TRANSFORMING EDUCATION FOR COMPLEXITY: WHY, WHAT, AND HOW

Report on GELP Moscow 2017 conference results
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The Global Education Leaders Partnership (GELP) was delighted to join with the Global Education Futures (GEF) initiative in conducting the 14th international convening of GELP that took place in Moscow between 31 October — 3 November 2017. GELP Moscow followed on from GELP Auckland (2015) and GELP Harvard (2016).

For over 10 years the Global Education Leaders’ Partnership has created the most powerful alliance of global education leaders committed to transforming learning systems to meet the needs of all learners. The partnership is a community of thought leaders from world-class organizations and education system leaders seriously committed to transforming education.

In 2016 we also formed a Global Change Leaders Collaborative to help accelerate and amplify our efforts. Members include GELP, GEF, WISE, Ashoka, OECD Centre for Education Research and Innovation (CERI), Centre for Curriculum Redesign, Asia Society’s Global Cities Education Network, and the Association for Supervision and Curriculum Development (ASCD).

GELP MOSCOW focused on the rise of the ‘Complex Person’ and the emerging and future competencies required of all our young people to thrive in a constantly changing global society. This GELP convening happened at a time when the GELP agenda has never been more relevant or more urgent.

GELP Moscow brought together a remarkable group of education leaders from more than 12 countries and 5 international education agencies. To gather in Moscow with Russian colleagues, and educators from the wider region, resulted in a challenging, inspiring and motivating dialogue.

We are delighted to present to you results of GELP Moscow — a coherent view of educational systems in transformation.

Anthony Mackay, Valerie Hannon
Co-Chairs, GELP
Our collaboration with GELP began in Spring 2015 during first international sessions of Global Education Futures. But even long time before that, as we watched this global network of systemic educational leaders, it was evident how close we are in our approaches and values. In late 2016, I proposed to GELP founders that Russia could join GELP community and host its next gathering. I am happy that this idea was supported not only by our global partners, but also by top Russian educational innovators and by leading institutions that help advance Russian education.

The gathering of GELP in Moscow served two main purposes. First, we collaboratively worked to define a range of practical approaches that allow us to create educational models addressing 21st century challenges, challenges of complexity. Our event became a collective living lab where international and Russian systemic leaders co-created a “whitepaper” for transition towards new curriculum, new assessment and tracking, new learning environments and processes, new ways of organizing educational systems. We recommended how this transition can be supported by governments, private investors, employers, parent communities and other stakeholders.

The second purpose was related to the fact that, even though the “iron curtain” fell over a quarter of a century ago, Russia remained a “blind spot” on the map of global educational innovators. Russian practices, approaches and solutions, based on a vivid research tradition (including Vygotskian approaches) are little known to our international peers. This rift can only be overcome by collaborative effort — and, perhaps for the first time in the history of modern Russia, we created the format of intense peer-to-peer communication that allowed dozens of Russian and international colleagues to know each other better, to exchange and co-create many ideas, and to move towards joint projects. For our Russian colleagues, this visit of their international peers served as a mirror through which they were able to adequately see themselves — and we are grateful to our GELP colleagues who agreed to walk this path with us.

The summary of GELP Moscow results is an enjoyable read, and I hope it will catalyze many more conversations within and between the communities of international and Russian educational leaders.

Pavel Luksha
Director, Global Education Futures
EXECUTIVE SUMMARY

1. Drivers of transformation of education — we should consider consequences of three main (and interrelated) drivers that “won’t go away in next 20 years”:
   - Digitalization + impact of automation of intellectual routine labor
   - Turbulence or “strategic uncertainty”
   - Need for transition towards sustainable civilization

2. The new curriculum — “classical” 21st century competencies (e.g. 4C or “empathy”) are necessary but insufficient
   - “Why” is more important than “what”: motivation of a learner (things that are meaningful and interesting) is the driver (not only “market oriented” because new markets — and many things outside “economic” dimension — are created by motivated / empowered people)
   - Preparing ourselves for “strategic uncertainty”: personal resilience (physical / psychological health) + mindfulness (attention to attention) + metacognition (“training in a space program: you don’t know how or when or with whom you fly but you are prepared” — this personalized methodology can be made accessible to everyone)
   - We need to cultivate learner’s ability to “assemble a personal worldview” from many facets
   - Not only developing competencies — but also forming values of 21st century eco-sustainable complex civilization

3. Change of assessment model is critical (because systems deliver things that are measured).
   - Methodologies that measure competencies / meta-competencies: there are many, they are available. Digitalization changes assessment, and technical capacity is sufficient — e.g. there are projects using Big Data, real time monitoring or blockchain. The main barrier is the mindset: why and with what objectives we design new assessment systems.
   - We need to begin taking learner motivation into account, and not only outcomes!
   - We should move away from increasing capacity of any assessment system (e.g. to track additional competencies) into “tracking and supporting uniqueness”, and from systems that “select and separate” into systems that empower (using experience of systems that work with 1% “most talented” and scaling it up to the other 99%)
To bring us into the new educational model (learning for life, learning for new knowledge-based economy, learning with digital platforms and “digital twins” etc.), “learner agency” becomes central

- Learner agency (the capacity to behave as purposeful reflective responsible social beings; exercising choice, actively seeking to achieve goals which have been understood and endorsed) to include learner voice, choice, and ownership: in the classroom, school, and beyond
- Teachers need to prepare to work with learner centered (and blended) learning environments. Teachers as “role models” and “empowerers” — as well as motivators, facilitators, and mentors
- Experience — and not only outcome / knowledge — driven education becomes central: game-based, play-based, exploration-based...

Such education is provided within educational ecosystems (as a variety of interconnected learning spaces and experiences) and not only existing educational institutions (e.g. public or private schools).

- Educational ecosystems are “cities (or communities) that learn”. They are enabled by platforms that connect needs of cities & communities with ones of learners — across different ages and learning needs. Therefore — ecosystems increase personal, collective and communal value of learning in the complex society.
- Key players that drive the emergence of ecosystems are: (1) specialized NGOs, (2) (regional) universities that integrate knowledge and innovation, and (3) complementary practice-oriented / project-based education (that connect learners with real life challenges). Ecosystems are further catalyzed by professional networks and school networks. The role of ecosystem catalyst (organizer, curator, “gardener”) is essential to create maximal value.

In order to move to this new educational set up, regulators need to adopt a new model of governance suitable for complex society. The model of “governing complexity” needs to be based on the following principles:

- Replacing “top down” approach with “bottom up” approach: generating, supporting and scaling up most promising innovations in the system instead of imposing standards.
- Creating “loyalty to change”, by engaging teachers and school administrators in design and implementation of necessary changes in education.
- Leveraging communities of innovative teachers and networks of innovative schools to catalyze and spread the change.
- Transform and evolve education with a multi-stakeholder approach, creating partnerships with parent communities, private investors, social entrepreneurs, and employers — encouraging this approach on all levels of the system, from municipal and regional to national.
1. Introduction: problematique of the complex world

Based on presentations by Michael Stevenson (Senior Consultant, OECD), Andreas Schleicher (Director of Education, OECD), Kai Min Cheng (Professor Emeritus, Hong Kong State University), and Alexander Asmolov (CEO, Federal Institute of Education Development).

The agenda of the conference was “transforming education for complexity”, and the focus of the first day was on the competencies for complex people.

There are several trends that will drive transformation of education in next decades:

1. Rapid change becomes the new norm. For example, in 1905, traffic in New York was completely horse-based; 15 years later it was car-based. Potentially, by 2030 New York will be dominated by self-driving cars. We have to be prepared for that level of change across many dimensions of life.

2. Technology (in particular digital technologies: Big Data, blockchain, machine learning etc.) plays a key role in the transformation. In particular, innovation by small and medium businesses, proliferation of digital technologies and increased rate of automation (especially of the routine intellectual labor) are already disrupting the existing world of skills and jobs — and they change demand for education and create new behavioral patterns of learners. The next generation, “digital generation”, may be better prepared for this transformation than previous generations.
3. Global turbulence — political, military, economic, environmental — will play an increa-
singly important role, and it will not go anywhere in next 20 years. The next generation
will be living in the ambivalent VUCA world.
4. Rise of new human culture that is indicated by notions of the “information society” (high
rate of information & knowledge accumulation, “information abundance”), “diverse” or
“multicultural society” (dialogue and tolerance to “otherness” as new virtues), “uncertain
society” (self-dependency, personal choice) etc.
5. Climate change, destruction of biodiversity and non-sustainable organization of global
industrial economy and urban society are among the main long-term challenges of the
21st century. Sustainable human civilization can only be established through the trans-
formation of education.

The Learning 2030 Framework by OECD represents the consensual view of the key
competencies that will be demanded in this transforming world, and different strategies to
acquire them. In order to cope with its challenges, the emerging complex society,
will need creative, aware, socially and emotionally attuned people, who were capable at
collaboration and innovation. To be prepared for such a future, people need to be able to act
autonomously, interact in heterogeneous groups, and use various tools (including language,
information, and technology) interactively.

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<td>Use knowledge and information interactively</td>
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<th>Interacting heterogeneous</th>
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<td>Relate well to others</td>
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<td>Manage and resolve conflicts</td>
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<td>Act within the big picture</td>
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<td>Form and conduct life plans and personal projects</td>
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<td>Defend assert rights, interests, limits and needs</td>
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**Table 1: OECD 2030 Learning Framework**

The principles of the Learning framework are further elaborated in the concept of the
Learning Compass: the idea that learning experiences need to be complex and interactive,
combining knowledge, skills, and attitudes and values — that will prepare people for the
complex world in which they can achieve sustained well-being.
However, there is more — perhaps we may need to go even beyond the well developed OECD framework in order to address the fundamental cultural shift of our times. In the work of Margaret Mead, three types of cultural communication were distinguished: in postfigurative cultures, that are slowly changing and dependent on accumulated practical knowledge, worship of ancestors dominates. In configurative cultures, that have a medium rate of change and depend on sharing of new knowledge, peer relationships become most important. In our times, we are moving towards prefigurative culture, when the rate of change is very high, our life depends on innovation and embracing change, and we “worship our descendants”, or learn from our children. The drama of our times, however, is that we don’t know our children, that teachers and parents lag behind the new generation.

The “culture of complexity” is dependent on our ability to move and learn together. In the age of uncertainty and complexity, an ability to cooperate, coevolve, and cope with diversity is crucial.
The time has come for education to change its mission: it has to move from the “translation of knowledge” to the “comprehension of opportunities”. Therefore, it needs to focus on the learner as a “complex person for the complex society” — in particular, on learner motivation, learner passion, learner ability to navigate life and the pathway of lifelong learning. The learner becomes a “whyer”: in other words, motivation (curiosity and the need to know “why”) becomes the driving force of learning. For a “complex person”, “universal actions”, or meta-competencies, become increasingly important, as compared to specific contextualized (e.g. professional) competencies. And teachers have to become companions in this journey: their role should be (a) motivators and “role models” of lifelong learners, (b) navigators that teach how to find one’s pathway of learning, and (c) facilitators that “host” individual and collective learning experiences.

The lesson has been “hacked” by the world of uncertainty!

**Figure 2**: Moving from lesson-centric to person-centric model of education (Asmolov)
1.2 Big challenges: perspective of Russian stakeholders

Three renowned representatives of the Russian business and political world presented challenges to the educational model that they observe from the perspective of economy and society.

Alexander Povalko is the CEO of Russian Venture Company, the leading agency that stimulates the proliferation of “startup economy” and coordinates the system of funds that co-invest in venture enterprises. He formerly served as the Deputy Minister of Education for Russia. Alexander has indicated three major challenges of the educational transformation:

- As the national economy struggles to transform itself into the 21st century knowledge based economy, the main demand is for two types of people: entrepreneurs that are able to initiate and scale up innovative businesses, and technological innovators that are able to create new types of technologies (including digital tech). These people need to cultivate and maintain specific mindsets that allow them to be productive — however, the existing secondary school education “breaks” such mindsets, as it forces learners to follow standards and passivizes them.

- Standardized “one size fits all” education becomes increasingly irrelevant, and personalization of education appears inevitable — especially because technologies for personalization are already very accessible. However, there is no clear pathway from the existing institution-focused education into the new learner-focused education, and it is not even clear where to start.

- Existing assessment systems are completely outdated and need to be replaced with modern assessment and tracking approaches. In particular, the micro-credentials system is highly effective. However, there is no clear strategy of replacing the existing system of qualifications and national examinations with the one of ongoing tracking and assessment.

Yulia Chupina, the First Vice President of Sberbank (no.1 bank in Russia and Eastern Europe with three hundred thousand employees), and the President of Sberbank “Investment into Future” Foundation (a foundation that supports national innovative projects in education) presented Sberbank’s case for change, and its expectations for changes in school education. Sberbank seeks to understand the question: what does the school of future look like, that could address national and global challenges of the future — recognizing that preparing children for this future may be easier than re-training adults. One hypothesis is that curriculum should be moved from knowledge based to skill based, with focus on innovation, digital skills, and preparing kids to work in new business environment (soft skills, collaboration, etc.). Also, it is evident that the future of work is team based — and therefore people need to move beyond individualism, develop a collaborative mindset and soft skills for collaboration. Finally, rapid proliferation of digital technologies, and virtual reality technologies in particular (which can become massive in next 5-10 years), will present a range of challenges for our bodies and minds — we are biologically prepared for the “analog” world, and digital interfaces use different type of interactions that may impoverish our emotional and physical capabilities. We do not understand the long-term risks of these innovations for our species, and we do not know how to prepare the next generation for them.
Both Mr. Povalko and Ms. Chupina expressed the concern that in the future the society may split into two very different groups: those who will be able to cope with increasing complexity (possibly, through augmentation with technologies including AI) and those who won’t be able to do so, and therefore will seek simplification. If this dystopian scenario is realized, these groups will demand very different models of education.

Finally, Dmitry Peskov, Director of Young Professionals at the National Agency of Strategic Initiatives (the main agency that coordinates collaboration between government, business, and educational sector, responsible for launch and proliferation of several hundred systemic initiatives, including the National Technology Initiative and the WorldSkills movement) spoke on grand educational challenges during the digital transformation of the economy and society. As his division has established many sectoral standards of online educational platforms, education technologies, and offline training methodologies, and currently coordinates the launch of one of the largest network based universities in the world (NTI 2035 University), he has outlined seven “big problems” of the next decade in education:

1. What should we use as new assessment methods “after the diploma”, for the purpose of lifelong learning, that can track a personal career track, update a personal competence profile, etc.?

2. Transformation of assessment at large. Do we really need specially designed assessment methods — tests, projects, essays, demonstrations, etc. — once we are able to track behavior of learners in real time and provide immediate feedback? Will exams disappear? Do we need to start assessing new dimensions of learning, e.g. “cognitive style”?

3. Cost efficiency: how do we create flexible personalized solutions (e.g. personalized learning trajectories for everyone) that are economically viable at scale?

4. How do we leverage the power of machine learning and big data to our personal learning benefit? Companies profile our behavior in the online world to create our “digital twins” that allow them to offer personalized products, customize our search, etc.
But in 10 years from now “digital twins” will be common, and everybody will have them (e.g. in a form of a personalized automated assistant in their mobile devices) — and many people will stop learning because they always can ask their automated assistant to help. How do we organize our learning so that we leverage the capacity of our “digital twin” without losing our own ability to learn. 

5. **How do we learn to unlearn?** Many practices and habits of our society are even more than useless — they are toxic for the digital society we are stepping into. How do we purposefully forget them, and how do we remove the “toxic” competencies of older generations?

6. **How do we create more teaching capacity for the new digital society?** In particular, how do we engage the best experts on the digital society — children that are 10-15 years old? How can we make them “legalized” teachers to learn from them?

7. **Mindset problem:** how can we recognize these and other problems in education, and how can we bring them to attention of our peers, our stakeholders, and regulators? Many of the problems become evident if we “think from the future”, from the situation that may emerge in next 10-20 years with the present dynamics. How do we anticipate these challenges and prepare for them, them? What habits of thought will be required?

### 1.3 Curriculum for the Complex World

#### 1.3.1. Advancing OECD 2030 framework: “Key competencies and new literacies” framework by the Higher School of Economics

The work of this session was chaired by Michael Stevenson (OECD) with two key presentations from Kirill Barannikov (Moscow City University) and Maria Dobryakova (chief expert researcher at the Institute of Education, Higher School of Economics). The session continued the discussion about the design of learning frameworks.

The session began with the general overview of the work of Kirill Barannikov and Igor Remorenko (head of MCU) on tracking the variety of competence based framework from mid 1970s to the present, in order to understand the genesis of specific framework and direction of their evolution. Barannikov indicated that there is a very wide range of definitions of “competencies” — and even though there is no unified understanding, competence learning frameworks are now widely used in the design of curriculum and policy making. One of the conclusions is that we need thorough studies to coordinate and integrate various competence-based frameworks.

The research observed notable transformation of “core competencies” over the last 20 years, and has identified communication, collaboration and IT among the top three competencies in various frameworks at the moment. It has been also noted that over time competency frameworks have become more complex and more life-oriented: e.g. if in earlier frameworks (such as P21) “communication” is essentially a hard skill, a measurable ability to listen, speak, read and write — now it also emphasizes communication with authority, multicultural communication, use of tools and media for communication, etc.
Maria Dobryakova has presented the work on “Key competencies and new literacies”, a framework created by the Higher School of Economics in its role as a leading body in the international consortium to design new school curriculum for Russia and beyond.

Competence implies a combination of knowledge, skills, attitudes, values etc. mobilized in a given situation (to perform a task / solve a problem). Performance makes competences visible, and so competence can be defined as a mastery in performing particular skills. Key competencies of the future curriculum in their framework are clustered in three categories:

A. Related to thinking and reasoning (also as applied to problem-solving)
   - A2: creative thinking

B. Related to interaction with others, social and emotional skills
   - B1: cooperation
   - B2: communication

C. Related to interaction with self (self-management, autonomous action)
   - C1: self-regulation, adaptability, planning
   - C2: learning to learn

Understanding literacies — a huge number of different literacies have been proposed, and the idea of this research is that literacy is about communication and inclusion, and is embedded into the cultural and social context: if you can understand what others communicate and if you can communicate what others communicate. Literacy is therefore defined as “ability to understand ‘text’ (in a broad sense) as a sign system (representing a specific domain or not), and act and communicate accordingly”. Two types of literacies are identified:

1. Foundational, or tool-specific (equips students with the capacity to develop and diversify the skills they have acquired through formal teaching, giving them many opportunities to use those skills for many diverse purposes.): oral and written literacy, numeracy, data literacy, ICT and social media, etc.
2. Domain-specific, or knowledge-specific: consumer economics, community resources, individual health & safety, government and law. This group of “literacies” allows people to act as normal members of the society.

Ensuing discussion observed that literacy used to be understood as a certain threshold, as a barrier that you need to overcome to start functioning; it protects you from the threats in your life. Competencies, on the other hand, create opportunities.

Further discussion was conducted in groups along the following lines:
1. What should be the place of problem solving in the framework? What should be the place of “learning to learn” — shall it be the integral meta-competence, as in the Finnish model? Problem solving involves two dimensions: thinking and learning in action.
1. THE "WHY" AND "WHAT" OF EDUCATION FOR COMPLEXITY

General problem solving is a comprehensive competence that involves thinking, acting, communicating and cooperating, and self-management. So perhaps it is broader than solving problems in the mind. In addition, problem solving requires complementary competencies such as creativity and invention that should also be on the list of competencies. As for “learning to learn”, it is a process that is larger than any in the presented schematics. And it also indicates that we may need a more sophisticated framework and a set of definitions than the one that has been proposed.

2. What does digital transformation imply for the set of literacies? Literacies (defined as above) are certainly being changed by digitalization: for example, there is now less need to memorize as we can find all necessary data online. We need to learn how to use various information resources, how to apply fact checking. Community building and community-based knowledge exchange and learning are essential. Security becomes a critical literacy to survive and thrive. The actual list of anticipated and needed changes is long.

3. Transition from illiteracy to literacy: is it a stage-based or a gradual change? The group agrees with the idea of a threshold in a continuum, and also recognizes that the

Figure 4: Understanding foundational literacies (Dobryakova)
threshold is floating, because the concept of literacy is context-specific and time-specific (as our society evolves, one can become illiterate over time). It is important to include a natural flow in the developmental cycle: to focus on “how to learn” more than on “what is being learnt” — especially because previous knowledge can become a burden over time.

1.3.2. Balancing commonality and flexibility
The aim of the session Balancing commonality and flexibility was to discuss the development and implementation of new curriculum frameworks that are fit for the fast-changing world. The discussion was moderated by Robert Randall from Australian Curriculum, Assessment and Reporting Authority and included four main speakers: Pauline Barnes (Education Council of New Zealand), Godwin Khosa (National Education Collaboration Trust of South Africa), Rod Glover (Save the Children Australia) and Olga Shiyan (Department of psychology of education in Moscow State Pedagogical University). Coming from different countries and backgrounds, they presented their points of view about the major challenges of curriculum development and change. The main questions that the panelists had to answer were:

- Skills, capabilities and knowledge that need to be developed — should they be articulated independently or relatedly?
- What extra data/research do we need in order to articulate such frameworks?
- What support should we give to schools/teachers to help such learning to take place?
- What barriers do we need to overcome?

Pauline Barnes (New Zealand) stated that her country has introduced a new curriculum of 21st century competencies in 2010. Seven years later, in many places they haven’t achieved everything they planned, as they underestimated the change that was required.

She argued that teachers need time for deep conversations to share ideas, practice and debate. They do not lack motivation: they lack time and space for thinking and discussion. There is a need to develop an inquiry-minded approach, that allows teachers to inquire and explore. As for the barriers, the qualification system drives what happens at school: although it is said that competencies are very important, what is really tested is knowledge. The “soft” aspects (i.e. personal relationships with the teacher) are no less important, but they unfortunately cannot be put into a curriculum.

It is not easy to effect change, she continued. We need to motivate teachers to take responsibility and have the time and space for a conversation. We have skilled teachers but they need a better environment. Parents can also be a barrier because sometimes they are not ready to accept the change (in some of most innovative schools, there are indicators that around a quarter of parents believe the education is not traditional enough).

Godwin Khosa (South Africa) indicated that teacher readiness is important: even though they believed teachers were ready for 21st century curriculum, but they couldn’t overcome the challenges like streamlining the curriculum, making it easier / simpler. For instance, communication across subjects complicates teaching — and it requires more sophisticated and
motivated teachers. The bar was raised in the last 10 years, and it frustrated teachers. Changes should not come too quickly in order not to frustrate teachers and leave them behind.

Changes cannot be driven just through policies. A big lesson from introducing the new curriculum is that it needs a lot of training for teachers. It is much easier with young, energetic teachers — and so it is possible to use better schools as examples to carry these models across the system. Also, parents have expectations and they can be a force against the change in your school. It is necessary to recognize the variety of situations in schools, and to allow them to move at a different pace. In South Africa, only 20% of schools can be considered as doing well, the other 80% are not doing well. Two main suggestions are therefore: (1) deeper thinking about change management, creating incentives for teachers and managers to adapt to changes, and (2) differentiation (not pushing all schools/regions to move forward at the same speed).

Rod Glover (Australia) works in public entrepreneurship, running a program that introduces an intensive alternative curriculum for children once a week, achieving great results that smash the mainstream education program. Rod argued it is the entrepreneurship that drives the change, not policies. Exceptional practice emerges bottom-up, it involves know-how. 80% of successful examples are solution-oriented, where changes come not from the top or the center. We need to share the know-how, so that the teachers adapt these models, instead of prescribing what to do.

The barrier is the expert mindset that if principals, teachers and bureaucrats just think harder about a problem, they can solve it. We need to bridge the gap between the teachers’ capabilities and the job they need to do, and focus on a bigger context, not just individual agencies or entrepreneurship at the individual level, but an entrepreneurial society and ecosystem. And policymakers need to be humble and admit that there can be better advice from someone who actually works in the classroom rather than from someone who is far away from it all.

There is also a need for more differentiated approaches both at school and between schools, he continued. Some kids are really struggling, so it’s fair to provide different approaches. In our program, teachers spend 20% of their time on training and once a year we discuss practice and they work out solutions.

Olga Shiyan (Russia) studies pre-school programs and curricula. In preschool, there is a perfect balance between knowledge and skills, and such a system can be used as a model. In Russia, however, there is a gap between the national curriculum (which is considered advanced because it has an emphasis on attitudes, values and skills) and the more specific curricula used in kindergartens, in which the emphasis on knowledge still exists. However, if adults want children to be self-directed in life, they should give them an opportunity to be autonomous and self-directed in the learning process. One of the ways to stimulate change is to use new types of monitoring and environment assessment to understand conditions for the development of values and soft skills such as cooperation. In general, school and college teachers are more rigid than pre-school teachers, so the first place to implement change can be in advanced pre-schools.
1.3.3. Preparing for digital transformation of society

Boris Ryabov (Managing Partner at Bright Capital LLC) moderated this session and the speakers were Olivier Bréchard (managing director of the WebForce3 network of schools for computing and coding in France, co-founder of the Institute of Action Research for Education), Yiannis Laouris (Entrepreneur in education, and Senior Scientist at Future Worlds Center — Cyprus Neuroscience & Technology Institute) and Alexey Semenov (co-chair of the Education working group of the Digital Economy initiative of the Russian government).

All three experts are intensively involved in the digital transformation of education.

Discussion was held about the purpose of the educational system itself in the age of digital transformation. Olivier Bréchard argued that the main focus of the curriculum should be to develop “explorer” and “researcher” competencies and make people IT literate. Yiannis Laouris suggested that education spaces should allow people to experiment and innovate, “pushing the limits” of our society. And Alexey Semenov indicated that the challenge of digital transformation concerns older generation perhaps even more than the new one, and therefore new educational model should allow collective multi-generational learning that involves not only children but the parents and teachers as well.

The main conclusions of the discussion were: that digital transformation may represent a massive challenge for the existing educational system and that four key elements of the strategy need to be accepted:

1. Education will constantly lose its relevance in the rapidly changing world, so it should be constantly updated;
2. Changes are massive and come very fast, so instead of prolonged experimentation, we need to think of mass scale solutions for the future;
3. Complexity of the future society will not allow “one-size-fits-all” approach to the curriculum, so it is necessary to focus on diversifying and interconnecting the educational landscape of many providers;
4. Most importantly, it is necessary to change the mindset of the educational sector from the industrial (preparing standard output) to postindustrial (creating unique experience for unique results).

1.3.4. Creating capacity for the “complex person” education

The session chaired by Alexander Asmolov was dedicated to holistic approaches that help develop a “complex person” for the complex society — taking further the ideas presented in Asmolov’s keynote.

Dmitry Leontiev, professor of Moscow State University, opened the session by indicating that throughout history human culture has been evolving from simplicity to complexity, but now we are at the risk of losing complexity, as there is much evidence of cultural devolution. Our main purpose is to re-establish a “culture of complexity” that

- Supports higher psychological processes and intents rather than lower processes and intents
- Requires active engagement and effort rather “passive consumption”
- Addresses variety and individuals needs rather that promotes standards and templates.
The culture of complexity raises learner awareness, embraces the value of effort, and helps maintain motivation for longterm learning commitment.

Alexander Poddyakov, professor of Institute of Education, Higher School of Economics, continued by indicating that teachers today are faced with the challenge of preparing students for a future world that is unknown and cannot be properly predicted — it is akin to the training astronauts for the first mission to the Moon. Teachers need to embrace novelty and complexity, and prepare students as researchers who continue to explore the reality and who challenge what they already know.

Artem Soloveychik, vice-president of “Russian Textbooks”, stated that the creation of new educational content (including textbooks) should be based on three premises: (1) we need to make learning a positive and desired experience, (2) we need to teach kids how to learn, and (3) we need to encourage them to learn for life. The existing educational content often contradicts these premises; furthermore, in Russia, over 80% of used textbooks were created before 1991 (before the collapse of the Soviet Union), when a totally different learning philosophy was still in place. We need to revise our approach to serve the main purpose of education.

The main role of education is defined by the root of this word: it is “obrazovanie” in Russian and “Bildung” in German, derived from “obraz” or “Bild” which means the “image” or the “form”. Education supports students in forming the image of the world, their own worldview. We assume that this complex process is done in three steps:

- As teachers, we derive the worldview from scientific knowledge and cultural norms;
- We divide this worldview into simple parts that explain elements of the worldview, creating didactic pieces: statements, experiences and exercises, and provide them to children; we ask children to learn these pieces and report them during examinations;
- Finally, children are supposed to synthesize the worldview from these pieces, usually on their own.

However, this last step is a complex intellectual operation that many children fail to accomplish. In a simpler and slower society, this may have not been a problem, because they could “catch up” later through interactions with their peers. In a complex and rapidly transforming world, the lack of ability to synthesize one’s personal worldview may increasingly become a problem, that many children and adults will experience. Therefore, we must focus our effort on developing ability to create personal worldview.

Eduard Galazhinsky, rector of Tomsk State University, spoke about the new role of universities in a transforming society that is becoming increasingly complex. As a holder of human knowledge, the university becomes a place where complexity is produced, and where people learn how to live and flourish in this complexity. University is more than a professional education — it is a place that develops people who are able to live “above” professions, who become trans-professional, trans-disciplinary, adaptable for the changing world. To develop complex people, we must move beyond “high technologies” and create “high human technologies” that are able to work with meaning and values.

Maria Falikman, Senior Researcher of the Moscow State University, indicated that curriculum should increasingly focus on metacognition: ones understanding of motivation and
learning strategies. Our educational institutions should ask not only, “what have we learnt?”; but also, “why and how have we learnt it?”. In the age of multitasking, metacognitive strategies are critical for managing information and task overload. Metacognitive strategies and motivation for learning seem to be connected — we need to explore this subject more deeply.

Mark Sartan, the founder and CEO of Smart School, shared his experience of creating a highly innovative school in Siberia, near Irkutsk. The main purpose of the school is to teach children to take responsibility for their own life; to consider their life as their personal project. The school provides various “life design” techniques that help children to set their own goals, to select best ways to achieve these goals, and to make reflections on their strategies. Children learn to take control over various circumstances of their lives, and graduate from school with their “personal life projects”. All children in school also have their own “value mentors” who help children better understand their personal values and to work towards higher values.

Anatoly Prokhorov, head of the Laboratory of complex human development and founder of Inner maturity school, indicated the necessity to shift from pedagogy and andragogy to psychagogy. It is necessary to bring psychotherapy (including self-therapy) and inner work into education. Education prepares people for the world of professions, but it does not teach us how to live our lives “professionally”. People who are considered adults physically and socially, in fact are often far from being internally mature. In personal and inner life, people often remain passivized and unable to evolve. We must advance education to include methods that help people deal with existential challenges and crises, and that support their personal inner evolution throughout life.

Pavel Luksha, director of Global Education Futures, added that our views on designing educational systems, including earlier stages of education, should take into account the whole cycle of human development, from birth until death. If we look from whole life cycle perspective, the purpose of education is much more than preparing us for our profession — it should support us as whole persons at every stage of our life. And lifelong learning, therefore, should not be confined to ongoing professional development — it needs to become our companion in addressing the variety of life challenges.

If we take the whole lifecycle perspective, we need to look at our learning journey from its final point — can we say at the end of our lives that we were able to realize our potential, to experience our life at its fullness? Our professional achievements will only be a small part of this journey. Can schools prepare us to live our lives as whole human beings, to achieve self-actualization?

Alexander Asmolov concluded that, in order to cope with complexity, we need to fall in love with it. We need to learn to live in a society that is complex and diversified, and we need to accept that we all become Caesars — in the sense that Julius Caesar was famous in his own time for his multi-tasking, but now everyone is multitasking. This is why we need to learn how to steer ourselves, to develop our metacognitive strategies, to create our own worldviews — as the human mind is not a finished project, we are evolving beings. And we also need guidance that comes from deeper human values and “inner work”, learning how to “know oneself”. The future of education requires the “technology of self”.

Report on GELP Moscow 2017 conference
1.4 Assessment and credentialing

1.4.1 Emerging directions in assessment and credentialing of learning

The next series of sessions focused on the transformation of assessment in line with new curriculum and a digital era. Sandra Milligan (Director of the Assessment Research Center at the University of Melbourne, Australia) shared her vision on new assessment approaches that involve the micro-measurement system with the following points:

- the recognitions of smaller steps (tracking and feedback) is much more important than the final result (qualification exam etc.);
- big data has huge potential in the demonstration of a person’s competences and knowledge; it also may be more convenient for possible employers to recruit the best suitable employees;
- there are many solutions for micro-credentials system using blockchain technology that are already present in the market; e.g. University of Melbourne (which is quite conservative) has already adopted one;
- some dimensions of assessment through globalization of learning based on globally recognized online platforms (e.g. Coursera, Udacity);
- however, possible system of assessment must be adapted to every particular region, sector and ecosystem; the generalisation of “micro-credentials” is impossible because of different industrial fields;
- new systems of assessment can only be established through cooperation between learners, employers and professional associations — and cannot be centrally imposed.

The main challenge of assessment is to address the measurement of metacompetences (e.g. soft skills) that cannot be tested directly. Sandra presented a framework of measurement

![Figure 5: Competence scale for ability to learn (Milligan)](image-url)
of students’ metacompetence — an ability to learn — developed by a team at the University of Melbourne. It establishes five competence levels in learning, ranging from “reader” (entry level) to “reciprocal teacher” (the top tier); each level has indicative behavioural patterns that allow one to determine a person’s abilities for communication and learning. The scale is based on the observable performance evidence.

*Elena Kardanova and Irina Brun* (Higher School of Economics) presented another possible framework of ability testing, derived from an international iPIPS project (Performance Indicators in Primary Schools). Their framework is focused on primary school assessment and uses evidence centered design. It evaluates several competencies at the same time, and provide instant feedback using Bayesian networks and providing feedback. Four tested competencies are 21st century “4C” skills (Critical thinking, Creativity, Communication, Collaboration), and the measurement of students’ progress in these skills is a comprehensive process that involves scenario based tasks with use of simulation games based on extracurricular material that allows students to demonstrate necessary skills.

### MODERN APPROACH TO DIAGNOSIS

**Special software**
- Game format
- Individual work
- Use the adaptive algorithm:
  - The test adapts to any child, changing the difficulty depending on the child’s responses

**Comfortable conditions for a child**
- Extraneous factors have less impact on the results of testing (fatigue, anxiety, inaccuracy)
- Effective testing time
- The possibility to assess children with special needs

*Figure 6: New principles of assessment of iPIPS (Kardanova)*

*Alexander Kondakov* (President of the Institute of mobile educational systems) indicated particular challenges to the transformation of assessment:
- competences and skills of the future –we have to make sure the knowledge our children are getting would be in demand in 12-17 years;
- competences of the 21st century are mainly based on soft skills, but these skills cannot be acquired without hard-skills training;
- the main challenge is to be in line with transformation of curriculum and assessment; our success depends upon the speed of detailing and implementing personalized levels;
- big data allows instant assessment and feedback to students and allows to adjust learning tracks according to the student interests and challenges;
one of the ways to move forward is to adopt the "spaceman training" approach used in the
Soviet Union: when they were trained, they didn’t know how, when, with whom they were
going to fly, and what would be their mission. They went through a very expensive training
that lasted around three years and developed their resilience and readiness for very
diverse problems, then they received a specialized three-week training right before the
mission. With modern learning technologies and methods, this approach can be made
accessible, can be generalized and can become a foundation of a new system.

Further discussions have suggested avenues for the development of assessment systems:
1. Metrics for teachers, such as information on students who are failing or have low atten-
dance must be done with “future outcomes” in mind rather than current performance, i.e.
assessment must become predictive.
2. Employers do not care about exam results but are interested in engagement and interests
of a person; the assessment techniques for such demands must be developed.
3. Improvement of assessment frequency is important;
4. Assessment and exams for qualification must be separated.

1.4.2 Qualifications in the era of technological transformation
The following session was devoted to opportunities for proper and fair assessment enabled
by new technologies. The main speakers were Ani Aslanyan (leading expert on blockchain)
and Konstantin Ziskin (Moscow State Pedagogical University). At the beginning Amelia
Peterson (GELP) introduced the session and stated that:

- qualifications play several roles: their main role is to demonstrate a person’s skills and
knowledge to those outside education; they are also a way of organising learning; and of
motivating and incentivising students to learn;
- there is a need for creating a more flexible system that will not have national certificates as
a constraint (e.g. a great number of refugees do not have proper certificates or diplomas,
so a new way to assess them must be found);
- technology has the potential to improve every aspect of qualifications — assessment,
reporting, and validation — but there has to be social and political will to enable these
changes.

Ani Aslanyan presented the concept of blockchain and possible implementations in the
education sphere. One of blockchain’s great advantages is its ability to create confidence and
trust, because the system is based on information which other members have approved and
can access. In terms of education it is useful for creating a universal qualification database for
employers and educators for verification of a person’s real qualifications; similar system can
be created to keep track of teachers’ working hours or school equipment. Overall, there are
two main areas for implementation: user and material issues. Blockchain can help to solve
a lot of problems in modern education, from checking a teacher’s actual presence (some-
times they can send an assistant), to tracking school property units or a student’s perfor-
mance when they move from one school to another.
Konstantin Ziskin talked about possible effects of digitalization of assessment, where instead of the teacher’s general attitude to all the students, machine-based assessment can create more personalized forms. Formal education demands a kind of “reinforcement” in the learning process, and digitalized assessment provides these opportunities: e.g. online-courses where machine-based algorithms can identify a student’s strong and weak points, or individualised assessment options; such “reinforcement” can also be achieved by humans but a teacher does not always have time for everybody. The three main challenges for the transformation are:

- having a technology does not solve the problem of «what» we have to assess;
- potential consumers (participants of educational ecosystem) do not always know what they actually need;
- inflation of qualification and the issues of trust in a new system.

Unfortunately, all these changes still have to deal with the fact that some qualifications will remain “low-level” and will not alter the social status of a person, so we have to prevent discrimination somehow. Another challenge is that any evolution requires human actions and relies on our decision whether to accelerate the system or not. Finally, digitalisation makes education more affordable but this creates one more challenge for current system — to stay urgent, to provide students with the things that cannot be obtained online.

Speakers from the audience responded that:

- blockchain is definitely a great opportunity for data storage, but it does not solve the problem of the actual assessment purpose issues;
- micro-credentials have been successful in coding, but coding is a sphere where there are a lot of self-established communities and shared knowledge; the point is in making such communities for other industries, to adapt the “coding framework” to other spheres.

### 1.4.3 Assessment in motivation driven education

Andrey Komissarov (head of EduNet initiative) gave a brief introduction to motivation-based education and the role of games in learning. According to Andrey, one of the main goals of education is to create pathways towards human happiness, and our happiness is defined not only by what we do, but rather by what roles we play. Most of the competences that make us successful and happy are the meta-competences (thinking, collaboration, communication, etc.). Development of such competences requires a shift in pedagogy towards action-based learning: a combination of project-based learning, co-created environments, gamified education, cross-disciplinary interactions etc. In order to become productive in such an action-based learning environment, it is essential to begin with assessment of motivation (e.g. initial assessment and then repeated every 6 months to take into account transformation of motivation). Example of gamified teaching methods include the “flipped classroom”; a system where students are doing customer-driven group projects, discuss them and test final knowledge in the game; also “serious” board games on geography and history can be implemented in this process.
An ensuing debate (by teams from three leading Russian schools — Skolkovo Gymnasium, St. Petersburg Game Lab, and New Humanitarian School) further expanded on the role and application of games in current education system:

- Gamification still needs many pedagogical and psychological skills and competences to be developed in schools to become a helpful resource to reach the essential purpose of education;
- The key to successful gamification is not in playing the games, but in co-creation and co-designing;
- Every modern school must be based on mindful gaming, as it increases student agency and experience of various social and professional roles (and related competences).

1.4.4 Tracking uniqueness: case of Sirius school for talented youth

The session was aimed to present practical working solutions in terms of working with talented people as well as to discuss the possible challenges in this sphere. The main speaker was Elena Shmeleva (Director of “Talent and Success” Foundation) who introduced the Sirius Educational Center. This project started in 2015 on the base of the reused Sochi Olympic site. Sirius works with educational facilities and businesses start-ups who form the curriculum; the graduates of the project enter top Russian universities. A global partnership with Yandex allows the center to have presence in online as well. At the moment, Sirius program involve 1% of all high school students in Russia.

**Figure 7:** Octalysis motivation assessment tool (by Komissarov)
Three areas of talent education are science, art, and sports. The main curriculum is short-term, as most programs last for 20 days (140 academical hours) but provide an equivalent to an entire school year program. There are several educational programs (e.g. music, arts, literary creativity); all of them include the best teachers and a 1-to-1 approach, meaning they can take a more individual perspective. Apart from content development, Sirius also cultivates a special “code of ethics” that is essential for the talented youth. All the programs are carried out by internal staff but is also open for university students and other teachers. The financing is provided by both governmental and private sectors to provide the best results in integrating talented students into the labour market.

Most important, Sirius serves as a national methodological center for youth talent development programs and talent assessment. From 2018, it is beginning to scale up the model across Russian regions, opening regional hubs that will use the same methodology for regional talent.

**Geography and specialization of the graduates**

**26 educational programs (sessions)**

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<th>Medium activity</th>
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<td>“Sport”</td>
<td>5331</td>
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Figure 8: Sirius as a nation-wide project for young talent
One of the big challenges of Sirius is that its graduates (at the level of 9th grade) are more competent than most university students. In the normal flow of educational system, they would have to wait between 3 and 5 years to commence their practice in laboratories or companies, when they are already prepared to do so. It is necessary to work with universities and companies to create a special track for these talented youth.

The group discussion further elaborated on two areas:

1. **Scaling of the Sirius model and proliferating its approach to avoid “elitism”**
   - Talent should be recognized at the place of its origin: regions where talented youth comes from should celebrate their achievements;
   - Encourage Sirius students to share their experience and knowledge with other students, providing motivation for others, spreading positive effects for further identification of talents;
   - Creating a network system of regional city hubs where every talent could be nurtured;
   - Providing opportunities to students to create impact at the regional or national level by launching social projects that can improve life in their societies.

2. **Using the Sirius approach to assessment to track and enhance personal uniqueness of every learner**
   - Train teachers at the national scale in Sirius methods and approaches;
   - The necessity of building an assessment system based on Sirius values (integrity, collaboration, etc.);
   - Creation of multiple development trajectories that include opportunities beyond university, e.g. social entrepreneurship, startup opportunities, and more — and allowing students to define their interest and begin their self-realization around those opportunities;
   - Establishing a “cloud resource” for finding talents for business.
2.1 Creating learner centered education

In the opening session of Day 2, Valerie Hannon, co-founder of GELP, provided the bridge between the curriculum ("what" needs to be learned) and educational models ("how" it can be learned). She indicated that education for complexity should embrace learner agency, which she defined as the capacity to behave as purposeful, reflective and responsible social beings, exercising choice, actively seeking to achieve goals which have been understood and endorsed. Learner agency is a foundation of the "complex person" capacity to cope with strategic uncertainty and transformations of the complex society.

From Hannon’s point of view, learner agency includes three components: ownership (teaching and learning processes which build self-efficacy), leadership (processes which give students the opportunity to lead the direction of change) and voice (processes which increase student influence over their learning environment). These dimensions of student agency can be exercised across multiple levels of the system: in the classroom, in the school, and in a larger learning ecosystem. It is essential that student agency begins in the class and becomes an indispensable element of the curriculum.
Agency is multifaceted and includes moral, political, economic, creative and other aspects of human action, occurring at the individual, collaborative, and collective level. One of the main purposes of educational ecosystems is to construct a larger variety of holistic learning processes that will create experience of student agency at these various levels.

**Table 2: Facets of student agency (Hannon)**

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<th>moral</th>
<th>political</th>
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Commenting on Valerie’s presentation, Pavel Luksha added two more reasons why learner agency becomes increasingly important:
1. Shift to “learning for life” paradigm, where “learning how to learn” is more important than specific content, and
2. Rise of digital learning tools and online learning platforms, which demand greater learner agency in order to create efficient learning experiences.

Valerie Hannon was followed by Jan Owen, CEO of the Foundation for Young Australians. One project of her foundation monitored new job advertisements to understand trends in skills demand. These findings indicated a significant shift in the composition of professional skills for the next generation. “Soft skills” are increasingly in demand, including critical thinking, creativity, and bilingual skills. Over time, the decline of routine-based jobs will demand more flexibility and self-direction. In order to prepare students for this transforming world of occupations, it is necessary to create learning experiences that are practice oriented and develop student capacity to innovate and organize, and to become entrepreneurial.

Transformation of education to address the demand for these “skills of the future” will require the rise of a learner-centered ecosystem that encompasses the following types of experiences and learning structures — in particular for high school and university students:
- Student-led learning;
- Networking, learner’s support;
- User-owned data;
- Leadership;
- Entrepreneurship;
- Funds to innovate.

Taking developmental stages into account (Karabanova)
Olga Karabanova, professor of the developmental psychology of Moscow State University, raised important questions about what educational systems best support the development of skills and student agency at different ages — and how educational ecosystems should take into account the developmental stages.

The presentation referenced Alexander Asmolov’s criteria for education as the leading social activity:
- Universality — universal learning activities — mastering a culture;
- Variability — educational profiles that are relevant to the interests of students;
- Learning to learn — main competence to reveal the competencies;
- Psychological characteristics of age, encompassing dynamics, structures and alteration of stable and crisis states.

Professor Karabanova suggested in addition that the design of learning experiences, including those that cultivate student agency, needs to be created in accordance with a
framework of developmental stages. One of the possible frameworks of developmental psychology, suggested by David Elkonin based on works of Lev Vygotsky, indicates the following developmental stages (with rough indication of ages normally corresponding to each stage):

- Early age (1-3) — joint activities with the adults,
- Preschool age (3-7) — game, main activities being reading and imagining,
- Junior school age (7-12) — developmental tasks,
- Adolescence (12-15) — personal education, learning autonomy,
- Youth (15-19) — developmental choice and self-determination.

What learners want: the Voice of Youth

Павел Луцш and Катерина Луцша presented results of the ongoing initiative, Voice of Youth, which aims to close the gap between children's and adults' understanding of learning processes and learner needs. It does this by engaging children in open communication about the future of education and society, and empowering them to participate in the change — understanding that the younger generation is one of the main stakeholders of the future.

Катерина Луцша invited several young students (age 11-14) as experts to share their thoughts on the potential challenges that schools are facing moving into the future, and possible changes that are necessary. The young experts outlined the following as important to them:

- Comfortable environments for more dialogue and communication both with peers and with teachers. Equality between pupils and teachers.
- An environment of respect for all student interests. Involvement, care and interest: students want a learning experience that is interesting and involving.
- The ability to understand their own vision of the future, with assistance of psychologists and supervisors.

During the Q&A session with the audience, the young students additionally proposed the following ideas:

- Technologies will have an impact on education: digital media, software and robot teachers may come to replace or combine with the classic textbook approach. But the role of teachers will remain; they are necessary.
- Exams, or other methods of evaluation as a means to test obtained knowledge and skills should remain, but they need to become more modern. Testing is more important for students to understand their progress.
- Experience of the real world is important: trying out various professions, including business, will allow for more accurate career decisions. Also, students are ready to help real world solve its problems, e.g. recycling.
- Children can create their own games, simultaneously playing and living, and it is possible to create games that many children of the world participate in, with the help of their teachers.
- Children and teachers need to become friends.
2.2 Creating learner centered environments

2.2.1 Developing student agency
This session discussed the role of teachers in self-directed learning, moderated by Fyodor Sheberstov, chairman of the board for Teach for Russia. The participants, experts and pioneers in next-generation education, included Stanislav Yankevich (Khoroshkola), Alexander Yadrin (Teach for Russia), Dmitry Zelivanskii (Novaya Shkola), Varvara Kuchuk (Shkola-park), Vadim Polyuga (i3.school) and Artyom Soloveychik (Rossiyskiy Uchebnik publishing house).

Fyodor Sheberstov oriented the session towards determining instructions for a common school transformation, to provide guidelines for teachers’ assistance to learners’ achievements.

The participants agreed that self-directed learning implies:
- A sense of purpose (the pupils have a goal for a day/month/life)
- A real-life context
- A mindset focused on growth (“growth mindset”) — in Russia, students don’t believe in themselves, while they should be confident that if they study well, their life will be better.

In this format of self-directed learning, the role of teachers is to be tutors giving inspiration, observing, analyzing and using the data obtained.

After a discussion, the participants named four groups of roles that a modern teacher has:
1) Motivation & guidance: inspiring children, giving advice;
2) Planning: helping children achieve goals, building perseverance;
3) Group work: facilitating group roles;
4) Expert: having knowledge and knowing how to apply it.

The participants also agreed that in order to help students become self-oriented learners, teachers should have 21st-century skills:
- be good at communication, collaboration and critical thinking;
- be role models for children and show the abovementioned traits needed for self-learning, such as having growth-oriented mindsets, being gritty, etc.;
- be life-long learners themselves and be able to learn together with children;
- be open and not afraid of change;
- be careful with giving feedback in order not to ruin the child’s personality;
- be tolerant to mistakes and understand that mistakes are part of learning.
2.2.2 Preparing teachers to work in learner centered and blended environments
The session was chaired by Tom Beresford (Innovation Unit, United Kingdom) and touched upon two major points: the idea of learner-centered teaching, and the new role of teachers and teachers’ professional development. According to Tom, school leaders need to cultivate new mindsets and behaviours. At present, the education system is teacher-centered, not student-centered, so it is necessary to unlearn the existing patterns. The change of teacher practice begins with purpose driven collective visioning (visions should be real attempts, not just on a website), and creation of structures that seed new learner-centered cultures (e.g. redefining how time is organized in schools, so that teachers do less and students are encouraged to speak and practice more). In order to implement new practices, teachers need to go on their own journey. In the emerging learner-centered environment, educators need to become both innovators and collaborators, and students need to feel themselves as a part of the collective.

Boris Yarmakhov (Russian Google Edu Community Coordinator) agreed that the teacher’s own learning journey is far more important than any theory of teaching imposed, and it is often enough to find the right way of teaching in learner-centered way. It is why communities of practice play the central role in teacher development. Being innovative on your own is a challenge: Boris used Everett Roger’s theory that change agents are normally distributed and applied this to the Russian population, so if only 3% of teachers are real innovators, this is roughly 1 teacher per school. But 64% might support certain innovations, and only 16% do not care or criticize. He concluded with the idea that online learning platforms (such as professional development platform developed by Boris www.prof.notoproject.org) can help to connect the innovators and should be actively used to support teacher professional development.

Maxim Bulanov (leader of Moscow division of National Tutor’s Association) spoke on the new role of a teacher. He stated that in Russia the whole system of education is not learner-centered, however, the National Tutor’s Association introduces a different practice, opting for teaching in blended environments, creating personal learning environments and individualized learning paths.

Speakers agreed that it is necessary to find more motivated teachers for the new system, focusing on innovation-oriented teachers who want to bring changes. Part of the solution is to bring more people from outside the existing system, e.g. from business or social work.

2.2.3 The role of digital platforms in learner centered environments
This session included presentations by Yiannis Laouris (Future Worlds Center & Cyprus Neuroscience and Technology Institute), Nick Weideman (Education Services Australia), Okhwa Lee (Professor of Educational Technologies, Chungbuk National University, Korea), Taras Pustovoy (Director of the Center of Innovative Educational Technologies at Moscow Institute of Physics & Technology), and Alexander Pryadchenko (Head of projects in LANIT Network Academy). The session addressed the evolution of digital platforms, and the advantages and current main challenges to implementation of digital learning.
Yiannis Laouris opened his presentation with Vygotsky’s quote, “by changing the medium we are changing the mental model” and continued to speak about a necessity to allow mobile technologies to spread to classrooms. It is important to understand the differences between type of platforms, separating platforms which manage processes and platforms which are designed to unite stakeholders, and the importance in today’s education to bring various stakeholders together; uniting kids, teachers and parents, taking away the educators’ monopoly on education. He ended by stating that the educational process has changed greatly from what it was in the 20th century, as well as from its desired state. He also indicated great risks in the use of personal information in learning platforms; learning abilities and interests are a very intimate information, and personal data protection becomes highly important.

Nick Weideman described the evolution of digital platforms in Australian schools. Improvements of the last 20 years have been in better quality resources, better procurement and increased curation, alignment of teaching standards and integrated formative assessment. He proposed that the main mechanisms to accelerate learning trajectories may be personalized learning resource paths. Students should understand “what comes next”. Recommendation systems need to be developed, to help students define which content is most relevant and useful next. He suggested that micro-credentials may be the best way of tracking student performance.

**Figure 10:** Design of personalized learning path (Weideman)
Okhwa Lee presented the Korean experience with digital platforms. Korean education is characterized by an extensive usage of technologies in all levels. The challenge is that not all of the many existing systems are connected so the new system for information sharing is aimed at solving this problem. Use of private student data, including student performance, is also an issue — there has already been one national crisis in Korea when it became open to the public, and now Koreans are very careful with which data to open. Government issues a set of regulations, and platforms have to comply — so this is a government-led process. Standards govern formal education, but students are able to learn more that standards define, and so standards limit them. On the other hand, many students are not interested in education, and it is hard to motivate them.

Taras Pustovoy explained that in order to create a national platform for all universities, fundamental changes of the system are required. He highlighted that for better stimulation learners should be rewarded inside the system. He supported the idea of learners’ understanding the trajectory and educational goals — assessment should provide a holistic mechanism of looking at oneself.

In the discussion, speakers argued that it is necessary to take student voice into account, and to reward students for their feedback and active engagement with the platform.

All speakers agreed that one of the main challenges is making online platforms financially sustainable and viable. Okhwa Lee suggested educational platforms developed by the government should be free-of-charge. Taras Pustovoy argued that it is necessary to make financial mechanisms more transparent, so that content providers will be paid.

2.2.4 New learning paradigms: game & event based
This session was conducted by Dmitry Zabirov (Russian Association for Games in Education, and Moscow School of Management Skolkovo). The main speakers were Andrey Komissarov (head of Gamified Education CS and leader of EduNet), Alexander Minkin (lead educational programs designer for ‘The Noon Project’, an organization engaged in socialization and career counseling for children in difficult situations, schoolchildren and students), and Michael Zabelin (lead game designer for the Institute of Broadband Education, St.Petersburg). In addition to adult participants, around eight kids (of age 8-15) participated in this working session.

Andrey Komissarov gave an overview of the historic development of game & event based learning in Russia, covering a thousand years of gamified education history. It all started in 1000 AD after christianization when soft-skill games and meta-competency games were introduced (‘bride meets the groom’, ‘wall-on-wall fighting’ to deal with aggression etc.). The first Russian constitution from 1096, “The Truth of Yaroslav”, mentioned the role of chess in training the mind of rulers. Fast forward to early 20th century and game based learning involved training student minds with card games. The scouts’ movement (later converted into Young Pioneers, a communist youth organization) actively used game-based education like ‘Red Dawn’ (‘Zarnitsa’) youth military game. In the 1920s many board games were
introduced in order to deal with a large number of undereducated people, to help develop thinking and collaboration — these board games were very different from German or US resource- and competition-based games (e.g. Monopoly). The first business simulation games in the world were also created in Russia in the early 1930s (Maria Bernstein, 30 years before Harvard) to train organizations for rapid industrialization. Starting from the 1960s, the Communard Movement was extremely influential, and aimed at developing personality and creativity through game-based learning. After the collapse of the Soviet Union, role-playing games became extremely popular (especially those based on Tolkien stories). In the 2000s, role playing developed into a significant movement of historical reconstruction. As the result of these changes, many new pedagogical models are born, which incorporate pedagogy into the existing gaming culture. Some of these projects are focused on teaching thinking to kids, for example the Neogen project allows kids to describe the rules and life of “worlds” that would be “paradoxical” from our perspective, such as a world where all people constantly lose memory of their past life, or the world where binary oppositions (e.g. right-wrong) are replaced by triadic relationships.

Andrey continued the discussion by the presentation of EduNet educational program. The core criteria of the programme are assessment which is essential and motivation. The platform provides live action games with digital elements intended for remote High-Tech Companies desiring to teach their kids soft skills that they later want them to apply within their communities.

Other cases included the project “Noon” presented by Alexander Minkin, operating in 2 regions of Russia with over 100 kids participating. It promotes the 21st century skills through live action roleplay for socialization and professional orientation of teenagers in a difficult life situation. Mikhail Zabelin presented the project ‘Metaversity’ which actively involve teachers as well as students through a series of gamified events called ‘Mind Structure’, with over 300 students involved in 3 cities. It considers the process of learning as “game of games”, or “metagame”, that can involve many gamified events (problem- and collaboration-focused) to obtain a variety of 21st century competencies. The work of Kazan Game Design Club presented by Dmitry Zabirov is centered on practice oriented games for schools and business; they are currently creating a handbook of game design, assuming that the game design is a skill of 21st century.

A collaborative design session indicated primary practical opportunities for the implementation of game based education in schools:

- Games that support public school processes: game-based learning was intended for students co-designing with teachers in public schools
- Games that support out of school activities, e.g. games for school students who want to get first experience of doing business (communication and teamwork, as well as marketing, economics, and business management);
- Games and events that involve art & drama: e.g. school and street festivals centred around the school that involve drama, art, film, etc.
- Games and events that explore environments outside of school, e.g. search for hidden
things in the environment using geocaching.

The group then used a gamified setting to reflect on their discussion, asking each other questions without answers, trying to advance the discussion by questioning each other. The questions included:

- Will games substitute all traditional forms of study, and replace the traditional curriculum (because it seems the game can do everything)?
- Can games be programmed to follow in a specific direction that teachers want?
- Can assessment be done by games?
- What if students enjoy their games too much, and never go back to their homes, to real life?
- How can we involve kids as creators of games?
- Should game design, that is more holistic than “problem solving”, be a 21st century skill? Can we teach it to all students, and make the world of learners into an international game?
- If everything becomes a game, what is the difference between life and game? Would life have meaning if the game never ends?

The speakers concluded the session with the idea that the most valuable component of games is they are finite, and it allows players to enjoy every moment.

2.2.5 Intermediary reflection

A short reflection session summarized the conclusions the participants had come to in the first one and half days. Pavel Luksha invited the participants to answer two main questions: (1) What are the critical changes that should be implemented in education content, assessments, relations between students and teachers, and the way learning is organized? and (2) How can people make these critical changes happen?

Participants made following statements

- A more holistic approach to educational transformation is necessary.
- Education needs to be more motivation-driven.
- Education should be connected to the real needs of cities and communities in order to revitalize them.
- Real practitioners should be involved.
- Communities connecting mentors, learners and the context should be created.
- Trust about resources and the environment is one of the key factors of success.
- More space should be given to the younger generation that is already making change happen.
2.3 Moving towards learning ecosystems

The next session considered the transformation of educational systems into learning ecosystems. The participants of the session were Connie Yowell (the Director of LRNG and formerly of education grantmaking at the John D. and Catherine T. MacArthur Foundation, where she oversaw an $85 million program on Digital Media and Learning, one of the first philanthropic efforts in the United States to systematically explore the impact of digital media on young people and implications for the future of learning); Andrey Sharonov (President of the Moscow School of Management SKOLKOVO); Valtencir M. Mendes (International Projects Co-ordinator, Jaume Bofill Foundation, Barcelona); Julia Howard (Fellow in Community Engagement at Phillips Academy).

Connie Yowell presented the work of LRNG, which seeks to transform cities into emergent ecosystems for learning. This ecosystem approach to system change is focused on the US and began in Chicago, but is now spreading in other US cities. The challenge that this project addresses is to prepare youth for a rapidly transforming world of work. The existing educational system is not prepared for the reality of work. There is a difference between how learners are engaged and how they want to be engaged, and a problem of a significant skill gap (40% companies in the US cannot find qualified employees). LRNG has built a platform to support learners, and is working to create learning communities where everyone could participate. They design learner pathways around three crucial parameters: Purpose (how learning connects to the world), Passion, and Peers.

LRNG believes the following transitions are necessary to reach a new learning paradigm:
- From Pipeline to Personalisation
- From Time Focus to Competency Focus
- From Schools to Ecosystems
- From Curriculum to Playlists
- From Diplomas to Badges
- From Teachers to Mentors

In the LRNG platform, any “mentor” can organize a playlist of learning experiences that can become a connected learning journey for learners. Mentors can create context. The platform connects peers and mentors and builds a community for learners. The platform recognizes that it is not the purpose of school to solve any social problem, but an ecosystem can do this. The challenges of developing the platform (that they are currently working on) are that it needs to be designed for youth, and to ensure trust and interoperability. The platform has to ensure that collaborations become easy, and should be as accessible as Uber is to drivers.

Andrey Sharonov (Skolkovo) indicated that Skolkovo plays a role of ecosystem integrator at the moment, trying to become a partner with several schools in the area (e.g. research institute SkolTech, Skolkovo startup incubators, New Economic School, educational
projects for teenagers, “Silver university” for older generation, etc.). In Andrey’s opinion, higher education institutions, universities in particular, can play the key role in creating learning ecosystems.

Val Mendes presented the work of the Jaume Bofill Foundation to create a theory of change with a focus on public schools ready for transforming. They created a network of schools with an open challenge based model (500 schools trying to work together), and then facilitating their efforts. Schools extended their scope, opened to out-of-school activities, and connected themselves with other ecosystem institutions (e.g. museums). It is a different personalized model using open methodologies — and if you trust in your community you could be amazed by the results.

Continuing discussion indicated that ecosystem is a self-organized system, and learning ecosystems have many similarities to startup ecosystems. Ecosystem is not simply a biological metaphor, but it allows us to take a “biological look” at a system. In order to create whole ecosystems, there is a role of ecosystem organizers, or “gardeners”.

2.4 Catalyzing ecosystems

2.4.1 Creating and sustaining learning ecosystems through inquiry networks

Judy Halbert and Linda Kaser introduced the Networks of Innovation and Inquiry (NOII) operating in British Columbia (Canada). The first of these networks began 17 years ago with a clear purpose to be the highest performing system in the world for quality and equity and through that system to contribute to the state.

There were a few problems at the very beginning. Firstly, they had to face the problem of learners’ disengagement — according to national surveys, around 15% of kids in Canada were intellectually disengaged from the learning system. Secondly, British Columbia historically had a tension between teachers and the Ministry, which led to tension between teachers and principals. So another problem to solve was to reduce teachers’ isolation and facilitate their teamwork across roles. Apart from that, some demographic conditions entailed complexity of a dynamic multilingual society — both indigenous and brought by newcomers — so they had to keep in mind different language and cultural groups.

The speakers decided to create an ecosystem that wouldn’t have any boundaries or hierarchy associations and traditional roles. They started working with 34 schools and managed to cover approximately 60-70% of schools in the province, working with over 10 000 teachers and supporting staff and graduates. This ecosystem grew naturally, in its organic way.

The speakers wanted their work to be results oriented and very grounded. They have been very influenced by the work coming of the Innovative Learning Environments (ILE) study about the nature of learning. They embedded this in their work and asked schools to focus on it.
The keystone of the networks is the Spiral of Inquiry. To define the term and to provide a clearer understanding the founders issued two books, The Spiral of Inquiry and the Spiral Playbook, which is a user-friendly guide with condensed ideas from the previous book. Unlike other action research, the spiral of inquiry focuses on learners and a deep understanding of their experience.

Children want to be considered and they want to see allies in their teachers, if not close friends. Listening to the learners and understanding deeply their experience can be quite time consuming, so one has to be very patient to get the result.

They have found that ideally, schools focus on one thing based on what they learn from their students, that can really engage the whole school. There are some sophisticated schools that can do two things at once, but more than that can be confounding.

The other key thing is “pushing the pause button” and asking: “how we are contributing to the situation” that we have learnt about from the students, and not only from the positive side. We can consider sense of disconnection, anxiety, lack of confidence or whatever a child can feel and take responsibility for that. This is probably the hardest part of the Spiral because it challenges some of our existing practices, but makes us think about other approaches.

As part of the Spiral of Inquiry they ask the following four questions to children in a school to understand their experience and get clear feedback.

1) Can you name two people in this school who believe you will be successful in life?
2) What are you learning and why is it important?
3) How are you going with your learning? (ability to self-assess)
4) What are your next steps?

If children cannot or are struggling to answer any of these questions, this is a signal of the need for action.

2.4.2 Role of school networks
In this session, the participants discussed the advantages and disadvantages of school or provider networks in developing education. The roundtable was moderated by Marcel Van Loo (OMO Scholengroep Bergen op Zoom eo, Netherlands), with Olivier Bréchard (Web-Force3, France) and Valtencir Mendes (Jaume Bofill Foundation, Spain) as the main speakers.

The participants agreed that there are numerous advantages to school networks, such as:
- The possibility of having partners who will invest in schools and employ graduates;
- The opportunity to share experiences at different levels (between school management, teachers and students);
- Cooperation between different types of institutions (government, non-profit, private, etc.).
However, participating in a network can also have negative consequences:

- If one school in a network is failing, it ruins the reputation of the whole network;
- There may be “school segregation” — schools that are not part of the successful network can be considered low-quality and lose students;
- If decisions are meant to be taken by all the schools, it may be too time-consuming and difficult to agree.

The participants came to the conclusion that there is no perfect size for a network to succeed — there are many examples ranging from several to thousands of institutions. However, it is important to remember that the size determines the management and decision-making model.

Other important conclusions included that:

- Networks need to build resilience in order to be able to adapt to the fast-changing world;
- It is crucial to encourage teamwork, to reflect on positive changes achieved together and to motivate teachers to start self-organized communities and platforms;
- There is no need to force schools to participate since they will be motivated themselves if they see the social significance of participation and the potential benefits;
- Participating in the network means that schools challenge each other’s models, fostering positive changes.

2.4.3 Role of complementary education in catalyzing educational ecosystems

This interactive session, moderated by Dmitry Kaysin (Moscow Aviation Institute), included 2 presentations on the role of complementary education in catalyzing educational ecosystems. It considered two cases of complementary education programs that served as catalysts of ecosystem: Junior Skills and Space Odyssey.

**Viktor Pronkin** (CEO Junior Skills) proposed the following key points for the discussion:

- The lag between school practices and professional and social practices.
- Rising need for early professional training programs
- Necessity of more intense involvement of the school in creating professional experiences.

An approach of Junior Skills is to provide experiences of professional skills training in schools, creating school teams with support of experts. This engagement should embed the following key elements: standards, skills competition and professional projects and experts’ networks of teachers. The results achieved during three years of the program include training for 40 skills; involvement of schools from 56 regions; creating a system of national competitions; and obtaining the support of President of Russia.

The ecosystem from the learner’s standpoint involves technology and craft lessons, trainings (during lessons as well), summer camps, real life projects, and competitions.
One of the changes in this approach is that it is not connected to the age of students: since learners with the same age have different psychological age, they should receive different and diverse tasks, not necessarily corresponding to their real age as in the traditional approach.

We should also keep in mind that children are ready to contribute to the world’s benefit. One of the essential problems in the current system is that it is too far from real problems and real working competencies.

Schools need to broaden the engagement of students. Learners are interested to get real skills that would help them in real life. The responsibility for correct guidance and facilitation of these tasks falls on mentors and teachers. The role of teacher in the system is completely changed — the teacher becomes a coordinator and a mentor. This entails the need of training teachers, and at Junior Skills the “first generation” of teachers now teaches new ones and disseminates their knowledge and competencies.

Pavel Rabinovich presented CosmOdys (Space Odyssey), another system of technology-focused complimentary education with a new approach, which includes:

- project-based learning, based on real (technology-oriented) projects conducted in schools;
- collaboration between students, teachers, science and business organizations;

Figure 11: Organization of JuniorSkills ecosystem
a three stage structure: project preparation period, exhibition of project and defense;
project festivals (already conducted for one and half years with more than 1000 students, all volunteers).

The first round of projects was based on challenges that prepare human beings for deep space missions (hence the name Space Odyssey): Planetarium, Observatory, Ecosystem, 3D photocopying, NCabinet of nanotechnologies, etc. Projects are done using the SCRUM methodology, where the teacher becomes product owner, student becomes scrum-master, and elements such as sprint planning and stand-ups are implemented.

The project comprises 200 volunteer experts, including state experts from Moscow and local experts in all projects. The organizers of the festival invite students from many schools and it is not necessary to have experience of working with the scrum method: everybody is welcome to participate.

This framework empowers children and develops their learner agency. Since the founders of the projects believe that all children are talented, the term ‘talented children’ is forbidden.

Figure 12: Transformation of role of learner in Space Odyssey (Rabinovich)

According to Mr Rabinovich, children who participate in the festival activities are highly motivated and capable of balancing many school, extracurricular and other activities, as well as preparing for the festival, so that the school load is not a problem. The festival organizers have to work with teachers so they do not dominate over children and let them work on their own.

During further group work, several issues of methodological development were discussed. The expansion of a mentor base is necessary for the project, and the mentors can be developed from the group of teachers as well as out of school professionals. Internationalization is a highly desirable component of the project, and opportunities for creating
cross-border teams are important. Businesses can further enhance their connection with these projects by providing learning opportunities, also allowing them to get an early look at talent for their operations. The emerging learning ecosystem that is developed with the support of this type of project would require articulation of real needs and real customers (businesses) who will act as drivers of transformation.

2.5 Various models of ecosystems

Anthony Mackay summed up the sessions of Day 2 with the key idea that in order to transform education we need to create healthy learning ecosystems with learner agency at the center. He recalled the idea that creation of sustainable communities should be ensured where life and work creativity flourishes.

Figure 13: Ecosystem architecture (OECD version)
Besides education related players, learning eco-systems would include parents, industry players, policy makers and regulators religious and community leaders, and combining and group learning. Learning process should be multidimensional (temporal, personalized, spacious). Children should have the central place in the process, be equally important and acquire 21st century skills.

Figure 14: Ecosystem architecture (Foundation for Young Australians version)

A more specific version of ecosystem architecture suggested interplaying elements that empower young learners to become entrepreneurs.
Other aspects of a learning ecosystem that were suggested included:
- multi-generational exploratory learning in communities and groups;
- focus on a personal journey (including journey for spiritual self-actualization);
- multi-layered organization of processes and structures;
- increased roles of chaotic processes, self-organization and creative destruction.

During the session, it was concluded that our exploration of learning ecosystems only begins. The modelling of ecosystems is a complex task, and they are multi-dimensional structures that cannot be captured with a single representation. We must continue the conversation to find the “ontology” of education organization for the 21st century.
3. The “How to Get There”

3.1 Transforming educational policies

Context setting
The first speaker of the catalyst session, Valerie Hannon, set the context for the last day of the GELP event by explaining why necessary transformations must be grounded in a political context. She indicated that the most important role in the transformation will be played by change leaders, systemic thinkers who can help create the new learning ecosystems.

There are four ways in which both existing and new players can approach transformation. Existing, conventional institutions tend to focus on improving formal learning or introducing informal learning modes as supplementary. New entrants of the system (entrepreneurs, networks) tend to focus on reinventing formal education or creating an entirely new paradigm through informal learning modes. But the most productive transformation strategy may be to focus on the nexus of these four quadrants — driven by both digital technologies and development of learner ownership to combine formal and informal learning, existing and new institutions.
The political power determines the speed, direction and stability of change; therefore we cannot and must not give up the politics and its tools, because we have to speed up the changes to address mounting global challenges. The political context is shaped by communities, media, new investors; every stakeholder must be mobilised for action and regulation, allocation of scarce resources.

It is also necessary to develop the narrative field, where "a guiding vision" should be established to support challenges to the existing schooling paradigm; this vision can only be created with the help of politicians and government authorities.

**Figure 16:** Focal areas of educational transformation (Hannon)
Governing education for the complex society

Tracey Burns (Senior Analyst in the OECD’s Centre for Educational Research and Innovation) was invited to the floor to explain the key principles of governing complex education systems, based on analysis conducted by the OECD. A key starting point in the policy context is efficiency, including matching of available resources with possible results in education, and working with failing schools to overcome existing efficiency gaps.

The fundamental difference between complex systems and other types of systems (simple or complicated) is that in complex systems every challenge is unique and has to be addressed in a unique way. Tracey compared a complicated situation (e.g. sending a rocket to space) and a complex situation (e.g. raising a child) to indicate that no previous experience is enough to solve the present challenge. The approach therefore has to be responsive and continually refined.

For governing complex systems, the following trends appear:
- Complex education systems imply decentralisation and more autonomy of schools, an increased number of interested persons (for example parents); multi-level relations appear which should remain transparent and equal.
- Increased accountability in all its forms: measurable objectives, focus on evaluation, transparency; again, the increased number of players who want to have a voice and state their visions are relevant. But the necessary capacity building requires cooperative work between local governments and school leaders and mutual cooperation between other stakeholders (private companies, media, researchers). Positive results can only be achieved with political support, concrete goals, appropriate resources and time. The accountability principle must be applied as a constructive system that supports improvements and sustains a holistic vision.

There are two branches of governance and accountability: vertical for hierarchical control (from higher levels of school authority to schools) and horizontal that is supposed to monitor teachers’ performance as well as involving multiple stakeholders in the processes of formulating visions and strategies, evidence and research for further transformation.

Effective governance of complex systems would involve the following elements: a focus on processes; flexibility; adaptiveness; capacity building; a holistic approach; and evidence-based progress.
Several case studies were highlighted as examples of governing for the complex world:
1. The Netherlands case focused on risk-based assessment and providing “weak” schools with necessary support; the case has showed some great success although some of the schools performed even worse after two years of the program.
2. The Norway case mainly focused on establishing closer cooperation between the main education authorities and local bodies. The goal was to achieve a balance in sharing information as well as building the necessary capacity in schools.
3. The Poland case, not yet published, will contain a general analysis of the school inspection system and present the core principles of evaluation of student performance.

Changing relationship between schools and economy: Human Capital 2.0
Isak Froumin and Pavel Sorokin, researchers from the Higher School of Economics in Moscow, presented the report Human Capital 2.0. The core idea is that our society should turn itself in the direction of a human perspective, so a human is in the center of all systems, including technology, economy, society, and culture, so that society is able to face the so-called “Grand Challenges” (social inequality, modernisation, economic growth). The main advantage of such approach is located in the human’s ability to adapt to the changes faster than any social institution.
Nowadays the dominating theory for economic growth is the Human Capital theory, which is promoted by major global organisations and has strong ideological and theoretical foundations. Still, it is limited by the implied stability of the economy and now by reduced productivity growth in the middle-income class; the main logic ("human capital" must match the economy’s demands) meets barriers in the traditional labour market.

**Why human is so important? Because individual can adapt to changes much faster than a company or a state.**
The rate of change in technology, individuals, businesses and public policy (2017 Deloitte Global Human Capital Trends, p.4)

![Figure 18: Increasing importance of human beings in the complex and changing society](image)

What does Human Capital 2.0 suggest? Changing the perspective, so people become not the actual labour resource, but the driving force to provide holistic socio-economic development. The primary goal is not to educate people to adapt to changes, but instead give them skills to transform current challenges and to operate “ahead of the curve”. The possible solutions are to:

1. Support the creativity and critical thinking through education; move away from the industrial framework and producing proper human capital for the labour market;
2. Make it possible for scholars and students to create the personified educational tracks connected with a particular person’s needs and interests;
3. Cultivate the culture of diverse practices and activities;
4. Change the vision of education from “preliminary stage before the job” to instant upgrade of a person’s skills and competencies.
3.2 New directions for policy making

3.2.1 Maintaining momentum in jurisdictions committed to transformation

This discussion was conducted between Anthony Mackay (GELP), Tom Bentley (RMIT University, Australia), Blye Frank (University of British Columbia, Canada), Okhwa Lee (Chungbuk National University, South Korea), Ekaterina Loshkareva (WorldSkills Russia) and additional speakers from the audience. Each speaker shared their personal visions on the problem of maintaining momentum in transformation in their jurisdiction. There were certain overlaps in their perspectives:

1. The crucial role of stakeholders, which implies literally everybody — from parents and their children (citizen) to the government bodies and ministries;
2. Establishing the partnerships between all the levels of the educational system; professional collaboration and cooperation are essential.
3. Critical thinking and creativity are the qualities and skills that must be developed from the earliest childhood;
4. The «story» should be promoted through media and other narrative tools;
5. Practical implementation has a huge influence; it needs more attention;

In addition to these similar points of view, the speaker expressed different views on the role of politics. For instance, Russian and Korean speakers agreed that the government is inevitable in terms of control and assessment standards, whereas others urged that where politics cannot move forward, efforts should be focused in other directions. Other speakers expressed the following ideas:

1. In order to move beyond the current politics of education people should intentionally work on transforming the political influence on education;
2. Students must be involved in the process of transformation as much as possible;
3. To continue transformation we must not create long-term visions of individualistic learning but instead create a vision of a whole society together with specific groups.

3.2.2 Learning ecosystems and the goal of equity

Participants of the discussion included Beverley Dyason (MIET Africa, South Africa), Zwoitwaho Nevhutalu (FirstRand Empowerment Foundation, South Africa), Pauline Barnes (Education Council of New Zealand and Aotearoa), Kim Luck and Peter Kelly (Queensland Department of Education, Australia), Sergey Kosaretsky (Institute of Education, Higher School of Economics, Russia), and Natalia Kiseleva (Rybakov Foundation Inclusivity Program). The main topic — equity — was covered from different perspectives of expected education changes. Following range of challenges was indicated:

1. Geography: speakers from aforementioned countries pointed out that in large territories with lots of remote areas, access to technologies needs to be provided to every education institution and stakeholder;
2. Basic resources: Zweito Nevehutalu, from First Rand Empowerment Foundation in South Africa, talked about lack of nutrition for kids, not to mention the basic technology facilities.

3. Inequity in learning processes: some changes imply growing inequality between developing communities of learners and those who cannot afford the basic tools for further transformative work;

4. Teachers: those who have higher qualifications are not always better in establishing proper communication with students and vice versa;

5. Common social inequality: despite the development of technologies, students from well provided families have greater access to good and holistic education than students from weaker society groups;

6. For many, the question of whether our world is becoming better is still open: borders, frontiers, social and economic barriers — these must definitely be treated in a transformed way.

However, possible answers were presented as well:

1. Creating an ecosystem for uniting institutions, stakeholders and actual learners;

2. Developing better engagement with teachers, who must become a part of the learning process themselves;

3. Solutions must be found globally, not on a local level; only this approach can allow worldwide changes that everybody is looking for.

3.2.3 The role of regions and cities

The session was dedicated to finding recipes for effective governance on the regional level. Each of the speakers presented their points of view and indicated spheres for improvement.

The first to speak was Alexander Anikeev (Minister of Education and Science of the Kaluga Region); he started with a suggestion to implement a project management model and leave behind the old hierarchical model in terms of governance of education processes. Another stated alternative was a network model with inclusion of all possible stakeholders and proper choice of necessary management mechanisms and roles. One of such mechanisms is management through associations of teachers, parents, and enterprises.

Next, Tigran Shmis (Education Specialist, World Bank’s Moscow office) talked about bureaucratic, social and to some extent pedagogical issues. We have to deal with our old model that complicates progress, for instance, our teachers still have to work with paper assessment papers instead of using only the electronic tools. One more challenge is to get teachers to spend more time with students in primary school, compared to kindergarten; the importance of establishing a child-oriented system. A wide range of other problems were stated: the inability of our legislation to keep up with educational requirements; language barriers (12% of Russian citizen do not speak Russian); lack of teachers in new competences (e.g. robotics); other bureaucratic obstacles.
Lyubov Dukhanina (Deputy of the Head of Education Committee, State Duma) touched the topic of extra-curricular education. Problems with free space for lessons could be solved by taking free auditoriums in art schools or even universities. Another suggestion was to change the whole paradigm: instead of keeping up with federal educational standards, digital assessments must always be there for children; they also must be allowed to contribute their own research work to the educational process.

Anastasiya Zyryanova (Program Coordinator at the Agency for Strategic Initiatives) mentioned a five-year-old project for people to choose a job with established methodology, plans, algorithms, but such initiatives do not work in practice, so a lot of efforts are to be done. She pointed out not only the importance of formal education but also the importance of informal institutions’ inclusion to the system. Moreover, there is a lot to do with children’s motivation, to teach them to assess themselves, develop management skills.

Fyodor Sheberstov presented the Teach for Russia project that works with people without a pedagogical background but who are passionate about their work as teachers and who can make changes from the inside. A switch in students’ motivation is needed — from external (teachers) to internal (themselves).

Pavel Sergomanov (Director of the Centre for Leadership, Institute of education, HSE), moderator of the discussion, concluded the whole session by introducing an appropriate metaphor that informal education is the engine and formal education is the train. He also emphasized that bureaucracy should be simplified in order to achieve proper development rates.

Other conclusions, including some suggestions and thoughts from the audience were:
- government does not have enough resources to convince all parents and children that changes are to be done, but the federal authorities must learn parents’ opinions;
- a radical approach: we should raise children without a thought of obligatory work search, so our economy will not deal with lots of insufficiently qualified workers;
- more freedom to teachers and schools;
- living for the sake of better future is good, but our children and the whole educational system live and work here and now.

3.2.4 Role of “bottom up” catalyzing (maps, foundations, competitions)
The key words for the session were framework and ecosystem, so the whole discussion was centred around these concepts.

Firstly, Pavel Luksha introduced the Protopia Labs idea. The purpose of this approach is to find the evolutionary framework consisting of new methods and solutions: generation of variety, selection and multiplication of successful cases. Different approaches must be tested in reality, positive results should be upscaled from experimental local spaces to global level. Here the idea of a “lab” is not necessarily a physical space but a principle that unites large.
number of various organisations. Successful projects will group around central nodes and the ecosystem establishes; this approach is commonly used as a way for coordination in the unpredictable world in business, and it should also work in education.

Next, three practical cases that use an evolutionary framework were introduced:

1. Diana Koroleva (KIVO, Competition of Educational Innovation): creating a new system for competitions in the sphere of education innovations. The organisation has been working for 4 years and during the first year we predicted 100 applications, then we got 500-600 applications, including IT projects, sites, programmes, and offline-projects. The key idea was to find motivation for participants to continue their work as well as to create the portrait of the 21st century innovators, both from the education sphere and outside of it. The statistics: lots of interdisciplinary projects, most of which are oriented for higher education; technical projects took lesser part; innovations mainly presented for students, very few projects for teachers; prizes — travel grant for presentation in other countries, collaborations with Microsoft, Sberbank, financial grants; the average age of participants — 35-60, very wide range; several students participated as well. We hope to add more instruments and mechanisms and we are open for discussion on improving the competition.

2. Lika Chekalova (GEF / Metaversity): creating a mapping tool for the Russian and global community. Navigation in the education; choosing not the knowledge sources but tools for personality development and lifestyle. The project is devoted to creation of a global innovators map (so the systemic level is introduced here); the scheme is the following: people who are working on the ecosystem level — people who create new methods reflecting each new approach and people who actually teach and educate other. If we are talking about the ecosystem, it need to be transparent and approachable to everyone. The map finds people who can present their ideas, as presentation skills are important in recognition as a teacher. It finds every emotion of listeners, way of life and pattern of education that we are looking for. The final conclusions: old practices do not work any longer, the new global education map must be established including universities, investors, authors, students, creators; it can create a criteria list to apply to local projects and could be based on data from professional societies.

3. Nurlan Kiyasov (Rybakov Foundation): shared protocols, finding and scaling solutions. Closer work with the government in terms of creating and sustaining conditions for digital economy; legislation and digital solutions, digital environment ecosystem; working on creating educational platforms. While creating the ecosystem of a national level, we invite everyone for global cooperation. Three main points:

1. Creating educational environment for self-realisation and self-development, but we do not have enough resources to create the proper structure so we hope for support from our leaders;

2. A “bottom-up” approach: the initiatives for change should appear from the primary levels of education (students, teachers, community members); this is hard to organise, but once it is established it will fruitfully work;

3. Only 1% of educational startups survive, so each new project should answer two main and vital questions: how the innovative idea would improve the learning outcomes and how the project would actually help teachers.
The group discussion first addressed elements that are missing from the presented "bottom up" approach:
1. Speaking about two dimensions: Global and National level;
2. Russia has its own way: today we should assume that we no longer rely on state support; we have new projects, ideas and initiatives, not in any way connected with the state. We should get on with it and work with these. We have socially responsible businesses who are the clients for the new alternative education stakeholder.
3. We should move to an education that includes everyone; we have to spread global projects, making everyone a leader of their own life; this is the way towards a new education.
4. Giving autonomy to teachers and communication tools — some do it manually by going from school to school.
5. We need to see more guidance in the way we build projects, aiming at targets that can bring together researchers-teachers and entrepreneurs allowing to regulate the discussion.

Then, the group addressed the question of possible tools for decentralised communication with the government:
1. There is no current direct communication, because there is no demand for another kind of education, no formal way to assess of the alternative education. Government is not the sole financial player on this market, there are other funding sources that are comparable and which are the real customers, so more contacts should be done with them.
2. We discussed the need for change in the education but there are no suggestions on the message that needs to be sent to government for them to change their thinking. The concepts that we suggest break all the ideological conceptions, the financial stream, the mass thinking; we are unsure the government is prepared to hear us.

3.2.5 Perspectives on resistance and progress
This "fishbowl session" was conducted in three rounds, so different opinions was discussed. The first round was about resistance and the following questions and ideas were raised:
- "difficult" teachers that are hard to re-train; how do we deal with those who are not interested in the process?
- changes are impossible without political influence, so we have to be very political;
- go beyond the government in terms of educational transformation;
- regeneration in the society is easier than transformation;
- this very resistance should be treated as a necessary ingredient;

The second round was devoted to the connection between resistance and progress:
- main stakeholders have to structure themselves as the resistance against bureaucratic system;
- transformation requires lots of research;
- again, political influence is crucial;
The final round was given to comments of participants:

- movements as the core principle of change;
- the resistance does not happen immediately;
- there is a dangerous probability of confusing people with undertaken changes in global education, so is should be formulated more thoroughly.

3.3 New players in transformation

3.3.1 Role of employers

This session was devoted to practical solutions that were presented both by potential employers and organisations that help establish productive relationships with large companies through various courses.

First, Anton Stepanenko (Director for Education, BCG Russia) presented a report created jointly with Sberbank, WorldSkills, and Global Education Futures. In the report, based on Rassmussen classification, all skills in the Russian labor market were divided into three categories: «skill-based» (basic qualification level, mechanic tasks), «rule-based» (middle qualification level, cognitive routine tasks) and «knowledge-based» (intellectual level, cognitive non-routine tasks). Nowadays Russia is not ready for transition to a “knowledge economy”, because the government prefers stability to growth. Accordingly, the country balances between less than good supply (which implies good primary education, average secondary education and higher education) with bad demand (problems with labour market attractiveness for talented people), so the state remains the main employer. The main focus should be on development of soft skills, so employers should start working more closely with universities and even schools; but it is still hard to assess the progress because there are not enough graduates for proper feedback of implemented changes.

After that, one of the leaders of Rosnano School League network presented a development of school products with this support of nanotech industry coordinators. One of the examples is a summer school for students where they can get a look “from the inside”, so the entity of technological process is revealed. This school’s curriculum demonstrates the connection between school education and actual technologies that are used in production, where chemistry and biology are crucial. The main objective of involving students of schools and universities in practical things can only be accomplished with persistent and hard work.

Two educational startups introduced their conceptions. The first one, Codabra, teaches children programming and game-design using games, cartoons, various applications. The speaker shared experience of working with Sberbank, so they teach children of the employees, another partner is Mail Group (one of the largest Russian IT-companies). With only 50 specialists, Codabra works with nearly 22,000 of children through a widely developed network of partners. They also help children with disabilities under the Sberbak’s initiative to develop special curricula for their needs. The second company, CrashPro, employs real industry specialists to help children get ready for working in digital companies. There are lots of joint project, the recent one was with QIWI (electronic money courses for children) and TASS (creation of science cartoons).
Speakers from other countries commented on the presentations:
- France: there are a real lack of competences on the ICT level, so enterprises are not that much involved in cooperation with educational institutions;
- UK: we have seen many attempts to create programs similar to Rosnano, to show students the “real world” of technological production;
- Hong Kong: we have the service industry, so there are a lot of small companies that do not have enough resources to predict the future needs of labour market; it is necessary to have the “meta-path”.

Pavel Sorokin stated the important problem: Russian employers are not interested in development of their own employees because it would imply higher salaries.

The Sberbank speaker concluded the session by suggesting closer cooperation between private sector and the government as well as overcoming the lack of trust between the stakeholders of Russian education and industry.

3.3.2 Role of socially responsible private investors in supporting ecosystems
This session, chaired by Denis Kravchenko (Chief Editor EdTech magazine) and Daniel Kozlov (CEO GVA) brought together several top private investors into education: Igor Rybakov (Rybakov Foundation), Sergei Solonin (QIWI), Gor Nakhapetyan (Skolkovo), Alexander Rudik (ProObraz) and Artem Kumpel (Severstal Foundation).

The key questions raised were: how to properly invest in educational projects? Where to invest — enterprises or human capital? What to do with complementary education? Therefore, several quite opposite points of view were presented:

1. The educational market:
   a. the need to understand how the market actually works for proper investments in financial vital projects;
   b. investors cannot make money on education, but only get pleasure and emotions from the process of helping educational initiatives; the same situation as with charity. Also, there are cases when investors received more profits from non-commercial projects.

2. Where our children should get education:
   a. some of the speakers do not believe in foreign education but are eager to improve the current situation in Russia;
   b. we should not limit our children; instead it is better for them to get the best possible education.

3. Where to invest money:
   a. time will show, because few years ago investors were confident about share of online education, but results show that it is not as effective as it was predicted;
b. investments should be done in people — teachers and mentors, developing their communication skills and raising trust of children;
c. only digital platforms, because there is no need in creating new Skolkovo or building new schools.
d. offline projects as well.

4. What is the role of government in terms of complementary education:
a. federal authorities should not interfere in the process at all; nowadays we are able to decline offers and suggestions and build our own systems; initiatives are crucial, because if there is none of them, then government becomes the main actor;
b. this type of education must be legislated and fixed by our government.

3.3.3 Role of social entrepreneurs
The session was moderated by Andrei Andrusov, deputy director at Education Innovation Support Center SOL. It included presentations by Vladimir Vainer (CEO of Gladway, foundation of development of media projects and social programs), Maria Rachinskaya (CEO of ‘the Noon’ project which works with teenagers who have social difficulties, endangered positions), Elena Gorokhova (CEO of a number of ecology-based organisations, NGOs and other social entrepreneurship) and Elena Khaletskaya, co-founder and head of Impact Hub Moscow.

Andrei Andrusov started the session by introducing the guidelines of the Education Innovation Support Center. The center provides financial support to particular interesting, scaleable and sustainable economic projects. He stated that now we are in the period of education privatisation as the necessary changes require private money. However, the main changes are supposed to come from grassroots to create social businesses, like uchi.ru, a gamified platform used by over 2 million kids.

Vladimir Vainer presented his company’s view on social entrepreneurship. They shared Korean expertise in the subject and launched the project in Russia and made a movie which became a symbol of social entrepreneurship. The next objective of the center is creating a community center allowing people to teach each other, become self-employed and create social businesses.

Maria Rachinskaya, introduced the idea of ‘the Noon’ project which works with teenagers who have social difficulties, endangered positions. The project includes serious educational content incorporated into game-based, drama and theatre activities. These technique allow them to learn to deal with all range of problems.

Elena Gorokhova, spoke about the platform ‘EcoClass’ for teachers, students and parents. It unites societies of people interested in ecology.
Elena Khaletskaya presented the idea of a community center or platform for those who want to make change. It should be an environment providing support to create social enterprises. She pointed out that people are motivated mostly by rewards and role models.

The session was continued by Mr. Glover from Australia who spoke on Australian experience in social entrepreneurship. Australian social organizations work in different niches: indigenous Australians’ education, ‘352 girls’ working in school process without replacing teachers. Schools are supposed to engage such organisations to provide cooperation.

Concerning the problems in social entrepreneurship development in Russia the speakers came up with the conclusions:

- social entrepreneurship is impossible according to the legislation
- procedures are complicated and require permission of authorities of the region in order to reach a teacher or a school
- education on entrepreneurship is missing

3.3.4 Role of parent communities
The session discussed the ways of involving parents into the learning process. It was moderated by Oksana Apralskaya (journalist, co-founder and editor in chief of ‘Family Education’ journal), with the primary speakers being Ekaterina Rybakova (co-founder and board member of ‘Rybakov Fund’ — non-profit organisation in education), Tatyana Zhukova (president of Russian School Library Association), Lika Chekalova (GEF expert, manager of the family education project ‘Hello Future’) and Artyom Soloveychik (vice-president of ‘Drofa-Ventana’ united publishing unit).

Lika Chekalova highlighted the idea of children, teachers and parents being pro-active equal parties of the educational process learning from one another. Students should be taught how to use the resources provided and find the best way to learn. She suggested the idea of children and parents learning together as a part of life-long learning, which could help to avoid the problem where children are sure that adults, especially parents, do not understand them, thus they do not want to cooperate with them.

Ekaterina Rybakova suggested that parents are already involved, but some too little and some too much. In order to achieve better results teachers should work not only with a kid, but with the whole family while schools should encourage graduates to take part in their activities. She reported that the Rybakov Foundation has a contest for the best school.

Tatyana Zhukova stated that librarians are among the most useful and educated people at school. Reading is essential for children and parents to become more creative and be able to process more information, which is a must for the new world as the main competence now is the ability to learn. She told about the initiative of integrating reading into children’s lives.
Artyom Soloveychik supported the idea that all children are different — talented, not interested, not active — and adults should accept them as they are. There is no universal education system that would suit everyone. Homeschooling communities help develop actual schools but it is not for everyone, at the same time, children shouldn’t be divided into talented and not as success at school does not mean success in life.

3.4 Closing session and ending remarks

The final session was attended by a number of political and social stakeholders of the future of Russian education, including representatives of the Government of Russia (Veniamin Kaganov, Aidee to Vice-Premier Minister of Russia), government agencies (Dmitry Peskov, head of Young Professionals division at the Agency for Strategic Initiatives, and Alexey Kudrin, Chair of the Board, Center for Strategic Development), and private investors (Alexander Rudik, Proobraz, and Igor Rybakov, Rybakov Foundation).

Dmitry Peskov indicated that Russia is actively taking steps to transform its education. On November 7, Russia officially opened the largest and globally unique digital learning university, that is aimed at training professionals of tomorrow, and that will exist for only 15 years, from 2020 to 2035. They will aim to integrate ideas of GELP there. It will be supported by a venture fund that will invest in various solutions supporting learner trajectory development.

Russia is about to hold the biggest hackathon in the world, in which participants will have three days to come up with projects for the digital university.

One of the biggest challenges is how to motivate our students. Only 3 to 5% are fully motivated, the rest are not. When do kids who don’t need anything aspire to become something else? How to engage them, how to “push the button”? We need to find the trigger and the system that would support this journey.

Igor Rybakov, the founder of the Rybakov foundation, and one of the main sponsors of the conference, addressed a number of questions in his closing statements:

- We’re all united by the value of human dignity.
- We will keep spreading our prototypes. Popularise educational initiatives, and export them, continuing to make Russia an exporter of intellectual initiatives. The Rybakov Foundation will try to attract entrepreneurs to education.
- I’m glad that there is a powerful community of different institutions. The resources we have in education are not used effectively. We have people and space but they’re not used effectively because there are not enough entrepreneurs.
- In our experience, fantastic results can be seen at schools which engage alumni communities. Work with alumni is what can heal and solve existing issues of trust, set an example to children, introduce new activities, and the work with them does not require money, this has been tried. Keep in mind we are all alumni, and we all need to take part in this.
- When the environment changes for the better, kids start to like going to school.
Veniamin Kaganov took the stage, bringing to attention that:
- We are going to see real change when people will stop expecting ready products from schools, but will gain a wish and ability to work together. Businessmen who think about the future are a growing trend. I believe trust between all stakeholders is key.
- That new challenges should be considered an opportunity to find new tools rather than a catastrophe.
- Schools are not only a place of study, but of childhood, and that on the example of my school, Moscow no. 2030 we can make children happy.
- Innovation can bring both success and failure.
- Children’s health should not be left without attention, research into information influence on health are vital.

Alexander Rudik concluded with the following:
- Solutions need to be practical.
- We need to get people involved.
- Changes should be both a result of political will from the government but also some changes are too quick for the government, and we should draw a line to distribute our responsibilities.
- We need to involve the private sector; the government has us as a partner and we’re ready to take responsibility.
- There are more innovations in Russia than in Europe. We can help you create a platform for prototyping, so new solutions can be helpful to the whole world.

Alexey Kudrin, ex-minister of finance of the Russian Federation, currently head of the Center for Strategic Development (responsible for the development of long term strategy of Russian government until 2030) and dean of the Faculty of Liberal Arts and Sciences (Smolny College) of St. Petersburg State University, drew his own conclusions of the event:
- Many students come to us thinking they want one profession, but then choose another.
- We prepare them for the diversity of the modern world. They are ready to change profession, as in the near future, one third of professions will disappear or change, and we need people who are ready for life-long learning.
- We need to involve all kids into education, because everyone has a chance at being successful.
- We need to equip schools for modern skills, like robotics on both a private and government basis.
- Russia doesn’t invest enough in education. We spend 3-6% GDP on education. We need more investment. We lag behind. Investing in education is investing in the future, otherwise we’ll lose the status of a technological country.

Anthony Mackay commented on the conference:
- Within the GELP community educators, the business sector, foundations, entrepreneurs and other partners come together to advance system transformation.
- In January 2018 we have the opportunity to gather together once again at the Global Change Leaders launch in Lyon France.
GELP provides the opportunity to deepen our collective understanding, resolve, and action to build system level learning eco — learning systems.

The Moscow Conference has given us the momentum and the capacity to accelerate, enlarge and amplify our endeavour.

Pavel Luksha expressed his hopes that this all is just a beginning, and made the following announcements:

- There are thousands of initiatives and potential partners, connecting all of whom, by creating a map of educational innovators and those who support them, is one of our current plans. This will give us an understanding of who is in the system.
- We also plan to develop software that trains to design and launch education ecosystems.
- We want to start an education program around the world for leaders of ecosystems. We want to launch prototypes. We need your support as an international community.
- Once again, this has been an amazing gathering. The main thing is that we have trust in each other. This conference further developed trust between Russian and foreign educators.