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Talent management under conditions of digital transformation in education

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Abstract. The article discusses the social and psychological aspects of the digital environment and their impact on talent management systems. It also discusses the current shift in the labour market and offers a new perspective on self-development and mentoring. The development of the digital environment does not only have positive, but also negative consequences. Social inequality will increase, bringing forth multiple psychological problems connected with the lack of opportunity for self-fulfilment and realization of one's personal talent. In these conditions, it is the type of work that cannot be codified that will provide the best opportunity for talent preservation. The value of human capital, creativity and mindfulness is increasing. In the digital environment, lifelong education becomes essential. The introduction of state of the art digital teaching methods will require cultural and psychological transformation from both teachers and students. The digital environment will require a new approach to self-development. It is highly important for the mental well-being of a person of the digital age to have a flexible development schedule. Informal education, however, will be able to balance the general need for knowledge pertinent to digital economy with preserving individual mental well-being. The authors propose a discussion around the concept of informal education that goes beyond the realm of robotic substitution and digital footprint.

Keywords: digital economy, transformation of the labour market, talent management, social and psychological aspects of the digital environment in education, a new look at self-development and mentoring of the gifted, informal education in depth.

Part 1

Industry 4.0 will inevitably bring changes to the labour market, and hence the education market and talent management systems. The inevitable consequence of industry 4.0 is a person's psychological adaptation to the digital environment and the awareness of the dangers of losing his job, losing his talent and (or) not applying basic education. Paradox? Not at all! The chairman of the World Economic Forum 2016, Klaus Schwab, believes that we are all witnesses of the fourth technological revolution and the sixth technological order: a combination of various technologies is erasing the boundaries between the physical, the digital and the biological (Grunin 2016).

The essence of the latest technological structure in the replacement of multiple information sense, necessary knowledge, the priority of producing, not consuming economy. World leading economists predict that with the current speed of development this structure will be fully formed by the middle of the 21st century (Sibgatullina 2018).

We are referring to the study of the University of Oxford (Frey, Osborne 2017), which listed occupations most at risk based on mathematical analysis of nine parameters. It includes a variety of clerks, machine and equipment operators, controllers, testers, various construction workers, repairmen, as well as the staff of fast food restaurants, hotels, airports, etc. These jobs are currently filled by many capable and talented

people, who are happy with their self-fulfilment and like their work.

These examples are trivial, the essence of the question boils down to the fact that psychologically a person was ready to reorganize the world of technical capabilities and was able to use it. A jump in automation is certainly happening thanks to new technologies, but not exclusively for this reason. The second component is the standardization of production processes. And this process requires a logical end.

What are the socio-psychological aspects of the digital environment and how should education respond to digitalization as part of development strategies?

Modern education is facing quite an unexpected issue: what to do if automation and new technologies are already beginning to force educated people out of the profession. Improving the digital environment and introducing robots into production will clearly stimulate the global economy, but it will increase social inequality and cause various psychological problems, connected to individual self-fulfilment and the use of personal talents.

What kind of training do people require in order to compete with *smart machines*? The emergence of software and hardware with artificial intelligence, which was facilitated by the rediscovery of neural networks in the early 2010s, makes it possible to hand the routine office tasks over to an automated system. Parents of first graders bringing their children to school in 2018 are already concerned with whether the school's educational environment meets the requirements of digitization. This is important for parents, since they want to be sure that by 2029, when their child graduates from school, they will fully possess the competences for managing this digital environment to the extent the future development of the digital economy will require. Another question that is as important for parents is what kinds of abilities and talents should be developed in a child, so that there are more likely to find demand for their skills after they graduate.

Here are some spectacular figures. The volume of the global robot market is monitored by the International Federation of Robotics in the 2010s. According to the organisation, the market has been growing by 12 % annually. In 2016, the total amount was 294 thousand copies. Of these: 191 thousand were sold in Asia, 56 thousand in Europe, 41 thousand in North and South America. The forecast for 2020 is 521 thousand robots sold, with their total number in the industry exceeding 3 million. In monetary terms, the mechanical labour market is increasing by 5 % per year and will reach 41 billion dollars in 2020.

However, not everybody will lose their jobs. Even the most advanced robots can only function within linear logic, based on a template. Therefore, it is the type of work that cannot be codified that will provide the best opportunity for talent preservation. Experts are only beginning to discuss the abilities, qualities and skills that will be required from a person. But one thing is certain: the abilities, qualities and skills that provide the biggest edge include originality, improvisation, critical thinking, ability to assess complex situations and make decisions. Another type of work that seems safe is the work that requires managing or convincing people. The same goes for people working fine arts or engaged in manual work. In total, the researchers counted 109 professions that are less than 3 % likely to be automated; all of these professions do not only require a mix of linear, logical and rational intelligence, but also emotional intelligence and empathy (Dmitrienko 2018).

Researchers believe that the professions that run a low risk of *automating talent* include: physical therapist, emergency manager, psychologist, narcologist, prosthetic surgeon, dietician, choreographer, investigator, dentist, school teacher, interior designer, motivational trainer, computer systems analyst, recruiter, social worker, forester, rehabilitation consultant, logistics, etc. (Dmitrienko 2018).

If you carefully read the list of these professions, you can find their common "helping value", difficult to automate the management of general abilities that form the basis for the implementation of these professions. There is no cookie cutter solution for the talents and skills you need to possess in order to retain your profession in the future. On the one hand, what is often required is maximum specialization, i. e. highly specialized skills, on the other hand, you might need versatility and a broad outlook. But since everything is changing so quickly, you will have to study throughout your life. Talent management experts predict that in some profession this will become an obligatory part of the annual cycle: a person works for 9 months, studies for 2 months and has a month for their vacation. Of course, individuals who naturally lean towards self-education will be more successful than others.

There is another serious issue in the discussion about the digital world. These are taxes. Automation taxes. There are already calls on financiers to restrain automation by imposing a tax on each robot used. Such ideas were advanced by the trade unions, but rarely did they go beyond the call for action. However, this initiative can also boast influential supporters in a number of countries. For example, Bill

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Gates, the founder of Microsoft, has repeatedly expressed the opinion that if a robot performs duties on an equal footing with a person, then you need to think about taxing its work at the same level as a person. In one absurd discussion, you could hear the opinion that the digital economy would introduce a "talent tax." On the one hand, one can agree that a person with abilities and talents can of course compete with robots, but it is difficult to accept the need for a tax.

These conditions clearly dictate that education, which takes on the role of developing, training and educating, both set goals that are ambitious, but meaningful and feasible, and weigh the possible psychological risks. The educational opportunities of billions of people connected by digital mobile devices with enormous power and memory that provide access to all the knowledge of mankind through the Internet are truly endless. However, the openness of education and its structuredness have now determined and will determine in the digital age and beyond, formal or informal tendencies of the continuity of knowledge acquisition (Dmitrienko 2018), the ability of a gifted person to reflect on their intellectual abilities and social constraints.

UNESCO has changed its classification of forms of continuing education (Gordina, Gordin 2010, 8). The psychological paradox in the digital world of possibilities is the appearance in this modified classification of the vector of human informal education. Informal education is beyond any formality and directed deep into a person and his knowledge of himself. Following the modern vector of development of the world economy, which dictates the need for formal and non-formal education, it is necessary to pay attention to the education of a person deep into himself, who has not lost interest in knowing his own inner world, while capable of critical thinking, deep reflection and constant search for the meaning of his own life events. It is this factor in the psychological measurement of the digital age that is the hallmark of talent management systems.

Thus, there are two psychological vectors: the vertical one represents the speed of the digitalization process, while the horizontal one represents the talented person's quest for themselves and for the competences required for living in the digital environment. Therefore, the developed countries have been right in advancing development programmes that are focused on the creation of a digital economy ecosystem that ensures effective interaction, including cross-border interaction, creates necessary and sufficient institutions and infrastructure, enforces changes in traditional industrial economy and ushers in a creative society, facilitating a transition to knowledge-based economy (Riabov 2018).

Part 2

It is clear that the primary focus should be on competence and socio-psychological training of highly qualified personnel. A review of the whole philosophy of education is in order: on the one hand, we are surrounded by more and more machines, and on the other, the value of human capital, creativity and mindfulness is increasing.

With the advent of the concepts of "digital technology" and the recognition of the importance of the changes already mentioned that the global, national and regional education systems are undergoing, not just the features of digital technologies in classrooms and classrooms, but the competencies that teachers and students as developing have come to the fore personality and creative individuality. After all, the robots have already surpassed people in performing similar tasks, which means that the student is required to be independent, to quickly navigate new circumstances and not to lose heart because of the changes. When we look at modern education, we see two key questions. The first is how education interacts with all other areas of society; the second is how the new opportunities provided by digital technologies and the new digital environment can be harnessed for human capability building. One hardly has a reason to worry, since more jobs will be created higher on the skills ladder.

Digitalization of the world education system has gone through several stages. The first stage — from 1990 to 2011 — encompassed the digitization of existing educational materials and practices. However, this was not yet truly digital education. The year 2011 saw the creation of massive online courses and universities on the Internet; elite education became available to all. Today, we are moving to Big Data-based education, where the system analyses a large amount of data on students' education activities and offers them a tailored education plan.

The key changes that the digital era has introduced into the area of education include:

– the state now sees education as its largest intangible asset. Formation and capitalization should be as manageable as possible. Psychological risks are determined by management mechanisms;

– recent improvements in digital, communications and network technologies have had a major impact on people's consciousness and how people process, transfer and store knowledge, leading

to a shift in the process of individual development and self-identification. Thus, in order to meet the diverse needs of the digital society, education must also become digital. Psychological risks are determined by the usefulness of the forms and content of digitalization of the subject level and the speed of their implementation;

– digital technologies easily transcend boundaries, national and cultural borders; they are highly accessible and inexpensive, which makes any knowledge publicly available. Digital education also transcends boundaries, national and cultural borders. The task of psychology is connected with the change at all levels of education, the creation of a new nonlinear, matrix architecture, network communication using new, constantly updated educational technologies and transformed talent management systems. Psychological risks are determined by the ability of the system to be flexible and the ability of education professionals to promptly respond to the changes taking place, their ability to master the fundamentally new environment in the time that they have.

If we consider the digital changes taking place in the education system and the labour market from the socio-psychological point of view, it becomes quite clear that the introduction of advanced digital teaching methods requires cultural and psychological transformation from both teachers and students' parents. The school can indeed be structured so that it facilitates the exchange of new ideas and digital cases inside and outside the newly created platforms to ensure that students become capable users of digital technologies. However, the digital trends should only be followed in school education if they are relevant to real practical skills that students will be able to use in their university studies and future employment. In all other cases, we will focus only on simulators.

An educational Simulator is always a psychological risk of the continued lack of demand and failure of even the most gifted person. The ability to cooperate is of paramount importance. To a certain extent, one can even say that cooperation — regardless of how surprising it may seem at first glance — plays the key role in the digital space. However, there is no reason for surprise, since the ability to establish contacts and/or create strategic alliances is always something that gives a competitive edge, be it in a competition between individuals or communities. Therefore, the focus on interdisciplinary networks and cross-project cooperation is currently one of the global education trends.

Currently, unequal access to the Internet is problem number one worldwide, including Russia. According to the International Telecommunication Union, 47.9 % of the world's population have access to the Internet. This means that technologies and materials for online learning are still not available for everyone. The highest proportion of people with Internet access can traditionally be found in developed countries: 81 %, while this number is 40 % in developing countries, and only 15 % in the least developed countries. In the Russian Federation, 59.6 % of the population have access to the Internet, which represents 87.5 million people. Another significant factor is the speed of the Internet connection. Out of a hundred, only 17 users in the CIS have high-speed Internet access (information is based on the accessible Google Public Data Explorer platform, ITU analysis in 200 countries of the world from 1998 to 2018). You can only see inferior levels in the Asia-Pacific region, North and South America and the Arab region, where the average speed of the Internet connection is about 2 Mbit/s.

Part 3

Is it enough that a talented person knows how to use digital technologies and how to better employ their skills in media communications? The question is how comfortable that individual is living side by side (or even within) the digital world. Is that individual aware of how digital technology can improve the quality of their life and develop their talent? Another thing that is as important for any modern person is the ability to boost their professional potential, to do their job at the highest level. It is required that students develop an understanding of the digital environment and an ability to intuitively adapt to new conditions to such an extent that they always have a motive for "creating new content." *Teaching* schoolchildren to actually live in the era of *numbers* and to understand their strategy of behaviour in the digital world just like teachers do is one of the most difficult social and psychological challenges for leaders of the education system. Here we should not forget that educational ecosystems must be sufficiently flexible. Let us consider the teaching methods that are completely new. In order to be effective, the integration of any new tool into the educational process has to always follow the main purpose of the education system, i. e. nurturing and developing students' interest in learning. The psychological risk here is that modern students do not always have the tools for assessing their talents and skills at the individual level. However, this is very important. Individual learning outcomes assessment is one of the trends in modern education worldwide. Such a system provides an opportunity to get a clearer

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picture of what students need to know in order to gain certain skills and competencies. The most popular skills of the future will be vocational, creative and critical thinking skills (Gorizonty razvitiya vysshego obrazovaniya 2015).

In the digital environment, lifelong education becomes an essential element. It is quite clear that any educational platform is ideally suited for generating knowledge, new discoveries and, consequently, achievements. As artificial intelligence and conventional *user* interfaces spread, various machine learning algorithms and tactile devices that respond to contact can be developed on the basis of educational platforms. The way human psychology works is that cognitive processes *direct* individuals towards research and the analytical aspect of knowledge. Therefore, the digital environment brings forth a new generation of computers, which would allow a person to explore the areas that have been unknown until now: for instance, black holes and/or DNA. The Robot Company, for example, based in the Russian technology park at the Far Eastern Federal University, has unveiled its digital brainchild, a cute android named Adam. This *living digital* system is controlled by virtual reality technology. Another example is the Junior underwater vehicle, which Russia presented at the Singapore AUV Challenge, an open Asian championship in underwater robotics, taking the third place. Another example is the NeuroNet products. One of the important focuses of this program is the development of technologies and devices that help people with disabilities to develop motor skills and improve the quality of life through the use of exoskeletons. For instance, the NTI Center for Neurotechnology and Virtual Reality consortium is developing a helmet that allows the operator to look at the world through the eyes of a robot and control its movement.

As mentioned above, the traditional education system cannot keep pace with the demands of the labour market. Many educational platforms are currently tasked with pre-training (school), training (college and university) and teaching refresher courses (education development institutes, etc.) for professions that do not yet have formal rules or standards. And there is no time to develop these standards. However, today there are at least 100,000 vacancies in the field of information technologies (e.g. artificial intelligence experts) in Russia, while there is not a single university issuing diplomas that certify graduates' practical competences and IT creativity (University NTI 20.35).

The digital environment also requires a new approach to self-development. It is highly important for the mental well-being of a person of the digital age to have a flexible development schedule. You can learn new things online; you can use the resources offered by the city where the educational platform is located, as well as the resources of public universities, digital academic libraries and other sources. After all, Big Data tools already exist which make it possible to take into account everything that we know about a person, everything that the person is ready to tell about himself. Many talents in development programs. This will help to look into and improve their development paths. A good example of this type of activity was given by Vasily Tretyakov, the Head of the University 20.35; their university tracks how high school students are developing their IT competencies. University 20.35 platform gathers a large amount of data on its students, which allows them to easily analyse what they have learned on the platform and what skills they actually possess today. What is more, these data make it possible to plan development strategies for both the platform and the student. In fact, one could say that big data analysis creates real-time educational standards.

Mentoring attains a new purpose in the digital age, since it allows individuals to learn practical skills directly from each other and share personal experience of reflection. A new strategy is now possible, where everyone is a mentor for others, with everyone making a contribution to the training of others and the development of their own talents. Thus, mentorship can become an accessible competence resource for everyone who is trying to develop these competencies. Mentor and one who has project ideas and plans for their implementation. Recruitment of the team under the mentor's eye and the "digital footprint" of the new "mentor plus" format. The main psychological condition for this to work is individual's motivation to continue acting as a mentor and, of course, the availability of a suitable project. Another important point is the role of a mentor in creating interfaces that allow you to determine what is most effective for each student. Designing a richer learning environment is also the responsibility of mentors; these environments have to be highly flexible, so that everyone could adjust the direction of their studies within the digital learning options: Internet entrepreneurship, systems thinking, intellectual property for engineers, bioinformatics, introduction to the blockchain, virtual and augmented reality technologies, neurotechnology, machine learning, computer psycholinguistics, graphic design, etc. Another point is that in the field of new technologies there is no product as such, and there is no market for it. It is not yet clear how to judge failure or success.

So, the responsibility is shared between the team and the mentor that leads it and works together with it. That is why, in our opinion, many technological clusters are currently actively offering intensive mentored training programmes targeted at specific skills. It is important to note, however, that such intensive programmes have to meet a number of requirements, including the uniqueness of technical permissibility, eventuality and equipment for a special format of intensive training. The goal of intensive programmes is to improve students' skills under the "eye of a mentor." The participants of such programmes, regardless of age, acquire knowledge of end-to-end technology. This type of training does not have psychological risks, but on the contrary, it has the psychological advantage of the "variegatedness" of the "digital footprint", the ability of mentors and talented students to fully complement each other, to communicate professionally in a friendly development environment. However, the education system is currently experiencing a shortage of mentors who are fluent enough in a particular digital technology, have mastered the skills of strategic and systematic thinking and understand how all these tasks and projects connected to digital technologies can be linked in the future.

A similar experiment was conducted during the intensive training programme on the Russky Island in July 2018, which had a digital tracking component. Each participant received a bracelet with biofeedback features. For 11 days, the heart rate of all participants was measured; these observations were used to track how their concentration and perception changed, how much they were involved in the process and whether they could no longer take in new information. The monitoring tools included tracking eye movement and cognitive load. The resultant data made it possible to develop a technology that is capable of assessing individuals' mental states during the learning process.

Superjob Company President Alexei Zakharov notes that sooner or later teams of mentors and world-class digital experts will be available to anyone who can search the Internet. Online communication will never replace live communication, but will be able to *line up* the trajectories of those who are teaming up to implement technology projects. Actually, this is already happening online to a certain extent. However, we would like to observe that this communication is not systematic, and is even rather chaotic. The ability to search for and work in such teams will allow individuals to complete projects quicker, which is a unique benefit, but it will create issues of trust and responsibility. And this psychological risk should not be discarded. We would also like to note that given the current development of the digital environment it is not only necessary to be able to learn, but also to expand the functionality, which is only a recent trend.

So how long is it until the digital future that everyone is talking about? Clearly, it is a continuous process. It may take a long time to arrive at the tipping point, but further changes will occur very quickly after that. At the same time, it is not only a question of technological development, but also of regulations and psychological change. Jaded with uniform products of mass digital production, the world is still looking for unusual sensations. In many ways, the members of the younger generation no longer want to be like everyone else; everyone wants to stand out with their own individuality, ceasing to be a passive consumer of digital space and becoming an active participant in everything. This process is happening both in their work, recreation, education and creativity. Individual impressions have become the main commodity and the main type of capital. This is how the *economy of impressions* is taking shape in the digital world of automation. The last two sentences are, however, up in the air.

Let us now go back to the idea of informal education and consider it within the context of a person's life, where a university is something more than just a school, a classroom or a library, it is also a wide array of digital and non-digital sources that are directly related to self-knowledge, the search for meanings and reflection. Furthermore, we would like to express a very controversial thought. From the point of view of psychology, to a certain extent, informal education will be able to balance the general need for knowledge pertinent to digital economy with preserving individual mental well-being, following worldly values associated with the development of human knowledge, building a healthy lifestyle for a comprehensive biosocial life "beyond the space of automation," in dialogue with oneself and in dialogue with living nature. The authors of the article would like to call for a discussion of this question.

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