

Innovation Technologies in Engineering Education

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ABSTRACT: *Under the conditions of globalization and high technologies hasty development, obtaining knowledge is crucial. If Ukraine doesn't create proper conditions to obtain knowledge, there will be the outflow of promising young people to virtual educational networks of other countries. The problem gains the national importance. Thus new educational strategies and tactics are necessary. One of the most modern forms of obtaining knowledge based on the best forms of training and related to the modern technologies application is distant learning.*

That is why some leading educational establishments of Ukraine which have some experience in distant learning as well as some establishments which are the distant learning software designers have established the science and production complex The Distant Learning Academy aimed to train public sector employees and administrators of public and private companies.

1 INTRODUCTION

Flexibility, international mobility, quick adaptation to new market requirements, application of alternative models to transfer knowledge are vivid criteria of successful operation of any educational establishment. For many world countries these global processes are signals to develop new educational strategies and search for a new tactics which take into account the informational civilization continuous changes. The leading countries have transformed the educational processes and developed strategic educational programmes. New educational technologies are being introduced into the Ukrainian universities including Donetsk National Technical University. The distance learning should be mentioned separately. It is one of the most modern forms of obtaining knowledge which is based on the best forms of training and is very promising as is related to the modern technologies application.

Modern informational and technical revolutions which are taking place in many countries of the world demonstrate the necessity of searching of new approach to the training specialists for all branches of national economies. The pace of science and technical progress requires the ability to be adapted to quick changes of technology generations and renew professional knowledge and competence within a short period of time.

The training system which meets these requirements should take into account innovation technologies providing the corresponding level of the students mobility as to the professional knowledge and necessary skills obtaining. This issue is one of the most important for the universities development and is reflected in the UNESCO programme Education for the XXI Century. It is the so called reply on movement of many world countries towards the informational community. The programme signalizes the change of the concept "one education for the whole life" for the concept "continuous education".

Thus the trends of social and economic development of the countries force to be creative in search and improve educational systems, introduce new technologies as to the continuous education.

With the appearance of the Internet a new trend in education – distance learning- based on computer and telecommunication technologies came into existence.

A number of Ukrainian educational establishments and research institutions, Donetsk National Technical University being among them, has certain experience in implementation of the distance learning. These establishments deal with technical provision of a distance network, development of methodical aspects of distance learning courses, arrangement of the distant learning classes and solve both theoretical and practical problems related to the implementation of the distant learning to the training process.

If Ukraine doesn't create proper conditions to obtain knowledge, there will be the outflow of promising young people to virtual educational networks of other countries. The problem gains the national importance.

That is why some leading educational establishments of Ukraine which have some experience in distant learning as well as some establishments which are the distant learning software designers have established the science and production complex The Distant Learning Academy aimed to train public sector employees and administrators of public and private companies. The training is based on modern informational and educational technologies and implementation of modern strategy of efficient training of specialists for the market infrastructure.

Within the frameworks of the Complex Donetsk National Technical University has established The Distant Learning Centre. The aim of the Centre is to fulfil the strategy tasks put forward by the President of the Ukraine and the Cabinet of Ministers as to training specialists in the field of administration and manufacturing. These tasks are as follows:

To develop distance learning at DonNTU;

To organize and systematize research on distant learning;

To train teachers and technicians for distant learning;

To develop methodology for the distant learning;

The establishment of the Centre stipulates for

the development of three trends in creation of the infrastructure of the university of the new type. It will make it possible to have the efficient distant learning system with the full cycle of organizational and methodological provision within the university and technological support of necessary informational flows between teachers and students;

efficient and economical training of students and postgraduate students, retraining of public sector employees, managers, academics teaching on market structures on the basis of distant learning. For this the best national and foreign specialists should be attracted;

joint with leading national and foreign specialists work on implementation of informational technologies, development and application the training material in distant format.

The first trend in the Centre's operation is the access to the world informational resources made with the help of the Educational Complex which is included to the educational network of the World Bank global development. The latest communication facilities will connect the Centre with the analogous bodies all over the world including the World Bank Institute. It'll make it possible to have electronic versions of courses, seminars, discussions, and database of different global sources linked through the interactive video, computer classes, the Internet facilities and satellite channels.

The second trend is related to the creation of the inter-university informational and educational network based on high technologies. It will be a joint with the leading producers of telecommunication facilities work. The network is to provide telecommunication and informational service to the great number of potential exterritorial users, popularizing of the distant learning.

The third trend is to develop methodology and write text-books on distant learning which will provide high level service to students, postgraduates and all levels of the population. The best specialists of the Complex are supposed to be attracted to the process.

The new distant learning system Prometheus 4.0 was created within the frameworks of the operation of the Centre. It is aimed to organize the distant learning process and test the knowledge of great number of students. Its components are the training organization and control. The system allows to train and check the knowledge within the corporate networks and Internet. Besides, it can be used as extra facility for traditional forms of training.

The automated functions implemented in the system are as follows:

Training control;

Allocation of the access rights to the educational resources and the system control;

The educational process participants interaction delimitation;

Making records as to the training complex users activity;

Training and knowledge testing within the Internet, corporate and local networks.

The Prometheus system solves the following problems:

Tests knowledge within the Internet, corporate, and local networks;

Organizes training with different level of correspondence to the classic model of university education. Some stages of training and model's elements can be inactivated;

Creates distributed educational network

You can get yourself acquainted with the Prometheus demo version at

<http://prometey.donntu>.

The concept of training of Masters and Bachelors is another trend of introducing of new technologies. It is implemented with the help of foreign universities-partners on the basis of the German Engineering Faculty established in 1992.

Bachelors training programme

It presupposes

general engineering training;

intercultural training;

special training;

expanded fundamental training

2 MASTERS TRAINING PROGRAMME

The skills to work in groups and make complex decisions as to creation of modern technologies and technological complexes are of great importance. Thus Masters training programme should not be limited by professional training only.

The aim of the programme is to give fundamental knowledge on the students research area. Two ways of development are possible:

for the universities oriented on industry the Master of Engineering programme is implemented. It takes into account the transition to more fundamental training. The Masters are successful as to operating on the existing equipment and its modernizing;

for the universities oriented on fundamental knowledge the Master programmes train future researchers. The graduates work in research centres, technoparks, research institutions etc. They are trained in accordance with the module system. The curricula are made up of independent modules covering a certain sphere of activity. It's easy within the system to combine training of Masters of Science and Masters in accordance with the speciality. The faculty teachers can easily differentiate between the students who are good at practical activity and those who are good at the theoretical one. It can be done due to a certain set of modules even at the initial stage of training and especially during the training on Masters programmes. The staff should find out the students' skills which will help them in their future professional activity.

Masters training on the speciality Electrical and Mechanical Automation Systems and Electric Drive is an example of such work. Its joint with the Institute of Power Engineering of Magdeburg Otto von Guericke University training. The theoretical students' training is made not by the department but by the faculty. Some characteristics of Masters training are taking into account at the expense of some modules and the choice of Master diploma work's theme.

As it is within the department's interest to have Masters who make research the new approach in organization of the students' work is needed. The working place of the students should be equipped with modern technique and its components which will allow students to spend all day at the department, have more frequent working contacts with the supervisor, and gain the skills of working in a team. When training is over the students get Master diplomas of both Magdeburg University and Donetsk National Technical University.

3 PRACTICAL WORK

The scheme of practical training of engineers that got Master diplomas at the companies of Germany has been adopted. After the training young specialists come back to Donetsk and work at the Engineering Centre of the branch with 100% of investment called Siemens-Ukraine. One of the tasks of the Centre is to gain engineering assistance to foreign countries. The specialists working there deal with automation and application of modern design methods and technique. In two years they start working at the reconstruction of Ukrainian enterprises and use the automation systems of the Siemens company. So the University's graduates are trained in accordance with the European standards and have the experience of

working abroad. With such theoretical and practical experience the graduates of German Engineering Faculty start their professional activity being sure in their future.

4 RESEARCH COLLABORATION

The research in one sphere is proved to be the most efficient one. That is why the collaboration was coordinated in the following spheres:

- adapted discrete control in electrical mechanical systems;

- control systems with artificial intellect and robotic complexes;

- optimization of the modes of operation of the independent non-conventional power sources.

This makes it possible to expand research and attract Masters and postgraduates-partners.

Training of Doctors of Science with their further work as academics of German Engineering faculty is one of the aims of long-term collaboration. By this the prospect of further development of the faculty is provided and the traditions are kept.