Training of IT professionals as a factor of information society development in Russia

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Abstract

Currently, Russia faces the challenges of becoming an active participant in the global process of the information society development. To implement components and principles of the information society, two major federal government documents have been adopted: «The Strategy for Information Society Development in the Russian Federation» and «The Information Society (2011-2020)» federal government program. However, there is a shortage in the information technology labor market in Russia. The paper reviews the status of IT professional training in the federal government documents and considers the issues and prospective development of IT-education in Russia. Based on the experience of Yuri Gagarin State Technical University of Saratov, we propose some apparent effective ways of IT education development.

Keywords: *IT professional training, Information Society, IT education development in Russia, «The Information Society (2011-2020)» federal government program.*

1. Introduction

At the World Economic Forum 2001, close relationship between the development of information and communication technologies (ICT) and economic well-being of countries was first officially noted. Nowadays, ICT play a leading role in the development of innovation, productivity and competitiveness. They diversify world economy and stimulate business activity, thus benefiting the improvement of living standards. From 2002, as part of a special annual report series on the development of information society around the world, the World Economic Forum and the Business School for the World (INSEAD) publishes the Networked Readiness Index (NRI) measuring the propensity for countries to exploit the opportunities offered by ICT. NRI is used by many countries to analyze issues in their policies and to monitor their progress in implementation of novel technologies. The last report of the World Economic Forum, *The Global Information Technology Report 2013*, containing data for 142 countries, noted, "The Russian Federation, overtaking China as the leading large emerging economy, rises two positions to 54th place thanks to improvements in higher rates of general ICT uptake, with growing numbers of Internet users (57th) and, especially, a spectacular increase in mobile broadband subscriptions (20th) that has multiplied exponentially, as almost half of the population now benefit from it. Despite this progress, the country continues to suffer from low rates of e-business (107th), a weak political and regulatory framework (108th), and a poor business and innovation environment (90th) that affects its capacity to further leverage ICTs to boost its economy and benefit from higher rates of products and service innovation (123rd)". [1] A number of publications, such as [2]-[5], review the problems and prospects of information technologies (IT) development as the basis of the information society worldwide and in Russia. It is worth noting that foreign researchers pay a special attention to various aspects of training and refresher courses for IT professionals to meet the increasing needs of the labor market in different countries. [6]-[9] Unfortunately, this issue is not properly reflected in the works of Russian researchers. This publication attempts to compile data on the role of IT professional training as one of the major factors affecting the formation of information society in Russia, and proposes the ways to deal with existing problems in the IT field.

2. Review of official documents

At present, there are many official policies and programs for information society development adopted by world governments, intergovernmental associations, and regional governments. The basic idea of these programs is taking advantage of the opportunities offered by contemporary ICT for the benefit of the people. Currently, the main official documents of the kind in the Russian Federation are *The Strategy for Information Society Development in the Russian Federation* (2008) [10], and its follow-up, *The Information Society (2011-2020)* federal government program (hereinafter referred to as The Program). [11] One of the key performance indicators listed by The Strategy is Russia's international ranking in terms of information society development. In this respect, Russia is projected to be among the world twenty leading countries by 2015. *The Program* allotted 22 key performance indicators of its implementation. Main key performance indicators are presented in Table 1.

Table 1. Key performance indicators of The Program.

Key performance indicators of The Program	Units of measure	2008 ranks	Projections for 2020
Networked Readiness Index international ranking of the Russian Federation	rank	74	among 20 world leading countries
IT Development Index international ranking of the Russian Federation	rank	50	among 10 world leading countries
Broadband Internet access, per 100 households	quantity	26	80
IT sector proportion in the gross domestic product of the Russian Federation	%	4.1	7.1
IT goods exports	million USA $	2140	8100
Proportion of electronic government services to the public	%	-	100
PC per 100 students of educational institutions	quantity	5	30
Proportion of electronic catalogues at the Museum Fund of the Russian Federation	%	21.8	100
Proportion of electronic document workflow between the branches of federal and state governments in the total document workflow volume	%	-	70
Proportion of electronic entries in the total public library funds	%	-	≥ 75

The Program accentuates that a sine qua non for the information society development is improving the quality of professional training as well as establishing a system of continuing IT education. Among the priorities for the period through the year 2015, *The Program* lists IT professional training and refresher courses based on educational centers and research in the IT field, along with creating the infrastructure for training high quality personnel in the field of supercomputer technologies and specialized software. However, among specific activities financed from the federal 2011-2013 biennial budget, *The Program* includes only the "IT development based on free software for research and educational use" (Annex 2: para. 37), whereas among activities funded from other sources, The Program lists just the "development of the teacher training and retraining system for secondary school teachers in computer science to meet standardized requirements" (Annex 3: para. 26).

Significant shortage of IT professionals was known in Russia long before the implementation of *The Program*. The most comprehensive analytical studies on this issue were conducted by non-profit Information & Computer Technologies Industry Association (APKIT) founded in 2001. [12] At present, APKIT includes over one hundred domestic and international companies in the field of software development, and computer and computer equipment manufacturing, leading domestic distributors, system integrators along with Russian manufacturers and developers. The association is in charge of protecting the interests of IT companies in their interaction with the state, and promoting the Russian IT market growth.

Recent analytical study published in November 2012 was conducted by APKIT and McKinsey & Co. to reflect the consolidated view of the IT industry business community on strategic perspectives of this branch development in the Russian Federation, and to identify the appropriate measures of the state support to form the IT industry "ecosystem". The study pointed out that, despite Russia having the third largest staffing resource potentially suitable for the IT field, an immediate readiness of university graduates for the industry is fairly low. Of 1460 thousand university graduates in Russia per year, engineer graduates amount to 13%. Of the total number of engineer graduates (188 thousand), only 15% are suitable for immediate employment in the IT field. Thus, the total number of engineer graduates eligible for IT field employment constitutes 34 thousand per year, while their numbers are much higher for China (94 thousand) and India (124 thousand). [13] Note that, in this context, the term "suitable for immediate employment" implies general acquaintance with IT industry, possession of basic functional skills, such as programming in multiple languages, and working knowledge of English language. According to the analytical study by APKIT, *Employment in Russian Economy in 2009 and Forecast of the Demand for 2010-2015*, the total number of eligible graduates will be under 50 thousand in 2015 whereas the demand for IT personnel might reach 350 thousand. [14]

According to [3], 94% of ICT professionals are trained at state higher education institutions. This fact confirms the significant importance of Russian universities in providing labor market with eligible specialists.

3. Approaches to the training of IT professionals in the Russian Federation

In June 2010, APKIT and Russian Union of University Chancellors formed a joint Commission that still operates at present time. The main objectives of the Commission include the development of consolidated proposals for implementing priority directions of IT education, and their financial and economic justification, including preparation of the IT Education Development Concept in Russia. In its decree, the Council of the Russian Union of University Chancellors identified the following priority fields for IT education development:
1. Developing contemporary standards of IT education in Russia in accordance with existing standards for primary, secondary and higher education;
2. Creating an integrated IT education system;
3. Building long-term integrative relationships with the world leading IT corporations and university-based IT centers.

We advise that the following criteria proposed by APKIT would be used as key performance indicators for the above-listed development areas:
– Number of IT field university graduates (thousand);
– Proportion of IT field students in the government-sponsored (free of charge) undergraduate and graduate education pool at universities (%);
– Total employment in the IT industry (thousand);
– Proportion of university graduates in IT fields obtaining employment at the IT companies during the first six months upon graduation (%).

Many tasks within the proposed framework of IT education development can be solved successfully by collaboration of the IT business community and universities. However, some of those (such as changing the curricula of IT education at secondary schools, financial support of IT-oriented higher education, and an increase in government-sponsored undergraduate and graduate education pool at universities) could not be successfully implemented without an active involvement of the State.

Within the framework of the first priority field, the third-generation educational standards for undergraduate and graduate (Master's) studies were developed. Those standards took into account IT field professional standards developed under the auspices of APKIT and approved by the Russian Union of Industrialists and Entrepreneurs [15]. The main problematic issue in this field is rapidly changing

requirements of prospective employers for knowledge and skills of the IT field graduates. That is why the quality of meeting this particular performance indicator depends on capabilities and willingness of a particular university to coordinate the content of specific disciplines with prospective employers, and to involve them into teaching students. These matters are traditionally paid adequate attention worldwide. [16]-[17]

Within the framework of the second priority field – creating an integrated IT education system – universities, in the course of complying with a new generation of standards, could expand IT education component for every field of study, including humanities. However, at universities, this is often impeded by some inertness of the Russian higher education system – first of all, by the IT incompetency of departments teaching students in the fields of sociology, economics and humanities. Besides, it seems practical to organize university-based training and retraining centers for IT professionals. For example, the APTECH Center for Computer Education successfully operates at Yuri Gagarin State Technical University of Saratov (SSTU) from 1999. Over the years, it has trained over 1500 professionals successfully working in Saratov region and beyond it. In our opinion, the success of this center could be explained primarily by regular monitoring of the IT labor market in the Russian Federation and by involvement of the IT business representatives into the teaching process along with university professors.

The third priority field for IT education development is implemented through building up sustainable integral relationships with world leading IT corporations and university-based centers. This priority field could be executed in various forms, initiated either by the business community or by universities. Based on many years of IT professional training experience at SSTU, it could be argued that the most effective university initiatives include the following:
- Annual participation of student in Science Olympiads and contests organized by IT companies, such as 1C, Microsoft, and others;
- Arranging student internships at successful IT companies. Considering that university centers in the Russian Federation are located predominantly in big cities, where IT firms are abundant in the market, these internships may take place simultaneously with educational process. In Saratov, such firms are represented by NetCracker company and EPAM Systems;
- Organizing Annual Career Days. Career Day is an event that traditionally takes place at higher education institutions. During this event, IT employers offer jobs to graduates and senior year students, test their IT competence, and provide their own training courses to improve student skills in the IT field;
- Inviting personnel from IT companies to teach, conduct scientific seminars, and give master classes to university students.

At present, an involvement of the IT business representatives into teaching students seems fairly challenging, as universities are not ready yet to provide competitive salaries to such professionals.

4. Conclusions

To achieve key performance indicators of *The Information Society (2011-2020)* federal government program in the Russian Federation, it is necessary to implement the proposed measures for IT professional training and retraining. From our standpoint, efforts by the State along with the initiatives of educational institutions and business communities are needed to improve IT education quality and to reduce the shortage of IT personnel in Russian labor market.

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