

INTERNAL UNIVERSITY MOBILITY PROGRAM "SELF-LEARNING UNIVERSITY" AS ONE OF SUCCESSFUL MECHANISMS OF INTRODUCING CDIO STANDARDS IN ASTRAKHAN STATE UNIVERSITY

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ABSTRACT

In this paper the structure, methods, action mechanisms and requirements of the internal university mobility program "Self-Learning University" have been studied in compliance with the implementation of CDIO standards in Astrakhan State University.

The program has been introduced in order to help faculty member and students better integrate themselves into the context of Conceiving — Designing — Implementing — Operating real-world systems and products. Enhancement of Faculty CDIO Skills (Standards 9) and Enhancement of Faculty Teaching Skills (Standards 10) is being put in practice in the form of the specific faculty and student developing program within the frameworks of which they can study the subjects they need either in order to implement a CDIO project (students) or to acquire new teaching skills (faculty). All this promotes international character of education in Astrakhan State University and helps students and faculty participate in exchange programs and joint PhD programs with foreign partner universities as well as participate in internships, traineeships and placements in business and industrial settings.

Statistics and practical results show that it also helps raise the faculty responsibility level and quality of classes in groups with guest students. Full-time students in the groups where guest students studied have become more motivated.

The aspiration of the faculty and students to join the "Self-Learning University" program is a reason to keep on developing the program, which helps to easier introduce CDIO standards in Astrakhan State University.

KEYWORDS

The internal university mobility, faculty and student developing program "Self-Learning University", enhancing faculty members and students' competence, implementation of CDIO standards in Astrakhan State University.

OBJECTIVES

1. The Internal university mobility program "Self-Learning University" has been worked out in order to widen the context for engineering education; the project involves both students and trainers,

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and also the administrative staff and is aimed at raising their motivation levels and better integrating them into the context of Conceiving — Designing — Implementing — Operating real-world systems and products. The program takes into account the characteristic aspects of a regional Russian university.

2. The action mechanisms of the internal university mobility program "Self-Learning University" have been studied in compliance with the implementation of CDIO standards in Astrakhan State University

3. The experience of enhancing faculty members and students' competence in personal, interpersonal, and product and system building skills has been shown; this experience gained via participating in the mobility program "Self-Learning University" has been used to participate in international partnerships (exchange programs, joint PhD programs) as well as to successfully implement design-build projects both in the university or in business and industrial settings.

INTRODUCTION

When it has become clear that the classical educating tools which have been used for many years in Russian universities to train engineers in different areas do not work properly; that the curricula are often too narrow and do not give the aspiring would-be engineers everything they want; that some of the trainers have already forgotten what it is to be a practicing engineer - we have come up with the idea to combine good training technologies of our university with the system of life-long learning/professional development in the way it functions at most successful companies worldwide, and with the principles of lean production [1] and Bologna system in order to introduce CDIO standards [2] at Astrakhan State University (ASU).

The modern education can only be efficient if it is integral, giving various possibilities and using methods of different systems of knowledge. It is the basic idea of the Internal University Mobility Program "Self-Learning University" [3] which we developed in order to comply with the most modern and practically necessary professional standard which is expected of students when they graduate and start working and at the same time to preserve the traditions of a classical university as existing for centuries.

BRIEF OF PREVIOUS WORK

The table below illustrates the basic components of the program.

The *guest student* is:

- a) a faculty member or a university staff member who study in normal student groups to acquire new teaching skills/new competencies;
- b) a student studying extra-curricular subjects he or she needs in order to implement a CDIO project.

Later we will show some organizational peculiarities and "bottle necks", which we have experienced when implementing the project.

Table 1. The Internal university mobility program "Self-Learning University"

BASIS OF THE PROGRAM	Bologna Process	Principles of lean production	Introduction/implementation of CDIO standards in Astrakhan State University

SUB-PROGRAMS	<i>Faculty developing program</i>		<i>Student developing program</i>
PARTICIPANTS	Trainers of the groups where guest students studied	Trainers enrolling for a semester and studying in real student groups becoming “students” of a certain field to acquire new teaching skills	Students studying extra-curricular subjects they need in order to implement a CDIO project/ Full-time students in the groups where guest students study
MECHANISMS	<p>The choice of a course to study for a semester (from a list of 137 courses)</p> <p>Studying of guest students in real student groups (not more than 3 “guest-students” per group)</p> <p>Taking exams together with other students</p>		<p>The choice of a course to study for a semester (from a list of 137 courses)</p> <p>Studying of guest students in student groups (not more than 3 “guest-students” per group)</p> <p>Taking exams together with other students</p> <p>Internship/placement at different university divisions and offices (1-3 trainees per a division)</p>
OUTCOMES	<p>Rising the faculty responsibility level and quality of classes in groups with guest students</p> <p>Rising the motivation level of full-time students in the groups where guest students studied</p> <p>Acquiring new skills and knowledge by “students-faculty” who were in the very center of the study process</p>		
FINAL RESULT	<p>Consolidated university community, self-learning and developing in the united way</p> <p>Rise in the ASU corporate culture</p> <p>Rise of ASU competitiveness</p>		

Organizational peculiarities

The “Self-Learning University” program goal is to integrate engineering and non-engineering educational technologies with the system of lifelong learning in accordance with the principles of lean production and Bologna system in order to introduce CDIO standards at Astrakhan State University (ASU).

As Table 1 shows, the program offers several possibilities for both faculty and students. In order to upgrade one’s skills or to obtain new competences teachers can enroll for a semester and study in real student groups becoming “students” of a certain field but not stopping to teach their classes.

Mechanisms of the program make it simple: choose a course – study for a semester – pass an exam – get a number of ECTS credits – and go on with newly-acquired skills.

The objectives of the Internal university mobility program "Self-Learning University" are the following – it has been worked out in order to widen the context for engineering education the project involves both students and trainers, and also the administrative staff and is aimed at raising their motivation levels and better integrating them into the context of Conceiving — Designing — Implementing — Operating real-world systems and products.

The program takes into account the characteristic aspects of a regional Russian university. In our case – it is a university as an integral part of several regional clusters, closely connected to companies, corporations, service providers; a university responsible for the formation of the unique general regional competency; an institution, on the one hand, realizing the regional model of training professionals basing on joint efforts of the local companies and the university, and on the other hand, aiming at achieving internationally recognized standards and following best international practices in its activity.

These characteristics were taken into account both when choosing the courses to be included into the program; and when motivating participants, helping them understand what they need and why they need it.

Students can also enroll for internships and placements within the framework of the program – this option has been added a year after the launch of the program when we monitored the first results, offering the participants to fill in a questionnaire and propose modifications and changes to make the process more optimized, to better answer the needs and demands of the potential participants.

RESULTS

The programs results are:

- rising the faculty responsibility level and quality of classes in groups with guest students. rising the motivation level of full-time students in the groups where guest students studied
- Acquiring new skills and knowledge by "students-faculty" who were in the very center of the study process [3].

More options

One more option for students who choose to take part in the "Self-Learning University" program is to write a thesis (bachelor or master) on various aspects of how to optimize the functions of a university division or office; or it can be just a project on a chosen case - say, how to make a piece of equipment used in class work more efficiently. All this will develop their

creative abilities and make them feel real context of engineers' work better - as they see the real things in a real environment and can contribute to making their university better.

Thus we also hope to make our university community even more consolidated and motivated; self-learning and developing in the united way, in the united learning environment. All this is positively influencing the level of corporate culture at the university and promoting the competitiveness of ASU.

The launch of the "Self-Learning University" program

How did it all develop when the university decided to launch the "Self-Learning University" program with the aim to better coincide with the CDIO standards and give students and teachers new horizons of professional development? What did it take to start?

It was not difficult: the program moderators (Mikhail Egorov and Olga Egorova) proposed to departments to draw up the lists of subjects/courses to be included into the general list. It should be not less than 5 subjects per department. As a rule, these are basic and specialized courses that are delivered by quite experienced teachers who can interact with students, work in projects, use multimedia technologies and - not less important - who are ready not only to have extra, guest students from other divisions, but also other type of guest students who are their peers, trainers and administrative staff of the university who need skills in that definite area.

Some rules and figures

It has been decided that no more than 3 guest students are allowed to join a group; otherwise it could negatively influence personal participation of every student, guest or full-time. At that time, a special division of our university, the School of Life-Long Professional Education has joined the team of the program in order to help organizing paper work and documents issuance. It has been agreed that a guest student can receive a certificate after the successful completion of the course and after he/she passes the exam - but only in case the course is 2 credits or more.

Most of the departments have gladly came forward with their proposals to join this initiative and as a result we had the whole list of courses to start the first, experimental "run" - and these were 137 courses which any trainer/administrative staff could choose to study. To do it, he or she was to fill in the application form and, being approved, officially started the course. The first intake was only 23 people, all motivated, of different age and different positions, they decided that they would become students for a semester and acquire skills they lacked. They knew they had to fulfil all the same requirements as normal students do. The project from the very start was and still is absolutely voluntary, which is very important to comply with the necessary, but not easy to implement principle - "the initiative from the employee to the employer".

The statistics shows that most of volunteers coming from technical and engineering departments choose courses in different foreign languages, economics and law, which in our opinion is a good sign – they feel they need to look into best international practices; they consider marketing their ideas, research products and pre-production models and they want to know more about legal and financial issues connected to it.

As for those with the background in humanities – they, vice versa, tend to acquire knowledge in engineering; for instance, some translation trainers chose to attend courses in welding technologies, bioengineering and oil and gas production in order (as they put it) to become more competent in the subjects they teach (technical translation).

There is one more important condition - we should not forget about the everyday commitments performed by those who are to become "guest students"; they still should be efficiently carrying on with what is expected of them by the university - classes, office duties etc.

These can't be transferred to someone else or not delivered at all. "Guest students" can only attend chosen classes provided that these classes do not coincide in time with their own classes and do not prevent them from doing everything required from them. The experience shows that the compromise can always be found: choose a different group, a similar course, another trainer etc. And they do not study as guest students more than 2 or 4 academic hours per week.

Monitoring experience: bottle necks

At the same time as the program started operating, the monitoring of its implementation was started too. Only this way it was possible to quickly balance any deviations as well as resolve conflicts, and promptly respond to criticism both from guest students/full time students and from trainers - which means from all the process participants. It could happen of course that a trainer teaching welding technologies chose to become a guest student in a group of full-time students studying technical English, and considering himself almost professional, he didn't want to realize that he actually needed another level group, no as advanced as he thought he would manage. Or another trainer from the department of physics choosing a course in intercultural communication was communicating so much during the classes that the other students complained he was suppressing them.

Of course there also appeared some technical and administrative problems - such as:

- the necessity of modifying the application form (a more detailed section on contact and personal information and a special section where an applicant explains his or her motives, why he needs to be enrolled for this or that course
- the relevance of holding coordination meetings calling together all the project participants and moderators to better explain the aim of the whole program and to discuss the definite goals of each guest student; as well as to better define the forms of controlling their studies, their behavior as the new member of the already formed group; to answer questions of the trainers who are having guest students for a semester. These meetings are necessary before the studies start and also in the mid-semester and (if need is) before the exams.
- it was found that some elder guest students ("ex cathedra", showing off their experience or just certain character traits) are too actively intruding into the process, into the course of the lesson, comment on the quality of projects prepared at home, distract and dispute when not needed with students and a trainer etc. Such situations can only be solved by offering this guest student, who is causing problems and making all of the rest uncomfortable, to try changing the group and the trainer so that maybe with other people the situation would change. If this doesn't help, it means the guest student is not psychologically ready to be back in the role of a student.

Apart from this, we faced no more specific challenges in setting up and running the program. As the program is voluntary, if a person expressed any resistance or worries about his or her participation in the "Self-Learning University", the organizers didn't put any pressure on them, just giving them all the information about the possibilities of participation, the aims it could help to achieve and the experience it could get them acquire.

The positive response of students

We should note that the full-time students mostly very positively responded to changing the customary context of their studies - the situation that there were new and unusual students in their midst. They were not embarrassed by the age difference and the fact that actually their guest students were already teachers themselves. As a rule, during the second or third lesson the distinctions were eliminated and the whole group worked as a united team. Which shows

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once again general high level of students' adaptability to changing the rules and inclusion possibilities for students of various types motivated to acquire skills and knowledge they need for future career development and professional growth.

Half a year after the program for faculty was launched, we added the possibility for students to use the same system of professional development and skill-adding. One more half a year later, as it was mentioned above, the option to get internships and placements at the university within the framework of the program was added.

The sub-program for students helps to easier implement Standard 3 which says - "Disciplinary subjects are mutually supporting when they make explicit connections among related and supporting content and learning outcomes" and "the integration of CDIO skills and multidisciplinary connections are to be made, for example, by mapping CDIO learning outcomes to courses and co-curricular activities that make up the curriculum" [4].

In a good university there are quite a lot of students motivated to become more competitive on the job market; and they need individual trajectories of study if they aspire to develop into "second to none" engineers. So the development of the inside, inter-university mobility gives those students all the opportunities they need to train themselves into innovative professionals who independently choose what they add to the basics, who are flexible and internationally oriented, not forgetting about the main clusters of the regional economy.

A way forward for the faculty

In their turn faculty need the inside, internal mobility badly too, because for most of them it will be the only possibility to "overcome" themselves and change the social role with the aim of becoming closer to what they talk about during the long theoretical lectures and rethinking that part of engineering education which they are in charge of. Unfortunately not all professors can be practicing engineers; but all can become students for a short period of time and realize how much students need practice and not theory from their trainers.

Every semester we have between 40 and 65 guest students (15-25 faculty and 25-40 students) - altogether around 300 people have participated in the program so far.

How does the internal mobility program promote international character of education

It is very important that our internal mobility program promotes international character of education in Astrakhan State University and helps students and faculty participate in exchange programs and joint PhD programs with foreign partner universities as well as participate in internships, traineeships and placements in business and industrial settings. A concrete example could be joint research doctorates with one of our important partners – Ca'Foscari University of Venice. When we prepared to launch joint PhDs (in biotechnology, chemistry, environmental protection), we realized the urgent necessity not only to help future PhD students master foreign languages, but also to give them a chance to study a whole range of subjects they needed to comply with the demands of the partner university (they didn't have some courses in their initial training; but needed the expertise). It is a specific example of a general situation – at most of the departments there are joint degree or exchange programs with foreign partners; in order to participate in them the faculty needed either to learn foreign languages (Western as well as Eastern) or to gain competence in a definite area because the curricula are often different. The same methods apply when a person needs to prepare him or herself for an internship at an enterprise.

This international approach is a good way to motivate faculty to develop and study continuously – internal mobility helps to better integrate in external policies.

CONCLUSION

Now all the three sub-programs are operating to a full extent. After each semester all the participants (trainers, guest students and full-time students) are being questioned anonymously to adjust the structure and methods in terms of the problems and faults detected. These surveys are not aimed at defining any generalized problems (because the mechanisms of the program are well characterized), but to see the development of every specific trilateral interaction.

All the qualitative and quantitative indexes of every stage of the program – such as the number of participants, the updated list of courses, the frequency or the continuous character of the program, possibilities of commercial participation etc. are the joint decision of the university authorities.

The program is being promoted and advertised among the potential participants – there are video clips, interviews with the program participants, discussions in social media etc.

The experience of enhancing faculty members and students' competence in personal, interpersonal, and product and system building skills has been so far successful and the aspiration of the faculty and students to join the "Self-Learning University" program is a reason to keep on developing the program, which helps to easier introduce and implement CDIO standards in Astrakhan State University.

If we try to phrase the main strategic goal of a modern Russian university which has engineer-training programs – it would be very simple: training of competitive successful graduates of various areas of expertise who would speak foreign languages and would realize the relevance of flexible development of their careers being able to analyze the market requirements and demands.

We all understand that it is not the university that sets up the challenge, but industries looking for such young professionals, the sooner the better. So we should never forget that in order to meet the demands, a university should be an entrepreneurial one [5] and the "Self-Learning University" mobility program helps a lot.

Training would-be engineers the university in fact is executing an order of an employer, real or prospective, and that is why we should be helped to remember that our students need real-life learning in industrial settings from the very start of their studies; they should be production-oriented, in the broad sense of the word – even their own university can be an industry. And again in this context the "Self-Learning University" program helps.

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BIOGRAPHICAL INFORMATION

Mikhail Egorov is Full Professor of Biotechnology, Head of Biotechnology and Bioengineering Laboratory and Director of the Department of Biotechnology and Biological Ecology at Astrakhan State University. He is a Member of the American Chemical Society. He collaborates actively with universities in Europe (Italy, Belgium, Switzerland) on topics related to curriculum development and the improvement of teaching engineers and assessing quality of teaching. His current scholarly activities focus on the advancement of bioengineering education in Russia and developing new biotechnological phytopreparations and biodegradable detergents. He is also involved in researching mechanisms and properties of brassinosteroids. He is a research and development adviser of 2 small innovative enterprises, a supervisor of a joint research doctorate program with the University of Venice. Publications include 2 monographs and more than 130 papers in national and international journals.

Olga Egorova is Full Professor of languages, Member of FIT Training Committee, Head of the Astrakhan Regional Office of the Union of Translators and Interpreters of Russia. She is Director of the Institute of Language and Professional Communication which is providing training of communication skills in the context of CDIO at ASU. She is also Director of the Centre for Translation Studies and Conference Interpreting of Astrakhan State University, Russia. She is a practicing interpreter and translator, has extensive experience in translating-interpreting work and lecturing in the European Union and Asia. Her current research focuses on curriculum development methodology and ways to adjust the curricula with mutually supporting disciplinary subjects into Russian and Central Asian universities. She is a research and development adviser of 2 small innovative enterprises, a supervisor of a joint research doctorate program with the University of Venice. She is also the director of the MA program in conference interpretation supervised by the European Commission and the European Parliament. Publications include 2 monographs, a textbook and more than 90 papers in national and international journals.

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