

more broadly across the subject spectrum — become more strategically directed by the universities themselves, taking into account the voice of learners as well as that of external stakeholders, such as funding bodies and employers.

## Conclusion

Whilst social sciences are clearly dominant at EMI universities in Central Asia, the rationale behind this trend is somewhat more complex. It is driven from above (state policy and regulations), outside (international organisations, processes of globalisation), and, to a lesser extent, from within (by universities themselves). These drivers are located within a context of both the contemporary political situation in Central Asia and the countries' shared Soviet heritage. Despite this unique set of circumstances, these EMI universities have, in fact, more in common with other such universities around the world than with other universities in Central Asia.

## References

[1] KIMEP is the Russian acronym for its former name, the Kazakhstan Institute of Management, Economics and Strategic Research.

[2] A full comparative list of courses offered at undergraduate and postgraduate level is available from the author.

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# Educational and Career Choices of Technically-Minded High School Graduates that Take State Exam in Physics

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The interest in the issue of technically-minded youth's attraction to engineering education and career paths is currently growing due to the increasing amount of investment in engineering industries made by the Russian government. The topic has become vitally important due to the need for import substitution, and the long-term shortage in qualified engineers. However, the motivation and personal attitudes of the technically-minded high school graduates towards future education and career are not properly monitored or estimated yet.

In order to get an idea about the plans and attitudes of these young people, we have surveyed those taking physics state exam (PSE). PSE is an elective part of the Unified State Exam taken by Russian high school graduates that enables them to enter higher education institutions (HEIs) to study in the fields of physics, engineering, and computer science. Actually, it is one of the most important milestones on an engineering career path.

Are those who choose PSE as an elective exam really enthusiastic about this subject? Is their choice of their future path independent? What education and career path do they envisage for themselves? Our aim was to find answers to these questions.

## Research Methods

In order to analyze the motivation and circumstances behind choosing PSE, 1230 respondents from 78 regions of Russia were surveyed, according to the share of school graduates in these regions. The questionnaire consisted of 24 questions, including the filter-question: 'Are you going to take PSE this year?'

## “Suppliers” of Future Engineers and Groups of Influence

We have learnt that the choice for PSE is not random for the majority of the respondents. It turned out that for nearly 1/3 of the respondents, the choice for PSE is predefined by the fact that they have been attending a high

school or a class where they studied advanced physics and mathematics. It means that a significant part of the graduates is 'destined' to become physicists, engineers or IT-specialists either at the age of 6-8 (choice of the school) or at the age of 12-14 (selection of the relevant class profile). The majority of the respondents (72%) admitted that they had made an independent choice of their future educational path and hadn't fallen under the influence of any group (i.e., parents, relatives, teachers, classmates). The most "independent" group among all is the participants of profile academic competitions for high school students, known as profile Olympics (POs), since 80% of the members of this group claim that their choice is free from others' influence. Even though the most important source of influence for the school graduates taking PSE is "parents and other relatives," they determine the future educational path for 21% of all the respondents and 14% of those who participate in POs. The opinion of classmates and teachers has barely no impact on the respondents' educational choice: 2.7% overall and 2% among the participants of POs. Even if one's future educational path was in fact modified by several groups of influence, we can conclude that the majority of those who take PSE have the feeling that they have made their choice consciously.

### Is Physics a School Subject that They Really Like?

The answer to this question is, 'Yes, it is.' 72% of respondents consider physics as one of their favorite subjects. Math is among the favorite for 70% of the respondents, and computer studies — for 23%. This confirms indirectly that the PSE choice is indeed a voluntary and motivated act. It is vital to mention that non-technical subjects, such as Russian language (18%), foreign language (12%), literature (10%), and history (9%), are also among the favorite. The results give us hope that these students will also succeed at developing their soft skills. The feedback we have obtained can also help modify and extend the ways of efficient career guidance; it shows that comprehensive approach to engineering education, at least during the first years of high school, could be of great value.

### Engineering: Not the Only Option

Data analysis results reflect the diversity of educational paths chosen by high school graduates that take state exam in physics. 62% of respondents want to become engineers, while 38% prefer physics or computer science. Interestingly, the share of "future engineers" among POs participants is lower than in the whole sample (54%). This fact marginally proves the assumption that the best high school graduates don't find engineering too attractive.

### Participants of Physics & Maths Olympics Want to Learn More

According to our data, 73% of the respondents already have an opinion about the level of education they ulti-

mately want to get. Speaking of the participants of POs, they are significantly more interested in long-term in-depth learning: 27% of them are willing to get a master's degree (compared to 18% in the total sample), and 11% want to get a PhD (compared to 6% in the total sample). Such high level of motivation for learning puts a heavy responsibility on HEIs. HEIs should do their best to stimulate the desire of talented students to master new competencies, capture and cultivate the interest for learning and doing science.

### Future Career Planning

Unclear employment perspectives are the main problem for high school graduates interested in physics. One of our survey questions was dedicated to the respondents' future career plans. According to the results, 35% of high school graduates taking PSE are planning to make a career in the field of engineering/physics or computer science. 27% want to become managers in the same field. 12% of the respondents want to be entrepreneurs, and only 7% intend to become academics.

### Conclusion

The overall quality of high school graduates who take PSE remains unstable from year to year. The average PSE score in 2011–2015 was 49.7 out of 100, while the average score for the state exam in social studies (which allows one to study economics, psychology, sociology, management at HEI level) was 55.4 out of 100. On the other hand, the amount of graduates taking PSE is quite high (about than one-fifth of all high school graduates that take the Unified State Exam). It is only rational that HEIs should try to attract the best graduates. At the same time, their ability to attract and retain talented technically-minded young people varies depending on their brand power.

In order to win the competition for the most talented high school graduated interested in physics, HEIs — together with industrial enterprises — should focus on building cooperation with high schools that offer advanced physics and mathematics. The main goals of such cooperation could be:

- To make the potential career paths clear and attractive for technically-minded high school students;
- To show the target audience the opportunities of combining technical competences and soft-skills (the source of lying in the humanities, which few students enjoy);
- To differentiate the engineering path from other alternatives and to show the self-actualization perspectives based on a positive mid- & long-term labor market demand;
- To provide specially tailored professional guidance programs for talented technically-minded high school students that win relevant academic competitions.

