Dear colleagues,

We are happy to present the 10th issue of Higher Education in Russia and Beyond, a journal that is aimed at bringing current Russian, Central Asian and Eastern European educational trends to the attention of the international higher education research community.

This issue is dedicated to contemporary computer science education in Russia, which exhibits some interesting trends. Part one of the issue describes the rise of computing hardware and information technologies in the USSR. This topic is still relevant because in the Soviet times, expert evaluations of the situation in this sphere were rarely made public. Soviet legacy is still tangible in other ex-Soviet countries, for example in Belarus, which is one of the world’s leaders in the sphere of IT outsourcing but maintains a largely Soviet-style higher education model.

The second part covers university education. Many comprehensive universities respond to the latest market trends by opening IT education departments and launching new programs in computer science. However, many higher education institutions in Russia are facing a serious problem: the most talented young people from their regions prefer to go to Moscow or Saint Petersburg to study.

The dynamics of IT industry presents another challenge: academic institutions cannot always keep up to date with the changes.

Part three of the issue is dedicated to further education projects and describes the newest approaches to working with high school students, university students and recent graduates used by HEIs, research organizations and commercial companies.

The facts that the educational landscape is very diverse and salaries in industrial companies are high lead to university graduates’ lack of interest in post-graduate studies, so in the final part of this issue you can learn more about how research institutes can work with students and universities in the current context.

Higher Education in Russia and Beyond editorial team and guest editor Sergey Zavarin (Analyst at the Faculty of Computer Sciences, National Research University Higher School of Economics)
National Research University Higher School of Economics

National Research University Higher School of Economics is the largest center of socio-economic studies and one of the top-ranked higher education institutions in Eastern Europe. The University efficiently carries out fundamental and applied research projects in such fields as management, sociology, political science, philosophy, international relations, mathematics, Oriental studies, and journalism, which all come together on grounds of basic principles of modern economics.

HSE professors and researchers contribute to the elaboration of social and economic reforms in Russia as experts. The University transmits up-to-date economic knowledge to the government, business community and civil society through system analysis and complex interdisciplinary research.

Center for Institutional Studies

The Center for Institutional Studies is one of HSE's research centers. CInSt focuses on fundamental and applied interdisciplinary researches in the field of institutional analysis, economics and sociology of science and higher education. Researchers are working in the center strictly adhere to the world's top academic standards.

The Center for Institutional Studies is integrated into international higher education research networks. The center cooperates with foreign experts through joint comparative projects that cover the problems of higher education development and education policy. As part of our long-term cooperation with the Boston College Center of International Higher Education, CInSt has taken up the publication of the Russian version of the “International Higher Education” newsletter.
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Institute for System Programming: How to Train Research Engineers for IT
Physics, and informatics, the number of students from Moscow admitted to the first year rarely exceeds 20%, which, however, might in part be explained by the fact that it is located in Moscow region, outside Moscow city, which officially constitute two separate regions.

Consequently, the only thing that is certain is that Moscow and Saint Petersburg remain attractive for applicants from all over Russia, mostly because of university brands there and bright career prospects. Are other motivational factors significant? Do IT applicants differ in their behavior? Both questions are open for debate.

How Can Humanities Facilitate IT Students’ Professional Success?

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People with technological educational background are often skeptical about the humanities. This is first of all caused by labor market inequalities: people employed in the IT industry, which requires an analytical mind and appropriate skills, are usually better paid than their peers representing the humanities. Secondly, people with a logical mind, especially students of leading technological universities, are used to finding logic everywhere, while the humanities are rare based on strict logic.

This often results in the fact that engineering students choose to ignore liberal arts courses available within their curriculum: when it comes to elective courses, they choose something related to their area of specialization, and when it comes to obligatory course, they treat them lightly and prefer not to spend time to actually understand the subject.

In this paper we will explain why humanities are important for engineering specialists on the whole and for IT people in particular and how to make tech students interested in such subjects.

In the highly competitive IT industry improving the business process and software development process becomes crucial for individual, team, and company’s success. Traditionally, the main issues for STEM field and for software development team productivity lay in the area of “soft skills” (or personal transferable skills), psychological phenomena and peculiarities.

Studies by Stanford Research Institute and the Carnegie Mellon Foundation conducted among Fortune 500 CEOs found that 75% of long term job success depended on personal skills and only 25% on technical skills. Personal transferable skills are generic skills required in all spheres of life and although they are also referred to as employability skills, they are relevant outside the workplace and are not industry-specific.

For effective performance at the workplace, companies need their employees to have not only domain knowledge, technical and analytical skills but also the skills to deal with the external world of clients, customers, vendors, the government and public and to work in a collaborative manner with their colleagues. For IT-managers soft skills and personal transferable skills become crucial due to the complexity of different types of communications (including virtual and geographically dispersed); level of ambiguity, uncertainty, and instability; necessity to cooperate with different types of people inside and outside of organization for providing significant new solutions and software products. It is easier for an IT-specialist to develop soft skills if they start acquiring and training them from the high school or undergraduate level of education via theoretically based and practically applied psychological courses (Seat at al., 2001).

Regarding the Computer Science Curricula 2013, the education that computer science undergraduates receive should adequately prepare them for the workforce and future career development in a holistic way (Computer Science Curricula 2013 ...). Psychological competence, which includes soft skills (such as teamwork, verbal and written communication, time management, problem solving, and flexibility) and personal psychological attributes (such as risk tolerance, collegiality, patience, work ethic, identification of opportunity, sense of social responsibility, and appreciation for diversity), play crucial role at the workplace and for personal career development. Successfully applying technical knowledge in practice often requires an ability to tolerate ambiguity and to negotiate and work well with people from different backgrounds and disciplines, with different psychological traits and behavioral preferences (based, for instance, on MBTI or other psychological typology).

Besides the great role of soft skills in STEM professions, it is stated in IEEE Spectrum that in the U.S. the majority (3/4) of STEM graduates work outside STEM fields and, at the same time, less than a half of people employed in STEM fields have a STEM degree. This can be a sign that the required competence list in STEM fields can be broader than it may seem.

When we are trying to name or define such skills, we can divide them into two groups: “soft skills” (or “21st-century
skills”) and specific hard-skills of humanities subject can be required to make some parts of the work in STEM fields. National Research Council has published materials of a workshop on soft skills where the following taxonomy of soft-skills for STEM education was explained:

- Social-Technical (translating client needs into technical specifications; researching technical information to meet client needs; justifying or defending technical approach to client);
- Social (reaching consensus on work team; polling work team to determine ideas);

The problem is that in STEM case higher-order cognitive skills and social skills are mostly ignored. Data on problem-solving skills assessed by the Programme for International Student Assessment (PISA) clearly shows that in Russia transferable skills are drained (OECD, 2005), which means that technical and socio-technical skills can be problematic for students.

Basically, every humanity course in STEM curricula should develop 1) soft skills and 2) strictly define which of core course components will help students be successful in their career if they decide to stay on STEM track. None of the tasks is easy but the latter needs further reflection on what competences within a specific humanity discipline could be applied in a STEM job.

According to the U.S. Bureau of Labor Statistics projects by 2018, the bulk of STEM careers (71%) will be in computing. [1] If we consider the fact that companies organize work in teams, we can realize the importance of communication, especially in complex environments (uncertainty, multicultural issues, etc.). The importance of communication and group dynamics is consolidated in standards like Society Software Engineering Body of Knowledge (SWEBoK); Software Engineering Education Knowledge (SEEK); Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering, tech. report, IEEE CS and ACM, 2004, etc.

These standards propose four main courses: Group Dynamics / Psychology, Communication Skills (specific to SE), Project Personnel and Organization, Human Computer Interface Design.

For example, at Higher School of Economics computer science students take some obligatory and elective psychology courses in order to develop soft skills, such as communication, team work and understanding personality. In addition, after reflection on what core psychological skills could be helpful for STEM students, we suggested interpretation (an ability to explain) and irritation (an ability to function outside comfort zone).

For example, interpretation can be useful for understanding motivation behind behavioral patterns or results of empirical studies and at the same time for data scientists specifically for extracting insights and presenting them properly in a creative manner.

Understanding interpersonal differences and how they function in the classroom, workplace or in a greater organizational context is important for students, teachers, specialists, and managers, especially in IT industry, which is quite far from natural simultaneous understanding of the bias of psychological aspects (Capretz, 2002). Learning to understand one’s own preferences, how these preferences affect one’s assumptions about what constitutes effective interaction, and how these assumptions affect one’s relationships with students or colleagues helps to create more productive relations and better team spirit. With a greater self-understanding and knowledge of preferences, IT students and specialists can more successfully cooperate with others and show greater individual development and career growth.

References


Computer Science Curricula 2013 Curriculum Guidelines for Undergraduate Degree Programs in Computer Science December 20, 2013.


Higher Education in Russia and Beyond (HERB) is a quarterly informational journal published by National Research University Higher School of Economics since 2014. HERB is intended to illuminate the transformation process of higher education institutions in Russia and counties of Eastern Europe and Central Asia. The journal seeks to adduce the multiple-aspect opinions about current challenges and trends of regional higher education and give examples of the best local practices. Our audience represents wider international community of scholars and professionals in the field of higher education worldwide. The project is implemented as part of cooperation agreement between Higher School of Economics and Boston College Center of International Higher Education.

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