countries is « education-research-industry» and this triangle is inseparable. It is on this basis that the financial system, commerce, market networks are developing. Though today in some countries (including Ukraine) the economic crisis does not promote development of technical education and there is no great demand in engineers, our task is to support higher technical education, preserve its structure for future economic growth. The expenditures for support of higher technical educational institutions will be much less than the money required afterwards for their reanimation. Maintaining the scientific and technical potential will be for the nation thousand times more economical than the necessity of creating it again in future.

The social task of similar importance is bringing up the person of high morality, culture, patriotism, physical fitness - all those features and characteristics without which a specialist cannot become a real professional and expert working for the good of his own country and mankind.

To achieve this we need highly qualified and devoted teachers, a well-balanced curriculum and the conditions under which the student's problems and his everyday concerns, interests, rest should be felt and appreciated and taken care of by the university (department and faculty) authorities.

2. Speaking about organizational- structural problems I would like to emphasize only two of them, namely, an increase of general educational component in fundamental educational block and the concept of continuous education.

Until the industry of such countries as Ukraine requires many graduates of technical profile, it is possible to extend the training of bachelors with good knowledge of fundamental sciences. They will be able, if necessary, to acquire new knowledge according to their qualification on the up-to-date scientific and technical level. Here we are to achieve the ratio between bachelor graduate engineers and masters as 60-25-15 It will be a response of education to a temporary decline of production.

In implementation of the concept of continuous education and the system of secondary school pupils training for technical universities we have carried out some structural reforms. What I mean is that higher educational institutions may have in their structure some educational unit of lower level, for example, preparatory departments, secondary technical schools and colleges. By setting up so-called educational-scientific industrial complexes it is possible to solve many important problems, such as early professional orientation of young people, improvement of secondary school training, successful search for gifted young people, provision of continuous non-stop education.

3. One more objective of higher technical education is developing scientific research at technical universities which cannot be carried out without adequate scientific support. We are sure that training of engineers and masters is to be conducted on the basis of modern scientific developments and should be oriented not at lectures-interpreters and promoters of scientific achievements but at lecturers-scientists whose own scientific studies are supported by creative contribution made by young students-researchers, and students themselves should be involved in up-to-date scientific developments as early as possible. In this connection especially, if one would like to take into consideration the experience of the western countries, the problem for Ukraine can be formulated very clearly – the bachelor general education level can be considered maximum only for higher technical schools with relatively “weak” developed scientific structure. At the same time developed institutions may use the right of training mostly engineers and masters.

Development of science at technical universities is also connected with post-graduate education when each specialist is once in 2-3 years to take four-six month retraining course. In future all facilities (financial, personnel, technical, etc.) of universities are to be distributed at a ratio of 3 to 1, that is, 75 % of educational facilities are to be directed at students' training and 25 % is to be aimed at improvement of qualification and re-training of specialists. In case such structures are established at technical universities we'll ensure transfer from the principle “Education for the whole life” to the principle “Education throughout the whole life”

4. The objectives to be reached in the sphere of methods of teaching have a wide range of tasks.. Here, in the first turn, we should mention the technology of knowledge transaction.

Unfortunately, till date in teaching a widely used method is so-called reproductive one, the content of which can be defined by one word – “repetition”. In other words, we often confuse the two different meanings, namely, education and teaching. Education in contrast with teaching is aimed at getting and

mastering “knowledge-tools” and creating on this basis the integral notion of the world, achieving all-round and integral thinking adequate to non-classical complexity of the existing world.

In many countries for a long time they have been using the constructive and innovative method the key of which can be the word “to create”. This system is especially favorable in technical education where the “knowledge” component is only a stage for realization of the “skills” component and where creation of the new is the goal of technical education which rules all tasks, stages and structures of teaching.

Here new possibilities for teachers and students will be opened with application of information and telecommunication technologies which are included in the global telecommunication networks and intellectual computer systems. Integration of such systems and networks even today forms the basis of the new infrastructure of the earth - infoshere.

One more problem of this block is creation of conditions required for students’ and specialists’ getting one more education not related to the first one.

Very typical examples of such “double” educational models for our country are : engineering and law; engineering and economy; engineering and foreign languages, etc.

And at last one more point. Technical education always tries to take the advantage of using the material basis of teaching process, namely, modern laboratories, exactness and acceptability of teaching means. And, unfortunately, at technical schools less attention (if none at all) is paid to pedagogical science.

By underestimating it we weaken teaching process, do not use its psychological aspects to the full extent. I would like to conclude these considerations optimistically with a belief in tremendous achievements of world technical higher school, its adequacy to the modern level of science and technology and also their orientation at the technologies and needs of the third millenium.