

**Chapter in: “Management: Strategic Imperatives and Trends of Transformations”. Monograph. Dedicated to the 75th anniversary of the Economics and Management Faculty. Eds: Sahaidak, Sobolieva and all, 2020, KNEU. ISBN 978-966-926-342-1**

## **THE ROLE OF EDUCATION SYSTEM FOR RESPONDING THE CHALLENGES OF INDUSTRY 4.0**

*Gagnidze Ineza*

The world economy is in a phase of rapid development. Based on the reports by recognized research organizations and the opinions of famous scholars, the paper explains the role of education system for responding the challenges of the Fourth Industrial Revolution, discusses opinions about the ways for improving school and university education, describes the best examples found in the world. The need for cooperation between different stakeholders for the implementation of effective education policies is especially emphasized in the paper.

We will start the discussion on the initiated issue by citing the forecast data that show the significant challenges that the government of every country faces. In 2018 the World Economic Forum published several reports, where the main issues are connected with the Fourth Industrial Revolution (4IR). “Across all industries, by 2022, growth in emerging professions is set to increase their share of employment from 16% to 27% (11% growth) of the total employee base of company respondents, whereas the employment share of declining roles is set to decrease from currently 31% to 21% (10% decline)”<sup>1</sup>. “The estimates suggest that at least 54% of all employees will require reskilling and upskilling by 2022.

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<sup>1</sup> The Future of Jobs Report 2018, Centre for the New Economy and Society. World Economic Forum. Committed to Improving the State of the World, p. viii.

[http://www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs\\_2018.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf)

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Of these, over a third will require more than six months of additional training”<sup>2</sup>.

Based on the scientific papers by the researchers of various countries, OECD points out that“ Some believe that 47% of all persons employed in the US are currently working in jobs that could be performed by computers and algorithms within the next 10 to 20 years (Frey and Osborne, 2013). Similar estimates are available for other countries, including Germany, where the estimate of the share of jobs at risk of automation is as high as 59% (Brzeski and Burk, 2015). For Europe as a whole, the share of jobs susceptible to automation ranges between 45% to more than 60%, with Southern European workforces facing the highest exposure to a potential automation (Bowles, 2014)”<sup>3</sup>.

“A study by McKinsey & Company suggest that by 2030, up to 375 million workers will need to switch occupational categories due to automation and all workers will need to adapt to co-exist alongside increasingly capable machines. A 2017 McKinsey Global Institute survey reported that 62% of business executives believe that more than a quarter of their staff will need to be retrained in part

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<sup>2</sup> Globalization 4.0 Shaping a New Global Architecture in the Age of the Fourth Industrial Revolution. World Economic Forum. White Paper, April 2019, p. 26.  
[http://www3.weforum.org/docs/WEF\\_Globalization\\_4.0\\_Call\\_for\\_Engagement.pdf](http://www3.weforum.org/docs/WEF_Globalization_4.0_Call_for_Engagement.pdf)

<sup>3</sup> FUTURE OF WORK AND SKILLS. Organisation for Economic Co-operation and Development (OECD) Paper presented at the 2nd Meeting of the G20 Employment Working Group. 15-17 February 2017 Hamburg, Germany, p.8. [file:///C:/Users/admin/Desktop/wcms\\_556984.pdf](file:///C:/Users/admin/Desktop/wcms_556984.pdf)

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because of automation and digital technologies”<sup>4</sup>. “By one popular estimate, 65% of children entering primary school today will ultimately end up working in completely new job types that don’t yet exist”<sup>5</sup>. *This is the generation that will enter the significantly changed labor market in 2030. This poses great challenges to all levels of education and grants special importance to it.*

With these changes in technology and the labor market, workers as well as policy makers face daunting challenges. Without effective policies, the gap between skilled and unskilled workers will aggravate the trend of income inequality, leading to social instability and undermining inclusive growth efforts.

Due to the above-mentioned, it is essential to find the key tools, which will contribute to mitigate the expected problems. In our opinion, education represents one of these tools.

The Report “Towards a Reskilling Revolution”, developed by the World Economic Forum, aims to help guide workers, companies, and governments to prioritize their actions, time and investments on focusing reskilling efforts effectively. “To make reskilling real, and prepare for accelerated structural change of the labour market, a wide range of stakeholders— governments, employers, individuals, educational institutions and labour unions, among others—will need

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<sup>4</sup> The Future of Skills in the Age of 4<sup>th</sup> Industrial Revolution. Desire2Learn (D2L), p. 2. <file:///C:/Users/admin/Desktop/The-Future-of-Skills-Whitepaper-1.pdf>

<sup>5</sup>The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution, World Economic Forum, 2016, p.3. [http://www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf)

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to learn to come together, collaborate and pool their resources more than ever before”<sup>6</sup>.

To emphasize the need for the above collaboration, the World Economic Forum has developed recommendations for three key stakeholders, in particular, for individuals, employers and policy-makers:

— For individuals, particularly those under risk of displacement, simply to remain employed will require engaging in lifelong learning and regular reskilling.

— For employers, investment in workforce reskilling and human capital development is a “no-regret action”—that is, it will be a beneficial investment even in the absence of skills shortages.

— For policy-makers, fostering continuous reskilling and lifelong learning across the economy will be critical in order to maintain a labour force with the tools needed to fuel inclusive economic growth and to ensure that companies can find workers with the skills needed to help them succeed and contribute their full potential to the economy and society.

The EU also considers that active involvement of companies in the development of effective education policies is highly important. With the purpose to prepare for the expected changes, the EU has developed two recommendations for education policy:

1. “Build a “European Coalition for Reskilling and Digitizing Industry” consisting of large European manufacturing companies which can help SMEs throughout the EU to develop their own

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<sup>6</sup>*Towards a Reskilling Revolution A Future of Jobs for All*. World Economic Forum. In collaboration with The Boston Consulting Group. Insight Report. January 2018, p.18.

[http://www3.weforum.org/docs/WEF\\_FOW\\_Reskilling\\_Revolution.pdf](http://www3.weforum.org/docs/WEF_FOW_Reskilling_Revolution.pdf)

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reskilling programmes. The coalition would be modelled on the Digital Skills and Jobs Coalition;

2. Upgrade the network of Digital Innovation Hubs into a network for innovation and skills development and training. Digital Innovation Hubs can function as regional facilitators that bring together regional SMEs seeking reskilling opportunities and large companies in the European Coalition for Reskilling outlined in 1”<sup>7</sup>.

A number of papers and reports are devoted to describing the skills that will be necessary for the employment of individuals in the near future. Top 10 trending skills determined by the World Economic Forum for 2022 are as follows: Analytical thinking and innovation; Active learning and learning strategies Creativity, originality and initiative Technology design and programming Critical thinking and analysis Complex problem-solving Leadership and social influence Emotional intelligence Reasoning, problem-solving and ideation Systems analysis and evaluation<sup>8</sup>.

New schools and new views on teaching are springing up around the world to help prepare the next generation for a rapidly changing employment landscape. One of the most significant developments in the literature of human capital and education pertains to the importance of early childhood education. Through a

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<sup>7</sup> Reskilling for the Fourth Industrial Revolution. Formulating a European Strategy. Dittrich, P.J. Jacques Dolores Institut, Berlin, Policy Paper 175, 3 November 2016, p.1. <https://institutdelors.eu/wp-content/uploads/2018/01/digitalskill-jdib-nov2016.pdf>

<sup>8</sup>The Future of Jobs Report 2018, Centre for the New Economy and Society. World Economic Forum. Committed to Improving the State of the World. ISBN 978-1-944835-18-7, p. 12.

[http://www3.weforum.org/docs/WEF\\_Future\\_of\\_Jobs\\_2018.pdf](http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf)

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global crowdsourcing campaign, the World Economic Forum identified eight critical characteristics,<sup>16</sup> examples of schools, education programmes and school systems that are paving the way toward Education 4.0<sup>9</sup>. These schools are selected both from developed and less developed countries, namely:

**1. *Global citizenship skills*** (Human activity continues to push planetary boundaries, posing further risk to growth and equality. Children must have the skills to navigate this new context, maintain social cohesion, promote sustainability and be agents of positive change). The Green School, opened in Bali (Indonesia) in 2008 is considered as one of the best examples of developing such skills by the World Economic Forum. The School is committed to education that promotes sustainability and shapes future green leaders. It currently serves more than 800 students aged 3–18, with plans to expand to New Zealand, South Africa and Mexico by 2021. There is another school, Kakuma Project, Innovation Lab Schools, in Kenya as well. The schools have developed their own curriculum that combines the 17 UN Sustainable Development Goals with STEAM (science, technology, engineering, arts and math) learning to foster empathy and global citizenship.

**2. *Innovation and creativity skills*** (In an ever-changing economic context, countries that can quickly generate and adopt new ideas, processes and products will have a competitive advantage. Fostering innovation and creativity will require a shift toward more

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<sup>9</sup>Schools of the Future Defining New Models of Education for the Fourth Industrial Revolution. Platform for Shaping the Future of the New Economy and Society. January 2020, pp.15-26. , [file:///D:/Kyiv%20-%202019%20-%202020/Kyiv%20-%202020/WEF Schools of the Future Report 2019.pdf](file:///D:/Kyiv%20-%202019%20-%202020/Kyiv%20-%202020/WEF%20Schools%20of%20the%20Future%20Report%202019.pdf)

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interactive methods of instruction where teachers serve as facilitators and coaches rather than lecturer). The example showing the development of such skill is found in Canada, namely, The Knowledge Society: Combining Hard and Soft Skills to Create the Next Generation of Innovators. It was designed to mirror the learning and working environments of major technology companies, exposing learners to the most cutting-edge innovations, such as blockchain, robotics and artificial intelligence, to help them understand how to use these tools to drive positive change in the world. Another successful example is in Mali - Kabakoo Academies. Kabakoo - which means “to wonder” in the Bamanan language in West Africa - is a pan-African network of schools that aims to help solve this challenge by empowering young Africans with the innovation skills needed to be employable within their local contexts, with a focus on small-scale manufacturing.

**3. *Technology skills*** (To capitalize on the full potential of the Fourth Industrial Revolution, businesses and economies must foster technology skills in the workforce of the future). A worthy example showing the development of the above skill is in Viet Nam, namely, TEKY STEAM. TEKY focuses on teaching technology skills through modules on programming, robotics, website design, multimedia communications and animation. Students spend about 80% of their learning time interacting with technology. Another successful example is in Indonesia: Accelerated Work Achievement and Readiness for Employment - AWARE. This project aims to build a future-ready workforce with the skills needed to succeed in the digital economy. It creates direct links between students, schools and industry leaders to support work-readiness among youth through structured, work-based learning in collaboration with over 65 private

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sector companies. Partner companies include BMW, Globe Telecom, LG Electronics and Schneider Electric.

**4. *Interpersonal skills*** (Fostering these skills can help children develop healthy relationships with others and consider different views, which can complement and augment other skills of the future). One of the best examples of developing these skills is in Spain “iEARN”: Creating a Global Community of Learners through Virtual Cultural Exchange. The iEARN is a non-profit organization founded in 1988 that partners with over 30,000 schools and youth organizations in more than 140 countries. It creates a global community of learners that engage in cross-cultural exchange and collaborate on service-learning projects via an online network. Another successful example is in Finland South Tapiola High School. The Finnish school system is consistently ranked as one of the best in the world, with South Tapiola high school ranked as one of the best schools in the country. Founded in 1958, it currently serves over 500 students, combining the Finnish national curriculum with a unique focus on collaboration through entrepreneurship. In the school’s Young Entrepreneurship Programme, for example, students work in groups to design and create their own business throughout the course of the year. These groups of students go on to compete in national competitions against other student entrepreneurs.

**5. *Personalized and self-paced learning*** (Creating learning ecosystems that are personalized and self-paced; accessible and inclusive; problem-based and collaborative; and lifelong- and student-driven can help unlock, for example, the interpersonal and innovation skills needed for the future, much in the same way that global citizenship can help create learning that is more inclusive). One of the best examples showing the development of these characteristics is in India Pratham’s Hybrid Learning Programme. It

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works under two basic assumptions: 1) it takes a village to educate a child, and 2) children are naturally inclined to learn. There are no teachers in the Programme. Instead the Programme taps into children’s natural learning curiosity to enable entirely student-grouped activities, with volunteers acting as supervisors and facilitators. Another successful example is Anji Play (China). The Anji Play curriculum uses true play as the mechanism for learning. The basic premise of this model is that any environment can become a learning environment. Anji Play is an early childhood curriculum established in 2002.

**6. Accessible and inclusive learning** (Despite massive expansion of public education in recent decades, learning remains inaccessible to many children around the world. As education continues to be a key driver of social mobility and well-being, learning systems must shift toward more accessible, and therefore more inclusive, methods to ensure access to opportunity for everyone). The United States Prospect Charter Schools (Designing an Inclusive and Equitable Approach to Learning) provide one of the best examples of these characteristics of teaching. The Prospect Schools closely mirror the city’s diversity. At the Windsor Terrace campus, for example, 41% of Windsor Terrace’s 324 middle schoolers are white, 34% are Latino, 11% are black and 6% are Asian. Half of its students are from economically disadvantaged backgrounds, and 25% receive special education service. The second successful example of this form of teaching is also found in the US, namely: Tallahassee Community College (TCC), Centre for Innovation, Digital Rail Project. Like many institutions of higher learning, TCC has a robust “dual enrollment” programme where college courses are offered to students in primary and secondary schools.

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**7. Problem-based and collaborative learning** (Today’s innovation-driven economy depends on the creation of wholly new ideas, services, products and solutions, and there is no process or formula for doing that. Creativity and innovation cannot be imitated). One of the best examples of these characteristics of teaching is in Peru - Innova Schools. Each child participates in the school’s Innovation Programme, which challenges students to design unique solutions to a social challenge. Each challenge is designed to be open-ended, enabling students to focus on the ideation and design process rather than finding an “answer” (e.g. “how might we reduce waste in our community?”). The second successful example of this form of teaching is in Oman - British School Muscat. It has developed a curriculum focused on discovery learning - a student-centered approach where multiple subjects are integrated into collaborative projects focused on the experience rather than the final product or answer. A recent survey shows that over 97% of parents felt their child enjoyed being at this school.

**8. Lifelong and student-driven learning** (While traditional education systems have been designed to decrease learning with age, a new system must emerge whereby people engage in lifelong learning to navigate future job disruptions. To realize this vision, a love of learning must be instilled in children from a young age). One of the excellent examples of this kind of teaching is the United Kingdom - Skills Builder Partnership. This is a global partnership that works with schools, teachers, employers and other organizations to build essential skills in children and young people. Its network includes 514 schools and colleges, over 200,000 students and over 700 organizations. Over the 2018–2019 school year, over 121 employers participated in the workplace exchange. Ecuador - Skilling for Sustainable Tourism provides an example of another

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successful form of teaching. Ecuador’s growing travel and tourism sector is projected to further increase its contribution to the economy’s growth in the coming years and is a major contributor to youth employment in the country. The Skilling for Sustainable Tourism Programme brings together key experts and leaders in the travel and tourism industry with the Ministry of Education to design and implement a curriculum that develops Ecuador’s future tourism workforce.

The discussion about the future schools emphasizes the necessity of such space, where various *stakeholders* (government, business, individual, educational institution) can engage in effective dialogue. We consider that such space is created in entrepreneurial universities. Here it is possible to implement projects for innovative economic development with minimal risks, time and financial costs.

We want to substantiate the effectiveness of the entrepreneurial university model based on the interesting statistics of Stanford University (USA)<sup>10</sup>. Located in the San Francisco Bay Area, Stanford University is a place of learning, discovery, expression and innovation. Stanford university is one of the most successful entrepreneurial universities in the world. Stanford alumni and faculty have created more than 39,900 companies since the 1930s. In 2017-18 Stanford University received \$40.96 million in gross royalty revenue from 813 technologies. Fifty-three of the inventions generated \$100,000 or more in royalties. Seven inventions generated \$1 million or more. In 2017–18, the Office of Technology Licensing (OTL) concluded 150 new licenses. Stanford has 18 designated independent laboratories, centers and institutes that

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<sup>10</sup> Stanford University <https://facts.stanford.edu/wp-content/uploads/sites/20/2019/02/stanford-facts-2019.pdf>

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provide a physical and intellectual intersection between schools and disciplines. More than 2,700 scientists worldwide use the lab’s facilities each year, and more than 700 scientific papers are published annually based on research at SLAC, which has earned four Nobel prizes.

Many universities have shifted to entrepreneurial models recently. This is substantiated by a large number of publications on this issue in the scientific field. Some of them provide analysis of the experience of the universities in several countries and management of innovation processes in these universities (Fini<sup>11</sup> et al. 2017; Gagnidze and Dominici<sup>12</sup> 2019; Gogorishvili<sup>13</sup> et al. 2019;

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<sup>11</sup> Fini, R., Fu, K., Mathisen, M.T., Rasmussen, E. & Wright, M. Institutional determinants of university spin-off quantity and quality: A longitudinal, multilevel, cross-country study, Springer. *Small Business Economics* Vol. 48, No. 2, 361-391, 2017, <http://dx.doi.org/10.1007/s11187-016-9779-9>

<sup>12</sup> Gagnidze, I. & Dominici, G. Effectiveness of an Entrepreneurial Universities and Spin-offs: Experiences and Challenges. 6th Business Systems Laboratory International Symposium, BORDERS WITHOUT BORDERS: Systemic frameworks and their applications for sustainable well-being in the global era. BOOK OF ABSTRACTS, ISBN 9788890824272, Pavia, Italy, 2019, Ab.61 <http://bslab-symposium.net/Pavia-2019/BSLAB-%20Book%20of%20Abstract-Pavia-2019.pdf#page=234>

<sup>13</sup> Gogorishvili, I., Gagnidze, I. & Papachashvili, N. Innovative Approaches in Higher Education System. 6th Business Systems Laboratory International Symposium, BORDERS WITHOUT BORDERS: Systemic frameworks and their applications for sustainable well-being in the global era. BOOK OF ABSTRACTS, ISBN 9788890824272, Pavia, Italy, Ab.56, 2019, <http://bslab-symposium.net/Pavia-2019/BSLAB-%20Book%20of%20Abstract-Pavia-2019.pdf#page=214>

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Guerrero<sup>14</sup> et al. 2020; Lekashvili<sup>15</sup> 2019a; Schoen<sup>16</sup> et al. 2014; Sciarelli<sup>17</sup> et al. 2020; Sobolieva and Lazarenko<sup>18</sup> 2019).

The concept of several schools that are relevant to Education 4.0 include sustainable development. It is one of the major challenges the modern world faces. The United Nations Organization has set 17 goals for sustainable development by 2030. Sustainable development is one of the challenges faced by the development of business environment. It is worth mentioning that in scientific literature there is active discussion on circular economy.

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<sup>14</sup> Guerrero, M., Urbano, D. & Gajón, E. Entrepreneurial university ecosystems and graduates' career patterns: Do entrepreneurship education programs and university business incubators matter. *Journal of Management Development*. 2020. In press.

<sup>15</sup> Lekashvili, E. Current issues of new economic policy. International Scientific and Practical Internet Conference Business Strategy: Futurological Challenges, November 20-22, 2019, Kyiv, pp.19-24. *KHEU, 2019. 495. ISBN 978-966-926-310-0; УДК 005.21:001.18]:004.773.7. <https://www.bsfucon.org/>*

<sup>16</sup> Schoen, A., Potterie, B. P. & Henkel, J.: Governance typology of universities' technology transfer processes. *The Journal of Technology Transfer*, Springer, Vol. 39, No. 3, 2014, pp. 435-453, DOI: 10.1007/s10961-012-9289-0

<sup>17</sup> Sciarelli, M., Landi, G.C., Turriziani, L. & Tani, M. Academic entrepreneurship: founding and governance determinants in university spin-off ventures. *J Technol Transf* (2020). <https://doi.org/10.1007/s10961-020-09798-2>

<sup>18</sup> Sobolieva, T. & Lazarenko, Y. Intellectual Property Management in the Shift Towards Open Innovation. *Int. J. Economics and Business*, Vol. XI, No. 2, 2019, pp.185-195. <http://dspace.tsu.ge/xmlui/handle/123456789/358>

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The circular economy’s central aim is to extend the life of all the goods and materials being bought, sold, used and discarded daily, throughout our societies, in order to curb extraction, pollution and waste.

One of the latest researches carried out by Newsweek Vantage indicates that “companies are prioritizing the following strategies and business models: *REduce* (Using design and manufacturing technology to lower material, energy and waste footprints), *REuse* (Offering subscription, leasing or sharing models, rather than basing business on one-off sales), *REmake* (Designing products that can be more easily repaired or “remanufactured” into new products), *REcover* (Turning by-products into new products or adding recycled content to products and packaging), *REnew* (Substituting renewable for finite materials and focusing more on sustainable sourcing).

Research also finds that “circularity is more than just an addition to corporate social responsibility or sustainability strategies. It requires a complete product and business model rethink, starting at the choice of material through to how products are designed, made, used - and disposed of”<sup>19</sup>. We believe that the cheapest way to develop such business models of the future is to work on them in university TTOs.

Why do we think so? Sustainable development and the development of business models of circular economy require changes in the behavior of individuals, which is impossible without enhancing propaganda and teaching at all levels of the education system. Therefore, the efficiency of university TTOs is conditioned

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<sup>19</sup> Shields, K. (2019) Going Circular: How Global Business is Embracing the Circular Economy. Ed: Cheah, P-K. Newsweek Vantage. Newsweek and Think Big Partners WLL, p.2.

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by their functioning in educational space along with research. In this context, rethinking the university system (Vesperi and Gagnidze 2018<sup>20</sup>) and the formation of entrepreneurial universities gain special importance. Transferring new technologies from foreign countries becomes easy by including these universities into international research programmes. Such universities create many new spin-offs and clusters around them through the TTOs. In this way, they contribute to the region's innovative development (Sepashvili 2018<sup>21</sup>). All the above proves that reform of the education system is vital for all countries. While determining the policy, requirements of sustainable development and the circular economy, as well as digital challenges need to be taken into account (Bichia<sup>22</sup> 2017; Gagnidze<sup>23</sup> 2019).

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<sup>20</sup> Vesperi, W. & Gagnidze, I. Rethink University system: towards Entrepreneurial University, E-Book of Abstract, Fifth Business Systems Laboratory International Symposium, Cocreating Responsible Futures in the Digital Age. Naples, Italy, 2018, pp.210-211. <http://bslab-symposium.net/Napoli-2018/BOA-BSLAB-Symposium-2018.pdf#page=219>

<sup>21</sup> Sepashvili, E. Innovative Clusters – A Model for Rising International Competitiveness. E-Book of Abstract, Fifth Business Systems Laboratory International Symposium, Cocreating Responsible Futures in the Digital Age. Naples, Italy, 2018, pp. 219-221. ISBN 9788890824265 <http://bslab-symposium.net/Napoli-2018/BOA-BSLAB-Symposium-2018.pdf#page=228>

<sup>22</sup> Bichia, Q. The effect of modern globalization and automatization trend on labor market. In: The 2nd International Scientific Conference: Challenges of Globalization in Economics and Business. TSU Press, Tbilisi, 2017, pp. 96-102. ISBN 978-9941-13-650-4 <http://eprints.tsu.ge/id/eprint/1430>

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Ostergaard and Nordlund (2019) argue that, while most debates around the future of education focus on the skills needed for the future and the imperative of reskilling, it is equally important to discuss the inevitable structural transformations of higher education. The authors discuss four major developments for “current *higher education system*”:

1. *Increasing need for life-long learning in a non-linear world*;
2. *Evolving needs and expectations of the “student-consumer”*;
3. *Emerging technologies and business models*;
4. *Towards a “skills over degrees” model*.<sup>24</sup>

It is also worth noting that planning and implementation of the necessary changes need to be carried out on school level as well as on university and lifelong learning levels. We believe that for improving the effectiveness of education policy it is desirable to study: (a) the occupations which will inevitably be replaced by artificial intelligence; (b) the occupations that are less probability of being computerized based on current technology; (c) the skills that will be demanded on the labor market in the digital era; (d) the teaching methods that ensure developing competencies and skills needed for

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<sup>23</sup> Gagnidze, I. Future challenges and the problems of development of the Circular Economy Business models. Proceedings of the International Scientific and Practical Internet Conference “BUSINESS STRATEGY: FUTUROLOGICAL CHALLENGES”. ISBN 978–966–926–310–0. KNEU, Kyiv, 2019, pp.13-18.

[https://ir.kneu.edu.ua/bitstream/handle/123456789/31848/sbfv\\_19\\_1.pdf?sequence=1](https://ir.kneu.edu.ua/bitstream/handle/123456789/31848/sbfv_19_1.pdf?sequence=1)

<sup>24</sup> Ostergaard S.F. & Nordlund A. G. (2019) The 4 biggest challenges to our higher education model – and what to do about them

<https://www.weforum.org/agenda/2019/12/fourth-industrial-revolution-higher-education-challenges/>

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decent work and professional skills needed for sustainable development in digital era.

Facing the 4<sup>th</sup> industrial and Reskilling revolutions, worldwide-recognized research centers forecast particularly high rates of economic development. There is no doubt that a small country like Georgia cannot determine trends in the development of the world economy. Therefore, given the above conditions, it is difficult to choose the right vector of development.

We believe that for making the right choice several factors should be taken into consideration; in particular, elaboration and implementation of the education research programmes and development of the sectors that will provide the possibility to adopt and introduce the new technologies created in the developed countries in Georgia should be supported (Seturidze<sup>25</sup> 2016; Surmanidze<sup>26</sup> et al. 2018), based on competitive advantages of Georgia production of inelastic demand goods should be focused on

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<sup>25</sup> Seturidze, R. Role of the ERP systems in the successful management of Georgian companies. Book of Abstracts Business Systems Laboratory Review. ISBN 9788890824234. Vilnius, Lithuania. 2016. pp.191-194. [http://bslab-symposium.net/Vilnius.2016/BSLab-Vilnius2016-e-book\\_of\\_Abstracts.pdf](http://bslab-symposium.net/Vilnius.2016/BSLab-Vilnius2016-e-book_of_Abstracts.pdf)

<sup>26</sup> Surmanidze, Z., Tsetskhladze, M. and Chanidze, K. Tendencies and perspectives of internet-economic development in Georgia. E-Book of Abstract, Fifth Business Systems Laboratory International Symposium, Cocreating Responsible Futures in the Digital Age. Naples, Italy, 2018, pp. 227-230. <http://bslab-symposium.net/Napoli-2018/BOA-BSLAB-Symposium-2018.pdf#page=236>

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(Katsitadze and Tushishvili<sup>27</sup> 2020; Kharashvili<sup>28</sup> 2017; Seturi and Urotadze<sup>29</sup> 2019; Tepnadze<sup>30</sup> 2019).

The Georgian scientist-economists also actively discuss the policy directions for responding the challenges of the Fourth Industrial Revolution at HEIs (Gagnidze<sup>31</sup> 2020; Lekashvili<sup>32</sup> 2019b;

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<sup>27</sup> Katsitadze, N. & Tushishvili, A. Contemporary Challenges in the Development of Business (MICE) tourism. V International scientific and practical conference “Strategic Imperatives of Modern Management” (SIMM-2020), KNEU, Kyiv, 2020, pp. 208-212. [https://ir.kneu.edu.ua/bitstream/handle/123456789/32923/sism\\_20\\_208-212.pdf?sequence=1](https://ir.kneu.edu.ua/bitstream/handle/123456789/32923/sism_20_208-212.pdf?sequence=1)

<sup>28</sup> Kharashvili E. Challenges for sustainable food security in Georgia, XV EAAE Congress in Parma: Towards Sustainable Agri-Food Systems: Balancing between Markets and Society, Parma, Italy, 29 August – 1 September 2017. [https://www.researchgate.net/publication/319979747\\_Challenges\\_for\\_sustainable\\_food\\_security\\_in\\_Georgia](https://www.researchgate.net/publication/319979747_Challenges_for_sustainable_food_security_in_Georgia)

<sup>29</sup> Seturi M. and Urotadze, E. Some opinions about sustainable development and tourism (case of Georgia). V International scientific and practical conference “Strategic Imperatives of Modern Management” (SIMM-2020), KNEU, Kyiv, 2020, pp. 286-289. [https://ir.kneu.edu.ua/bitstream/handle/123456789/32943/sism\\_20\\_286-289.pdf?sequence=1&isAllowed=y](https://ir.kneu.edu.ua/bitstream/handle/123456789/32943/sism_20_286-289.pdf?sequence=1&isAllowed=y)

<sup>30</sup> Tepnadze M. Agriculture and Rural Development Policies and Institutional Frameworks; Proposed Mapping for Wine Tourism in Georgia. Proceedings of the 9<sup>th</sup> International Scientific Conference Rural Development 2019. pp. 492-496. <https://ejournals.vdu.lt/index.php/rd/article/view/616/898>

<sup>31</sup> Gagnidze, I. The Role of Entrepreneurial Universities for Responding the challenges of Reskilling Revolution. V International scientific and practical

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Tavartkiladze<sup>33</sup> 2020), Industry 4.0 general challenges (Papachashvili<sup>34</sup> 2018; Jamagidze<sup>35</sup> 2020), problems of Gaining Competitive Advantages in digital era and innovative cluster development (Churchelauri<sup>36</sup> 2018; Polodashvili<sup>37</sup> 2019) and other

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conference “Strategic Imperatives of Modern Management” (SIMM-2020), KNEU, Kyiv, 2020, pp. 323-327.  
[https://ir.kneu.edu.ua/bitstream/handle/123456789/32952/sism\\_20\\_323-327.pdf?sequence=1](https://ir.kneu.edu.ua/bitstream/handle/123456789/32952/sism_20_323-327.pdf?sequence=1)

<sup>32</sup> Lekashvili, E. Management on Innovations in Georgian Higher Educational Institutions: Key Problems with teaching Economic Science. Marketing and Management of Innovations. Issue 1, 2019, ISSN 2227-6718 (on-line), ISSN 2218-4511 (print), UDC 378.147:33, <http://doi.org/10.21272/mmi.2019.1-23>., pp.281-293;

<sup>33</sup> Tavartkiladze M. Employment challenges in Georgia. V International scientific and practical conference “Strategic Imperatives of Modern Management” (SIMM-2020), KNEU, Kyiv, 2020, pp. 350-354.

[https://ir.kneu.edu.ua/bitstream/handle/123456789/32959/sism\\_20\\_350-354.pdf?sequence=1](https://ir.kneu.edu.ua/bitstream/handle/123456789/32959/sism_20_350-354.pdf?sequence=1)

<sup>34</sup> Papachashvili, N. Industry 4.0 and its impact on the international trade. IV International scientific and Practical Conference “Strategic Imperatives of Modern Management” (SIMM-2018), KNEU, Kyiv, Ukraine, 2018, pp.444-453. <http://ir.kneu.edu.ua/bitstream/2010/24244/1/444-453.pdf>

<sup>35</sup> Jamagidze, L. Trade Performance and Policy Challenges under Globalization 4.0. Proceedings of the V International Scientific and Practical Conference on “Strategic Imperatives of Modern Management”. KNEU, Kyiv, 2020, pp. 191-194; <https://drive.google.com/file/d/1dOqDdXmJcmJJAmd8PSDI6laHcO4yYiW/view>

<sup>36</sup> Churchelauri M. Perspectives of transport cluster development in Georgia. IV International scientific and practical conference “Strategic

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issues related to the formation of effective future business environment in Georgia.

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Imperatives of Modern Management” (SIMM-2018), KNEU, Kyiv, 2018, pp.279-283. <https://core.ac.uk/download/pdf/197267024.pdf>

<sup>37</sup> Polodashvili, A. International scientific links of Georgia for the innovative development of economy. V International scientific and practical conference “Strategic Imperatives of Modern Management” (SIMM-2020), KNEU, Kyiv, 2020, pp. 347-350.

[https://ir.kneu.edu.ua/bitstream/handle/123456789/32958/sism\\_20\\_347-350.pdf?sequence=1&fbclid=IwAR0S1OPACzZdMNen3lOcZX1H335XkZcIVtzpbOeQRmRxC-HLlwZpvnM4clg](https://ir.kneu.edu.ua/bitstream/handle/123456789/32958/sism_20_347-350.pdf?sequence=1&fbclid=IwAR0S1OPACzZdMNen3lOcZX1H335XkZcIVtzpbOeQRmRxC-HLlwZpvnM4clg)