

## EVALUATION OF STUDY PROCESS IN STUDY PROGRAM “AGRICULTURAL ENERGETICS” AT FACULTY OF ENGINEERING

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**Abstract.** The main purpose of the professional study program Agricultural Energetics at the Latvia University of Agriculture, Faculty of Engineering is to prepare the specialists in electric power and heat energetics for small agricultural enterprises. The situation in the energy field of the country is changing, and the study program has to consider these changes. The evaluation of the program was performed by Latvian and foreign experts and also the self assessment was worked out. Also questionnaires of the students, graduates and employers and the SWOT analysis were carried out. During these processes some problems and strengths of the program were cleared out as well as several conclusions were worked out. The possibilities of the program development are defined.

**Key words:** education, evaluation, study program, engineer, agricultural energetics.

### Introduction

The long-term conceptual document "Latvian development model: Man in the first place" defines people's knowledge and wisdom as the basic resource of the state development [1]. Good education has great importance to form a career. Demands grow on people, who are flexible, able to develop, may adapt to variable conditions of environment and promote their level of knowledge.

As pointed in the Conception of the educational development 2007 – 2013 [2] the number of students in Latvia in the field of nature sciences, engineering and technologies is not sufficient. Comparing this with the average results in the EU, only 5.2 % of all students in Latvia were studying nature sciences and mathematics, but in the EU the average was 11.8 % in 2004.

In 2004 only 1.2 % of the Latvian higher education establishment graduates are unemployed (in the EU average 6 – 7 %) [4] That proves the assurance, that education is such a human activity sphere, which straightly affects the life quality and it is considered as a process and a tool of personality development. Better education gives better opportunities to find a job; more educated people are able to use their skills and potentialities more efficiently to administer progression of their lives. It has been stated that people with higher education level in majority states of the European Union (EU) are more pleased with life [3].

The situation in the energy field all the time is changing and the professional bachelor study program Agricultural Energetics must consider the changes in education positions and trends in the EU as well as the changes in the labour market in the sphere of energy in Latvia. The main aims of the program are:

- to provide energy production, energy supply and energy utilization (energy infrastructure related) companies in small towns and rural areas with knowledgeable and skilled specialists in electric power and heat energy applications, trained using a practically applicable professional study program;
- according to the economic needs and requests stated by the Latvian state, to prepare competent engineers, who have extensive knowledge of agriculture product production and processing, who can offer solutions for rational energy use and latest technologies application related to energy production, supply and utilization, and who can work as qualified managers and engineers in private, state and municipal organizations in the positions related to energy production, supply and utilization;
- to promote balanced development of rural areas through preparing highly educated young people – high-culture people – professionals, specialists satisfying the requirements of the power engineering working career, who could return to live in the region of the origin after graduation, to work in important and prestigious positions in the energy sector.

Training of specialists in the frame of the program corresponds to the Zemgale planning region development programme 2008 – 2014 [4].

Priority 1: “Educated, Creative and Competitive Individual”:

- facilitated improvement of the education quality at all stages of education for the way forward to a high level of individual competences and development of creative thinking;
- to facilitate preparation of manpower that meets the requirements of the labour market.

Priority 2 “Development of Knowledge in Economy”:

- to facilitate interrelation among education, research and entrepreneurship.

Priority 3 “High Quality Living Environment”:

- to facilitate increase of energy efficiency in heat supply company systems, residential houses and public objects;
- to facilitate identification and utilization of renewable energy resources;
- to inform the society and companies of the possibilities to use alternative energy resources.

One of the most important medium-term national planning documents of Latvia is the Latvian National Development Plan for the time period 2007 to 2013 [5], which provides a strategic objective – “Education and knowledge for economic growth and technological excellence of economics”, and to achieve it three priorities for development are highlighted:

- educated and creative persons;
- technological excellence and elasticity of the enterprise;
- development of science and research.

Considering the location in Zemgale region, the Latvia University of Agriculture (LUA) is a regional university, but on the other side it is a university that prepares specialists for rural districts all over Latvia.

Analysing the distribution of the students in the LUA [6], it is cleared up, that the main part of them are coming from the countryside – 67.4 %, the others come from Riga – 9 % and other big cities – 23.6 %. The specialists, prepared in the study program Agricultural Energetics at the LUA, Faculty of Engineering, are provided mostly for power supply and maintenance of electrical and heat equipment in small agricultural enterprises. Whereas another university in Latvia – the Riga Technical University - prepares specialists for the so called big energetics, that are guided to big electric power and heat producers, transmission and distribution of energy. But despite of this, a great amount of the graduates from the program and a large part of part-time students work in the state stock company „Latvenergo” (the electric power producer and distributor in Latvia) subunits, like distribution networks etc. That confirms the competitiveness of the graduates in the labour market also in the sphere of the so called big energetics and the high evaluation of this study program between the employees and employers of energy enterprises. The programme includes both electrical and heat energy that makes the program unique in Latvia. As the result, the graduates have better and more flexible possibilities in the labour market.

### **The aim of the research**

To find out the strong and weak points in the professional bachelor study program Agricultural Energetics as well as to discover the possible solutions for promotion of the study process.

### **Methods**

Statements from scientific literature, regulations, statistic data analysis are included in the research. Interviews (conversations) with full-time and part-time Agricultural energetics and Agricultural Engineering students are carried out. 44 respondents - students and graduates are surveyed. The SWOT analysis is used to clear up the possibilities to improve the study program.

### **Results and discussion**

A very important precondition to implement studies successfully is motivation of students. The youth make choice to study due to different reasons: somebody is looking for any education, because he understands the role of education in his life but he has not clearly defined his main interests, the

other wants to study in a certain speciality and after that to work in it, somebody complies with parents will or follows his friends or that is the demand of the employer.

Analysing the questionnaire it was stated that the main reasons to choose this study program are: family impact (23 %), friends' advice (31 %), advertisement (15 %), and other (31 %), incl. interest in the branch (33 %) and career perspective of the profession (33 %).

An important role in the study process is played by the competence of the teaching staff and their possibility to obtain the attention and interest of the students in the delivered topic. The analysis of the students' questionnaire shows the following: professionalism of the teaching staff in the speciality is recognised by 68 % of the respondents, in methodology 49 %, in communication during acquiring the study course 38 %. That means: the existing level of the lecturers is high in the speciality, but there are possibilities to make improvements in methodology and especially in communication skills with the auditorium.

89 % of the respondents accept the principles of democracy in administration of the faculty and 84 % do not contemplate problems in communication between the students and the administrative staff as well as the teaching staff.

9 ECTS of the study program consist of elective courses. 83 % of the students are satisfied with the content and volume of them.

The respondents also evaluated the possibilities to obtain additional knowledge. This is included in the following: possibilities to improve language knowledge – 89 % satisfied, skills to work with computer – 94 %, to do sports and health improvement – 78 %.

The questionnaire of the graduates includes the graduates from the program in the period 2000 – 2008. 56 % work in the field of electric power engineering, 22 % – heat engineering. The main tasks to be performed and the scope of work of the graduates are divided into the following segments: 33 % of them are working as consultants, project developers, the remaining part is involved in production, pedagogical activities, trade, accounting and financial management, and services. 44 % of the respondents' daily working tool is a computer, as well as information collection and analysis activities.

100 % respondents confirm that their knowledge obtained during the studies was useful in their practice, such as engineering calculations, design, measuring, design of technological schemes etc. Evaluating their qualification for the labour market, the answers were the following: 22 % – excellent, 56 % – good, 22 % – satisfactory.

Approximately 33 % of the respondents had been in practice abroad during the studies. But this number is not unequivocal, because this number changes every year and for the present it is less.

It is very important to forecast how the energy branch will develop. In response to the question of what energy fields (as they feel and forecast) in Latvia will develop the fastest during the next 6 years, the respondents mentioned the following:

- renewable energy products, production and usage;
- energy accounting, production, trade and intermediate services in the energy branch;
- heat energy related business;
- electric energy distribution network reconstruction related activities.

Answering the question about the branches of energy where the demand for engineers to be employed will increase, the response was the following:

- installation and maintenance of heat and water supply systems;
- installation and maintenance of energy producing equipment and systems;
- design of electric equipment and systems.

Overall response as to the structure and quality of the studies was that the current study organization and content did not create problems for graduates. However, the graduates recommend to have greater emphasis on practical and creative skills development during the studies. Within the proposal for studies and study methods improvement the most frequently mentioned points were the following: increased intensity of field trips to manufacturing facilities, to include more innovative things in the course content, to highlight the design issues, to larger extent associate tasks with actual practice.

Also the role of the study materials placed in home page is substantially increasing.

The Guidelines of Education Development 2007-2013 in Latvia bring forward purposeful usage of ICT in the education system as one of the important instruments to promote the quality of education [7].

The majority of students are using possibilities of e-environment in studies. It is possible to divide e-materials in several groups: group of summaries of theory that perfects the lectures, group of methodology and guidelines for practical works and course projects, also the tasks for home work, group of materials for interactive study process, where it is possible to consult with the lecturer, to send the solved home works etc. The last is still in a developing phase and the importance of this will rise by developing of distance education. The Modular Object-Oriented Dynamic Learning Environment (Moodle) possibilities are rolling in the study process.

Using of e-environment took off restrictions of time and space with the aim to expand the range of educational establishment services and their efficiency of action as well as for attractiveness and competitiveness in global environment [8].

Regular evaluating of weaknesses and strengths of the study programme indicates opportunities for development, by analysing the academic resources, material and technological basis and available financial means. Based on the above described activities and the results of the analysis the SWOT analysis of the study program was worked out (Table 1).

Table 1

**SWOT Analysis of study program “Agricultural Energetics”**

<u>Strengths</u>	<u>Weaknesses</u>
<ul style="list-style-type: none"> <li>• high qualification of the teaching staff;</li> <li>• lower study costs;</li> <li>• individual approach to every student during individual work, consultations, etc;</li> <li>• the programme includes both Electrical and Heat directions of energetics, that makes the program unique in Latvia;</li> <li>• the programme contains subjects devoted to Alternative energy;</li> <li>• good cooperation with energetic enterprises used as the basis for students’ practice, cooperation with the management of enterprises;</li> <li>• cooperation with the employers regarding the evaluation and improvement of the study program;</li> <li>• active membership of the teaching staff at international conferences and research work;</li> <li>• availability of wireless Internet at all the premises of the Faculty of Engineering;</li> <li>• availability of the computer room at the Institute of Agriculture Engineering for the students’ individual studies after the lessons;</li> <li>• financial resources coming by the EU projects give opportunities to improve the study environment, hardware, laboratory equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• study materials for e-studies and distance learning;</li> <li>• study courses in foreign languages;</li> <li>• weak co-operation with entrepreneurs;</li> <li>• limited amount of finances;</li> <li>• trend to decrease the number of study places, financed by the national budget.</li> </ul>

Table 1 (continued)

<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> <li>• development of e-study environment MOODLE, launched at the Latvia University of Agriculture;</li> <li>• continuous and intensive ensuring of interdisciplinary links in the studies;</li> <li>• orientation of study and Bachelor papers to practical tasks and more conjunction to real objects;</li> <li>• ensuring of direct correspondence of the themes of Bachelor papers to the qualification to be obtained as a result of studies;</li> <li>• diversification and improvement of the study methods;</li> <li>• more intensive exchange of students and teaching staff with Latvian and foreign Universities;</li> <li>• broader engagement of guest-lecturers;</li> <li>• participation in competitions for receiving scholarships;</li> <li>• further participation in projects, including the attraction of the EU funding for the improvement of provision for studies.</li> </ul>	<ul style="list-style-type: none"> <li>• decreasing of the total number of study places, financed by the national budget;</li> <li>• economic situation in the country;</li> <li>• demographical situation in the country;</li> <li>• students' material provision;</li> <li>• difficulties in the Latvian labour market (decreasing of working places and possibilities to earn money according to the received education).</li> </ul>

## Conclusions

To improve and further develop the Energy engineering studies the following issues have to be considered:

1. To follow the directions and trends in development of the labour market in energy industry it is necessary to sustain and broaden the cooperation with employers by involving them in the study process evaluation and development;
2. It is necessary to consider in the teaching process more closely the development programmes and forecast of the region, state and EU development;
3. To obtain good practice from other universities by developing more intensive exchange of the students and teaching staff with Latvian and foreign universities;
4. The lecturers more widely have to use the possibilities of interactive study forms including e-environment, but keeping in mind, that e-learning cannot substitute contact forms of education.
5. To develop language skills of the students and teaching staff, that will stimulate obtaining of the latest achievements in the energy branch in the world.
6. To develop students motivation to obtain knowledge and understanding of the role of education in the development of personal career, business, and life quality. This condition needs integrated approach supported by the state policy of development, including financial policy, attitude formation to education and understanding of the role of educated personality in state development.

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