

# HERB

Higher Education in Russia and Beyond

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Doctoral Education at the Crossroads

ISSUE

**4(25)**

WINTER

**2020**







## Dear colleagues,

Highly skilled graduates are considered as a necessary condition for innovation, technological development, and economic growth. It is no surprise that the number of doctoral students is growing worldwide. However, doctoral education faces many challenges: the increasing number of alternatives to an academic career for PhD graduates, the changing expectations of doctoral training, non-competitive entry level salaries in academia, and the high attrition rate. In addition to these, Eastern European and Post-Soviet countries have to deal with excessive state regulation, the underfunding of science and research, constant regulatory changes, etc.

In 2016, an issue of HERB was dedicated to the challenges of the organization and reform of doctoral education (issue 3(9)). In this issue, four years later, we want to give an update and show what has changed during this period. You will learn how doctoral education has changed over the past few years in different countries, what reforms have been implemented and what effects they have had, what the historical roots of the current state of doctoral education are and how doctoral studies have evolved. The articles cover wide range of doctoral education stakeholders—from those who plan to enter doctoral programs to those who got their degree many years ago.

We truly hope that you will enjoy this collection of articles.

**Guest editor Saule Bekova**

*(Research Fellow, Center for Sociology  
of Higher Education, National Research  
University Higher School of Economics,  
Moscow)*



## 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 computer science, 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. Higher School of Economics incorporates

97 research centers and 32 international laboratories, which are involved in fundamental and applied research. Higher education studies are one of the University's key priorities. According to recent QS World University Ranking, HSE is now among the top 150 universities in the subject of "Education". This research field consolidates intellectual efforts of several research groups, whose work fully complies highest world standards. Experts in economics, sociology, psychology and management from Russia and other countries work together on comparative projects. The main research spheres include: analysis of global and Russian higher education system development, transformation of the academic profession, effective contract in higher education, developing educational standards and HEI evaluation models, etc.

## Center for Institutional Studies

The Center for Institutional Studies (CInSt) is one of HSE University's research centers. It focuses on fundamental and applied interdisciplinary research in the field of institutional analysis of the economics and sociology of science and higher education. CInSt is integrated into international higher education research networks and cooperates with foreign experts through joint comparative projects that cover the issues of higher education development and education policy. As part of our long-term cooperation with the Boston College Center for International Higher Education, CInSt has taken up the publication of the Russian version of the "International Higher Education" newsletter.

One of the main research areas of CInSt is the study of applicant and student strategies related to higher education and the link between education and the labour market. Our studies analyze the issues that applicants face during the admission process, the factors of student

success during their studies at universities, the issue of student employment and combining of study and work. We also study the expected and actual returns to education and labour market outcomes of university graduates depending on educational factors and strategies of school-to-work transition with particular attention to gender issues. Research on university graduates is conducted in collaboration with other research centers, including The Laboratory for Labour Market Studies at HSE University, Center for Research in Higher Education Policies of the University of Porto, and Ghent University.

The results of the research are published in leading educational journals, such as Higher Education, Higher Education Quarterly, Urban Education, International Journal of Educational Development, European Journal of Education, Journal of Education and Work, Journal of Higher and Further Education, Tertiary Education and Management and other outlets.

# Contents

## HERB

Issue 4(25) Winter 2020

Doctoral Education at the Crossroads

### Recent reforms and lessons from history

- 6 Maria Yudkevich, Victor Rudakov**  
Doctoral education across the world: between diversity and unification
- 7 Aliya Kuzhabekova**  
Bibliometric analysis of doctoral education worldwide
- 9 Marek Kwiek**  
Doctorates in Poland: problems and prospects
- 10 Elena Kobzar**  
The transformation of doctoral education in Russia: recent lessons
- 12 Maria Yudkevich**  
PhD programs in Russia: from the Soviet legacy to the present day



## The Academic Journey: from student to professor

**14 Saule Bekova, Ivan Smirnov**

Determinants of doctoral degree aspirations: insights from a nationally representative panel study

**16 Evgeniy Terentev**

Collective or individual enterprise? Who provides academic support to doctoral students at Russian universities?

**19 Boris Bednyi**

What is the proportion of Russian PhD students defending their theses and continuing their academic careers?

**20 Katerina Guba, Angelika Tsivinskaya**

Plagiarism on the academic periphery

## Young researchers on PhD training

**22 Aray Saniyazova**

Young researchers as drivers of change in doctoral education

**24 Marina Spirina, Alena Nefedova, Ekaterina Dyachenko**

When reforms are not enough: how to improve Russian PhD training? Viewpoints of young internationally mobile scientists

# Doctoral education across the world: between diversity and unification<sup>1</sup>

**Maria Yudkevich**

*Director: Center for Institutional Studies,  
Vice-rector: HSE University  
(Moscow, Russia)  
[yudkevich@hse.ru](mailto:yudkevich@hse.ru).*

**Victor Rudakov**

*Research fellow:  
Center for Institutional Studies,  
HSE University (Moscow, Russia)  
[vrudakov@hse.ru](mailto:vrudakov@hse.ru).*

Doctoral education worldwide is characterized by diverging trends toward diversity and unification, which are influenced by massification and internationalization, growing research requirements, labor market challenges, and changing purposes of doctoral education. On the one hand, there is a tendency toward increased flexibility, as illustrated by the development of professional and work-based doctorates, of distant and part-time forms of PhD programs, and variations in terms of types of PhD programs, supervision, and study process. On the other hand, the formation of global doctoral education systems with worldwide flows of students, faculty, and graduates, and the development of world-class universities contribute to unifying the enrollment and study process of doctoral education, and lead to similar requirements for those intending to pursue careers at world-class universities. However, this process of unification affects only top universities, frequently leaving national doctoral education systems intact—which also creates institutional differentiations within countries.

## The Origins of Global Differences

The patterns of doctoral education in a given country depend considerably on the model that was chosen during its emergence and the implications of subsequent reforms. During the formation of their system, countries adopted models or elements of doctoral education of other countries with mature academic systems. For instance, some countries adopted the German model, with its strong focus on research work during the doctorate. Some went for a two-step doctoral education system as in the Soviet Union and some post-Communist countries (requiring two dissertations). Later, others adopted the US model, which is more structured and includes considerable coursework. During the nineteenth and twentieth centuries, there were several different national leaders in the sciences, and as a result doctoral education in many countries is a mix of best practices of these leading countries, adopted to fit in-

ternal realities and national institutions. In our publication *Trends and Issues in Doctoral Education: A Global Perspective* (2020), we analyze key trends in doctoral education around the world.

## Scale of Labor-Market Outcomes

During the past two decades, there has been a massive growth in the number of PhD holders, caused by increasing research ambitions of universities and a need for faculty by expanding higher education systems. It is frequently mentioned that there is an oversupply of PhD graduates globally. However, one must differentiate between the situation in most higher-income countries, where doctoral graduates are indeed in excessive supply and face employment problems in academia, and in many lower-income countries with expanding tertiary education systems, where there is a dire need for PhD graduates. Nevertheless, due to a shrinking academic labor market in higher-income countries, the employment prospects of doctoral holders, especially in the humanities and social sciences, are getting worse, which explains the spread of postdoc formats of employment and emphasizes the importance of industry as an employment destination for doctoral graduates.

## Internationalization

In terms of internationalization, English-speaking countries and countries providing an option to write and defend one's thesis in English have an important competitive advantage in attracting international doctoral students. A long history of doctoral education, as in Germany, or a past as a colonizing power, as for France—which provides massive flows of students from former colonies with expanding higher education systems—are other predictors of high number of international doctoral students. Countries like Brazil, China, and Russia are regional powers in terms of higher education and mainly attract students from neighboring countries.

## Processes and Types of PhDs

There are considerable differences between doctoral program processes, namely in program length, levels, and intermediary exams, affecting PhD completion and attrition rates, as well as between types of PhDs, dissertations, and supervision. There is a stable increase of part-time and distant formats of PhD programs all over the world, which, however, raises issues of quality and learning outcomes. There is some heterogeneity in terms of program length, although in general programs last between three and five years depending on country and subject. Despite the fact that in several countries (e.g., Germany, Poland, and Russia) there are still some elements of two-step doctoral degrees, with the implementation of the Bologna reform two-level systems are gradually disappearing. There is a differentiation between research-based (mainly in Europe) and course-based (mainly in the United States) approaches to doctoral education, but most countries gradually move toward course-based PhDs. Another clear trend is

a change in dissertation requirements, namely the increasing significance of research publications.

A need for new leaders in the knowledge-oriented economy, the importance of industry–university partnerships, a shrinking academic labor market, and wide criticism of the lack of attention to skills of academic doctoral training have led to a change of purpose of doctoral education. PhD programs are no longer limited to nurturing new scholars for the academic labor market. This leads to the development of professional and work-based doctorates, especially in fields like accounting, finance, law, medicine, and nursing.

### Funding and Status of Students

There is a wide diversity in funding models of doctoral education: free, tuition based, with scholarships and loans, or with a salary. In China, Japan, South Korea, the United Kingdom, and the United States, tuition costs are high and financial help depends on funding from programs, research projects, or universities. Germany provides students with the necessary support during their studies, making doctoral education there an attractive option for talented youth from around the world. In Kazakhstan and Russia, some doctoral students pay tuition fees, but these are quite low. In the majority of doctoral systems, including in the United Kingdom and the United States, doctoral candidates are considered students, while in Germany, the Netherlands, and some of the Scandinavian countries, doctoral candidates have the status of university employees.

### The Impact of the Pandemic

As all other students, doctoral students are affected by the current pandemic. Many are not able to work on their projects, especially where equipment is involved. Some suffer from lack of communication and support from their advisers and departments. For those who are entering the job market this year, the situation is extremely uncertain and insecure. But the negative effects of the pandemic are likely to increase: Some doctoral schools at several major US universities have already announced that they will not admit PhD candidates into their programs next year in order to “concentrate resources on their work with existing doctoral students.” Universities will definitely need time to return full scale to their function of preparing new academics.

### Notes

[1] This text was initially published in the journal “International Higher Education” № 105 (winter) in 2020



# Bibliometric analysis of doctoral education worldwide

Aliya Kuzhabekova

Associate Professor: Graduate School of Education,  
Nazarbayev University (Kazakhstan)  
[aliya.kuzhabekova@nu.edu.kz](mailto:aliya.kuzhabekova@nu.edu.kz)

### Purpose

While there is increasing global scholarly interest in understanding doctoral education, there is a lack of studies which provide a systematic overview of the research domain. In this brief article, I provide a bibliometric analysis of global research on doctoral education using data from Thompson Reuters Web of Knowledge. The dataset was created by applying a keyword search to the database to select publications from journals in a variety of disciplines publishing papers on the issues of doctoral education. The specific search algorithm, which was applied to paper titles in “Advanced Search” option of the database and which produced the greatest number or the most relevant papers was as follows:

*TI = ((doctoral or PhD) and (education or student\* or enrollment or admission or advising or mentorship or supervision or development or socialization or training or experience or graduation or retention or enrollment))*

The resulting dataset included 916 publications from 2011 to November 2020. The dataset was restricted to journal articles only.

### Analysis

Based on publications available in the Web of Knowledge, scholarship on doctoral education has been steadily growing over the last decade. In 2011, the database captured 46 articles on the topic, while in 2020 the number of articles in the dataset had more than doubled (115). The increase in the number of publications was accompanied by an increase in the number of citations. Citations on the topic have experienced exponential growth over the last decade (from 174 in 2010 to 1,811 in 2019 and 1,489 in 2020 for which only incomplete data was available). 97% of the papers were produced in English. 64% (586) of the articles come from the fields of education and educational sciences and 13% (121) from medical sciences.

Most research has been conducted in the English-speaking world with the US producing 45% (411) of the publications, followed by Australia 13% (123), and the UK 9% (87). Among non-Western countries, South Africa 5% (45), China 4% (36), and Turkey 1.6% (15) are showing an increasing interest in the topic. 12 of the articles were produced by authors with affiliation in Russian universities, most notably HSE University.

Researchers pursuing the topic of doctoral education came from 825 different organizations around the world. The majority of these were university research centers from the US. The 5 most productive organizations are the University of Virginia 2% (21), the University of Illinois 2% (19), Georgia State University 1.6% (15), and the University of Michigan 1.6% (15) and Australian National University 1.5% (14). Other important centers of scholarly activity on doctoral education are Oxford University, the University of Pennsylvania, the University of Helsinki, the University of Technology in Sydney, Indiana University, McGill University, Ohio State University, and the University of New Mexico. The top researchers on the topic of graduate education in

terms of number of publications are Boyce (the University of Virginia), McAlpine (McGill University), Gardner (the University of Maine) Guerin (the University of Adelaide), Kim (the University of Illinois) Almarode (the University of Virginia), Feldon (Utah State University), Kiley (Australian National University), Lund (Georgia State University), Napper-Owen (University of New Mexico), Manathunga (the University of the Sunshine Coast) and Pyhälä (University of Helsinki). Each of them contributed 7–13 papers to the dataset. Table 1 provides information about the top 5 articles by citations in the dataset. All of these articles were published in English after 2000 in highly cited journals in education and education-related fields.

**Table 1.** Five most cited articles

Title	Authors	Journal and Year	Total citations
The role of the department and discipline in doctoral student attrition: Lessons from four departments	Golde, C.M.	Journal of Higher Education, 2005	269
How are doctoral students supervised? Concepts of doctoral research supervision.	Lee, A.	Studies in Higher Education, 2008	235
“I heard it through the grapevine:” Doctoral student socialization in chemistry and history	Gardner, S.	Higher Education, 2007	172
Does advisor mentoring add value? A longitudinal study of mentoring and doctoral student outcomes	Paglis L., et al.	Research in Higher Education, 2006	157
Mentor relationships in clinical psychology doctoral training: Results of a national survey	Clark, R.A., Harden, S.L., Johnson, W.B.	Teaching of Psychology, 2000	143

Almost 7% of the articles (60), which is the greatest share of publications in the dataset, came from *Studies in Higher Education*. The two other journals publishing articles on the topic, were *Higher Education Research and Development* (5.3%, 49) and *Journal of Professional Nursing* (3.2%, 30). Some other key education journals publishing *Higher Education*, *Studies in Postdoctoral and Graduate Education*, and *Teaching in Higher Education*.

Only 19% of the articles in the data set indicated sponsoring organizations. Two of the most frequently mentioned agencies are the U.S. National Science Foundation and the U.S. National Institutes of Health and Human Services. Other top funders are the EU, the Robert Wood Johnson Foundation, and the Spanish Ministry of Economy and Competitiveness.

The analysis of keywords used (Figure 1) indicate that many articles are concerned with issues of mentorship and supervision. Second, a large share of studies discusses issues related to curriculum, teaching/training/pedagogy, assessment/evaluation. Some topics of special interest here are research training, academic writing and e-/distance/blended learning, and international graduate student experiences.

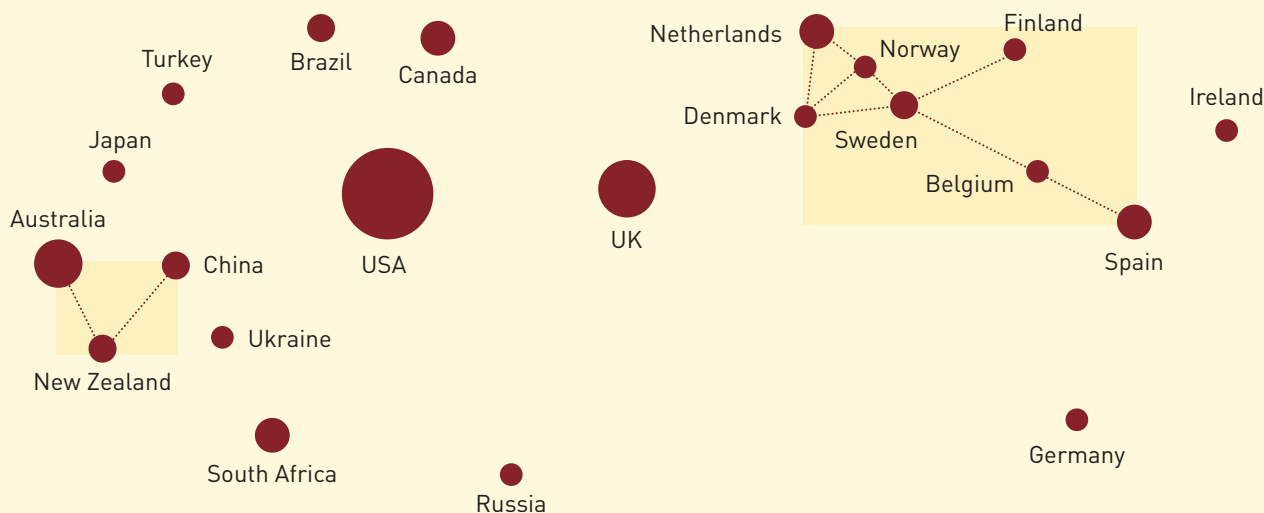
**Figure 1.** Word cloud of keywords



Figure 2 shows the social network map of international collaboration in research on doctoral education. The map was generated from an auto-correlation matrix of country affiliations. The key observation from the map is that there is barely any international collaboration among scholars studying doctoral education. Some ties among scholars exist in Europe, and among Australia, New Zealand and China. However, there does not seem to be much interaction among scholars in the US and Canada or between continents.



**Figure 2.** Social network map of international collaboration in research on doctoral education



### Key observations

One of the most important observations from the study is that there is growing interest among scholars in investigating doctoral education. Most of this research, however, is conducted in the Western, English-speaking world, which is not consistent with the increasing enrollment of doctoral students in the non-Western world. There is room for the domain to grow in terms of research in non-Western countries and comparatively.

Another observation is that the domain of research is still at the early stages of development and is scattered among several journals. There is a very small number of specialized journals that are devoted to the topic of graduate/doctoral education in particular. There is also a very low degree of collaborative activity.

The last important observation from our findings is that a very small share of articles on doctoral education are supported by funding. This is surprising, given that doctoral education is highly publicly subsidized in many countries.

One of the characteristics of exploratory bibliometric research is that it tends to raise more questions than it answers, and that is surely the case for the present article. Due to the large size of the dataset, it is impossible here to conduct an in-depth content analysis of the articles or determine commonly used methodologies, theories or more specific themes covered in the research. More importantly, it is important to understand that the approach used in this paper depends on the choice of the data source and the selected keyword sequence.



## Doctorates in Poland: problems and prospects

**Marek Kwiek**

*Professor: Center for Public Policy Studies,  
University of Poznan (Poland)*  
[kwiekm@amu.edu.pl](mailto:kwiekm@amu.edu.pl)

Under the communist regime in Poland, the number of doctoral students was low, supervision followed the traditional model in which doctoral students worked closely with their supervisors, and completion rates were high. However, following the collapse of communism in 1989 there were three significant developments.

First, there was the massification of higher education in general and of doctoral education in particular. The number of doctoral students grew very rapidly from 1990 to 2006 before stabilizing. By 2019, there were 53,926 students studying for doctorates in Poland compared with 2,695 in 1990.

Second, this dramatic expansion of student numbers was not accompanied by a corresponding increase in the number of academics, which only rose by half. This had serious consequences in terms of the burdens of faculty supervision and hence the quality of doctoral education [1].

Third, while thousands of extra students entered doctoral education, only a small minority gained their doctoral degrees; many either quickly dropped out or successfully completed their programs but never wrote or defended their theses. Despite the 20-fold increase in doctoral students from 1990 to 2019, there was only a 3-fold increase in the numbers of doctoral graduates from 2,324 to 7,100. This disparity between entrants and doctoral degrees awarded is central to understanding the emergent tensions around doctoral education in Poland. The current intake

of doctoral students combines the overproduction of doctoral students and a scarcity of doctorates [2].

Prior to the end of Communist rule in 1989, the basic rationale behind doctoral education was to provide trained staff for higher education institutions. From 1989, doctoral education was extended to those who wished to continue in higher education, without considering academic jobs. Massified, underfunded, organisationally uncoordinated—and most of all, perhaps, devoid of a clear purpose—doctoral education has drifted into the unknown, and most doctoral students now combine doctoral studies with non-academic work rather than being socialized into academic norms.

Doctoral education in Poland has been systematically criticized in scholarly circles and in the popular press. Previous reform waves in 2005 and 2009–2011 did not change either doctoral education or the doctoral supervision model. However, in 2016–2018, a model emerged in which doctoral education was transferred to a new institutional layer of doctoral schools. The newly created doctoral schools took on all the responsibilities previously given to faculty councils and new doctoral students were selected; since October 1, 2019 they have been educated and funded through centralized doctoral schools created at the level of institutions.

A new law on higher education (2018) introduces the concept of doctoral schools, located exclusively in institutions that are highly ranked for research performance. A new geography of doctoral education is gradually being introduced, with all full-time doctoral students concentrated in doctoral schools and a limited number of part-time doctoral students still scattered across the system. In 2019, there were 3,900 doctoral students located in doctoral schools.

The total number of doctoral students is expected to decrease by 30–50% in the coming years but all of them will receive doctoral scholarships at the level guaranteed by the Ministry of Science and Higher Education through the new centralized doctoral schools. The major difference is the coordination of doctoral education at the institutional level. For the first time, the central administration will be able to coordinate the distribution of doctoral students across academic disciplines. Doctoral schools will provide collectively designed curricula for doctoral students which will include institutional level general subjects and faculty level specialist subjects. Key events will be coordinated by the school—rather than being loosely structured and uncoordinated as in the past [3]. The responsibility of doctoral supervisors will be towards doctoral schools, doctoral schools will be expected to prepare professional development plans for their students in close collaboration with doctoral supervisors and to prepare professional training for the new supervisors associated with them.

Overall, a traditional, somewhat amateurish approach to doctoral education—which perfectly fitted the low scale of operation prior to the expansion—will gradually be replaced by a more professional, centralized, and rule-gov-

erned approach implemented across the whole system. As planned, team supervision will become more widespread and the opportunities to internationalize doctoral education through international co-supervisors will be much more widely used. The issue of doctoral students being poorly supervised because of full-time work outside of the higher education sector will be solved: doctoral scholarships are substantial and their level increases after two years of doctoral studies. No external work for doctoral students will be allowed, easing the work of doctoral supervisors and doctoral students alike.

Polish doctoral education has also been experimenting with an entirely new type of doctorate: the so-called “enterprise doctorate,” which is similar to the professional doctorate. Although the number of new doctorates is limited (500 new doctoral students each year from 2017), it warrants mentioning as a new idea. Under this new ministerial scheme, doctoral students are entitled to receive a relatively generous doctoral scholarship and a salary from any enterprise that employs them. Doctoral education and dissertation are undertaken in partnerships between higher education institutions and enterprises. Only the highest ranking institutions (according to national research) are eligible to offer this new type of doctorate.

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# The transformation of doctoral education in Russia: recent lessons

Elena Kobzar

*Head of Office of Doctoral Studies:  
HSE University (Russia)  
[ekobzar@hse.ru](mailto:ekobzar@hse.ru)*

Seven years ago, a major reform of Russian doctoral programs began. This reform was a response to the challenges of training new generations of researchers. The growth

in the number of state-funded PhD students was accompanied by a low share of thesis defenses, a decline in the quality of dissertations, and a noticeable number of PhDs choosing a career in business rather than academia.

Which of the steps taken to reform PhD training can be considered successful, and what challenges still remain? What could be a suitable response to these challenges?

### **Performance Criteria for PhD training**

The first issue of Russian PhD programs is the low numbers of the thesis defenses. All the efforts undertaken so far have failed to reverse this long-term trend. Completion rate usually refers to the ratio of students who defended their thesis to the number of enrolled on doctoral programs. In recent history, this indicator has not exceeded 20% of enrolled.

The situation with the thesis defense is not good, but it is still better than as described in official reports. The fact is that not all defenses are taken into account when assessing the completion rate of PhD programs. The relevance of the indicator "completed with defense" as a target indicator for training researchers has been long, and rightly, criticized. First of all, because the bulk of PhD students in the country (in different years from half to 2/3 [1]) defend their dissertations after their graduation, and these defenses were not taken into account when calculating the completion rate. However, even taking into account the total number of defenses, the completion rate of PhD training is low: about 40% of PhD students fail to complete their studies [2]. More than half of those who have completed their studies do not defend their dissertations.

More adequate indicators of the performance of PhD programs could be the total number of PhD awarded and the average preparation time (time to degree), and the career of PhD students (unemployment rate in comparison with workers with other levels of education, average salary, job placement). However, the switching to using this indicator requires significant restructuring of the data collecting system on PhD programs and PhD students.

### **PhD training and the labor market**

The decrease in the number of defenses (in absolute and relative terms) in recent years is also part of a longer trend in the labor market for PhDs, and the result of the relatively recent reform of the degree-awarding system. One of the consequences of this was the tightening of the thesis requirements.

In recent decades, not only in Russia but also in most countries with a long history of the development of PhD training, there has been an influx of workers with scientific degrees into the non-academic sector. The change in the employment structure of PhDs is explained not only by the difference in salaries in these sectors but also by the fact that the non-academic sector has long and steadily created and reproduced a segment of jobs in which research competencies are in demand. Therefore, it is impossible to unequivocally negatively assess this trend as the employment of overqualified workers.

Changing the employment structure of PhDs is one of the challenges facing the doctoral training system. The skills and competencies offered by current PhD programs are more suited to academic work. However, many universities are in no hurry to restructure the programs to meet the demands of the external labor market, because the overwhelming majority of universities consider PhD programs as training exclusively staff for academia.

PhD students in Russia enter the labor market long before graduation. Quantitative studies have shown that at least 90% of full-time PhD students are employed; often full-time and off-campus. One of the effects of combining work and study is a decreased motivation to continue PhD studies. Interest in entering the labor market during PhD studies cannot always be explained by the need to earn money, given the very low PhD scholarship. The results of surveys of PhD students at HSE University conducted in different years show that, regardless of the size of the scholarship, 25-33% of PhD students would continue to combine study and work. One of the explanations may be that PhD students enter the labor market in order to acquire the competencies and skills necessary for further career growth which cannot be obtained at university. If these competencies and skills were offered by PhD programs, the need for early entry into the labor market would probably be lower.

### **Directions of recent reforms**

The motive for reforming PhD training in Russia was not only the low completion rate but also the low quality of many dissertations. The reform of the system for PhD awarding, carried out in the early 2010s, focused on monitoring the defense process and tightening defense requirements: the minimum number of publications in peer-reviewed journals required for the defense of a thesis has increased and it has become mandatory to video record the defense, to place dissertations and reviews of dissertations on sites available for public review with rigidly established terms, to check the activities of dissertation councils, etc. It took more time for both PhD students and universities to meet these requirements and fewer PhD students managed to defend their dissertations on time.

In 2017, the next stage of the reform of the system for PhD awarding started—about 30 leading universities and research institutes were given the right to award their own academic degrees. These organizations must comply with a number of requirements (for example, the higher minimum number of publications required by a student to get their PhD), but they can independently determine the procedures for thesis defense. The first result of the reform was more flexible procedures of defense which allowed to adjust to the specifics of different research fields. Besides these organizations were first to start using technology for the remote defense of dissertations, which allowed to expand the pool of leading researchers involved in the thesis review process. The remote defense format was later extended to all universities and scientific institutes. In general, empowering universities and institutes has been



a positive step and has allowed the testing of a variety of technologies for the thesis review and expertise.

Among other steps to develop the system of PhD training, taken over the past 5 years, the following have been positively assessed:

- the development of a system of grants for PhD students financed by the state;
- an attempt to remove the excessive regulation of PhD training. A draft law has been prepared that abolishes the PhD programs accreditation that has been focused on monitoring the formal conditions of the training programs, and not on the quality of doctoral training;
- the revision of the nationwide requirements for admission to PhD programs. Universities can give preference to applicants who have experience in research when selecting them. Previously, the only path to PhD studies was formal exams, now universities can take into account a wide range of individual achievements (publications, research experience, conferences, etc.).

## Conclusions

The development of the PhD training is associated with several factors: the creation and expansion of the research infrastructure in universities and research centers, with encouragement to develop network forms of training for PhD students, with consolidating the resources and experience of different organizations, and with the provision of opportunities for organizations to choose the technologies and methods for training PhD students adjusted to field of study and the labor market.

## Notes

[1] Calculated by the author based on Rosstat data [https://rosstat.gov.ru/free\\_doc/new\\_site/population/obraz/asp-dokt.htm](https://rosstat.gov.ru/free_doc/new_site/population/obraz/asp-dokt.htm)

[2] Calculated by the author based on Rosstat data <https://rosstat.gov.ru/folder/13398> ("Main indicators of PhD training")

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# PhD programs in Russia: from the Soviet legacy to the present day

**Maria Yudkevich**

*Director: Center for Institutional Studies,  
Vice-rector: HSE University  
(Moscow, Russia)  
[yudkevich@hse.ru](mailto:yudkevich@hse.ru)*

In its first years, the Soviet government was already concerned with the problem of training staff for higher education. It needed, in a short time, to fill universities with new cadres who received a "proletarian" education. By 1923, the first regulations of the People's Committee for Education for Russia were adopted, regulating the procedure to train graduates for research and educational work. Two years later, PhD programs became the main tool for training research and pedagogical staff. Adopted in July 1925, "Regulations on the Procedure for Training Scientists at Higher Educational Institutions and Research Institutions" mentioned for the first time the term PhD student and describes the first outlines of the future system of PhD programs.

In January 1934, the Council of People's Commissars of the Soviet Union adopted a resolution "On academic degrees and titles", which established two academic degrees in the country: candidate of science (PhD) and doctor of science [1]. This two-tiered degree system, which follows the German tradition, continues to this day. A key role in setting the requirements for theses and the system for awarding academic degrees was assigned to the Higher Attestation Commission (HAC), which had been created two years earlier. This role remains with the HAC to this day.

PhD students were trained both at higher educational institutions and at research institutes (including the institutes of the Russian Academy of Sciences). The latter were not engaged in educational activities and accepted university graduates into PhD programs. After completing their PhD programs, they often stayed on as researchers. Work on staff training developed at a rapid pace. By 1927, there were 892 PhD students in the Soviet Union: 376 in universities, 241 in agricultural universities, 171 in industrial and technical institutes, 44 in medical colleges, 26 in socio-economics, 16 in pedagogy, and 18 in art [2]. The PhD students of the first decades represented an older group than the PhD students of the late Soviet period or of today who enroll, as a rule, immediately after graduation. In 1929, 38.4% of graduate students were aged 30–39, and 49.8% were 25–29 [2].

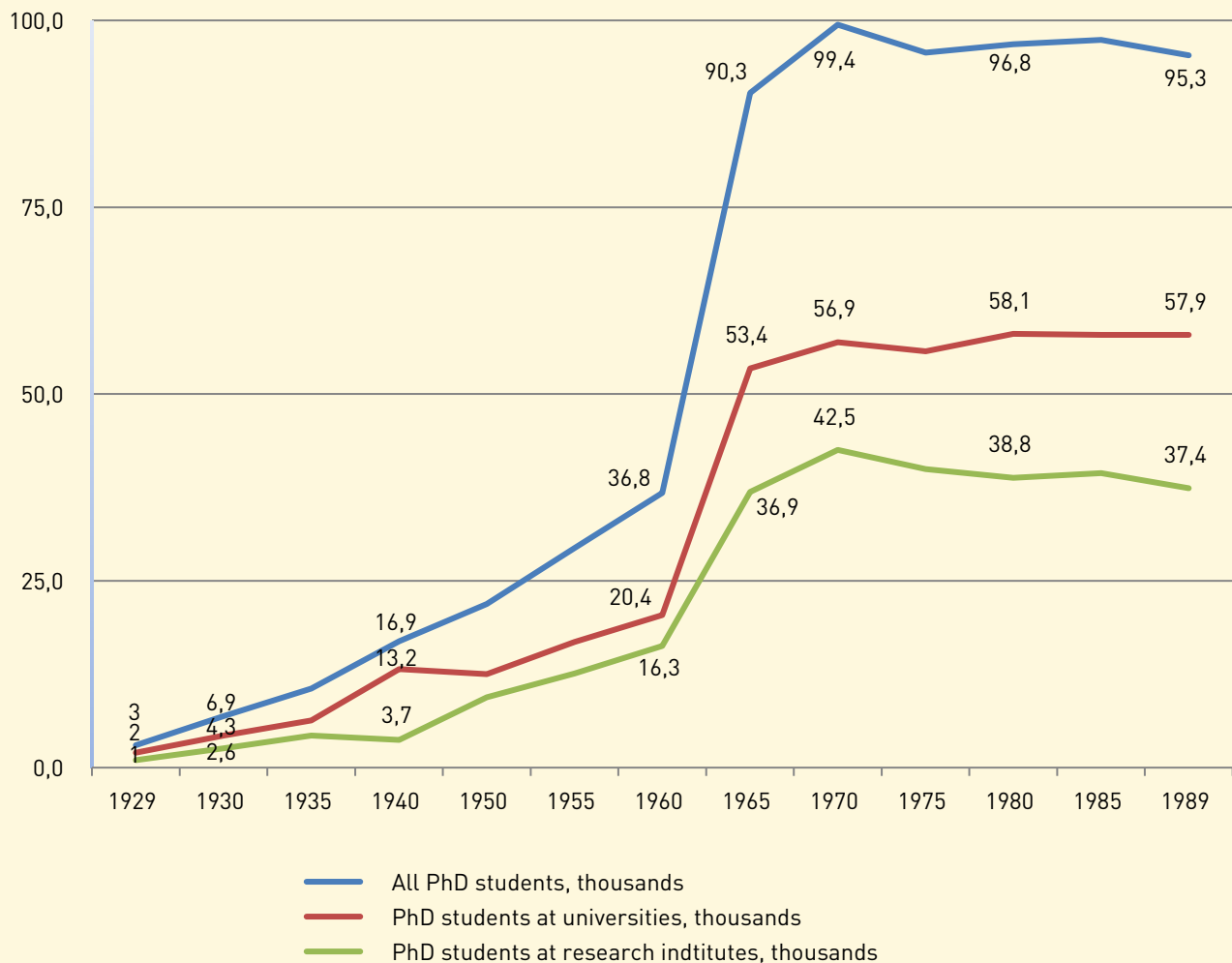
Considering the importance of training university staff, the State took a number of centralized measures to ensure their quality. In 1934, a list of universities was approved in which the defense of theses was allowed. Its

initial version included 75 universities, of which 40% were industrial universities and their number gradually increased [2]. Attention was also paid to the gender composition of postgraduate students and as a result, on the eve of the war, up to 35% of professors and teachers in universities were women (recall that in pre-revolutionary Russia women were not allowed to teach) [3]. Centers for the training of scientific and educational specialists for the republics of the Soviet Union were also created as until a short time previously, there were no institutions of

higher education at all. This was also an important and ambitious task and all PhD students received state scholarships (in the pre-war period, almost twice the average salary).

The scale of staff training in the post-war period changed dramatically. By the end of the 1950s, PhD studies were widespread (Figure 1), including a significant share of programs of part-time (correspondence) format (the first correspondence programs appeared before the Second World War). It remains significant today.

**Figure 1.** The number of PhD students in the USSR by type of educational institution 1929–1989 (thousands)



Compiled by the authors on the basis of statistical collections:

*The socialist construction of the USSR, 1934, p. 418; The cultural construction of the USSR, 1940, p. 242; The national economy of the USSR, 1913–1955, p. 153; The national economy of the USSR, 1959, p. 760, 1960, p. 788, 1965, p. 715, 1990, p. 308; The national economy of the USSR for 60 years, 1977, p. 145; The national economy of the USSR for 70 years, 1987, p. 65*

The features of the system began to take shape and remained to the end of the Soviet period: a relatively low share of PhD students studying at research institutes (although universities were involved in research than research institutes), a high proportion of PhD students studying at correspondence programs, a low percentage of successful graduation—in some years graduation requirements included a defense, in others not.

The system of training PhD students in the Soviet period was based on the premise that PhD programs serve to train

teaching and research staff for universities and research institutes (including the Russian Academy of Sciences).

As a rule, its own graduates were admitted to PhD programs of the university after completing a 5-year undergraduate program. Although this admission required the successful passing of entrance exams, the main challenge was not the exams themselves, but to be able to take them. For admission to a PhD program, a university graduate had to receive a recommendation upon graduation. This depended on academic success and the level of the com-

pleted thesis, as well as on the recommendation from the Komsomol and party organizations. Completion of a PhD was a prerequisite for building an academic career, and PhDs were assigned to work in universities or research institutes.

PhD programs in the sectoral context were determined by the needs of the industry. Accordingly, the dominant share of PhD students was in technical specialties, and there was only a small proportion of PhDs in the humanities.

### Modern Russia - an overview

With the collapse of the Soviet Union, a transformation of PhD programs began. From the mid-1990s there was a significant increase in the total number of PhD students, which continued until 2010, and in many respects the growth in these 15 years was determined by the emergence and explosive growth of the fee-paying segment of PhD programs; previously all students studied at the state's expense. Considering this as a revenue stream, universities in many cases accepted university graduates with very poor training and who were not interested in an academic career. In 2015, every third PhD student was tuition-paying.

It must be understood that this expansion occurred during the most difficult period for universities. The scholarship, which state-funded PhD students continued to receive, was no longer enough to survive on. PhD students began to work en masse, full-time and often in areas that had nothing to do with their studies.

During this period, the number of universities accepting PhD students also increased (from 398 in 1990 to 748 in 2010), while the number of research institutes that train PhD students decreased both in relative and absolute terms (from 834 to 809). The growth of the "university" component of PhD programs was because a PhD gave its holders higher social (and not just academic) status and therefore was in demand by those who were not going to pursue career in science or education. In addition, fee-paying PhD students were a source of additional income for universities. Universities began to tolerate the combination of work and study (and what else could they do?), taking into account that neither the teaching salary, let alone the scholarship, provided PhD students with a decent existence, and they simply had to look for additional sources of income. Today, the PhD scholarship remains very low, however, there are more opportunities for graduate students to earn additional income through participation in research projects and teaching. Despite the increase in the number of PhD students, the share who defend their theses remains low.

With the change of priorities in industrial policy, the structure by discipline has undergone marked changes: technical sciences still remain the most popular, although they have noticeably lost ground. Judging by the indicators of the share of graduates from PhD programs who defended their theses, the key suppliers of PhDs to the Russian market were in the areas of technical, economic, and medical sciences (in 2015, 24%, 13% and 16%, respectively).

The sectoral structure of state-funded and fee-paying PhD students also differs. There is a higher graduation rate for state-funded PhDs, with an emphasis on technical and natural sciences. Fee-paying PhDs are concentrated in economics and law, that is, in those areas that are most in demand by the non-academic labour market and do not require graduate students to work in laboratories or with equipment, making the combination of thesis work and employment more practical. In 2015, PhD students of technical specialties accounted for 29% of the state-funded cohort and only 14% of the fee-paying cohort; for economists 11% and 29%, and lawyers 4% and 13%, respectively.

Although today the structure of PhD programs has changed in comparison with the Soviet period, these changes are less related to the demands of the academic market. To a greater extent, they are determined by demand from the non-academic labor market and by supply from universities. This is dictated by the incentives for higher education institutions to have large PhD programs that attract state and student funding. This results in many systemic problems for Russian PhD programs, including a low percentage of defenses, quality problems, and the low number of students interested in pursuing an academic career.

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## Determinants of doctoral degree aspirations: insights from a nationally representative panel study

**Saule Bekova**

*PhD, Research Fellow: Center for Sociology of Higher Education, Institute of Education, HSE University (Moscow, Russia)*  
[bekova.sk@gmail.com](mailto:bekova.sk@gmail.com)

**Ivan Smirnov**

*PhD, Research Fellow: Chair for Computational Social Sciences and Humanities, RWTH Aachen; Leading Research Fellow: Laboratory of Computational Social Sciences, HSE University (Moscow, Russia)*  
[ivan.smirnov@cssh.rwth-aachen.de](mailto:ivan.smirnov@cssh.rwth-aachen.de)

The number of doctoral enrollments and the number of doctoral degrees awarded annually is growing worldwide



[1]. However, the opposite tendency is found in Russia. The number of doctoral students is steadily declining and has been almost halved over the last 10 years from 157,437 in 2010 to 84,265 in 2019 [2]. The proportion of students who enroll in doctoral programs immediately after their graduation from a University has also decreased remarkably from 31% in 2010 to 5% in 2019 [3].

This raises concerns over the potential negative effects that such an outflow of talented graduates to the non-academic labor market might have on universities. For instance, it might further complicate the replacement and recruitment of research and teaching staff who are already struggling to compete with more lucrative career opportunities outside academia.

Given these concerns, it is especially important to identify the determinants of doctoral degree aspirations and to understand the difference in the profiles of students who decide to leave university after undergraduate studies and those who decide to enroll in doctoral programs. While the factors determining the chances of successful completion of a doctoral program in Russia have been studied [4], little is known about the factors determining the decision to enroll in such programs in the first place. Our study is intended to fill this gap by analyzing unique data from a nationally representative longitudinal study “Trajectories in Education and Careers” (TrEC) [5]. TrEC has been tracking 4,400 students from 42 Russian regions since 2011. We focus on the educational outcomes of students along with key socio-demographic characteristics and their association with plans to obtain a doctoral degree.

The educational outcomes are measured by PISA scores [6]. The participants took PISA tests in 2012 when they were 15 years old. Note that academic achievements measured by such standardized tests are known to be stable over time and correlate highly with important life outcomes.

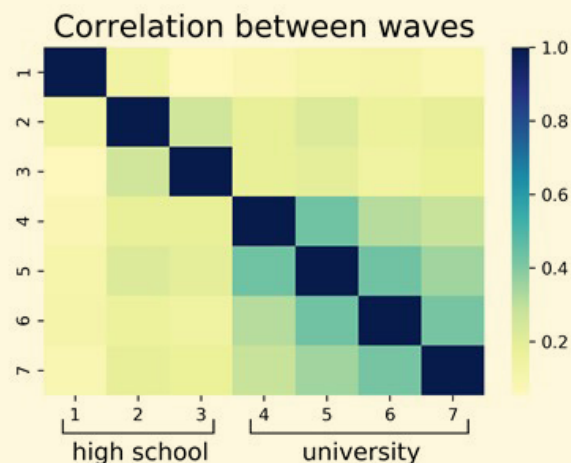
#### Student plans to receive a doctoral degree

During the seven waves of TrEC survey students were asked about the highest academic degree they want to achieve. We focus on comparing students who indicated that they want to receive a doctoral degree with those who chose lower levels. First, we assessed the evolution and consistency of students’ aspirations over time. The share of those who plan to obtain a doctoral degree steadily increases from 1.6% in the first wave (ninth grade in high school) to 5% in the seventh wave (fourth year of their undergraduate study).

Figure 1 shows that during high school the answers to the question regarding doctoral aspirations are not consistent. Students often change their minds which is not surprising

given the fact that the majority of schoolchildren choose a university where they want to continue their studies only during their last year of high school studies and doctoral education is far in the future. As a result, the answers in the ninth grade are only weakly correlated with the answers in the 4th year of university (Pearson’s  $r = 0.09$ ,  $P < 10^{-9}$ ) and could be considered as non-attitudes. However, starting from the first year of university, the answers became more stable, with correlation ranging from  $r = 0.18$  to  $r = 0.44$  for consecutive years.

**Figure 1.** Correlations between answers of respondents at different waves of data collection



### Who plans to go to doctoral study?

We then study the factors that are associated with plans to receive a doctoral degree. We report the results obtained using the answers from the last wave, but the results were qualitatively the same for all of the university waves.

We check the relationship between the factors and students plans, and we find that the educational outcomes of a student, their socio-economic status and the highest level of their parents' education predicts doctoral aspirations. We also find that these plans are independent of gender. Continuous variables such as educational outcomes and socio-economic status were standardized to have a mean of zero and a standard deviation of one.

We also use a logistic regression model to predict doctoral aspirations (Table 1). We find that the strongest predictor is the educational outcome of the student: a one standard deviation increase almost doubles the chances of planning for a doctoral degree. The chances are also increased for students with higher socio-economic status. Intriguingly, the father’s, but not mother’s, university degree is also predictive of higher chances of planning for a doctoral degree.

**Table 1.** Binary logistic regression predicting students plans

Variables	Model 1	Model 2	Model3
Educational outcomes	1.903 [1.517; 2.386] ( $P < 10^{-3}$ )	1.984 [ 1.593; 2.470] $P < 10^{-3}$	1.894 [1.488; 2.411] $P < 10^{-3}$

Variables	Model 1	Model 2	Model3
SES	1.886 [1.266; 2.811] (P = 0.002)	2.108 [1.390; 3.197] (P < 10 <sup>-3</sup> )	1.475 [ 0.905; 2.405] P = 0.118
Mother having university degree or higher		1.130 [0.720; 1.773] (P = 0.594)	0.986 [0.598; 1.627] P = 0.959
Father having university degree or higher			1.734 [1.061; 2.835] P = 0.028

Higher performing students are more likely to plan to pursue doctoral studies, which holds after controlling for socio-economic status and parental education. Our findings indicate that the decrease in the number of enrollments in doctoral programs could probably be explained by the reduced interest among lower performing students and that doctoral education retains the ability to attract the strongest students. Further studies, however, are needed in order to determine if these aspirations are translated into actual enrollment.

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## Collective or individual enterprise? Who provides academic support to doctoral students at Russian universities?

Evgeniy Terentev

*PhD, Senior Research Fellow: Centre for Sociology of Higher Education, HSE University (Russia)*  
[eterentev@hse.ru](mailto:eterentev@hse.ru)

## Introduction

Most national systems of doctoral education have experienced significant institutional transformations over the last twenty five years in response to the global challenges of massification, internationalization and marketization [1, 2]. One of the most prominent changes was the global shift from the "master-apprentice" model of doctoral education, based on dyadic communication between doctoral students and their supervisors, towards a structured model, which establishes shared models of doctoral student support and control, and a transparent system of milestones for doctoral students. The main aim of this global shift was to increase the completion rates, which were significantly lower compared to other levels of higher education, to increase the quality of doctoral theses and to decrease the average time-to-degree, through establishing a complex system of academic support to doctoral students. While there is significant variation in the implementation of this model in different contexts, most European systems of doctoral education now demonstrate the main attributes of the structured model such as shared models of supervision and special institutional structures (graduate or doctoral schools) which are responsible for the implementation of doctoral programs, explicit and transparent systems of milestones and requirements for doctoral students [3].

The Russian system of doctoral education took a step towards the structured model of doctoral education in 2012 after the introduction of the Federal law “On Education in the Russian Federation”. However, some characteristics of the current model remain as they were in Soviet times. This paper analyzes one of the core aspects of structured doctoral programs—the shared academic support of doctoral students provided by the departments responsible for the doctoral training. We answer two research questions: (1) What kind of academic support (related to work on the thesis and publications) do doctoral students in Russian universities receive? (2) Who provides different types of academic support to doctoral students? While analyzing the actors who provide academic support we focus only on teaching and research staff of institutional units (doctoral schools or departments) responsible for the implementation of doctoral programs.

## Methods and data

We use data from an online survey of doctoral students at six Russian universities conducted May–June 2019. The 3 universities in the sample represent the group of leading Russian universities, which participate in the academic excellence program “Project 5-100”; two of them are located in Moscow. Overall, 1,045 doctoral students participated in the survey which is about 40% of all doctoral students who study at these universities. 23% of respondents study math and earth sciences, 27% engineering and technology, 24% social sciences, 14% humanities, 7% educational sciences, and 5% other areas. Almost two thirds of the sample are first- (36%) or second-year students (30%). 87% are full-time doctoral students and 83% are state-funded. 51% of respondents are male. One of the questions in the survey was related to the types of academic support which respondents receive during their study from teaching and research staff in their departments (“Who performs the following functions during your doctoral journey?” Possible options: Supervisor, Other teaching or research staff in the department, Head of the department, No one).

## Departmental academic support: who provides academic support?

Our results show that the majority of doctoral students receive different kinds of academic support (Figure 1). 90% or more of them receive comments on the results and conclusions of their study, texts of theses, and publications, and advice on methods of data analysis. However, for 10 out of the 14 options presented in the questionnaire, more than 10% of doctoral students reported receiving no support. For instance, 14% of doctoral students reported that they do not receive support in editing texts for publication. 11% do not receive support in finding literature on the subject of their dissertation and 13% in the organization of field research. Receiving support related to solving administrative issues (organizing field work, meetings with experts and internships), and navigating in the academic world (recommending experts, finding reviewers, informing about scientific events) is significantly less common

than support in issues related directly to work on thesis and research. However, previous studies showed their critical importance for the academic integration of doctoral students [4].

Another important finding is related to the fact the supervisor remains the one and only person who provides different kinds of support for most doctoral students. The share of those who receive the support from faculty other than the supervisor, varies between 9% and 38%. Less than 10% of students get help with editing the dissertation text, and 11% with organizing internships and employment. The most widespread types of academic support from the faculty are information about scientific events (38%), recommending literature on the subject of dissertation (29%), giving advice concerning the methods of data analysis (28%), recommending experts for communication (28%), and commenting on results and conclusions (27%). Heads of departments are involved in providing academic support for only 5–23% of doctoral students depending on the type of support. However, they could play important role especially in the last stage of doctoral study. Their expertise and advice could help doctoral students to get through the highly bureaucratized pre-defense procedures.

## Conclusion

This study showed that the shift to structured models in Russia is far from completion. The model of dyadic communication between doctoral student and supervisor without complex academic support from other members of departments is still dominant. For a large share of doctoral students, academic support is mainly restricted to providing advice and comments on issues related directly to thesis research and writing with no support in solving broader issues related to integration into the research community. A significant share of doctoral students receives no academic support even from their supervisors and are left alone in their study. This situation significantly increases the risk of academic failure, since previous theoretical and empirical studies have shown the critical importance for doctoral completion of strong academic support and integration into the departmental research community [5, 6]. More efforts should be made on national and institutional levels to build a strong system of departmental academic support to doctoral students. This can help to overcome the problem of extremely low completion rates from doctoral programs in Russian universities and research institutes. For instance, establishing collective forms of supervision and engaging a wider range of faculty in work with doctoral students (e.g. through participation in research seminars) could decrease the risks of academic isolation and excessive dependence on the expertise and relationship with the supervisor.

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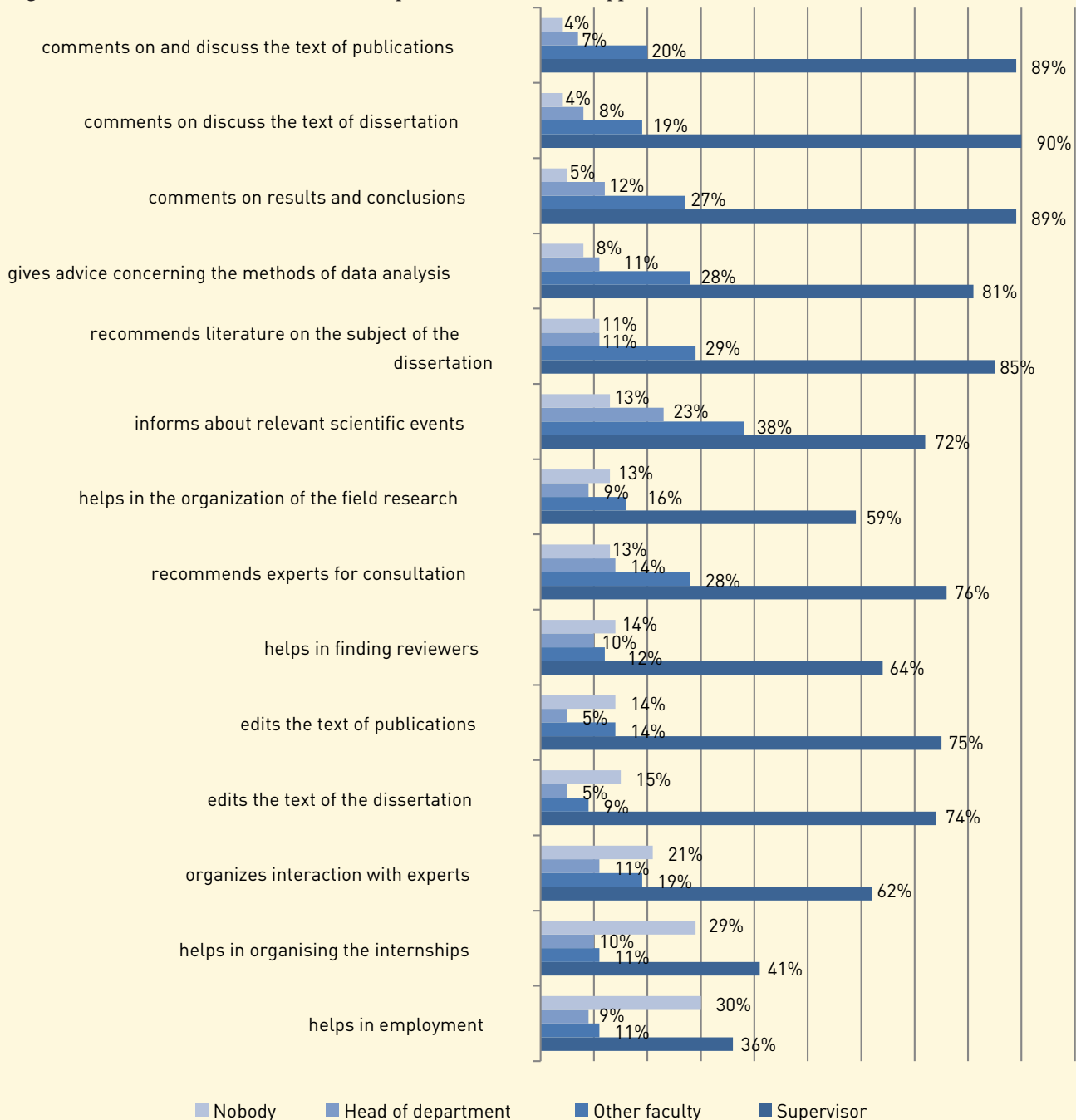
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**Figure 1.** Prevalence of different kinds of departmental academic support to doctoral students, %



# What is the proportion of Russian PhD students defending their theses and continuing their academic careers?

**Boris Bednyi**

*Director: Institute of Doctoral Studies, National Research Lobachevsky State University of Nizhny Novgorod (Russia)*

[bib@unn.ru](mailto:bib@unn.ru)

The training of researchers and teachers for higher education has always been considered a goal of Russian PhD programs. The clearly oriented role of this institution in the 20th century was supported by organizational and economic mechanisms that determined the goal and content of PhD programs, and the forms and conditions for preparing PhD students for an academic degree and their subsequent research or teaching work. However, over the past two to three decades, PhD programs in developed countries have been transformed significantly. A significant proportion of PhD program graduates find a job outside academia and it causes rising concerns regarding the implementation of doctoral programs main mission — training staff for science and higher education. In academic journals, there are some alarmist judgments about the growing dysfunctionality of Russian PhD programs. However, the discourse is rather organizational-political than research since most expert judgments are not supported by reliable empirical data or research results.

In Russia, the state of PhD programs can be judged by the annual statistical reports of higher educational institutions. The approved set of indicators characterizes the structure of admission, number of students and graduates in various areas of training (including thesis defense). However, the current statistics do not reflect the actual outcomes and effectiveness of PhD programs. The proportion of graduates defending their thesis is the only performance indicator. However, the majority of Russian PhD students do not manage to complete their thesis during the period established by the state (3 years for the humanities, 4 years for science and engineering). Many of them continue to work on their theses after their graduation. Unfortunately, thesis defended after finishing their PhD programs are not reflected in state statistics, which significantly complicates the assessment of the effectiveness of Russian PhD programs.

The key questions in this context are:

1. What proportion of Russian PhD students are awarded a PhD?

2. What is the actual thesis defense rate and how long does it take to prepare a thesis?
3. What proportion of PhDs pursuing an academic career after graduation?
4. Are there any differences between research fields in time to degree and in retaining PhDs in academia?

To answer these questions, we conducted a cross-sectional study of the scientific productivity of doctoral students from several leading Russian universities.

## Methodology

Quantitative data on the thesis defense, scientific publications, patents and other outcomes of doctoral students from nine Russian universities were analyzed. The sample was formed based on lists of PhD students who completed their studies in 2013 (N = 1178). Seven universities from the sample have the status of a National Research University, five are participants in the "5-100" Program. Doctoral students in science, engineering, the humanities are represented in approximately equal shares.

To identify graduates who stayed in Academia, a three-year "publication window" was selected: from 2016 to 2018. This made it possible to cut off their publication activity during the PhD. Those who defended the thesis, published research articles and had other outcomes during this period were considered as an academic staff [1].

## Thesis defense

Approximately 90% of PhD's get their degree no later than during the first two years after graduation. It is about 41% of all graduates from the studied cohort of doctoral students. 45% of graduates defend their thesis during 5 years after their graduation, which is almost double the percentage of graduates who got their degree during the normative period of study.

According to our estimates, the average time to degree is around five years. A "fast defense" most often occurs among those specializing in chemistry, politics, economics, linguistics, and history. These students work on a thesis usually no more than three to four years. The longest time to degree (over six - seven years) is typical for law, ICT, physics and math.

There are no statistically significant differences in the performance indicators and the rates of thesis defense between full-time and part-time doctoral students. However, such differences were identified between students with different conditions for financing PhD studies: for state-funded students, the defense rate for the five years period was almost twice higher than for fee-paying students (50% vs 28%). The low performance of this category is largely caused by the biases of the selection system when it comes to the fee-paying students. The lowered entry barriers for admission to fee-paying students lead to the recruitment of applicants who often do not have the necessary level of academic and research training, a scientific background on the topic of their thesis or internal motivation. This negatively affects learning outcomes and their work on a thesis.

Our data on the proportion of PhD students defending their theses, at first glance, are similar to the data of the US and the EU ( $\approx 50\%$  and  $\approx 66\%$ , respectively) [2, 3]. However, our estimates do not take into account those who withdrew before graduation (the share of defenses was calculated from the number of graduates). If we adjust the calculations for dropouts during the training, the percentage of defenses within five years after graduation decreases to 29%. This is significantly lower than in most European countries and the US.

### Remaining in academia

Another important indicator of PhD programs effectiveness is the proportion of graduates that stay in Academia. In our sample, 40% of graduates continue their work in Universities and scientific institutions and this share is more than two times higher among graduates who were state funded (52% vs 24% among fee-paying students).

According to our data, the number of PhD's who stay in Academia is 63%, which is close to the average for the EU [3]. As for the field differences, about 70% of PhDs in natural and technical sciences and less than 50% of PhDs in the humanities remain in Academia.

An important parameter characterizing the employment of PhDs is the proportion of those working at the university they graduated from. The proportion of such graduates is 75% regardless of the discipline or type of university. A high level of inbreeding can lead to negative consequences, it fosters conservatism and often has a negative impact on the Universities development.

### Conclusion

Based on our calculations we can see that no more than 18% of the total number of those enrolled in doctoral programs end up getting the degree and working at universities. With the decline in the number of graduates and PhDs, it must be admitted that Russian PhD programs are not fulfilling their goal of training staff for the academy. This conclusion is confirmed by the growing lag between Russia and leading countries in the share of PhDs in the total population, and by negative changes in the age structure of Russian researchers, namely, a decrease in the proportion of researchers in middle age groups.

The data indicate that successful PhD graduates are characterized by a willingness to work in the academic sphere. Russian young people are going into research, but, apparently, not for long. It seems that the main task of state policy for training academic staff should be focused not only on attracting young people but also on finding effective mechanisms to retain middle-aged researchers. However, this task goes beyond the scope of PhD training.

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## Plagiarism on the academic periphery

**Katerina Guba**

*European University at St. Petersburg, Center for Institutional Analysis of Science & Education, (St. Petersburg, Russia)*  
[kguba@eu.spb.ru](mailto:kguba@eu.spb.ru)

**Angelika Tsivinskaya**

*European University at St. Petersburg, Center for Institutional Analysis of Science & Education, (St. Petersburg, Russia)*  
[atsivinskaya@eu.spb.ru](mailto:atsivinskaya@eu.spb.ru)

Serious flaws in academic integrity in Russia are publicly acknowledged and widely discussed by the academic community, state officials, and the public. Special attention has been devoted to academic misconduct in the writing of dissertations. Numerous examples of plagiarized dissertations include not only exceptional cases such as political and public figures, but also academics. An academic degree is the key qualification for a university appointment, promotion, and pay scales. For many universities, it is not the quality of the dissertation but the qualification per se that makes the difference. As a result, dissertations are perceived as a formal barrier. Facing this barrier does not necessary require putting much effort into producing an academic text of high quality. Instead, many choose to rely on ghostwriters in their quest for a doctorate, or steal others' texts [1].

### Academic plagiarism across research fields

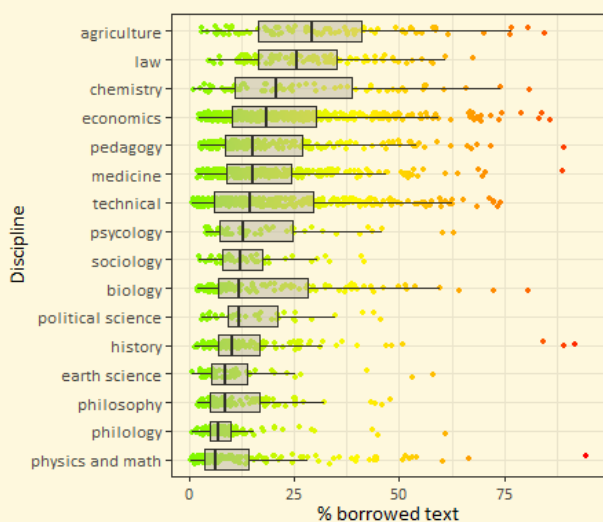
However, the focus on Russian dissertations in general hides the variance inside the national academic community. Is there any difference in how often scientists from dif-



ferent disciplines plagiarize? We expect that some research fields are more involved in this while for others it is a relatively rare event. In the study of plagiarism in Russian dissertations, we use a representative sample to examine how the incidence of plagiarized text varies depending on the discipline. We used Russian plagiarism detection software (“Antiplagiat”), a tool allowing the comparison of selected texts with extensive text collections, particularly dissertations and academic publications. The final sample consists of 2,468 doctoral dissertations (8.8% of all dissertations defended during this period) randomly selected from all dissertations defended in Russia between 2006 and 2016.

Our data demonstrate that plagiarism is widely present in Russian dissertations compared with the incidence of plagiarism found in Western academia. The average share of detected plagiarism was 19.1% (median - 13.9%). Only a quarter of dissertations have less than 7% plagiarized text, which can be explained by the erroneous indication of legitimate text by the software. It is unusual to copy an entire text—in only 41 texts was the plagiarism rate above 50%. Figure 1 presents the overall distribution of plagiarism across disciplines. The highest median percentage of borrowed text is in agricultural dissertations (29.12%), law (25.6%), and chemical sciences (20.8%). The lowest is in physics and math (6.2%), philological (6.9%) and philosophical (8.4%) sciences. Among social sciences the incidence of plagiarism is highest for economics, pedagogy, psychology, and political science.

**Figure 1.** Distribution of plagiarism by discipline ordered by median percentage of borrowed text



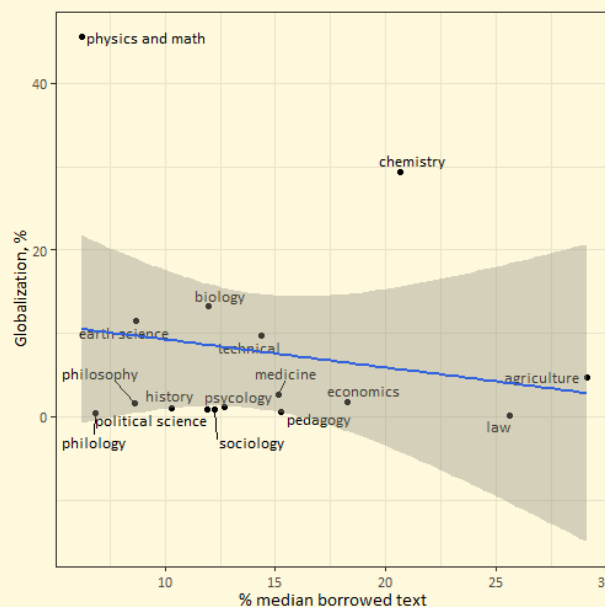
### What is the pattern behind the disciplinary variance in plagiarism?

We propose that socialization with scientific ethics would be different for those who engaged with the international academic community and for those who “stayed local” and did not publish internationally [2]. While some might claim that it is necessary to follow global standards, local groups might follow their own norms and practices. Researchers from less globalized disciplines might have al-

ternative views on academic misconduct. The norm of textual authenticity requires any academic text to be written from beginning to end by the author or authors. However, the definition “from beginning to end” is ambiguous. It is possible that plagiarism might be perceived as a culturally appropriate practice, so it is important to bear in mind different perspectives on academic misconduct [3].

To examine whether the level of plagiarism corresponds with the level of globalization, we measure the globalization of academic disciplines by calculating the share of publications indexed in a global citation database (Scopus) in the overall output of academic disciplines. Regarding the number of local publications, we rely on the Russian Index of Science Citation which covers the output of Russian journals. The calculated value of globalization is highest for physics and math with 45.54% and the lowest for the law with only 0.21%. The ordering of the academic disciplines by globalization mirrors the divide between natural and social sciences. Figure 2 presents information on the relationship between globalization and the percentage of plagiarized text. Physics and math stand out as having the highest globalization level and the lowest median for value for plagiarism. Dissertations in chemistry have a higher median percentage compared to other natural disciplines which are more globalized than social sciences. Other disciplines more closely follow the pattern of higher globalization being associated with a lower percentage of plagiarism. Even after running regression models with a number of controls the effect is significant.

**Figure 2.** Median % of plagiarism by the globalization of disciplines



### The role of disciplinary conventions in research misconduct

Our purpose was to empirically examine the level of plagiarism by Russian scientists and to show the role of academic disciplines in addition to individual and organizational factors. While most research on academic misconduct is

conducted in Western countries, we collected data from the academic periphery. We might expect that researchers from less globalized disciplines have rationalizations that keep them from strictly following academic norms. Authors with plagiarized dissertations do not perceive themselves as scientists involved in plagiarism. They rationalize their actions by borrowing technical parts of the text (descriptions of equipment, experiments, justification of relevance, recounting scientific discussion), or using the work of colleagues to which they have contributed (as when a supervisor uses dissertations of his PhD students). Nevertheless, such practices do not correspond to the norms of global science, which strictly exclude any plagiarism.

In most research on academic pathologies, variations between research fields have not been conceptualized. We suggest that further research on systematic factors explaining academic misconduct require special efforts to improve the conceptualization of disciplinary variance.

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# Young researchers as drivers of change in doctoral education

Aray Saniyazova

*Postdoctoral Fellow: Centre for Sociology of Higher Education, Institute of Education, HSE University (Russia)*  
[asaniyazova@berkeley.edu](mailto:asaniyazova@berkeley.edu)

Doctoral education in post-Soviet countries has experienced significant developments over the last 5 years. However, issues related to the structure and quality of programs including admission and graduation requirements, the quality of supervision and assessment, research funding, and career prospects for graduates have remained. Young researchers first benefit from the transformation of doctoral education, but their voices are frequently missing in the discussion of these issues. This is not the case in Kazakhstan, however, where doctoral students, recent PhD graduates and postdocs have served as catalysts for almost all the developments that doctoral education has undergone in the country in the past couple of years.

The active involvement of young researchers in voicing the issues that they faced became more structured with the creation of the Young Researchers Alliance (YRA), which was established by a group of young researchers at Nazarbayev University in 2018. The underfunding of research, the lack of transparency in research grant allocation, an outdated mechanism of research funding that does not take into account the specificities of research in different fields, grant application requirements that disadvantage young researchers, excessive publication requirements for doctoral candidates, and low stipends were some of the concerns raised. These concerns expressed on different platforms reached decision makers who started involving young researchers in the discussion of how to solve these challenges and issues. In December 2018, the Council of Young Scientists (CYS), a consulting and advisory body at the Ministry of Education and Science of Kazakhstan (MES) was established. CYS contributes important insights to the discussion of state policies and measures to enhance the academic preparation of researchers, fostering research opportunities, increasing the funding and commercialization of research, advancing career prospects and so on. These insights have been used to initiate the developments in doctoral education in Kazakhstan that are discussed below.

## State funding of doctoral education

Doctoral education, as well as all other levels of education, in Kazakhstan is highly dependent on state financing as in many post-Soviet countries. Until 2016, a state grant was the only way to pursue doctoral studies. In 2016, universi-

ties were allowed to admit applicants who meet minimum admission requirements and who were willing to cover the costs of the program, on average 2 million tenge per year (approximately 4,500 USD). There has been an increase in the number of state grants for PhD students from 585 in 2015–2016 to 2,355 in 2020–2021. In 2018–2019 the overall number of doctoral students was 4,937, while the number of allocated state grants was 2,240. The state grant covers tuition, international research trips and provides a monthly stipend of 150,000 tenge (approximately 350 USD) that was increased by 25% in January 2020.

### **Admission requirements and changes in entrance exams**

Eligibility criteria for admission to PhD programs and admission requirements have long remained irresponsive to the changing nature and needs of the PhD applicant population. While there are fewer concerns about the eligibility criteria which are a master's degree or completed residency, at least 1 year of work experience and foreign language proficiency, there have been suggestions of revising admission requirements, and in particular the procedures for conducting entrance exams: the foreign language (English, German or French) proficiency test and a comprehensive subject exam. Does conducting a locally developed English proficiency exam in the form of a standardized test give an objective assessment of the language proficiency required for research and publication in English? Could restructuring subject exams, designed and conducted by each university independently, to include elements of external review help make the process more transparent and ensure that the process is fair? In addition, there is a growing number of applicants who have earned their master's degrees in English-language institutions either abroad or locally and waiving English proficiency exams for this category of applicants, as proposed by the young researchers, could be a reasonable decision.

Some of these concerns have been addressed to various degrees. For some fields like social sciences an alternative to the subject exam has been introduced—a provision of GRE certificate (The Graduate Record Examination, a standardized exam that is often required for admission to graduate programs worldwide, mostly in the US) meeting the score requirements outlined in the Rules for Admission developed by MES. A requirement to have an external examiner and a representative of MES in the examination committee has been introduced.

In 2019, the foreign language proficiency exam was replaced by the requirement to provide an internationally recognized certificate of proficiency in a language with a set of minimum required scores. For example, for English it is IELTS, with a minimum score of 5.5, TOEFL or Duolingo English Test with equivalent scores.

However, reality showed the vast majority of applicants were not ready for these new requirements. Many applicants did not have certificates in place by the admission deadline, many applicants had scores that were below the

minimum requirement and as a result many state grants were left unused which had financial implications for universities. Then, due to the pandemic there were problems with taking tests and it was decided to revert to the old format and leave international language tests as an optional alternative.

### **Changes in publication requirements**

Publication is an important prerequisite for obtaining a PhD in Kazakhstan. The requirement to have at least 7 publications in journals recommended for publication of research outcomes by the Committee for Control in the Sphere of Education and Science (CCSES) of MES without any strict requirements to the content of the publication or the reputation of the journal has been perceived by doctoral students as excessive and having a negative effect on the quality of publications. This concern prompted the MES to look closer at publication activity, and it was revealed that many local journals including those recommended by the CCSES do not meet the international requirements for academic journals. MES found that many journals lack the essential features which are at the heart of the publication process such as double-blind peer-review and a strong editorial team. Therefore, new requirements intended to strengthen journals and improve their quality are being introduced that will help doctoral students publish quality papers locally.

In response to student concerns, publication requirements have been revised and, depending on the field of study, one or two papers in high quartile journals is enough to be allowed to defend a dissertation.

### **Funding for young researchers**

Research funding has been revised to introduce more flexibility, optimize the process, make it more transparent, and allow more grant opportunities to young researchers including PhD students. Having a certain percentage of young researchers, including PhD students, in a research project is now one of the requirements for state funded grant projects. In 2019 it was also announced that separate funding would be allocated for the research projects of young researchers. The amount of funding allocated for this for 2020–2022 was 9 billion tenge (approximately 21 million USD). Furthermore, on September 1, 2020 the President in his annual message to the people of Kazakhstan announced the allocation of an additional 1,000 research grants for young researchers and the provision of opportunities for international internships in leading universities and research centers around the world for 500 people annually as part of the “Young Scientist” project.

There are still many issues that doctoral education in Kazakhstan faces but the involvement and joint efforts of all stakeholders and, importantly, of young researchers—who continue voicing their concerns—is a promising sign for the continued transformation of the system.





# When reforms are not enough: how to improve Russian PhD training? Viewpoints of young internationally mobile scientists

**Marina Spirina**

*Analyst: IPSOS (France)*  
[mospirina@gmail.com](mailto:mospirina@gmail.com)

**Alena Nefedova**

*PhD, Associate Professor, Senior Research Fellow:  
Laboratory for Economics of Innovation, HSE University  
(Russia)*  
[anefedova@hse.ru](mailto:anefedova@hse.ru)

**Ekaterina Dyachenko**

*Leading Specialist: Department of Scientific and  
Information Development, RANEPa (Russia)*  
[dyachenko-el@ranepa.ru](mailto:dyachenko-el@ranepa.ru)

More than seven years have passed since the transformation of Russian PhD programs into the third level of tertiary education and changes in the requirements for thesis defense. Nevertheless, defense statistics show that the low efficiency of doctoral-level programs have not only remained but worsened. The causes are mainly structural (for example, insufficient funding for PhD students, the lack of a Master-to-PhD fast track, the low level of involvement of PhD students in research projects, etc.), but there are also more implicit cultural factors that characterize institutional features of Russian PhD programs.

Policy makers and researchers, when developing the reforms in the system of training scientific and academic staff, very rarely turned directly to the PhD students themselves, their learning experience and their perception of the barriers to success. This, in our opinion, is a serious omission. A well-known phrase says: “everything is learned in comparison”, so we asked PhD students and early-career researchers who have studied or had internship experience abroad (more than 3 months) what they liked in foreign PhD programs, what successful solutions and best practices from foreign systems they would advise to implement in Russia.

Data collection took place as part of the research project ‘International Mobility of Russian Young Researchers: Scope and Effects for a Scientific Career’ [1], where training in foreign PhD programs or internships was one of the studied areas. The sample included PhD students and young scientists studying and working in different cities of Russia (including Moscow, St. Petersburg, Tomsk,

Tyumen, Irkutsk, Kaliningrad and Pushchino), in various fields of study (humanities, science, and medicine) and different types of organizations (universities, institutes) who had international experience (Master's degree, PhD, internships, or work abroad). A total of 40 interviews with an average duration of 80 minutes were collected in a period from March 2 to May 7, 2020. This paper gives these young researchers recommendations and impressions, with comments from our expert position. It is important to keep in mind that these recommendations were formulated based on the subjective opinions of our respondents about what they liked the most in their foreign academic experiences.

## The flexibility of PhD programs

In the US and many European countries, the duration of postgraduate studies is not fixed and can vary within several years depending on the student's conditions. This provides PhD students more time to write their thesis and to take courses and internships. For example, in some countries, a PhD student is eligible for courses not directly related to the PhD topic. The option to extend the duration of study in doctoral school is also essential if a PhD student wants to change the topic of his work or even entirely change the scope of the research.

## The introduction of a more flexible system of categories of scientific specialties

The research branches available within PhD programs abroad are often less regulated, which makes it possible to prepare and defend interdisciplinary work. In the US, for example, PhD students have the right to adapt or even completely change the field during their studies. Greater disciplinary openness gives those students who want to change their original choice.

## Creating a bigger variety of tracks in PhD programs

The practice of leading countries shows that not all PhD applicants subsequently pursue an academic career. By introducing different PhD tracks, this problem has been partially solved. Thus, depending on preferences or the type of funding, students can choose a fundamental or applied research track. Speaking about ‘professional track’ of PhD: this is the specific case of PhD in Arts and Design. It also can be applied in those fields to which the concept of “practice” is relevant (e.g., medical practice, law practice). This flexibility allows universities to attract a wider range of applicants with a variety of requests.

## Decreasing the share of compulsory courses

Many foreign universities are reducing the share of compulsory courses in their PhD programs. PhD students can enroll in the courses they consider necessary. However, this is their conscious choice, not a duty.

## **Increasing focus on scientific writing skills training**

In foreign universities, there are often specialized courses teaching how to write a research article that will be accepted for publication in an international journal. In addition, graduate students are usually offered specialized courses in academic writing that allow them to develop and practice other writing skills.

## **The development of soft and transferable skills**

Participants in our study often noted that during PhD programs, students also learn soft skills that can be applied beyond their own field, for example, planning, self-management, public speaking and presentation skills. In addition, PhD students can devote time to a variety of internships in related areas of future employment, for example, in a knowledge-intensive business or public service. As a result, recent graduates already have diverse work experience, and it increases their chances of employment.

## **Intensification of horizontal and intensive interaction with the supervisor and the academic community**

Our respondents noted that the status of a PhD student in Europe and the US is very different from that in Russia. In Russia, a PhD student is still perceived as an apprentice [2]. In some foreign countries a PhD student often has the status of a junior researcher, and for many of our informants this was especially unusual. This status means that PhD students can freely, and on equal terms, express their own opinions on projects in which they are involved. They often interact with research supervisors in informal settings (lunch, coffee breaks, etc.); such discussions give an impetus for reflection, open up new prospects for work, and act as a catalyst for ideas. The importance of communication with other colleagues is also important and PhD programs regularly organize events that contribute to the formation of trusting relationships between PhD students and other university staff.

## **International orientation of PhD programs**

PhD programs at foreign universities often have an explicit international focus. Even in non-English speaking countries, English is often the language of communication in laboratories and research teams. English is used for training courses, writing articles, and public presentations and talks. Many PhD programs imply international internships and participation in international conferences as an obligatory part of the training. Diversity among employees and students creates an environment for the socialization of young researchers in the international research community.

## **Making university libraries 'third place' [3] for graduate students**

Libraries in foreign universities are not only a source of knowledge through open access to study materials but also

an important place of socialization. Libraries in foreign Universities are usually characterized by democracy and openness (they are usually public) and an informal atmosphere. There is the opportunity to sit comfortably with a book; drink coffee and have a bite to eat right at the desk, without having to interrupt your work; you can even take a nap after a tiring day. A friendly and comfortable atmosphere encourages people to stay longer and to come back. The libraries perform as 'third places' where it is easy to engage in conversation and make new acquaintances; a place where people gather informally and create social connections. It is no coincidence that many libraries function as co-working spaces. In this way, libraries help create a sense of belonging to the university's undergraduate, graduate, faculty and research community.

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As the results of interviews show, the experience of studying abroad on PhD programs allows one to look critically at Russian practices and suggest possible innovations. An important point is the willingness of PhDs themselves to become agents for improving the system for future Russian PhD students.

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[3] The third place - a part of the urban space, which is not associated with home ("first place") or work ("second place"). An example of such a place can be a cafe, club, or park. The concept of "third place" was first presented in: Oldenburg, Ray (2000). *Celebrating the Third Place: Inspiring Stories about the "Great Good Places" at the Heart of Our Communities*. New York: Marlowe & Company.

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***For notes***

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Higher Education in Russia and Beyond (HERB) is a quarterly informational journal that has been published by the National Research University Higher School of Economics since 2014. HERB is intended to illuminate the transformation process of higher education institutions in Russia and countries of Eastern Europe and Central Asia. The journal seeks to voice multiple-aspect opinions about current challenges and trends in higher education and share examples of the best local practices.

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### Editorial and publisher's address:

20 Myasnitskaya Str., Moscow, 101000

Russian mass medium registration certificates:

Print ПИ № ФС77-67449 issued 13.10.2016

Web ЭЛ № ФС 77 - 65994 issued 06.06.2016

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ISSUE

**4(25)**

WINTER

**2020**

