

Integration into the Global Educational Process Through the Curriculum Renovation in SSAU

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Abstract: - The paper presents some positive results of the education reform in Russia, using Samara State Aerospace University (SSAU) as an example. It is also aimed at inviting universities of the world to collaborate in training highly qualified aviation engineers for the global marketplace. The renovation of the structure and content of higher education in SSAU is just the first step in integrating into the common educational area. This process requires time and effort. The article shows how the problem of keeping a traditionally high standard of teaching mathematics and science within the curriculum change is solved. Besides, it shows the benefits of cooperation between the University, research centres and industry. It is highlighted that international university collaboration can greatly influence the process of globalization in education.

Key-Words: - Educational reform, SSAU, Multi-tiered system of education, Applied Mechanics, Mathematics, International cooperation in education

1 Introduction

The paper touches upon the problem of globalization in education. It focuses on current changes in the Russian education system, and in training of engineers in Samara State Aerospace University (SSAU), in particular. SSAU is one of the leading universities in Russia; it has become one of the winners of the national project "Education" for the innovations that foster the implementation of the reform at tertiary level. The aim of the presentation is to show positive trends of the reform, and invite universities of the world to collaborate in training highly qualified specialists in the field.

Samara State Aerospace University, former Kuibyshev Aviation Institute, was founded in 1942 during World War II. The Soviet government and more than 30 aircraft factories were evacuated to the city of Kuibyshev on the Volga. It took a very short time to set the production of the low-flying attack aircraft *Ilyushin-2* going. The army badly needed this most popular and effective aircraft. To the success of its production, skilled engineers were required for the factories, and these engineers were trained in the Institute. After the war, Kuibyshev, known as Samara now, became a big and powerful centre manufacturing aircraft, aviation and rocket engines; developing plane and space technology. Among the major breakthroughs of the aviation industry are a strategic bomber *Tupolyev-95*

equipped with an engine *NK-12*, a carrier rocket *Soyuz*, an aerospace system *Energia-Buran*, the analogue of the *Shuttle*, a jet engine *NK-38* which is now used in American launch vehicles, just to name a few. All this sophisticated state-of-the-art machinery was created with the direct assistance of the scientists of Kuibyshev Aviation Institute.

Now the teaching staff of the university makes up 150 distinguished professors and more than 500 associate professors. About 12000 students are enrolled in 54 departments of SSAU. It awards diploma in 35 specialties. It is a well-equipped educational and scientific centre, with modern labs and lecture halls, a media centre, a museum, which stays on top of educational initiatives and market needs. Taking into consideration the best practices in education of different countries, SSAU is trying to find its own way of reforming the higher education (HE). According to the "Concept for Modernization of Russian Education Until 2010" [1], the main aims of the reform are:

- to renovate the structure and content of education
- to provide a high standard of education
- to ensure continuity of general and professional education for life-long learning.

While carrying out the reform, SSAU was one of the first universities that started the

transition from a one-tiered to multi-tiered HE system. This curriculum change is along the lines of the Bologna Process, ‘an intergovernmental initiative which aims to create a European Higher Education Area (EHEA) by 2010’ [2]. The university sets an ambitious aim to be one of the leaders in education in the field of aviation engineering and fundamental studies capable of preparing specialists for the global marketplace. However, the process of integrating into a common educational environment seems to be developing not as efficiently as we expected it to be due to some objective factors.

2 Problem Formulation

Establishing a common structure of HE systems across Europe and elaborating national frameworks for qualifications compatible with the overarching framework for qualifications in the EHEA requires time and effort from all the countries-participants of the Bologna Process. For Russia this process is especially complicated as the multi-tiered system differs very much from a conventional Russian HE system. The innovations involve the accreditation and introduction of Bachelor’s and Master’s programmes; incorporation credit system instead of traditional course hours; developing a new system of quality assurance and assessment: testing instead of traditional oral examination; ensuring academic mobility of students and staff, etc.

The problems SSAU is facing now concern: firstly, keeping a traditionally high standard of teaching mathematics and science within the curriculum change and reduction of academic hours allotted to these subjects, and, at the same time, designing a more flexible curriculum in order to meet the ever-changing demands of the real world; and secondly, making international university cooperation more effective and efficient for the benefit of students from partner institutions.

3 Problem Solution

Russia is undergoing a dynamic change not only politically, economically and industrially. Moreover, the citizens’ perception of the world is drastically changing. The world is becoming smaller, more global. The international character of educational services provided by different institutions takes on special significance. The administration and

teaching staff of SSAU try to take these changes into consideration to improve the quality of specialist preparation.

The rapid development of aviation and aerospace technology in Russia called for the organization of new departments of Applied Mathematics, Mechanics, Information Studies and Physics in SSAU. All these specialties focused on natural science are based on a carefully chosen and well thought-out set of mathematics-oriented disciplines. It is appropriate to quote here the words of a famous philosopher Immanuel Kant, “In any particular theory, there is only as much real science as there is mathematics”. A special emphasis on Mathematics accounts for the fact that any engineering development needs to be preceded by an in-depth analysis and precise calculation. The progress of any field of knowledge largely depends on how much it gained from mathematics, physics and information technologies in terms of methods and approaches. The integration of these disciplines on the curriculum allowed students to get better results at the examinations. In support of the fact, we can name such achievements as winning all-Russia subject Olympiads in Mathematics and Theoretical Mechanics (A. Melnikov, Ye. Kurkin, V.Serov), and a specialized contest in Aviation Design and Energy Plants (N.Peleshko, Ye.Malkina, N.Smykina, A.Yefimov, Ye. Pomanova); and generous grants awarded to students from such companies as *Boeing* and *ALCO* (given to A. Vitchenko and M. Serebryannikov).

The students have quickly estimated the advantages of fundamental training at its true worth. Student enrolments at the University for Mechanics, Physics, Mathematics and Information studies have increased steadily in recent years. These natural science disciplines serve as a basis for classical engineering training as they provide for mobility in further education. Having acquired a profession in exact sciences, it is easier to get vocational training in the engineering sphere of activity. The industry now demands for highly skilled professionals with both fundamental and particularly specialized knowledge.

In order to meet this challenge, SSAU has implemented three HE degrees: Bachelor (for a period of no less than 4 years), Specialist (5 years) and Master (6 years) in accordance with the RF Federal Law “On Higher and Postgraduate Professional Education (no. 125-FZ of 22 August 1996). Now SSAU offers 28 accredited programmes of the three-tiered cycle.

During 7 years we have been training Bachelors and Masters in the areas of Applied Mathematics and Informatics; Mechanics, and Applied Mathematics and Physics. The work is being done to expand the list of Master programmes. Under this system of HE students got an opportunity to choose and change a particular field of study. The offered options are important as they will enable them to realize their potential and interests. The flexibility of structure and reinforcement of individual student's work increases the learner's responsibility for their learning path. Consequently, they will feel more confident at their workplaces.

Another challenge of the modern world we have to take into consideration is the fact that students juggle their studies on Master programmes with their jobs. To ensure the continuity of education and guarantee highly-paid jobs on the market, SSAU has negotiated contracts of employment with several research centres of the Russian Academy of Science, including Central Design Office "Progress," that let the students perfect themselves in the chosen sphere and do research under the supervision of SSAU professors.

SSAU is proud of its scientific school which has a long history. Such professors as V.A.Soyfer, F.V.Grechnikov, V.P.Shorin V.S.Aslanov, V.A.Barvinok and others are well known in the world. The professors are not only engaged in research and teaching students, but are also the authors of various patented technologies. They supervise the research conducted together with the Russian National Centre of Space Flight Operational Control, The European Space Agency and others. The SSAU graduation school has trained a lot of promising researchers and designers. Among them, for instance, is associate professor A.Doroshin whose research into the dynamics of coaxial bodies in space systems is sponsored by a special grant of the President of the Russian Federation. Moreover, SSAU students and teachers presented various designs, including a new aircraft constructed in the SSAU design laboratory under the guidance of Professor V.M.Shakhmistov, at the Moscow International Aviation Salon this year.

We consider it a good practice to invite noted scientists and visiting professors to deliver lectures, to annually arrange professors' and students' scientific conferences where talented researchers have a chance to share the results of their investigations. The example of such experience is a workshop on aviation engineering when SSAU was playing host to

EWAVE in 2007. Presenters from 11 foreign countries took part in this event.

Joint students' and professors' research together with the ESA (European Space Agency) has resulted in a brilliant accomplishment, YES2 (Young Engineers' Satellite 2) project. The teams from all over Europe have constructed a satellite planned to be launched in September, 2007, in the Baikanur Cosmodrome [3]. Students and teachers of SSAU took an active part in the project realization.

Russia is getting more and more open to international contacts and cooperation. Samara is a striking example of such change: once it was closed for foreigners. At present, only in SSAU 115 students from different countries are getting HE. Our international collaboration is not limited to providing educational services to students from other countries. The teaching staff participate in the international scientific conferences, and various professional events, for example, aircraft exhibition in Le Bourgé. Besides, many professors have publications in international journals like *Cosmic Research*, *ELSEVIER Journal of Applied Mathematics and Mechanics*, *Mechanics of Solids* and others. However, we are not quite satisfied with the present-day situation in the sphere of cross-cultural contacts. The globalization of science and economy, world integration of business structures make for closer integration of educational institutions especially at tertiary level. We would very much like to extend and intensify the cooperation with different universities and colleges for the benefit of educating a new generation of students who should be capable of functioning efficiently and creatively to live together peacefully on our small planet.

Committed itself to the development of cross-cultural relations and internalization of programmes, SSAU is seeking partner universities. There are several possible spheres of cooperation: implementation of joint curricula and issuing dual diplomas in the field of Applied Mechanics, for example; student and professor exchange, joint research projects, etc. We are open to negotiations and other ideas as well. We try to stick to a practical approach in education and relate classroom theory to professional skills.

To get rid of the language barrier, we have started a new project aimed at increasing the English language level of proficiency of the faculty. First, teachers of English upgraded their expertise having taken a teacher development

course in ESP “RESPONSE” launched under the auspices of the British Council, Moscow, the RF Ministry of Education, and the Open Society Institute [4]. It received a positive feedback from the participants of the workshops and encouraged curriculum change and materials design. Then various courses of English were offered to the teachers of the specialist knowledge. This experiment is still in progress, but the first results proved to be quite successful. Students, too, have got an access to different types of courses where English is a medium of instruction.

There’s no doubt that upgrading faculty will greatly contribute to the success of the educational reform as these are the teachers who always stay in the front line of all initiatives and innovations. Without improving quality of education it is impossible to solve vital problems of the modern world. For instance, such burning issues as climate change, energy safety, or the Mars exploration and establishing an international space station, can’t be approached by only one or a few countries. These definitely global problems can be handled by the *world* community which requires joint efforts of all the

countries. And educators from different countries can assist in these endeavors.

4 Conclusion

To sum it up, the papers presents just a few positive attempts of Samara State Aerospace University in renovating the structure and content of engineering education which is aimed to develop flexible and lifelong learning routes for students and ensure their employment. The advantages of a multi-tiered system and benefits of close cooperation with industry and research centres are shown. Special emphasis is placed on extending collaborative projects with other universities which will allow a smooth transition from closed educational systems to a global environment in education. Fruitful, mutually beneficial cooperation and joint efforts of educators of the world can have a great impact on training highly qualified professionals capable of anticipating and solving the complicated problems of the international marketplace and meeting the challenges of the 21st century.

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