

Experience of Strategic Partnership «University – Enterprise» for Development of Engineering Staff Training

St. Petersburg State Electrotechnical University «LETI»

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The establishment and development of partner relationships between universities and enterprises is a very important task amid the developing economy of knowledge. It involves creating a net of organizations that are interested in mutually beneficial cooperation in the spheres of staff training, logistical support of educational process, production process improvement, joint research and development and etc. To make these activities the most efficient it is necessary to find the way of cooperation «university – enterprise» on the base of mutual interests and benefits. The article shows the experience of St. Petersburg State Electrotechnical University «LETI» in development and implementation of the program of strategic partnership «university – enterprise» aimed at development of engineering education.

Key words: Engineering Education, Strategic Partnership, Industrial Enterprises, Labor Market Analysis.



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Due to the development of market economy in Russia the universities' task in staff training became wider and more complicated. Fulfilling the state order for staff training at the expense of the federal funds the universities have to take into account needs and particular qualities of regional and local labour markets, which make hard and controversial demands to the fresh specialists. Universities need to train highly qualified staff both for large federal state unitary enterprises and for small and medium enterprises of different types of ownership that consume more and more graduates. Universities should also take care about graduates' employment, their social protection and their fast adjustment to the employer's demands. Eventually it adds to the

competitiveness of a university on the educational service market.

The formation of partner relationships the labour market is one of the most important tasks of universities amid the developing economy of knowledge. It involves creating a net of organizations that are interested in mutually beneficial cooperation in the spheres of staff training, logistical support of educational process, production process improvement, joint research and development and etc. To make these activities the most efficient it is necessary to find the way of cooperation «university – enterprise» based on mutual interests and benefits.

It has been said for years that universities should train specialists that are in demand for real economy. However,

generally the higher education system still offers academic but not applied education. The universities trying for training applied specialists can't satisfy the growing demand of large enterprises for high professional level of staff. It should be noted that no one can blame only universities as they have mostly outdated laboratory and production equipment which makes training in modern technologies impossible. Nowadays technical base of universities, as a rule, significantly falls behind that of enterprises. Besides, though the Russian higher education is fundamental, it has a very weak link – the feedback of the consumers that is enterprises.

Strategic partnership of universities and enterprises is the demand of time. Mutual interest in higher level of graduates' training, including the quality of special training, encourages stakeholders to establish long-term partnership. Consumers of graduates are ready to invest in the system of higher education in order to have highly qualified specialists oriented towards technological features of a particular production or enterprise. Investing into the development of specialized universities, the strategic partners have the right to participate in the social governing body of a university, to assess the quality of graduates and teachers competence, to analyze the content of academic programs and curricula and to assess the level and relevance of scientific researches. Due to such partnership the education programs, which are developed and implemented by universities, can be really oriented towards the contemporary labour market.

Long-term partnership «university – enterprise» can involve different interaction models. There are some of them: target training, retraining for in-demand specialties, and the implementation of technical, research and production tasks with participation of leading university specialists and students. It can also include joint development of standards and programs in vocational education and retraining that can meet the demand both of the contemporary economy and perspective directions of develop-

ment. Nevertheless, every particular partnership agreement should be made on the basis of mutual interests creating a complex program of dipole interaction «university – enterprise» that can be changed if environment changes.

The polytechnic universities in big industrial cities that train graduates for several industrial branches should choose their partners basing on the main (prior for the university) scientific and educational directions.

This statement becomes obvious, if we admit the fact that the main university output is trained specialists. Their quality is determined by the level of scientific research conducted by the corresponding departments and faculties. The system of strategic partners gives the possibility to reconstruct the lost feedback of graduates' consumers, which is necessary for further development of vocational education to the benefits of the national economy.

The implementation of participatory form of quality management in student training in main scientific and educational directions can mean establishing of expert-analytical councils. They should be formed as independent collegial bodies under the jurisdiction of a university and should mostly consist of representatives of industry, academic and applied science who are strategic partners of the university. Such expert councils are reliable link of universities and education authorities with real economy. They can monitor particular labour and educational market segment. It provides quick and effective adjustment to changing demand by correcting special professional training part of the curriculum, which makes possible to be ahead of time in training the staff for high-tech industries.

The program «Strategic partnership», which has been implemented in St. Petersburg State Electrotechnical University «LETI» since 2005, is unique in terms of its status and tasks to solve. Its goal is to ensure high quality of professional training of specialists on basis of complex collaboration of the university and enterprises in interest – strategic

partners, by joining together intellectual, material, financial and corporative resources of the partners.

The basic objects of the program «Strategic partnership» are:

- Forecast of labour market needs and employment of graduates.
- Joint development of the educational programs content and their informational, methodological and logistical support.
- Joint implementation and resource support of educational programs, technological and pre-graduation practical training.
- Qualification standards development.
- Quality assessments of educational programs and graduates.
- Activities of the expert councils in scientific spheres of «LETI».
- Encouragement of students' participation in real project and research activities. The implementation of the educational technology «study through research projects» while training practice-oriented specialists.
- Conducting research and development, new technology implementation and product release.
- Training and work experience of the university teaching staff on the basis of the partner enterprises, joint training of highly qualified staff.
- Development of strategic partnership infrastructure, establishment of joint scientific and educational centers, laboratories, basic departments and centers of collective use.
- Development and testing of effective ways of university-enterprise interaction.
- Conducting joint conferences and seminars for students, post-graduates and young scientists.
- Participation in collective management bodies of the partner enterprises. Formation of collective expert and advisory body to coordinate university-enterprise interaction.

The collaboration is based on long-term agreements and complex projects that cover educational, scientific and innovative spheres, and is implemented through the following:

- Conducting joint scientific researches
- Establishing joint educational and scientific structures
- Holding joint scientific and technical conferences and seminars in prior scientific spheres.
- Organizing practice and diploma project of students in a partner-enterprise.
- Target training of specialists by order of the partner-enterprise.
- Joint formation of educational programs and curricula.
- Use of the enterprise staff in teaching process.
- Post-graduate study of the enterprise staff in university.
- Retraining and training of the enterprise staff on the basis of university.

All the stages and forms of the collaboration are determined by certain contracts and agreements.

Nowadays the University has more than 40 strategic partners that consume the graduates, educational services, and research and development products. Among them there are scientific and project organizations, high-tech enterprises and defense industry. Since 2002 «LETI» has been the base for the research and practice conference «Planning and ensuring of staff training for the industrial and economic complex of the region», which is supported by the Russian Ministry of Education and Science, Union of Industrialists and Entrepreneurs and St. Petersburg Administration. The university specialists have developed documents «Regulatory and Methodical Support of Strategic Partnership» that are recommended to be implemented in the universities of the country. They are published in scientific and methodological issue «Innovative activity» by Russian Ministry of Education and Science.

The administrative body of the program is the Center of strategic part-

nership and innovations which has the executive functions.

«LETI» is an active member of Association of electronic, engineering and info and telecommunication enterprises (The president is the general director of OJS «Avangard» Shubarev V.A.). On its basis in 2008 «LETI» and the partner enterprises initiated the establishment of Regional Council on interaction of universities with enterprises of electronics, engineering, means of communication and info and telecommunication in St. Petersburg. It started with the agreement between the Association with the St. Petersburg Council of rectors approved by Rosobrazovaniye and Minpromtorg of the Russian Federation. The main task of the Regional Council, which consists of the heads of 8 leading technical universities, 2 vocational education colleges and 14 enterprises of St. Petersburg, is to coordinate, plan and ensure the quality training of the staff for the industrial and economic complex of the region.

Another important result of the system interaction of universities and enterprises is the establishment of the scientific and educational consortium of higher education and intermediate vocational education institutions, high-tech enterprises and scientific and project organizations of St' Petersburg «Corporative institute of scientific research and continuing education in the sphere of electronics, engineering, communication means and info and telecommunications.»

Local analysis of labour market demands is very important for the effective employment of the graduates. Therefore, the results of the research made at the university in 2010 seem to be interesting. The aim of the research was to analyze the demand in the «LETI» graduates among the high-tech enterprises of St. Petersburg and their willingness to collaborate with the university.

52 city enterprises took part in the research. 12% of the enterprises work in the sphere of shipbuilding, 23% radio engineering, 21% electronics, 17% electrical engineering, 31% IT, 40% engineering, 12% power engineering, 4%

medicine and microbiology, 17% other. It should be noted that the enterprises could position themselves in several spheres. The direct respondents were the heads of the enterprises.

The sampling of the enterprises according to the number of the staff was the following: more than 27 % of the enterprises have 1000 employees, 21% - from 500 to 1000, 31% - up to 500 people, 11% - less than 100 people, and 10% - no data.

The survey results show that high-tech enterprises of the city need the specialists trained by «LETI» and are ready to employ them for vacant positions of all the specialized directions. The qualitative characteristics of the demand in the university graduates in different scientific spheres are presented in Table 1.

Another important issue was to define the satisfaction level of the employers by the quality of the graduates. As the survey results showed, 92% of the employers have «LETI» graduates of the last 5 years in their staff. Three-quarter of all the enterprises are satisfied with the training level of the university graduates, including completely satisfied are 19%, rather satisfied are 56%, partly satisfied – 19%, rather unsatisfied or completely unsatisfied – 0% (6% of the respondent didn't answer the question).

It was natural for us to find out the weak points in the student training in the university. Thus the enterprises were asked the following question: «What don't you like about the training level of the «LETI» graduates?». The answers to the question are shown in Table 2.

Besides, 19% of the respondents showed the lack of the target training for their enterprises as the disadvantage of the university training. The conclusion is the enterprises showed as drawbacks the insufficient practical training (56%), and insufficient work experience (40%), which means the necessity to develop a practical component of the educational process in university.

The research also showed the possibilities offered to the graduates by the enterprises. These offers are the following: interesting occupational work (98%),

high salary (56%), wage supplement (social package) (75%), work with modern technologies and equipment (69%), training (83%), career prospects (85%). It allows us to say that generally the enterprises are ready to make beneficial employment offers to the graduates, to supply them with interesting work, career prospects and training. However, only slightly more than half of the enterprises (56%) are ready to pay good salary.

Not less important problem of the research was the enterprises' assessment of their interaction with «LETI» in the sphere of research and development. All the enterprises make research and development in the directions which are fundamental for the university. But only 55% of them collaborate with the university. ¾ of the total number of the enterprises collaborating with the university is satisfied with such interaction. More than a half (56%) of the enterprises considers the results of the researches and developments conducted by the university to be better than that of other organizations.

It was especially interesting to research the willingness of the city enterprises to collaborate with «LETI». The survey showed the following:

- More than 80% of the enterprises are ready to take part in practice, training and graduation projects arranged on the enterprises.
- 33% of the enterprises are ready to participate in special training, but not all of them are ready to pay for such training.

- 43% of the enterprises are ready to order graduates from the university in the frame of special state-financed admission.
- 31% of the enterprises would like to have their staff been trained in the university but only half of them are ready to pay for this service.
- Almost half of the enterprises (46%) are ready to employ the students for a part-time job and 12% are ready to pay scholarship to the students who are going to work for these enterprises in future.
- A half of the enterprises are willing to make joint scientific and research work. 23% of the enterprises consider the joint monitoring of new scientific research results and expanding the scope of their application to be prospective forms of mutually beneficial collaboration of the enterprises and the university.

The program «Strategic partnership» and the experience in interacting with employers formed the basis of innovative education program of «LETI» «Specialist training for prior high-tech branches of innovative economy of the country», which was implemented in 2007-2008 in the frame of national program «Education». More than 50 scientific and educational centers and laboratories, which were established and equipped in the frame of the program, allowed the university to increase its competitiveness and appeal on the market of

Table 1. Demand of the university graduates

Scientific and Technical sphere	Demand in specialist, %	Prefer «LETI» graduates, %
Radio engineering	35	37
Telecommunication	27	27
Electronics and microelectronics	40	38
IT	35	33
Power engineering and electrical engineering	48	25
Automation and management system	23	50
Engineering and information and measurement technology	33	33

scientific and engineering products and educational service and to arrange the education process and development of scientific products in cooperation with the strategic partners.

Nowadays the main directions of LETI-enterprises integration have been formed. These are the implementation of basic and additional training programs, special training including highly qualified staff, and coordinated staff policy. The university has positive experience in involving strategic partners into training the staff of the university departments they are interested in. It is highly qualified teaching staff. Strategic partnership not always starts with the interest in graduates. There are a lot of examples of long-term joint collaboration in new technology development and production modernization. The necessity in personnel support of the upgraded technology or modernized products arises for the enterprise only at the implementation stage. It leads to the need of joint educational centers that gradually become basic departments and long-term programs of special personnel training for a particular group of enterprises are formed. Such model of personnel support of new technologies is at work in LETI for a number of enterprises.

Going back to the problem of system approach to the arrangement of university-enterprise interaction it is necessary to note that the Regional Council on the interaction between universities and enterprises of electronic industry has

been working for 5 years. The council has executive management. A lot of experiments in special training including the legal aspect of graduate assignment were discussed at the Council meetings. One of the problems was how to assign a future graduate to the chosen enterprise. The following way out was suggested: enterprises hired fifth (sometimes fourth)-year students as part-time employees and sent them to the specially designed training programs in the university. These programs are additional to the standard education university program. This is the way the university work with «Concern CSRI Electropribor», JSC, Research Institute «Vector» JSC, Research and Production Enterprise «Radar MMS», «Avangard» JSC and other. A student and an enterprise sign a contract that determines the working period of the student for the enterprise after his/her graduation and 1.5 -2 -year special training course as well as penal sanctions, which have never been applied yet.

The development of specially designed training programs of staff becomes more important in connection with new two-level education system. The second level of training will be considerably determined and financed by particular enterprises and corporations. That is why the development and implementation of possible forms and methods of personnel training with the participation of consumers is the topical issue nowadays.

Table 2. Graduate training deficiencies

The reasons for the enterprises to be unsatisfied	%
Theoretical training	21
Practical training	56
Computer skills	6
Foreign language acquisition	21
Business knowledge	6
Management skills	15
Teamwork skills	21
Communication skills	10
Insufficient work experience	40

Talking about strategic partnership one cannot forget about the university innovative infrastructure that includes innovative technological centers, business incubators, technoparks and centers for technology transferring and commercializing. All these units form the so-called university education-scientific and innovative complex (ESIC). In LETI there is a three-sphere model of ESIC. The core of the ESIC consists of educational, scientific and innovative blocks of the university. The close innovative belt involves small enterprises of the technopark and technologic innovative Center, which are closely connected with the university, being established by it. There is also a far innovative belt – the enterprises, which are strategic partners of the university. They have contractual partnership relations with the university.

Some years ago LETI initiated the establishment of expert councils on main scientific and educational directions. These councils mostly consist of the employers' representatives. Being interested in the university education quality as well as in the personnel quality, they willingly assess the quality of educational programs and students' competence. To implement it a methodical basis was created, a lot of bumps were raised in this sphere and now the university is ready to share its experience both positive and negative. On the basis of LETI there is an annual scientific and practical conference

«Planning and implementation of personnel training for industrial complex of the region» established to discuss topical issues of the development of specially designed personnel training and employers' participation in assessment of graduates' quality etc.

A dipole model of university-enterprise interaction is being implemented nowadays in different forms but it is a passed stage when a separate university interacts with a separate enterprise. Today's aim is to establish a net interaction. It is necessary to create a regional communicative media with universities, colleges and technical schools on one side and the enterprises which make scientific and production complex of the region. Talking about industrial and economic cluster it is necessary to note that any competitive cluster consisting of high-tech enterprises and engineering companies can't develop without quality personnel supply and scientific support. That is why education and science sustaining industry is the basis for innovative clusters. Complex multilinked clusters such as shipbuilding, which is rapidly developing in the city, or electronics, which is catching up for the lost time, need net interaction. One university or one enterprise will never be successful in these spheres.

In 2007 the program «Strategic partnership» implemented by LETI was awarded by St. Petersburg government.

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