

GREENFIELD ERA IN EDUCATION

SEDeC RESEARCH

SKOLKOVO Education Development Centre (SEDeC)

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GREENFIELD ERA IN EDUCATION¹

The secret of change is to focus all
of your energy, not on fighting the old,
but on building the new.

Socrates

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of Management SKOLKOVO for their time and contribution to this study:
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¹ A greenfield project is a project unconstrained by prior work. It is similar to construction in a clear
area where no previous facilities exist.

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Today, the world is on the verge of a new wave of innovations which can dramatically change the existing educational landscape. The future of the traditional educational institutions most often discussed in the expert community can be referred to as the brownfield — a historical area of educational practice. Greenfield will be represented by new educational projects (educational startups) based on new technologies. Such projects have recently got a special name, EdTech, and the amount of their funding has increased 3 times over the past three years, reaching USD 1.1 billion. Greenfield era opens unique opportunities for business teams, educational institutions and whole countries. It is quite possible that the best educational projects of the coming fifty years have not been created yet and we will be privileged to witness their emergence.

This publication offers a detailed analysis of new technological and educational projects and proposes five solutions for developing the Russian educational system.

1. Background Factors for Changing the Educational Landscape

Benchmark innovations in education are quite rare — in fact, there were only four over the last thousand years.

- *The first one* were universities which developed in 10th–12th centuries in Europe. They focused on translating the aggregated knowledge (Bologna, Paris).
- *The second one* was the classroom-lesson system proposed by John Amos Comenius in the 1640s which became the standard for the mass education, especially at schools.
- *The third one* was the development of research-type universities based on Wilhelm von Humboldt's model aimed at generating scientific knowledge and training scholars.
- *The fourth one* was the concept of hands-on learning and experimental education proposed by the American philosopher John Dewey at the turn of the 19th century to the 20th, which laid the basis for developing project-based learning and active training methods.

Despite the fact that some education experts and researchers suggest a different view of the significant events that took place in the previous thousand years, most of them agree on one thing: today, at the beginning of the 21st century, the world is on the verge of a new wave of innovations which can dramatically change the global educational landscape.

One of the most discussed recent publications on this topic was an essay *An Avalanche is Coming: Higher Education and the Revolution Ahead* by Michael Barber, Katelyn Donnelly, and Saad Rizvi. The work was published in March 2013 and initiated a wide discussion among the experts in Russia and the world about the future of education and, in particular, the future of universities.

Today, the world is on the verge of a new wave of innovations which can dramatically change the educational landscape

In recent years, many other opinions have been published which observed the crisis of the traditional educational system, such as *The Crisis in Higher Education* by Nicholas Carr² (September 2012), about a dozen of presentations at TEDTalks (Sir Ken Robinson, Dan Meyer, Emily Pilloton, etc.³), as well as a number of articles by various authors reflecting on whether education is a new bubble, published from 2009 to 2013.

In Russia, the debate on the future of education has recently become quite vivid. This subject is discussed both at expert workshop and forums and in various publications. Some examples are:

- Vladimir Mau, *How to Upgrade Education*⁴ (July 2012)
- Dmitry Livanov, Andrei Volkov, *Bet on New Content*⁵ (September 2012)
- Isak Frumin, *It's Not That Bad to Bring the Gurus Down*⁶ (October 2012)

Generally speaking, there has been a consensus on the current state of education and the need/the inevitability of changes shared by the international and Russian expert community in recent years.

We would like to note four key trends which determine the current situation and will set the main parameters of the education in future.

² <http://www.technologyreview.com/featuredstory/429376/the-crisis-in-higher-education/>

³ <http://www.teachthought.com/trends/10-of-the-best-tedtalks-on-improving-education/>

⁴ http://www.vedomosti.ru/opinion/news/2303684/kak_modernizirovat_obrazovanie

⁵ http://www.vedomosti.ru/opinion/news/3499241/stavka_na_novoe_soderzhanie

⁶ http://www.vedomosti.ru/opinion/news/5580231/molodye_da_rannie

Trend 1. Education Becoming Mass

Accessibility of education has been a dominant global idea in education during the previous 50 years, and it is consistently implemented by major development agencies such as the World Bank, OECD, and UNESCO.

In our opinion, for most developed countries, this 50-year idea is close to its end. The share of the population in OECD countries that have at least school education is about 90% (80% in Russia). The share of people with higher education in G20 states is now almost 40%, and in some countries, such as Russia, Canada, Japan, and South Korea, it has exceeded 55% (see Fig. 1).

So, the question is: What is the next global idea that could become a new driver for global education development over the next 50–100 years?

Accessibility of education has been a dominant global idea in education during the previous 50 years

We assume that this could be the idea of 'new higher' education focusing on a limited number of people and thus restoring the elitist principle to university education, as it was before.

Trend 2. Education Becoming International

The global talent war is becoming the main competition driver and a priority for educational institutions, corporations, and countries all over the world.

The growing internationalisation pertains both to school and university education worldwide.

For example, in many schools in Switzerland, the share of the students having Swiss citizenship is not more than 30%, which makes the cantonal authorities develop special measures to maintain the quality of native language education. Similar situation can be observed in the UK, which is a recognised leader in school education and accepts a lot of students from other countries.

In higher education, the global number of students going to universities abroad exceeded 4 million people in 2010 and could reach 8 million in 2025 — even by the most conservative estimates. Typically, foreign students are financially secure young people with great mobility, abilities, and talents which enable them to enter the world's leading universities. They are in the midst of today's global competition, which is often led not by separate universities alone but by educational consortia or even countries.

In this context, we can observe the growing role of international educational standards and ratings, both in school (PISA, PIRLS, TIMSS — the best known international student assessment systems) and in higher education (TEUFEL, rankings of world universities, the Bologna Process and the system of unifying educational results).

The talent war and global competition which seemed a distant prospect or a bright slogan just yesterday, have now become a reality for many educational institutions. Realising this, the leading European universities, in particular, dramatically increased the number of their master's programmes in English — from 2 to 10 times for the past five years (see Fig. 2).

Educational institutions and governments in many countries are now facing a difficult dilemma. They have to choose between *internationalisation*, that is, the inclusion into the global educational environment and adoption of international rules of the game, and *autonomisation*, which means ignoring the interna-

The global talent war is becoming a reality for many educational institutions

tional trends and implementing a protectionist educational policy with the risk of becoming an educational outback in 10–15 years. This is a choice that Russia is facing today as well.

Trend 3. Turbulence of Global Economy and New Technological Culture in Industry

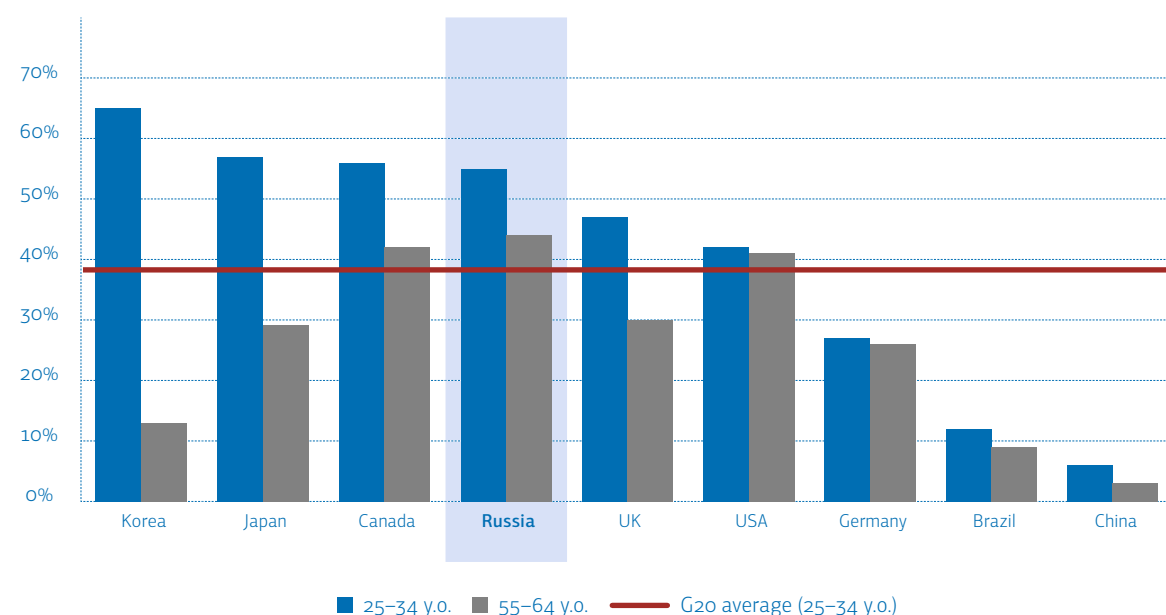
The current state of education and its future are discussed against a number of world financial and economic crises which have a significant impact on bankability of education.

For example, from 2000 to 2009, the increase of public funding in the OECD countries was 40% at constant prices. In this context, the four-time increase in government spending in Russia, partly due to the recovery growth following lower funding in the 1990s, stands out and is associated with the beginning of the active phase of educational reform in the country (see Fig. 3).

When estimating the global situation after the financial crisis of 2008, we can observe that the public funding in most developed countries of the world demonstrates a downward tendency, while the government actions are aimed, first of all, at increasing the efficiency and return of the funds invested in educational institutions.

Corporations, in their turn, as the stakeholders and 'customers' of education, cannot increase their spendings on this item. For example, the share of private expenditures in the total amount of funds allocated to education has significantly dropped in the OECD countries — from 30% in 2000 to 22.9% in 2009, and in Europe, it does not exceed 15%.⁷

Fig. 1. Share of population aged 24–64 having higher education



Source: Education at a Glance 2012 (OECD)

⁷ Source: Education at a Glance 2012 (OECD).

In times of financial and economic uncertainty accompanied by the turbulence of global markets, the horizon of responsible business planning has reduced to 1–2 years, making significant long-term investments, including those in education, impossible. In these circumstances, all the negotiations about the col-

laboration between business and educational institutions are nothing more than good intentions without mutual obligations or guaranteed budgets.

In addition, we are witnessing the changes in the core technologies that lay the basis for industry and economy at large. In just 10–15

years, wired telephone and fax were replaced by mobile technologies and the Internet. Raw hydrocarbons, oil and gas are gradually substituted by environmentally friendly, renewable energy sources; research of new nuclear and hydrogen-based sources is in progress. Elements of smart infrastructure, such as smart grid or intelligent transportation networks, etc. are being implemented.

According to foresights, a package of new technologies in the global industry can develop as early as 2025, which would require fundamentally new professional competencies from the employees and ordinary users that are often impossible to predict. We live in the fast-paced environment of qualification inflation,⁸ when the competencies that are in demand today may become obsolete as early as tomorrow and even more, become a constraint for further social and economic development.

Public funding for education declines, while the government actions are aimed at increasing the efficiency of the invested funds

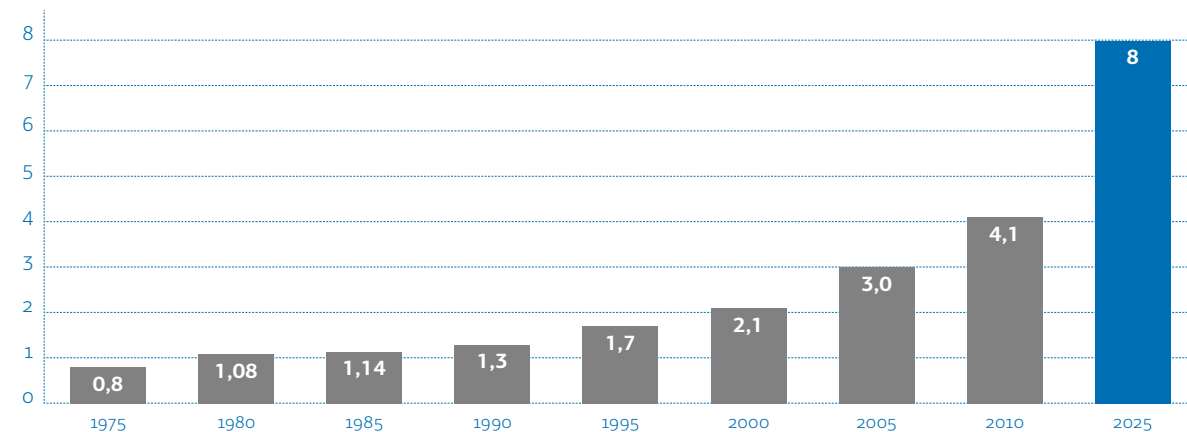
These conditions make investment in education less attractive, which is likely to result in decreasing financial opportunities for the development of educational institutions within 5–15 years.

Trend 4. Digital Revolution

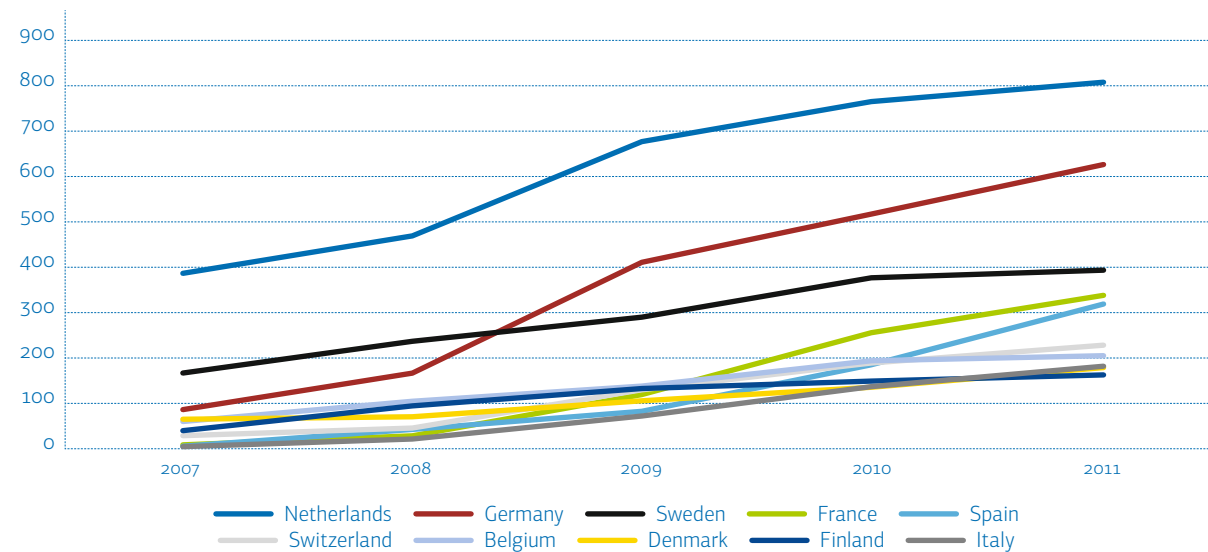
In less than 15 years, the digital revolution has affected all spheres of human activity. First of

Fig. 2. Global internationalisation of higher education

Number of the foreign students (world, million people)

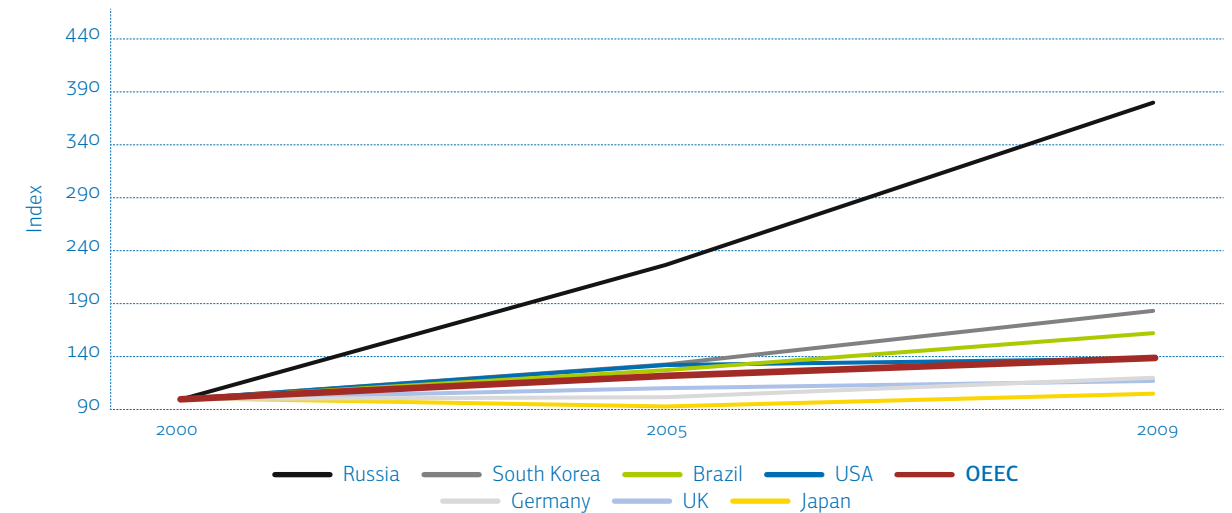


Number of master's programmes in English



Source: OECD, 2012

Fig. 3. Dynamics of public financing of educational institutions in the leading countries of the world



Source: Education at a Glance 2012 (OECD)

⁸ Reform of Professional Education in Contemporary Russia, presentation by Vladimir Knyagin, February 2008.

all, it is associated with the rapid development of modern information and communication technologies (ICT): mobile communication, Internet, and computer technologies all around the world.

The number of the Internet users is expected to reach 2.7 billion by 2013, and the penetra-

tion of mobile services in certain regions of the world has already exceeded 100 per cent — that is, the number of connections to mobile communications exceeds the number of population (see Fig. 4).

This was the backdrop for an unprecedented growth of Internet businesses in the

2000s, which quickly grew into global companies with a multibillion-dollar market capitalisation (Google, Facebook) and changed the usual formats of communication, information processing, and social interaction between people.

These technological innovations have affected the education sector with about a 10-year delay. The first projects in online education, which had started back in the 1990s and dealt with the transfer of educational materials in digital form, have not brought any significant results or radical changes in the educational process. However, the past few years saw the birth of second-generation educational projects. There are a lot of publications about MOOC (massive open online courses) and striking examples from this sphere — *EdX* (a joint project of Harvard, MIT, and Berkeley), *Udacity* and *Coursera*, which currently brings together more than 4.5 million students from around the world. A number of promising projects in other areas — management of educational process, assessment and certification of

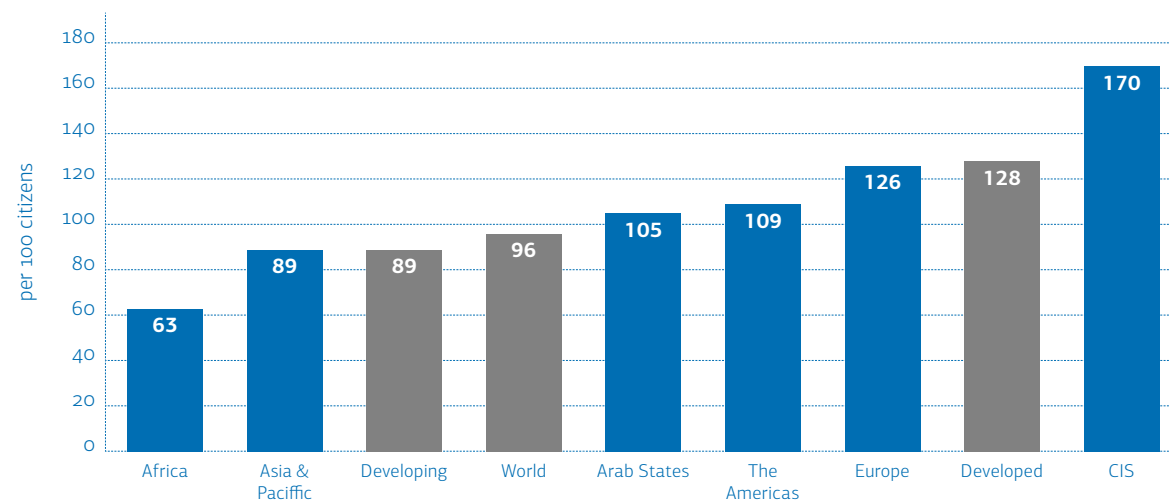
learning outcomes, social networks for teachers and students, researchers and employers, etc. — appeared as well.

The experts compare the mass distribution of educational projects of this scale with innovation avalanche,⁹ the essence of which is that the specialised educational startups are able to perform certain traditional functions of schools and universities — teaching, results assessment, community building, etc. — more effectively. This is expected to increase competition and produce inevitable changes in the existing models of universities and schools.

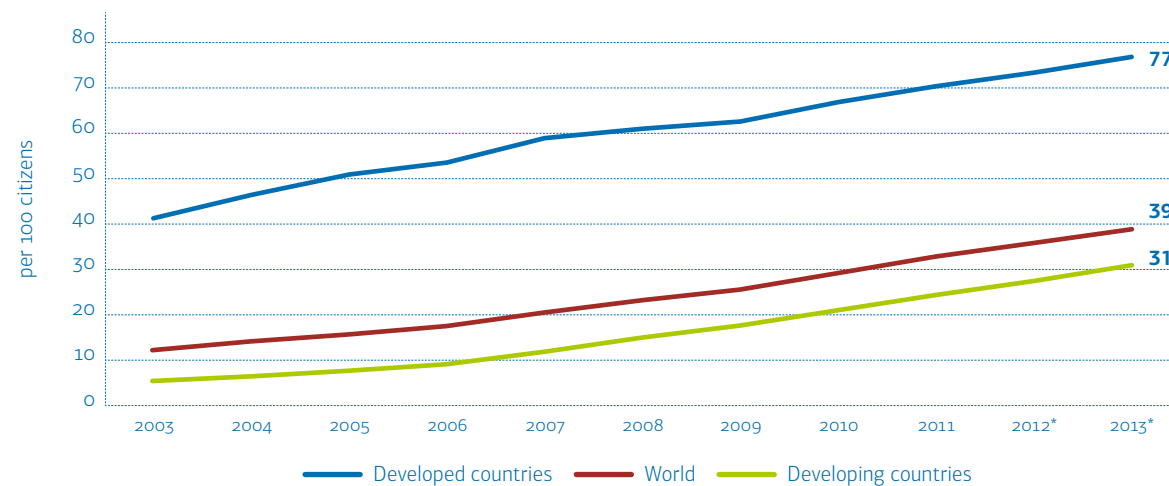
The above-mentioned educational trends, or challenges — massification, internationalisation, and digitalisation against the decreased opportunities for additional funding — call for drastic and urgent transformations of educational institutions. This opinion is shared by many experts and managers in the field of education. The debate arises about the concept of the future education and, in particular, about the new models of higher education institutions which will replace the traditional ones.

Fig. 4. Key parameters of ICT development in the world

Penetration of mobile communications, 2013*



Number of the Internet users, 2003–2013*



Source: ITU World Telecommunication / ICT Indicators database

Note: * Estimate

⁹ See Michael Barber, Katelyn Donnelly, Saad Rizvi, *An Avalanche is Coming: Higher Education and the Revolution Ahead* (2013).

2. New Educational Landscape: the Greenfield Era

Today, there are over 19,000 higher education institutions in the world¹⁰ (see Fig. 5). Over the past hundred years, despite two world wars, a number of deep economic crises (1930s, 1970s, and 2000s) and a wave of technological innovations (radio, television, and Internet), which could be seen as a threat to traditional education, the number of educational institutions had been increasing exponentially. On the one hand, it met the mass demand for education on the part of a growing middle class; on the other hand, it contributed to the competition between the universities for the best students and staff and the limited financial resources of households, companies, and governments.

In the beginning of the 21st century, the situation has escalated from an economic point of view. When the number of educational institutions is growing faster than their scope of financing, this inevitably leads to decreasing incomes for most schools and universities.

At the same time, the potential for increasing financing is very limited. Due to high debt burden and budget deficits, many governments fail to maintain the quickly rising scale of ex-

Over the past hundred years
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penditures on education, while the corporate and households' budgets are in big demand not only among the schools and universities, but also among many training companies, corporate universities and educational start-ups offering affordable, high-quality training throughout the world.

Weak cost control and conservative HR policy play their role as well, and so the current situation poses a threat of chronic budget deficits, and in some cases, bankruptcy for the educational institutions.

To assess the existing state of affairs and possible scale of the approaching crisis, it is necessary to deliver a series of stress tests for educational institutions, as it was done for the banking system after the global financial

**Fig. 5. Total number of higher educational institutions
(universities, institutes, academies, etc.) in the world in 2013**

Webometrics 2013	Top 100	Top 200	Top 500	Top 1000	Total
North America	78	99	178	398	3 484
Europe	16	66	212	415	4 975
Asia	3	20	66	104	6 142
Latin America	2	9	19	39	3 487
Oceania	1	6	20	35	149
Arab World	0	0	2	4	569
Africa	0	0	3	5	355
World					19 161

Source: Webometrics 2013

¹⁰ <http://www.webometrics.info/>

crisis of 2008. Experience like this already exists.

For example, in 2012 the Ministry of Education and Science of the Russian Federation conducted Monitoring of the Activities of the Federal Educational Institutions of Higher Professional Education, where 3 of 5 estimated figures were economy- or finance-related (income and R&D per 1 academic staff member, classroom and laboratory space per 1 student). The monitoring results showed that 136 out of 502 state universities and 450 out of 930 branches demonstrated the ‘signs of inefficiency’ and needed reorganisation.¹¹ In other words, more than 25% of state universities and almost 50% of their branches failed the financial and economic stress test.

Despite the fact that the academic community strongly criticised the first monitoring experience, the obtained results signalled about the possible economic and financial instability of the universities and confirmed the need for transformation of the traditional educational models in accordance with the new social and economic realities. Similar stress tests for educational institutions in other countries could give a more detailed picture of their performance.

Thus, the economic and financial circumstances have become the main driver of today’s changes. To keep their place in the educational landscape, managers of educational institutions have to take immediate measures to adapt to new economic conditions. This is a major challenge, because a lot of educational institutions were established and managed in the manner far from economic agents.

When this threat is considered seriously, it is clear that the education of the 21st century is facing a management task of an unprecedented size and complexity — **the trans-**

The education of the 21st century is facing an unprecedented task — the transformation of several dozens of thousands of educational enterprises

formation of several dozens of thousands of educational enterprises, whose activities embrace over 100 million of people, and their annual budgets only in OECD countries make more than USD 2.3 trillion.¹²

Leading educational experts around the world offer their solutions to this problem.

- Michael Barber, Katelyn Donnelly, and Saad Rizvi believe that under the increased competition, five types of universities have the chances of success: elite universities, mass universities, niche universities, local universities and colleges offering life-long learning (see *Information* for more details).¹³
- Henry Etzkowitz suggests a model of ‘entrepreneurial university’¹⁴ as a response to the challenges of the knowledge economy and the need to diversify universities’ incomes. In this model, the university becomes the centre of producing and applying practical knowledge, and actively engages in social and economic development of the region; the graduates will become not only the experts in certain areas, but also entrepreneurs creating new jobs.
- From among the Russian solutions, it is worth to note the concept of ‘problem-

oriented university’, a model used in the corporate programmes of SKOLKOVO business school.¹⁵ These universities are supposed to train the teams that would be able to develop new activities and ensure the transformation of the existing corporations, industries and territories in response to today’s challenges. Thinking and communication focused on solving urgent problems become the main processes in such institutions, and training is built on teams’ strategic and project work.

Practical transition to a new education model and performing systemic restructuring of existing educational institutions is a complex challenge a few can deal with. One of the successful examples is a story of the Arizona State University (USA) where it took 10 years to bring

the university on the way to a ‘new model of the American research university’,¹⁶ based on interdisciplinary research and development, high-quality mass education (more than 72,000 students), and active participation in the development of the state and local communities.

Other striking examples are Stanford, Harvard and the Massachusetts Institute of Technology (MIT); with a strong research core, they move towards commercialising their developments and shaping business environment around the universities. For example, the MIT alumni have founded more than 25,000 existing enterprises with the annual turnover of USD 2 trillion, which is equivalent to the scale of the eleventh economy in the world.¹⁷

However, the examples of successful university transformation suggested by the experts are an exception rather than the rule. In

Information: Five Models of Universities of the Future

In essay **An Avalanche is Coming: Higher Education and the Revolution Ahead** by Michael Barber et al., the authors present five models of universities which can survive the innovation avalanche.

The elite university:	universities with strong global brand, significant endowment, rich many-century history and worldwide-known professors;
The mass university:	universities which will provide quality education for the growing middle class around the world. One of the benefits provided by these universities will be the opportunity to work in the world’s leading companies.
The niche university:	universities with narrow field of expertise which managed to occupy a niche in the international division of the intellectual labour and become the world leaders in certain researching or educating areas;
The local university:	universities which play a key role in developing local or regional economy through training of qualified personnel or organising applied research in response to requests of the regional companies, authorities and local communities;
The lifelong learning mechanism:	a new form of higher education composed of various learning modules provided by both educational institutions and specialized companies without the necessity to attend a certain university.

¹¹ Source: Monitoring of the Activities of the Federal Educational Institutions of Higher Professional Education, Ministry of Education and Science of the Russian Federation, 2012.

¹² Source: OECD statistics, OECD countries expenditures for the educational institutions in 2010, in current prices, at purchasing power parity.

¹³ See Michael Barber, Katelyn Donnelly, Saad Rizvi, *An Avalanche is Coming: Higher education and the revolution ahead* (2013).

¹⁴ Henry Etzkowitz, *The Triple Helix: University-Industry-Government Innovation in Action*, 2008.

¹⁵ Dmitry Livanov, Andrei Volkov, *Bet on New Content*, Vedomosti, September 2012.

¹⁶ See <http://www.asu.edu>.

¹⁷ Edward B. Roberts and Charles Eesley, *Entrepreneurial Impact: the Role of MIT*, 2009.

a way, restructuring an existing educational institution can be compared to reassembling the engine or replacing tires in a car at full speed. Theoretically, it is possible; at the same time, besides a comprehensive actions plan and highly professional management team that shares the values of change, it required enough time and favourable conditions.

Therefore, many attempts to transform educational institutions face the inertia of the system and resistance to changes, and in practice, they often reduce to improving and enhancing the existing models.

Back in 1930, the Spanish philosopher José Ortega-y-Gasset addressed the student federation at the University of Madrid, "...government and university [in Spain] alike need reform: it is not a question of desiring reform or not; it is imperative that we make an effort, because neither of these institutions is working. They are machines worn out by the wear and tear of use and abuse."¹⁸ These words seem to be relevant even today, 80 years later. We are still waiting for a new wave of bigger innovations in education.

Without denying the importance of large-scale transformations, we think it necessary **to change the logic of discussing the future of education.**

To do that, we must admit that it is impossible to find an exact answer to the question "What will the educational landscape look like in 10, 20, or 50 years?" Any answer will be only a probability. The existing model of educational institutions is likely to remain for many years and survive more than one avalanche of technological innovations, as it was in the 20th century when the era of radio or television began, or in the 15th century with the advent of printing.

We must also admit that various trends and external factors — first of all, technological — will provide new opportunities and potential new market niches or areas for educational experiments that will be able to develop alongside the traditional educational system, developed over the past centuries.

The international management practice distinguishes between two spaces of project development and implementation:

- Brownfield means development of utilised space, usually associated with modernisation and increased efficiency of existing production facilities and processes;
- Greenfield means development of a new area where new infrastructure is built and new projects are started from scratch.

This distinction is common in the oil industry. Existing oil and gas fields, or the brownfields, eventually start diminishing returns, so the oil companies willing to maintain production volumes and revenues are forced to advance to new territories and implement large-scale greenfield projects that focus on developing new oil fields (for example, in Eastern Siberia and on the Arctic shelf) or developing new hydrocarbons production and processing technologies (such as shale gas).

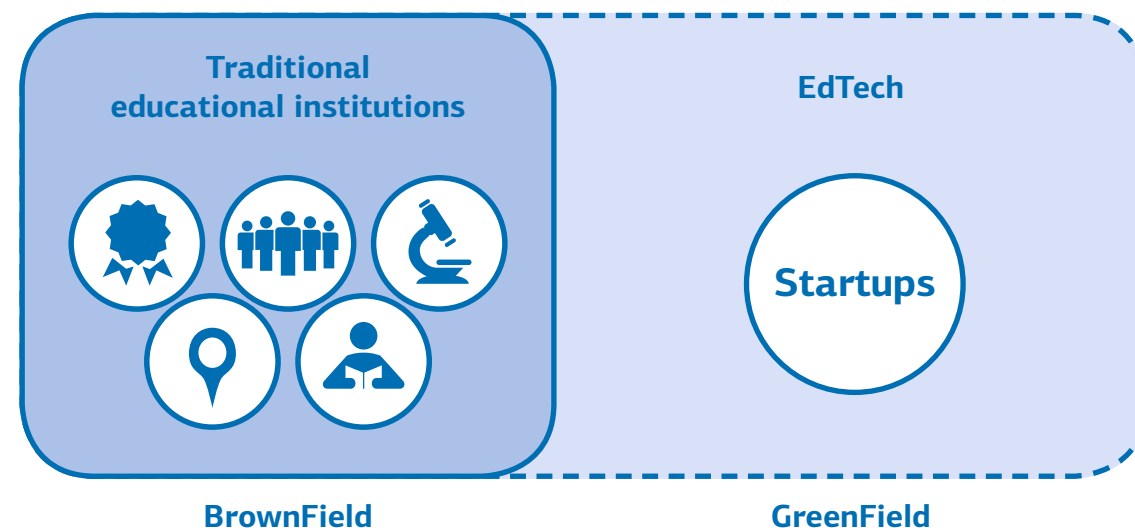
Applying this metaphor to the field of education, we can assume that the wave of

technological innovations can result in a new space of educational initiatives, which are created from scratch (in the green field) and exist alongside the brick-and-mortar educational institutions.

Within this framework, the future of the traditional educational institutions most often discussed in the expert community can be referred to as the brownfield — a historical area of educational practice. Greenfield, in its turn, will be represented by new educational projects (educational startups) based on new technologies. Such projects have recently received a special name, EdTech¹⁹ (see Fig. 7).

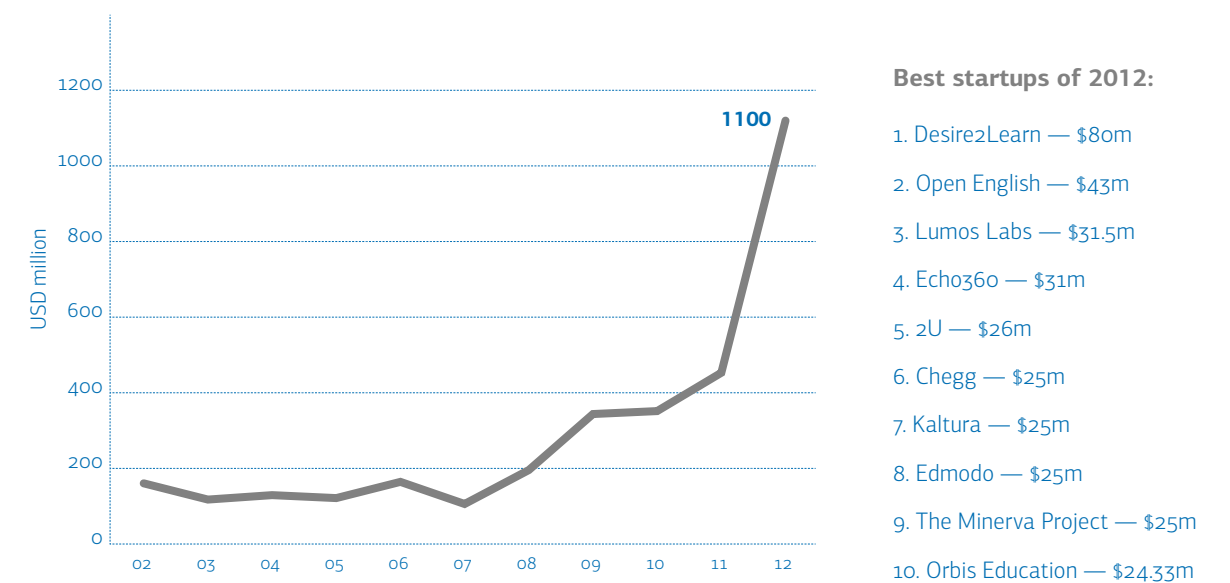
However, the existence of a new educational space — an educational greenfield — is yet to be proved. Drawing analogy with business, the main criterion would be a critical mass of educational projects created from scratch, which have managed to attract significant investments and gain popularity and trust of the users.

Fig. 7. Two spaces of education development



¹⁸ José Ortega-y-Gasset. Mission of the University. Routledge, 2014.

Fig. 8. Venture capital investments in educational startups worldwide²⁰



Sources: National Venture Capital Association, GIGAOM

¹⁹ EdTech (Education Technologies): educational projects based on modern ICT technologies.

²⁰ <http://gigaom.com/2013/01/21/more-fodder-for-bubble-debate-ed-tech-startups-get-1-1b-in-2012/>

The analysis of the dynamics of venture capital investments in educational startups shows that during the past 10 years, there has been developing a market of new educational initiatives that manage to attract substantial funding. For

example, from 2010 to 2012, the scope of investments in educational projects worldwide has increased threefold, from USD 350 million to USD 1.1 billion, which exceeds the budgets allocated for education in some developed countries.

Educational startups which attracted the biggest financing in 2012 ²¹



Desire2Learn was established in 1999. It deals with the study and development of educational process management in schools and universities, offering a unique educational environment and lifelong learning mechanisms for students, corporate employees and government agencies. The company is a leader in cloud-based educational solutions providing a platform to more than 1,000 customers and 10 million students around the world.



OpenEnglish is an online English language school operating at large and rapidly growing global market. Founded in 2007 in Miami, the company specialised in teaching English to Spanish-speaking residents of the United States. The teachers of the school — native speakers working online — and the interactive educational content enable OpenEnglish to customize the path towards the fluency for each student.



The mission of **Lumosity Labs** is to become a leader in understanding and improving the efficiency of the human brain, giving everyone the opportunity to reveal their intellectual capabilities. Lumosity programmes and website are designed to train the basic cognitive skills such as memory and attention. Established in 2007, Lumosity has over 45 million users today and is one of the fastest-growing websites in the number of subscribers.



Echo360 provides an opportunity for each student to overcome the traditional barriers to individual educational experience. Using multi-platform for fast recording and playback of lectures, the company provides media on demand services to universities and colleges and helps their students get access to the educational content of their schools at any time.



2U partners with universities in developing, administrating and selling online educational programmes. The company develops unique technological platforms which transform traditional courses into online training based on web technologies. 2U also provides educational logistics and support to students from the stage of admission to the programme up to awarding a diploma.

²¹ Source of information about the projects — Crunchbase.com.

Compared with 2002, the level of investments increased by almost 10 times (see Fig. 8).

This statistics shows a significant increase in investors' interest in educational startups, thus proving the hypothesis that a new educa-

tion development space, the educational greenfield, is formed.

Ironically, there are no MOOC initiatives (Coursera, EdX, etc.) among the top 10 educational startups which attracted the largest

Educational startups which attracted the biggest financing in 2012 ²¹



Chegg is an online textbook rental service. It was founded by two students at the University of Iowa, dissatisfied with the existing procedures and prices for textbooks in the university bookstore. Started in 2007 as a local service, the company currently offers its services to more than 6,500 universities and colleges in the United States. Using this service, the students can order any number of books at an attractive price in just two clicks, and they will be delivered within a week.



Kaltura offers the world's first online open-source video platform which enables over 100,000 clients — media companies, universities and service providers — to enrich their websites with adapted video, photo and audio functionality. The services include creating, posting and managing video content, its promotion and monetization of the content, and analytics.



Edmodo offers a convenient and secure platform for the students and teachers which can be used for interaction and communication, exchanging content and educational applications, access to assignments, assessments and class discussions. The aim of the company is to help the teachers use social networks for adapting the classes to the needs of every student.



The Minerva Project provides a new insight to the university education for the most talented and motivated students from around the world. Combining the best of Liberal Arts & Science with advanced technologies, Minerva claims to train future leaders and innovators in all disciplines. During the training, a group of international students will be travelling, studying and living in 7 best cities of the world and interact with the teachers through a special online platform. The first class will start in the autumn of 2015.



Orbis Education develops, promotes and manages the educational solutions for nurse training, thus solving the problem of nurses deficit in hospitals and US healthcare system in general. Working together with leading medical schools and universities, the company offers flexible and customized Bachelor's programmes for online nurse training.

investments in 2012. These projects received significant funding as well, but they are in the second ten of the investors' popularity rating (Coursera attracted USD 22 million in 2012). The space of EdTech projects proved to be wider and more varied than it is commonly thought and debated in the media community. The phenomenon of MOOC which is a common example of breakthrough innovations in education is only the tip of the iceberg.

Despite the great diversity of the educational projects which received significant funding in 2012, they share some common characteristics:

- orientation towards the global market and effective demand which the traditional system of education does not pay attention to or fails to meet as quickly and efficiently, from the convenient and cheap rent of the textbooks up to lifelong learning mechanisms that are broadly discussed during the last 10–15 years but still remain just

an attractive idea for the majority of traditional educational institutions;

- the use of modern technological solutions from adjacent areas (first of all, computer, communications and media technologies) which can provide new benefits, simplify and enrich the educational process: online platforms, social networks, systems for accounting and analysis of large data arrays, etc.;
- successful background of the project (the age of the most companies in the investment top 10 is from 2 to 5 years) or the name and reputation of the founders, as is the case with the Minerva Project, with the former Harvard president Larry Summers in the Board of Trustees — all this contributes to lowering the risks which inevitably arise at the startup phase of a new project and building up of a new industry.

The emergence of business incubators, which specialise in supporting educational startups,

is another sign of the formation of a new educational space.

To date, there are more than 7,000 incubators in the world assisting young companies in various economy sectors: medicine, biotechnology, composite materials, semiconductor technology, Internet, etc. However, the past few years saw the first EdTech incubators specialising in technological developments for education.²²

Most of these incubators stick to classical operation mode developed in Silicon Valley over the past decade, offering their entrepreneurial teams short-term programmes to refine their ideas and the so-called Demo Day, an opportunity to present their projects to a wide range of business angels and venture capitalists.

This is, for example, how Imagine K-12 works, one of the most famous incubators in the field of education which was founded in 2011 by successful people with experience in Silicon Valley and high-tech companies Yahoo! and Google. Intending to disseminate the innovations in school education, the incubator organises three-month programmes, providing the startup teams a working place in its office, and most importantly, its expertise, marketing support and access to venture capital investors. All this is offered in exchange for six percent share in the company. For eighteen months of the incubator activity, more than USD 40 million have been invested in educational projects, and about 70% of the entrepreneurial teams received financing.

The Startl incubator, funded by the major US funds (sponsored by Gates, Hewlett, Kellogg and MacArthur, chose a more provocative positioning and different scheme of work, with a slogan 'Shock the System'. The support is given to the educational projects based on modern electronic and media technologies. One of the most successful startups of the incubator, MindSnacks, gaming app, received the investment of about USD 1.2 million; further plans include modifying the business paradigm and extending the support to the projects located in the regional business communities in the US.

Finally, the third model of supporting new educational initiatives is offered by NASA, which provides financing, technology tools and services for project teams with interesting ideas on STEM training (short for 'science, technology, engineering and math'). This allows the corporation not only solve the problem of professional training, but also to be an active career advisor and attract talented young people to work in the aerospace industry.






Thus, in addition to new educational projects which become more popular around the world, a complete business infrastructure of supporting and funding the educational startups has been formed over the past few years.

An increasing number of people focuses on creating new successful solutions instead of fighting against the old educational models. Supported by investors' money and growing attention from the media, the educational startups become a mass phenomenon and continue gaining steam. Unlike the traditional educational institutions, they play on the side of the current trends — massification, globalisation and digitalisation of education (*see Part 1*) instead of confronting them. Thanks to modern technologies, the educational startups can offer more accessible and affordable education for the global market, focusing not on the government or corporate budgets, but on the venture capital or private funds. This is how the challenges and threats for traditional players turn into great opportunities and competitive advantages for new teams and projects.

With virtually unlimited scalability, EdTech projects become attractive in terms of investment, while some education leaders discuss the creation of a 'billion university'.²³

So, we are witnessing the formation of a new educational space, whose scale and potential entitle us to speak about a new era in the development of education — the greenfield era which can not only lead to the emergence of multi-billion dollar educational businesses, but also to the transformation of the traditional education system.

Fig. 9. Three models of EdTech-incubators

Learning Technologies		
		
Innovations in school education	Slogan: Shock the System	Support of STEM training projects
3-month programme for project teams + investing of ca. USD 80,000 (up to 60% of startups)	Support of 'non-system' (media and electronic) projects	The incubator provides finance, tools, and services to the teams
USD 30 million raised	Support of Gates and Hewlett Foundations	NASA
		<ul style="list-style-type: none"> • Space games • Virtual worlds • Tools for professional growth

Sources: TeachThought.com

²² See 10 EdTech Incubators Aiming to Change Education Forever (<http://www.teachthought.com/trends/10-edtech-incubators-aiming-to-change-education-forever/>).

²³ Anya Kamenetz, \$60 Million Venture To Bring Harvard, MIT Online For The Masses. *Fast Company*, May 1, 2012. URL: <http://www.fastcompany.com/1836120/60-million-venture-bring-harvard-mit-online-masses>.

3. EdTech: New Technological Platform for Education

The first online education projects came up in the 1990s, but the boom of their popularity and investment activity is observed only now, 20 years later. Why?

In our opinion, the rise of educational startups became possible as a result of a stable model of reproduction and development of new educational practices. This happened due to a new technological platform for education which has formed over the past few years; this platform combines the advantages of individual EdTech projects into a unified system offering comprehensive educational experience and an alternative to traditional educational formats.

A similar qualitative change took place in interpersonal communication about 10 years ago with the new social networks — Facebook, Twitter, Instagram — based on new technology platform (Web 2.0). This social and technological innovation has contributed to formation of a new cohort of people who are accustomed to live and work in the web. They were the first participants and followers of the second-generation online educational projects.

The arrangement of a new educational technology platform is shown in the chart (see Fig. 10). Its key elements are the following:

1. **Massive Open Online Courses (MOOC)** enabling to arrange the educational process for thousands of the students at any point of the world simultaneously.
2. **Learning Management Systems (LMS)** which build individual educational paths and allow assessment of learning outcomes for the whole variety of new educational formats.
3. **Environment supporting the new education** which is comprised by the 'factories' producing new educational content, social networks for teachers, students and employers, as well as systems analysing big data which provide for continuous improvement of teaching

The rise of educational startups became possible as a result of a stable model of reproduction of new educational practices

technology and adaptation of educational process to the requirements and capabilities of a particular student.

4. **New educational infrastructure** opening the physical access for millions of people to new educational opportunities: computers, tablets and smartphones, upgraded educational institutions and special co-learning centres that are yet to be established.

Let's have a deeper look into how the individual elements of the new technology platform work and give examples of the educational projects which have already been implemented in each of them.

3.1. Massive Open Online Courses (MOOC) as the core of the new technological platform of education²⁴

Massive open online course (MOOC) is a special type of educational online course providing large-scale participation and open (free) access for all who want to study. This type of courses has been available for several years already, but it is only recently that elite universities from the top 10 best universities in the world — Harvard, MIT, Stanford and others — began to offer them as well. Educational courses from the world leading professors which were previously available to a narrow circle of people only, have become open to hundreds of thousands of students around the world, regardless of their income and experience.

²⁴ This section is based on article by Ivan Smagin, EdX and others, SKOLKOVO Business School, 2012.

The appearance of the first MOOCs is associated with Stanford University which launched three educational courses attended by over 100,000 students in autumn 2011. For example, the course of Professor Sebastian Tran on artificial intelligence was attended by more than 160,000 students from 190 countries. This successful initiative was supported by other universities, first in the United States, and then around the world. Some of the projects received wide recognition: Coursera, Udacity, EdX and others. By the summer of 2013, the large-scale initiatives on creating

their own online platforms were launched in Australia, Britain, Germany, and Brazil. Many leading countries of the world joined the technological race in education, yet without the active participation of Russia.

MOOC became the hottest topic in education: last year alone, over 100 research papers and articles on MOOC were published, and The New York Times called 2012 the “Year of MOOC”.²⁵

What is the secret that makes the new educational technology so attractive? On the one hand, the MOOC is based on **translating knowledge from teacher to student**, the pro-

cess which is clear for educators and is proven by centuries of experience; on the other hand, MOOC brought this process to technological excellence.

In the 1990s, the traditional online courses were limited by the desire of their authors to provide participants with the opportunity of direct contact with the teacher. MOOC do not suggest such a possibility, since no one can communicate with dozens of thousands of students. In these circumstances, the determining factor of the course success is its design: the course must be designed so that the student could master the material without the teacher’s involvement.

A kind of standard has been set by the pioneer of mass online learning, Khan Academy, created in 2006 by the MIT and Harvard graduate Salman Khan. For several years, more than 3,400 educational videos were released, covering a wide range of topics from the school curriculum — from the fundamentals of arithmetic and algebra to the French Revolution. The lessons are given in the format of 12-minute videos during which the empty whiteboard is filled by the key points of the lesson accompanied by a lecture, which, as a rule, is presented by Khan himself.

Khan Academy videos are extremely popular and got more than 200 million views on YouTube. The success of the project proves that online courses should not be a simple copy of the classical university lecture, when a professor presents the course standing at the board and communicating with the students from time to time. The material can be divided into short modules, each devoted to one concept or idea. The students can master the material in different ways, depending on their knowledge, skills or interests. The courses can be enriched with additional preparatory material for beginners and more complex tasks for advanced students. Ideally, the MOOC format allows to get away from the ‘one size fits all’ education model and provide the students with an opportunity of personalised learning. The process of student communication plays a special role in

In MOOC the process of translating knowledge is brought to technological excellence

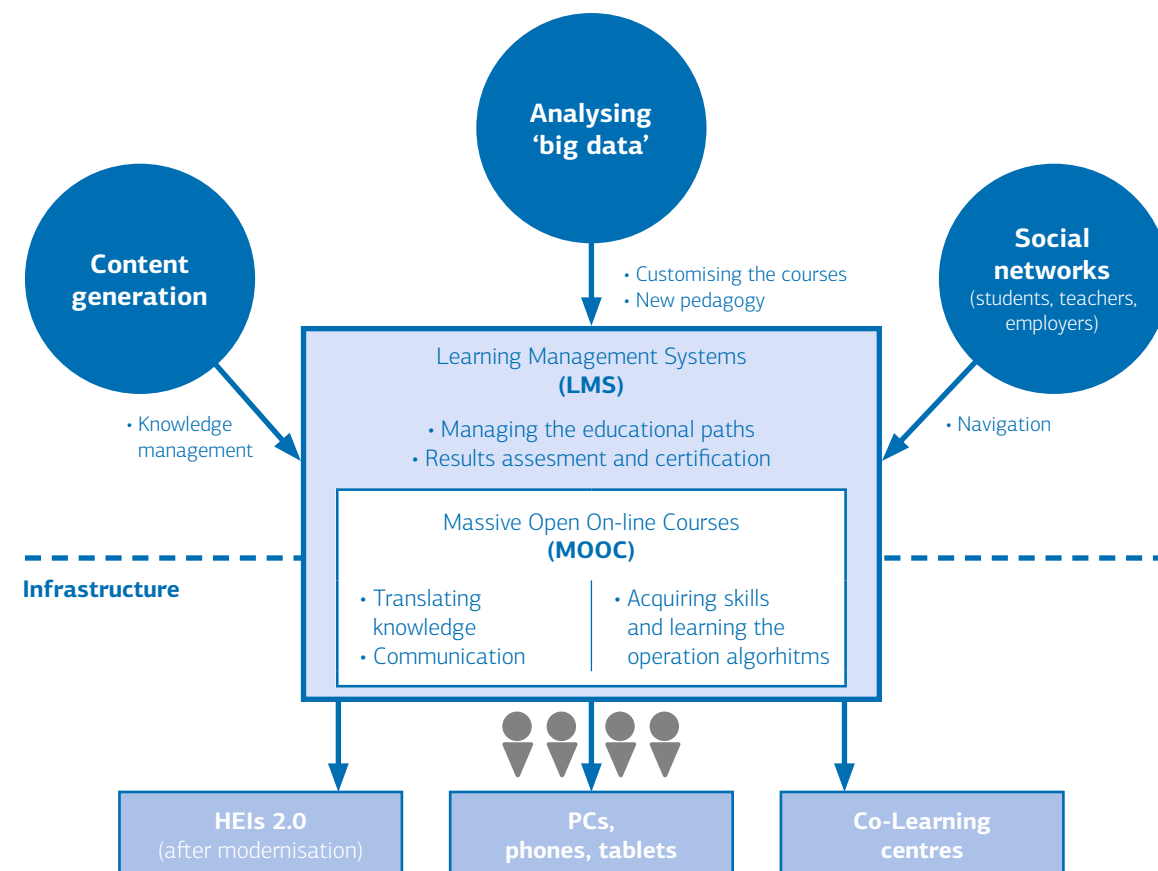
the MOOC. The mass character of the courses results in students uniting in communities, both online and in real life, to help each other in learning. Due to larger scale of the online community, the students can interact with each other better and deeper than they could when studying in a traditional classroom. Such communities begin directly influencing the course itself — the students find and share some extra materials, discuss the difficulties on the forums and suggest solutions. They also develop software products that help to learn the materials better or translate them into national languages, thus making the courses available to an even larger audience. More than 100 volunteers translated CS221 course on artificial intelligence²⁶ into 44 languages.

Many students admit that studying at MOOC is more difficult comparing with traditional universities: the assignments require thorough researches on the topic; studying materials and independent work take much time.

Two main methods are used to assess the knowledge: automated tests with multiple-choice questions and writing assignments that are assessed by assistant professors and/or the students themselves. The new tools assessment gain more ground: computer adaptive tests where each subsequent task is selected based on the answers to the previous one and automated tools for testing written assignments.

The final examinations are usually held on a paying basis and held in regional test centres or directly from the home/office using special devices for user identification. However, not more than 10% of the participants reach the end of the online course.²⁷

Fig. 10. New technological platform for education



Source: SKOLKOVO Education Development Centre

²⁵ See Wikipedia, http://en.wikipedia.org/wiki/Massive_open_online_course.

²⁶ The first course implemented by Udacity.

²⁷ See MOOCs on the Move: How Coursera Is Disrupting the Traditional Classroom. Knowledge @ Wharton. University of Pennsylvania. November 7, 2012.

Currently, most of the MOOC do not charge any fee. In fact, the only financial constraint to learning is the fee for the Internet access, which makes the service widely accessible to more people. At the same time, further development of the MOOC projects will clearly need significant funding which can hardly be covered solely by charity. The founders of the projects rely on the various ways of monetisation such as fee for exams which will enable to reliably estimate the progress of students and issue the certificates recognised by employers, mediation between students and potential employers, and counselling the students.

The projects such as EdX or Coursera can also be seen as a response to increased demand for elitist education. The middle class in developing countries is becoming an increasingly important part of society, which means that millions of people around the world experience real need for high-quality education. However, the leading world universities cannot keep up with demand. For example, only about 6% of applicants are admitted to Harvard although the admission criteria are formally met by about 80% of applicants.²⁸ The cost of higher education in the United States increased by a total of 550% since 1985²⁹ — that is several times greater than

the rate of inflation over the same period and is an additional sign of the growing demand for quality education.

Therefore, for the majority of motivated students from around the world, the massive online courses have offered a real alternative to traditional educational programmes to acquire new knowledge and new skills.

Except for MOOC based on technological formats of knowledge translation, a new segment of the educational online projects focused on training various skills from teaching reading and writing to making complex business decisions in situations of uncertainty has been actively developing over the recent years. A large number of training simulations available online and intended for different target audiences from preschoolers to active professionals has been created.

Such projects are based upon the process of learning new working algorithms by action and its subsequent reflecting as opposed to watching video lectures and learning materials in classical MOOC. It explains why the simulations share

Many students admit that studying at MOOC is more difficult comparing with traditional universities

a common feature of a *game format of training* encouraging action. Gamification becomes an important characteristic of the new educational platform enabling to use the game approaches for better engagement of students in the process of learning new skills and competencies.

For example, in 2012 there were about 1 million educational applications for tablets and smartphones with 80% developed for children of preschool age aimed to facilitate early child development, train mathematical skills, literacy, language skills, and creativity.³¹ In 2012, their turnover was around USD 150 million and the experts predict that it could exceed USD 750 million by 2015.

Description of the most popular MOOC initiatives



Khan Academy is a non-profit educational organisation founded in 2006 by Salman Khan. The success of Khan Academy is to some extent accidental as the project has grown from a hobby of its author and proved incredibly popular unexpectedly for him. Its mission is 'providing quality education to everyone everywhere'. The Academy's website provides access to more than 3,600 free lectures on mathematics, history, health, finance, physics, chemistry, biology, astronomy, economics, etc. The project is supported by donations partly from Google and the Bill and Melinda Gates Foundation³⁰.



Coursera is one of the most successful MOOC platforms that offers more than 420 training courses from over 80 partners and brings together more than 4.5 million students from around the world. Founded in 2012 by Stanford professors Andrew Ng and Daphne Keller, the project managed to attract over USD 65 million of financing. The courses have been developed by the professors from the leading world universities, including Princeton, Stanford, and Columbia University. The content of course includes video lectures with subtitles, lecture notes in text format, homework, tests, and final exams. If a course is passed successfully, a certificate is issued.



EdX is a non-commercial project in the area of online learning created by Harvard and MIT in 2012. EdX offers free access to over 60 courses developed by the University of Berkeley, Harvard, Austin, MIT, Georgetown and others. Besides the educational component, the founders of the MOOC platform intend to explore how students learn and how new technology can transform education.

²⁸ Benchmark bets on online university by David Gelles in New York FT April 3, 2012.

²⁹ Daphne Koller. What we're learning from online education, filmed June 2012, posted August 2012, TEDGlobal 2012.

³⁰ Source: Wikipedia, http://en.wikipedia.org/wiki/Massive_open_online_course.

Description of the most popular MOOC initiatives



Lynda.com is an educational company providing hundreds of online computer, design, and business trainings enabling to achieve personal and professional goals.

Established in 1995 in California, the project received a record-breaking funding among all EdTech projects of USD 103 million in January 2013. The secret of success is in a large number of highly sought online trainings from dozens of professionals from various fields.



Udacity is a commercial educational organisation founded by Stanford professor Sebastian Tran in 2012 that attracted USD 20 million from venture capitalists. Unlike similar MOOC platforms created by universities consortiums, Udacity offers about 30 courses designed not only by university professors, but also by leading industry experts in such areas as computer sciences, design, mathematics, and technology business. Each course offers several levels of difficulty: for beginners, basic, and advanced students.

³¹ Carly Shuler. iLearn II: An Analysis of the Education Category of Apple's App Store, 2012.

A separate type of online simulations is represented by computer simulations which provide an opportunity to simulate the process of managing an organisation or control a complex technical system (aircraft, rig, etc.) and help to quickly master the managerial and technical skills.

The first flight simulator was introduced and patented in 1929, and the first simulation for managerial skills was developed by RAND Corporation (1955) and McKinsey (1957) which has since become the standard for training managers in the world training companies and business schools. Currently, there are about 10 major companies developing simulations for different sectors of the economy or offering global online projects for training managers (e.g., Global Management Challenge that annually brings together over 35,000 managers from 30 countries).

Many educational simulations and training devices were originally created as a new form of full-time classes, so today they are in the process of transition to a new technological platform that will allow to translate the entire learning process in online thus multiplying the audience of participants. This class of the EdTech projects has just started the way of classic MOOC to become truly massive online courses with established standards of training oriented predominantly not on the video lectures, but on complex computer simulations.

It is safe to say that we are at the stage of formation of a new segment of the mass online courses developed for technological shaping of various skills for millions of people around the world.

3.2. Learning Management System (LMS)

Formation of new educational practices and the development of mass online courses require the development of a new approach to learning management system (LMS) intended to ensure two basic functions:

- to build and manage a student's educational paths, ensuring continuity and

A new segment of the massive online projects is focused on training various skills

coherence of the educational experience obtained through diversity of formats of the online and offline learning;

- to assess and certify the learning outcomes in a single coordinate system, clear and applicable for various stakeholders — employers, professional associations, public authorities and, of course, students themselves.

The new learning management system becomes a life-long learning mechanism capable to build a customised educational path at different stages of a person's life and career basing upon the diversity of gained experience.

As a response to this request, the first educational startups specialising in new learning management systems came up in the world. The LMS projects were those that enjoyed the biggest funding as of the end of 2012 (more than half of all investments) and Desire2Learn Corporation, which offers solutions for life-long learning, became a leader in attracting investments among all EdTech startups.

If we consider Desire2Learn as a benchmark in the market of LMS products, the main elements of modern learning management system should include:

- *tools for shaping the learning environment*, which include the development of customised educational programmes, new multimedia, and convenient channels of students communication;
- *'image capture' tools*, which enable recording presentations and lectures in the classrooms and connect to them in real-time mode or on demand from the students' computers and mobile devices;
- *mechanisms for collecting and analysing data* on learning outcomes to generate de-

tailed reports with infographics and conclusions about the effectiveness of the learning process;

- *solutions for transferring educational content and learning assignments to mobile devices*;
- *tools for shaping a student's e-portfolio* which would allow to measure and record the learning outcomes in various courses and develop the own network of useful educational contacts;
- *systems of management of educational content enabling* to store, modify and share the educational materials with the participants of the educational process.

These elements of the learning process managements allow not only to naturally incorporate all modern multimedia and communication technologies into the educational process, but also to manage the participants' individual educational paths within a variety of educational services offered in the market.

The new opportunities provided by LMS systems allow to change the approach to development of educational strategies for cor-

Gamification becomes an important characteristic of the new educational platform

porations and individual students and switch from the logic of selecting the educational programme or institution to the logic of managing the 'competence chain', by analogy with the business with its 'value chain'. This will greatly improve the efficiency and effectiveness of the educational process as the requests for necessary competences can be addressed to different providers — MOOC, training companies or traditional educational institutions — choosing among those which can shape them better, faster and cheaper.

Thus, a new learning management system allows making a significant step towards changing the 'institutional core' of education³² — to switch from management of educational institution that dominated over the last 500 years to the management of individual educational path.

Examples of some educational projects focused on acquiring skills and algorithms of work



ROOT-1 is a remarkable example of a company working over the monetisation of gamification trend. Founded in 2010, it is developing educational games to practice writing and vocabulary skills. They have developed several educational games that can be played online or downloaded to a smartphone. In 2013, the company was purchased by Edmodo, the largest educational social network.



Capsim is one of the world leaders in the development and use of computer business simulations in the educational process. Every year more than 100,000 people around the world use the company's educational products — the university students and lecturers who use Capsim simulations in their management courses or MBA programmes as well as the corporate clients. In addition to the online management simulations, the business skills testing products have also become widely popular.

³² This idea was suggested by P.G. Shchedrovitskiy in his interview to The Prime Russian Magazine on June 24, 2013.

3.3. Ecosystem of supporting new education

The most important condition for development of a new technology platform is the **ecosystem of supporting the new education** ensuring quality of the new educational process (MOOC) and comprehensive learning management system (LMS).

The ecosystem consists of three main elements:

- systems of analysis of large arrays of data generated by millions of MOOC participants;
- specialised social networks consolidating all participants of the new educational process;
- “factories” which would produce the educational content.

Each of these elements of the ecosystem serves to personalise and tailor the educational experience obtained by the participants in highly technological formats of the massive online

Development of MOOC requires new approaches to management of educational process

learning. Some experts believe that it is not the MOOC, but the elements of the new educational ecosystem formed around the process of online learning which embody the genuine revolution in education.³³

Mechanisms of analysis of large arrays of data (Big Data)

MOOC format allows collecting huge amounts of data, determining exactly how the materials are retained by dozens of thousands of students and identifying the patterns for better understanding of the learning processes. Thus, the creators of these courses have a very good possibility of continuous improvement based on real data and through feedback and assistance from the participants themselves.

For the first time in a thousand years, thanks to modern systems of data collection and analysis, developers and training providers have the opportunity to keep track of every educational action of millions of students and see to what educational outcomes it leads. This allows not only to continuously improve the learning process making it more efficient for all participants but also customise the training course under the abilities and capabilities of a particular student.

By analogy with Google which collects and analyses information on millions of clicks for users to provide them with the most personalised and ‘useful’ advertising, modern education providers will be able to **configure and customise their educational courses** tailored to the individual needs of students — to form the most productive study groups, release time for creative tasks and answer questions as early as they arise.

The new opportunities offered by the analysis of ‘big data’ in education have become available only recently with the development of science and technology and require significant time and financial investment.

In particular, Knewton, the leader of this trend in education, identifies five types of data that can be collected and analysed to improve the learning process:³⁴

- **Identity Data:** basic demographic data about the student (gender, age, place of residence), information on the rights of access to the course/application, etc.)
- **User Interaction Data:** number of clicks, page views, returns, etc. These metrics have long been an important tool for all companies selling goods and services via the Internet, because they can significantly optimise the interaction with visitors and retain customers. These data are collected quite easily and directly affect the effectiveness of learning so

The new LMS systems allow to move on to the new the logic of learning management — managing the ‘competence chain’

they should be used by all developers of online courses.

- **System-Wide Data:** registries of users, marks received, information on attendance rates — all these data of thousands of students of a training course can provide a good feedback for improving educational process and correcting faults which inevitably arise when developing a new course.
- **Inferred Content Data:** enable to assess how efficiently a group of students or an individual student retains separate blocks of content. For example, how fast a student moves from one section of the course to another or how accurately the test assignment corresponds to the content of the course. This type of data is not easy to collect as it requires some special algorithms and tools to handle such kind of information.
- **Inferred Student Data:** what exactly did the student remember from the course taken and at what level? Why did he/she give the wrong answer — because he/she did not know or remember the answer or was distracted or the question was worded incorrectly? What is the probability that the student can successfully cope with the next assignment? What should be done to get prepared for the upcoming exam? These and other questions about student’s personal learning activities are the key to radical improvement of the effectiveness of the educational process

Description of some LMS startups



GoalBook is one of the most known projects born in Imagine K-12 incubator; it attracted about USD 1 million financing from business angels. The aim of the project is to design and develop school platforms enabling to manage and discuss the students’ individual curricula. The project helps to harmonise the communication between teachers and students, involve parents and children through the setting of clear learning objectives and ensure the formation of truly individual educational paths.



Clever is a project created in 2012 which managed to attract USD 3 million of ‘seed funding’. The goal is to develop and implement the user-friendly applications for working with the information systems of high school, creating and updating accounts for each student. To date, over 6,000 schools are Clever customers.

³³ See Doug Guthrie. The Coming Big Data Education Revolution, August 15, 2013 (<http://www.usnews.com/opinion/articles/2013/08/15/why-big-data-not-moocs-will-revolutionize-education>).

³⁴ Jose Ferreira. Big Data in Education: The 5 Types That Matter, July 18, 2013 (<http://www.knewton.com/blog/knewton/from-jose/2013/07/18/big-data-in-education/>).

although these data are the most difficult to collect and interpret.

Despite the obvious advantages provided by the analysis of the big data to the educational process, few can benefit from this opportunity. Handling Big Data requires complex database architecture, labelling infrastructure, complex taxonomic systems, and innovative self-learning machine algorithms analysing the information. In addition, hundreds of teachers, courses designers, engineers, and researchers must be involved. The development of such a complex system is hardly profitable for a single training course or educational institution, therefore only a few companies with large portfolios of educational courses and applications and possessing the necessary technology will be able to take full advantage of the new educational opportunities offered by the analysis of large data arrays.

The Big Data in education is becoming an increasingly hot topic with every passing day. It is associated with the possibility of a significant transformation of the educational process and the educational technology which constant improvement can bring it to a high degree of perfection. It is no coincidence that Coursera announced the launch of a new course in October 2013 *Big Data in Education*³⁵ (developed by Ryan Baker, a professor at Columbia University) and two leading research centres in the field of education — The Centre for Education Policy Research³⁶ (Harvard) and the Centre for Education Policy Analysis³⁷ (Stanford) — state the improving the educational process based on the analysis of large data arrays as a priority for their research agendas.

Quite possibly, in just a few years we will witness the appearance of new pedagogy (Great Didactics³⁸), which will be developed based on studies of the big data and will make a new standard for mass education around the world.

Ecosystem of supporting the new education becomes an important condition for development EdTech-platform

Social educational networks

Appeared less than 10 years ago, the social networks have become an important part of life for millions of people and radically changed the process of communication and social interaction which has long gone beyond the boundaries of the virtual world.

A similar process is observed today in education with appearance of specialised social network for teachers, students and employers. They perform the **function of knowledge sharing and navigating** through numerous educational courses, the number of which increases every day in both the formal and informal education. Self-learning communities also become an important element of the new technology platform, complementing the learning process with the irreplaceable social experience and skills of working in an international multicultural environment.

The educational social networks ensure several levels of interaction:

- **‘student-student’** level is observed in the massive online courses jointly studied by dozens of thousands of students in specially organised open communities where ‘everyone can teach everyone’ (see *ShowMe project*);
- **‘teacher-student’** level allows transferring of the functions of the traditional educational process into online, including the exchange of educational materi-

als, checking tasks, grading assignments or tutor’s support to students (see *Edmodo and Tutor-spree projects*);

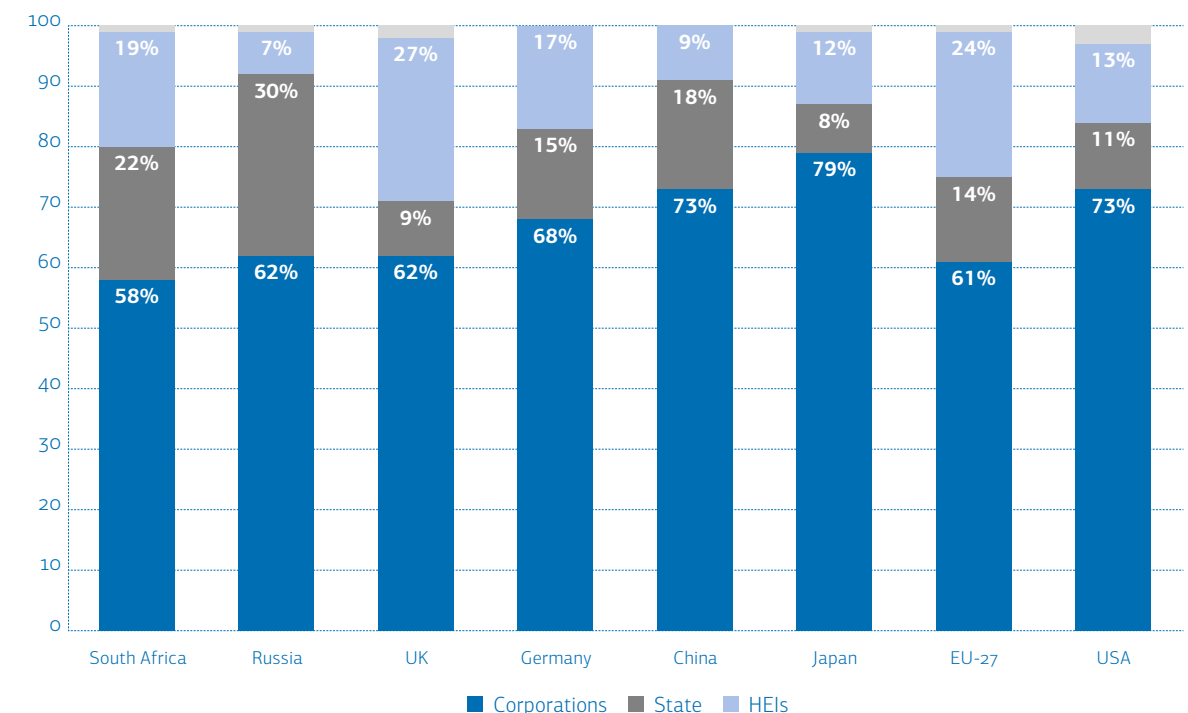
- **‘teacher-teacher’** level is carried out in a specially designed space for the interaction of teachers from different educational institutions to jointly develop the training courses, exchange curricula and materials, discuss new pedagogical ideas and approaches (see *BetterLesson project*).

Besides, due to active participation of employers, the social networks enable to **synchronise educational and career paths of students**, which is usually impossible in traditional education and leads to the common situation when

Big Data analyses allows to configure and customise their educational courses

the graduates start their careers in the areas far from their studies. Modern social networks help to overcome this constraint. On the one hand, the largest professional social networks like LinkedIn,³⁹ start adding educational options to the profiles of their users — for example, through offering the community members to highlight their competencies in their CVs, and suggest-

Fig. 11. Share in all R&D budgets allocated for various researches centres



Source: OECD, MAIN SCIENCE AND TECHNOLOGY 18 INDICATORS: VOLUME 2010/2

³⁹ LinkedIn (<http://www.linkedin.com/>), the biggest professional network with over 225 million users from 200 countries of the world.

³⁵ Big data in Education (see <https://www.coursera.org/#course/bigdata-edu>).

³⁶ <http://www.gse.harvard.edu/cepr/index.php>

³⁷ <http://cepa.stanford.edu/>

³⁸ By analogy with famous The Great Didactic by J. A. Comenius published in Latin in 1638 that has become the pedagogical basis for classroom-lesson system creation.

ing that dozens of their colleagues and partners confirmed or disproved this information.

On the other hand, based on the results of the examinations, the MOOC provide the opportunity to select ten or one hundred best students awarded with the highest qualification in the subject of the course such as programming or mathematics. The selected group of talents becomes a target for head-hunters and potential employers as their competences have been confirmed by technological and impartial evaluation system.

To date, more and more recruiters and corporations explore the new opportunity of

search and selection of staff. For example, last year, the top management of Aquent staffing agency found the growing demand for employees with HTML 5 programming skills the market could not satisfy. As an experiment, the company launched a short MOOC course on HTML 5 and 367 students out of 10,000 registered participants passed the final exams. Having interviewed the best students of the course, the company could employ 200 of them. Based upon the results of the experiment, the management decided to create a separate project called Aquent Gymnasium in order to launch a series of similar training courses.⁴⁰

Projects forming the ecosystem of support to new education



Knewton is the world leading provider of adaptive learning which has provided over 320 million personal advice to students from around the world. The company has created an infrastructure platform that adapts the standard educational content to the unique needs of the students worldwide. Knewton analyses thousands of educational materials with different data, concepts, level of complexity and media formats, and uses sophisticated algorithms to make them an ideal selection of content for each student. The more students use the platform, the better it becomes (by analogy with Google search engine). A year ago, Knewton was named 'a pioneer in technologies' at the World Economic Forum. Today, the students, colleges and universities from 190 countries use the technological developments of the company.



BetterLesson is a project created in 2011 on the initiative of several schools that allows the educators to create new educational courses, share new ideas, find lesson plans and teaching materials from the best teachers from around the world. The database contains thousands of presentations, documents, and curricula.



ShowMe is an open learning community, where one can learn and teach everything. Since its establishing in 2009, the participants have created over 1.5 million online classes with the use of special tools built into the project website including the application for iPad. To expand their activities, the developers managed to attract the investment of more than USD 800 thousand.

⁴⁰ Michael Fitzgerald, Companies Create MOOCs To Fill Skills Gaps, May 28, 2013 (<http://www.informationweek.com/education/online-learning/companies-create-moocs-to-fill-skills-ga/240155639>).

Thus, MOOC and specialised social networks have become a new tool for finding the talents around the world, regardless of the age and country of residence. In the future, this may lead to the fact that in a couple of years the largest MOOC initiatives will become the competitors for the recruiting companies which could change the rules of the game in the global labour market.

'Factories' of the educational content

With the increasing number of MOOC platforms, the content of the courses becomes the

main competitive advantage in the fight for the best students. The success of Coursera or EdX is that they were the first to attract the world leading universities and their best professors to creating the educational courses on their online platforms. The intellectual potential accumulated by the universities over the years has become a major driver for the educational content at the first stage of development of a new technology platform. However, with the growing scale of the MOOC and increasing number of online courses, the situation may change.

Even today, there came up some successful MOOC initiatives — the courses created

Projects forming the ecosystem of support to new education



Noodle Education was created by the founders of the Princeton Review and 2U, veterans of education and technology, such as Kaplan and Kumon, in order to change the ways of interaction between students from schools and universities. Noodle created the first 'engine' for online counselling and social network for life-long learning. The users of the service receive personalised recommendations on the use of all the possibilities of formal and informal education from pre-school to university, from local private teachers to international programmes, from mathematics to fitness. Currently, the database of Noodle embraces 220,000 educational institutions.



SkillShare. This virtual community provides the opportunity to learn 'everything from everybody'. The participants offer other members the classes on almost any issues from baking pies to attracting venture capital for a small fee. Founded in mid-2011 in New York, the project was able to attract almost USD 4 million of funding and extend its activities to other US cities.



TutorSpree is a project providing a new approach to the outdated way of looking for a tutor and mentor for one's studies. All tutors on the website are screened and their qualifications are assessed, and the students can post and read the reviews about their work. The website offers online interaction between a tutor and a student, and its functional is designed to search, select, coordinate schedules and pay for the work of more than 5,000 tutors.

by the employees of corporations or independent experts (see *Udacity and Lynda.com*). The potential of this intellectual resource for education is enormous, in the coming years it can make a real alternative to the Academy.

In addition, the analysis of worldwide budgets for researches evidences that higher education institutions have lost their role of the main centres where new knowledge is generated; they have only 25% in the budgets for fundamental and applied researches while in the United States or China these shares are even lower — 13% and 9% respectively (see Fig. 11). R&D departments of large corporations and leading think tanks which often perform researches and developments for the government agencies become the new global players in the market of new knowledge.

With the appearance of MOOC platforms, the largest think tanks (RAND Corp., Brookings, etc.) and professional producers of content (Pearson, Economist Intelligence Unit) have received a unique tool enabling to translate new knowledge and concepts to millions of people worldwide in a quick and

cheap manner. So, the consulting companies, R&D centres and think tanks become significant players in the education market and competitors for the traditional educational institutions.

Considering that a student has the opportunity today to choose the best from hundreds of free educational courses, the competition between the various producers of knowledge will only increase. Quite possibly in the future this will lead to emergence of a new type of educational organisations — large online universities at research centres and think tanks.

3.4. New Infrastructure of Education

Online education is often criticised for its isolation from the real world and the 'incompleteness' of the educational experience. However, this restriction is eliminated largely by development of modern communication and computer technologies and formation of new physical infrastructure enabling the 'delivery' of the

educational content to each user anywhere in the world.

The new technology platform of education can be accessed via the so-called 'smart connected devices' — tablets, smartphones, and personal computers with Internet access. In 2012, their total world number exceeded 1 billion pcs, and the IDC experts expect this figure to overcome 2.2 billion devices by 2017 (see Fig. 12).

The number of mobile devices is increasing; they become much more accessible for various segments of the population. For example, in 2012 Datavind released supercheap tablet for educational purposes for the Indian market; the price of the device for students was only 1,130 rupees (USD 21). Similar projects are on the agenda of computer equipment manufacturers for the markets of China and developing countries. As a result, the smart computing devices with access to the Internet get mass distribution and gradually become the main channel of access to new formats of education on 24/7 basis.

The access to online courses can also be obtained in some schools and universities which opted for development of a new technology platform and upgrading of their learning process.

For example, in January 2013, the San Jose State University jointly with Udacity launched an online course which, if passed, awards the students with academic credits. In February 2013, the American Council on Education announced that it would recommend its partner universities to acknowledge the results of some MOOC courses when awarding a degree to a student.⁴¹ The next step on this way will be the appearance of comprehensive educational programmes for bachelor's and master's degrees completely in the online format. The first example is a joint MOOC master's degree course from Georgia Tech, AT&T, and Udacity on Computer Science scheduled for launch in January 2014. The cost of the course providing the opportunity to receive the full value diploma of higher education will be USD 7,000 which is 2-3 times lower

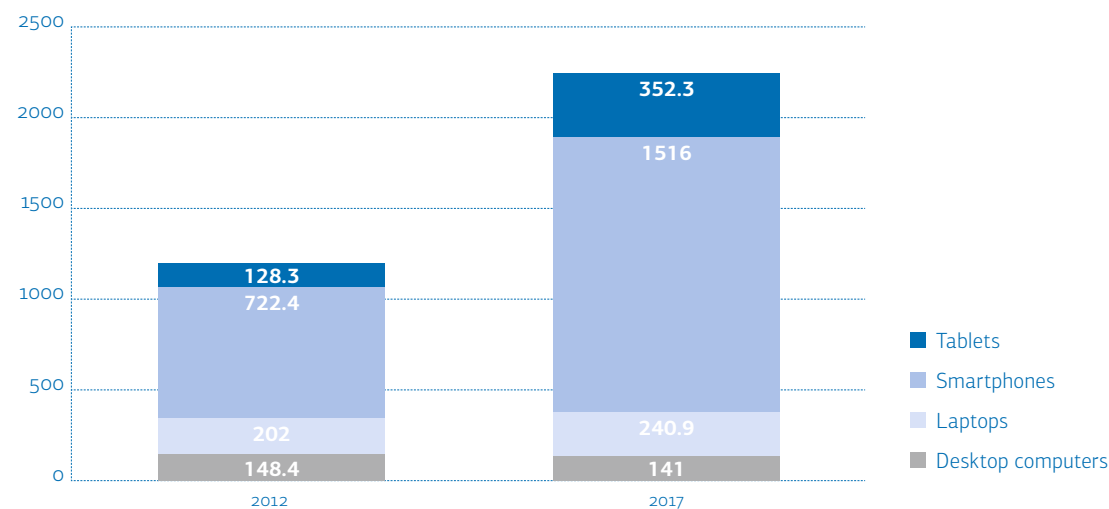
than the cost of similar course in the traditional full-time format.⁴²

Finally, the expansion of educational online courses can bring a new type of educational infrastructures — so-called 'co-learning' centres (centres of collaborative learning) tailored for the new technological platform of education. By analogy with the existing 'co-working' platforms providing the individuals and teams with the temporary workspace to implement their projects, the 'co-learning centres' will host all those willing to study in the MOOC format.

The classroom, which will resemble rather a creative or club space than a traditional lecture hall, will be able to accommodate hundreds of people at the same time; the students can have dozens of different courses in parallel under support of trainers and tutors. During the breaks between video lectures and doing assignments, the participants can communicate in a cafe on a variety of topics: discuss concepts just learned at their courses on software, biotechnology, business, artificial intelligence, etc. Perhaps, this free communication and joint educational environment arising around the MOOC education in co-learning centres would kick-start fresh business ideas and create successful startups across different disciplines and industries.

Thus, the formation of a new technological platform of education (EdTech) is at the advanced stage. All elements of the platform are successfully implemented in the form of separate educational startup projects that quickly gained the trust of investors and the recognition of users. The next step in the development and scaling of the new platform could be an integrating project which would combine all the elements of the new education. Perhaps in the next few years we will witness the emergence of a new generation of educational corporation claiming to be a Google or Facebook in education. At least, the educational 'greenfield' provides great opportunities for it.

Fig. 12. Number of Smart Connected Devices in the world in 2012 and 2017



Source: IDC, 2013

⁴¹ Melissa Korn. Big MOOC Coursera Moves Closer to Academic Acceptance, Wall Street Journal. Retrieved March 8, 2013.

⁴² <https://www.udacity.com/georgiatech>

4. Five opportunities for Russia

‘Digital revolution’ and boom of educational technology have not touched Russia yet. While universities in the US, UK, Germany, Australia and Brazil work over formation of educational consortiums to create and promote the international MOOC platforms, the majority of Russian educational institutions keep competing for government budgets and students studying on a paid-basis at the regional and sometimes national levels, thus acting in brownfield logic.

Similar situation is common for many other countries of the world; they are at a real risk of missing the next technological revolution — this time in education — and continue to invest in the development of traditional educational solutions, while the world major players will move to new technological mode.

Of course, some proactive teams attempt to join the global game and run the Russian educational projects on the new technology platform. For instance, the *Eduson.tv* project broadcasting ‘dozens of distance education business courses for busy professionals’ or *Universarium.org*, the open e-learning system offering the first massive online courses from the best Russian universities.

However, most of these projects are oriented toward the Russian audience that makes them different from the international EdTech startups and can pose a serious constraint for the next stage of development. Despite the large size of the country, the potential of our internal educational market is significantly less than those of the Europe or North American with their potential capacities of 0.5 billion people and even cannot be compared to the potential domestic market of India (1.24 billion people) or China (1.36 billion people), see Fig. 13.

Strategic priority of the so-called Russian World (the Russian-speaking population of the planet) hardly seems promising. The experts estimate that the share of the Russian-speaking people among the total world population was 260 million people in 2010 and

‘Digital revolution’ and boom of educational technology have not touched Russia yet

it will drop to 215 million people by 2025.⁴³ Therefore, any Russian startup initially limiting its activity by the size of the country would be a project on the narrowing market. In whatever industry they are implemented, such projects have limited market potential and are unlikely to attract significant resources for development from investors.

Therefore, the internal educational market in Russia should be viewed as a polygon or an experimental platform for launching pilot projects, shaping their own competencies and attracting resources for further development. Also, already at the initial stage, the Russian startups need to develop the models and solutions of entering the global market of education.

At the same time, the era of educational greenfield offers a unique ‘window of opportunities’ not only for the launch of new educational initiatives on a global scale, but also for the modernisation of existing educational institutions.

Let us consider five main opportunities which can enable Russia to take advantage of the ‘digital revolution’ and give it a chance to get on the cutting edge of global education.

Opportunity 1. Forming MOOC zone in Russia

The first step towards the launch of the Russian MOOC platform can be done by localisation and adaptation of best foreign online courses from Coursera, EdX and other well-known projects in the following areas:

- competencies required by Russian corporations and missing in Russian uni-

⁴³ Russian language at the turn on the 20th century, Moscow, Centre for Social Forecasting and Marketing, 2012, p. 387.

versities (e.g., systems engineering, project and programme management, lean-technology, supply chain management, etc.);

- 'priority areas of science, technology, and engineering in the Russian Federation' where the abroad providers have researching basis and successful practice: nanosystems, information and communication technology, life sciences, transportation and space systems, energy efficiency and conservation.

Localisation of the best foreign courses will fill the gaps in the competencies missing in Russian industry and science, saving considerable time and resources for development of own educational resources. This way was chosen by *Digital October* project that became an official partner of Coursera in Russia.

In parallel, a national MOOC platform can be created, with the first courses developed against a secured (stable) demand:

- 'Mandatory courses': courses for migrants, 'preventive conversations' in case of an administrative offense, certification courses for admission to public administration, courses on 'anger management', etc. Certificate of successful completion of the course should be taken as an official document by the employers, thus reducing the burden on government employees and ensuring a guaranteed mastering of skills or topics.
- Network courses provided by educational consortia with the necessary capacities and resource bases such as general education courses for the network of fed-

eral universities or national researching institutions.

The analysis of the international experience shows that the formation of the Russian MOOC zone should be focused on the use of existing technological developments (including from abroad) rather than developing its own platform from scratch. Another success factor would be attracting of private funding which should be the major at the initial stage of launching MOOC initiatives.

Opportunity 2. Promotion of the best Russian courses in the international MOOC platforms

The popularity of online courses in leading international MOOC platforms does not only contribute to development of the international reputation of a particular university or professor, but also becomes an effective tool for the positioning of national education systems in the global market.

For example, the creation and offering of the best courses from the Russian professors and experts through Coursera platform could be the first significant step towards the integration of Russia into the international educational and intellectual space.

But before that, the areas of competitiveness of Russian education and science should be identified. It is necessary to establish topics and disciplines where our country has world-class competencies and can claim to leadership and popularity among potential students from around the world.

The first courses for international MOOC platforms should be designed exclusively in English on those disciplines and areas where Russia has been traditionally strong: certain branches of mathematics and physics, literature, culture and art.

If this initiative would be successful, many Russian teachers and research teams will receive an additional motivation to start promising researches and search for their own niches in the global division of intellectual labour.

Opportunity 3. Modernisation of regional education systems based on modern technological solutions

There are over 1,000 universities in Russia, they are often scattered across the regions suffering from severe shortage of qualified staff and resources. Despite this, they keep providing students with a complete package of educational programmes, often unable to ensure their quality. Meanwhile, the introduction of massive online courses followed by final exams and necessary certification for the students can solve this problem.

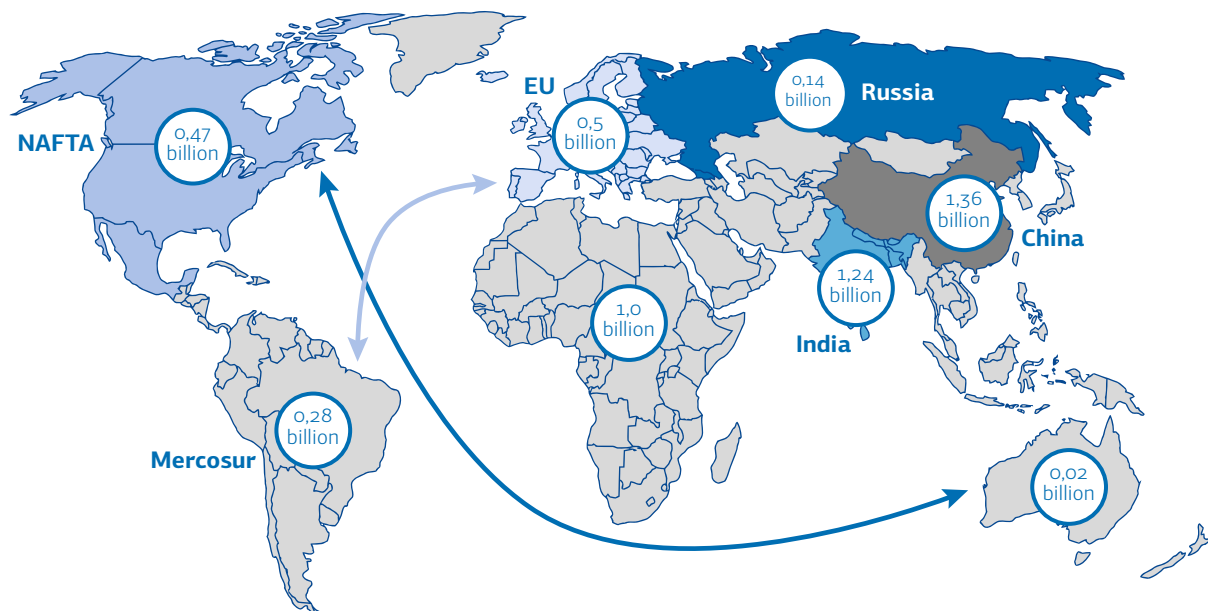
With this aim, a number of major institutional changes should be implemented:

- move to the credit-modular system which must be synchronised with recognised international systems of registration of learning progress;
- authorise the Russian universities to recognise and accept the results of the MOOC courses passed by students;
- carry out the selection, preliminary examination and public and professional accreditation of the online courses recommended for learning in the Russian universities;
- promote the introduction of modern learning management systems (LMS) enabling to manage and consider the results of the network educational programmes in a variety of formats, including online one.

The list of educational online courses recognised by the Russian universities may be developed on a competitive basis by the leading universities of the country with internationally confirmed competences on certain disciplines and research areas.

The implementation of this initiative will ensure the required level of training quality at basic educational programmes in regional universities and will free the additional resources for development projects — the launch of new research areas, formation of business infrastructure, staff development, etc.

Fig. 13. Demographic groups and world education markets



Next step can deal with modernisation of over 50,000 schools in the Russian regions with similar problems, especially in rural areas.

Opportunity 4. Establishing infrastructure for individual educational paths

The development of technological innovations in any industry is impossible without the accompanying social transformation that contributes to formation of a group of people ready to become the first customers and early adopters of new technology solutions.

The individual consumers and household budgets become the main driver of the development of educational startups worldwide and ensure initial resources for promotion of projects and the critical mass of participants. For example, in the US more than 35% of students take the online courses while still in school and university, thereby forming a large market of potential buyers of new educational products.

In Russia, the situation is less favourable. In 2012, MA FDFgroup assessed the attitude of Russian consumers to distance education and found that only one in nine Russian citizens had the experience of the online learning and only 6% expressed the intention to take up an online course in the next six months (1% were sure to start, 5% might start).⁴⁴ The pool of potential supporters and followers of educational innovations ready to pay for it with their own money in Russia is extremely small. This becomes a serious limitation for launching of new educational initiatives — the lack of domestic market which could be a springboard to the global education market.

On the other hand, the number of Russian participants in international MOOC is increasing — more than 120,000 students from Russia have enrolled to Coursera courses which indicates good potential market; the dynamics of this market can be accelerated by several decisions and initiatives:

We will be privileged to witness the development of the best educational projects of the coming semicentenary

- introducing new mechanisms and channels of financing for individual educational paths in Russia, including vouchers to pass online courses, co-financed by employers and the state; preferential educational loans; other financial instruments to attract funding in exchange for a portion of future income of the student;
- Creating of a new educational infrastructure in the largest metropolitan areas of the country — ‘co-learning’ centres to ensure marketing of new educational projects and tutor support to new users of MOOC.

Tailoring the country infrastructure to the individual educational paths would make a decisive step towards the formation of space for educational greenfield — launching new educational practices and implementing pilot educational initiatives by teams of Russian developers.

Opportunity 5. Launch of a national EdTech incubator to support educational startup teams

The major drive for success in the era of educational greenfield is investing in people and business initiatives rather than in educational institutions.

Successful launch of the first EdTech incubators in the United States suggests that such initiatives can be implemented in other countries, considering local conditions and level of

development of business culture and practices in the country.

The incubator like this in Russia should support educational projects originally focused on the global market and provide their business teams the necessary educational expertise, marketing and promotion of developments, as well as access to ‘seed’ and venture financing from private investors.

This is a chance for Russia to use the energy of thousands of people and business teams across the country and join the forming trend in order to move to a new technological path and become a leader in global education in the next 3-5 years.

Greenfield era opens unique opportunities for business teams, educational institutions and whole countries.

It is quite possible that the best educational projects of the coming semicentenary have not been created yet and we will be privileged to witness their development.

⁴⁴ Results of study Users' Attitude towards Distant Education, prepared by MA FDFgroup, May 2012.

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Denis KONANCHUK

HEAD OF THE SKOLKOVO EDUCATION
DEVELOPMENT CENTRE

Since 2012 Denis Konanchuk has headed the SKOLKOVO Education Development Centre.

Besides heading SEDeC Denis has been Deputy Academic Dean since 2015.

In 2010–2013 Denis Konanchuk was Advisor to Dean for strategic projects and managed consulting projects in the field of education.

Denis was involved in implementing:

- The strategic programme of development for the Northern (Arctic) Federal University, Arkhangelsk city (2010–2012);
- The Concept and strategic programme of development for the Ural Federal University, Yekaterinburg city (2008–2010);
- the Concept for the Russian International Olympic University, Sochi city (2009–2010).

Denis Konanchuk was involved in developing and implementing programmes for the federal and regional level personnel of the Government of the Russian Federation including the staff reserve of the Government Office (2010), managers of the Government of the Republic of Tatarstan (2010), reserve personnel of the Ministry of Industry and Trade of the Russian Federation (2005–2009), staff of the Central Bank of Russia (2003–2009).



Andrei VOLKOV

PHD,
PROFESSOR OF MANAGEMENT

Dr. Andrei Volkov was Dean of the Moscow School of Management SKOLKOVO since its foundation in 2006 till 2013. Dr. Volkov is a recognized expert on higher education in Russia. He is also currently serving as an Advisor to the Minister of Education and Science of the Russian Federation, where he spearheaded an Expert Team that developed a program on reforming Russia's higher education system. In 2006, he headed a group of experts from the G8 countries on Russia's initiatives in education.

In 1984 Dr. Volkov graduated from the Moscow Institute of Engineering and Physics (MIFI). From 1984 till 1991 he worked as Research Fellow at the Scientific Research Institute of Atomic Reactors.

Prior to joining SKOLKOVO, Dr. Volkov held a number of key positions within the academia.

From 1991 till 2002 Dr. Volkov was one of the founders and leaders of the Togliatti Academy of Management — the institution in the Samara Region widely-known for its innovative experimental approach to education.

From 2002 till 2005 he worked as Vice Rector at the Academy of National Economy under the Government of the Russian Federation.

SKOLKOVO Education Development Centre

SKOLKOVO Education Development Centre was established in 2011 as the leading Russian centre of research and expertise in the field of Higher education.

Our goal is to develop new approaches and promote new education management practices to be employed both in Russia and abroad.

For the last 3 years SEDeC experienced a rapid growth in terms of scale, team and visibility.

Every year we launch at least 10 large-scale projects, shaping Russian higher education landscape and developing human capital for Russian universities and corporations. Now SEDeC has 25 research specialists and project leaders and more than 200+ international experts, participating in SEDeC consulting and educational projects.

Our vision is to work with global challenges in the field of education and conduct practice-oriented research, improving current educational system in Russia.

SEDeC has 4 major types of activities:

1. Consulting & Policy advice.

For the last 3 years SEDeC specialists developed a number of Strategic plans for leading Russian universities, including Ural State University, Sochi Olympic University, Northern (Arctic) Federal University. We conducted more than 20 strategy sessions, involving top-managers of Russian universities in strategy development and change management process.

Together with our strategic partner — the Ministry of Education and Science of the Russian Federation — SEDeC experts developed major Government Concepts, including National Digital Strategy in Education, Life-long learning Concepts, new Universities development agenda.

2. Executive education programs, aiming to develop and support new leaders of higher education in Russia.

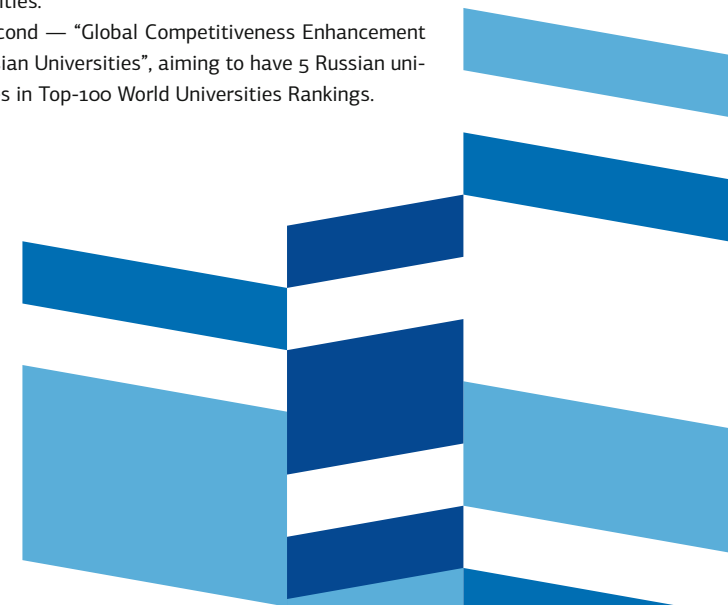
In 2013-2014 SEDeC conducted educational programs for 300+ top-managers and high-potentials of the Russian universities. Alumni of these programs have already been elected as Rectors of major Russian regional universities, like the National Research Tomsk State University, Tyumen State University and others.

3. Trend-setting research projects is the priority for SEDeC. For the last few years we have published in Russia meaningful papers on Online Education and Educational Startups (EdTech), Future Jobs and others. We are proud to have international partners, supporting our research and consulting projects. For example, together with ILO we conduct international project “Applying G20 Training Strategy” in 5 developing countries (Vietnam, Armenia, Jordan, Kyrgyzstan and Tajikistan).

4. For the last 2 year SEDeC on behalf of Russian Ministry of Education and Science became a Project-office for National Education Initiatives, providing expertise support and coordination.

The first one is “Global Education Initiative” – the opportunity for the Russian citizens to study in the best world universities.

The second — “Global Competitiveness Enhancement of Russian Universities”, aiming to have 5 Russian universities in Top-100 World Universities Rankings.





The Moscow School of Management SKOLKOVO is the largest private business school in Russia established in 2006, when a number of Russian and international business leaders joined their effort to create a next generation business school. It was founded by 18 Russian and exterior companies and individuals, all of which are recognized industry leaders in their fields: oil and gas industry, metal industry, energy sector, investment, banking and insurance. The school is operated through private-public partnership. Dmitry Medvedev, the Prime Minister of the Russian Federation, is the Chairman of the International Advisory Board for the Moscow School of Management SKOLKOVO. Notwithstanding, the school is funded solely by its commercial activities and private investment.

The business school's approach to teaching is marked by the combination of world-class academic curriculum with abundant hands-on experience. The SKOLKOVO business school managed to develop a number of educational practices which are both unique in the Russian market and best suited for change leaders development. The range of academic programmes is tailored to the needs of those who are ready to meet market challenges and want to feel confident in the fast-changing reality of the global economy. The SKOLKOVO business school's community joins representatives of the largest Russian and foreign companies, medium and small businesses, and public authorities, who believe that entrepreneurial approach and pro-active attitude are the key to the successful development of Russian and global economies.

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