Digital Transformation of Higher Education: International Trends

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ABSTRACT

Development of "smart technologies", digital applications and educational resources of MOOC, SPOOC and several other is a factor of the global educational space transformations, grading the ways of education and its organization. The article presents an analysis of key trends related to the digital transformation of higher education. The following were highlighted. Outside-the-Box Strategies as a mandatory element of the educational policy of universities. Passport to Education is a pilot experiment at Boise State University that starts a new type of relationship between a student and a university. Network in Education - a growing trend as a new way of organizing social structures in the co-presence. Blended Learning is an increasingly popular technology of traditional and online learning combination, Micro-Colleges is the MTI experiment that meets the needs of lifelong learning and opens up new horizons for higher education. Blockchain in Education and its capacity, imperceptibly changing the reality of higher education organization . VR-Technologies, Artificial Intelligence, Chatbots for Learning as new learning opportunities.

Keywords: university, higher education, digital transformation, international trends

1. INTRODUCTION

Development of "smart technologies", digital applications and educational resources of MOOC, SPOOC and several other is a factor of the global educational space transformations, gradually changing the ways of education and its organization. Particularly, in June 2019, more than 33 million students were registered on the Coursera platform and more than 3 thousand courses were presented, and the Coursera for Campus [Kennedy] project was launched in October 2019.

Although it's hard to imagine modern universities without numerous mail servers, digital platforms and Internet sites, the massive migration of academic courses to the Internet due to the COVID-19 epidemic has again raised a number of questions and brought down routine practices. What is happening in education? What are the main trends in international space if one try to look beyond the horizon, throwing the fuss away?

2. METHODOLOGY OF THE STUDY

The idea of structural involvement of universities in

the global space [Marginson 2, Marginson 3] was used as a basic methodology. The vectors of international trends were assessed according with the best one at the top in terms of relevance and possible consequences for university education and the process of organizing education. The concept of technological revolution [Shwab] was used as a dominant to identify the architecture of technological changes and its possible consequences for the social sphere. Content analysis, structural analysis, literature review and expert interviews revealed the most significant international trends. They are presented in this article in general.

3. RESEARCH RESULTS

The analysis revealed a number of trends that were prominently outlined in the global agenda for the development of universities and higher education.

3.1. Outside-the-Box Strategies

The attitude to MOOC in the academic environment and society is still assessed in different polarity. Skeptics believe that this is just a fad, and no significant changes in education are expected [Zemsky], while optimists, on the contrary, believe that the learning process will undergo a serious transformation that provides new opportunities

[Siemens]. Particularly, there is an opinion that the difference between watching a lecture of a famous university professor live on an educational platform and being present at the same lecture is physically similar to the difference between reading Anna Karenina in two different fonts [Carey]

One of the obvious consequences of MOOC introduction was the expansion beyond the classroom not only in matters of the educational process, but also in matters of organization and management. Outside-the-Box [Christensen, et al. 2010] strategies provoked by the abundance of digital technologies and globalization expansion have become an almost mandatory element of the educational policy of even compact universities in the regions in recent years. Competition was at the global level.

Digital platforms, including MOOC, provide three possibilities that are seen as values: distance, scale, and personalization. It was these components that made it possible to expand an act far beyond the classrooms, which was an additional opportunity in the context of COVID-19 pandemic.

3.2. Passport to Education

The cost of higher education is growing rapidly around the world. The solution to this problem is proposed in the form of a new student enrollment scheme – Passport to Education. Boise State University has launched a pilot version of the subscription-based tuition model. Passport to Education costs USD 425 per month for six credit hours or USD 525 for nine in any of two online undergraduate programs. This is 30% cheaper than full-time education. This is something like subscribing to online platforms like Amediateka, Netflix, etc. or even a gym membership with various types of services. For a monthly fee, students can choose their own courses to attend and figure on long-term access to counseling and professional assistance. The Georgia Institute of Technology also considers the Passport to Education model for practical use. This will allow students to reduce education costs and choose courses more concentrated.

3.3. Network in Education

The "network society" term was introduced into academic use by Jan van Dijk [Dijk], and later Manuel Castells [Castells] developed the concept. Network organization as a new way of organizing social structures in conditions of virtual co-presence extends to all spheres and levels of human life. There is a smooth transition from the vertical structure. Education is not an exception. Digital technologies as a tool and globalization as a platform for the interaction of actors can increase the level of mobility and involvement in various processes. Educational programs are becoming charter. For example, in 2016, six universities from different countries entered into an

agreement on acceptance of loans to students who completed a course within the MOOC at a partner university. The following have concluded the agreement: Delft University of Technology (Netherlands), École Polytechnique Fédérale de Lausanne (Switzerland), Australian National University and University of Queensland (Australia), University of British Columbia (Canada) and Boston University (USA). This is the first step in the regulatory space formation that allows the student to freely move from one platform to another.

3.4. Blended Learning

Blended Learning (sometimes the "hybrid learning" term is used) is an educational approach that combines learning with a teacher (face-to-face) and online learning. Blended Learning involves elements of student's independent control of educational route, time, place and pace of learning, as well as the integration of learning experience with the teacher and online. There are six main models of Blended Learning: face to face (where the teacher drives the instruction and augments with digital tools); rotation (students cycle through a schedule of independent online study and face-to-face classroom time); flex (most of the curriculum is delivered via a digital platform and teachers are available for face-to-face consultation and support); labs (the entire curriculum is delivered via a digital platform but in a consistent physical location; students usually take traditional classes in this model as well); self-blend (students choose to augment their traditional learning with online course work); online driver (all curriculum and teaching is delivered via a digital platform and face-to-face meetings are scheduled or made available if necessary) [Friesen].

There is ongoing debate in the academic community about the pedagogical expediency of transfer to MOOC and online learning. We should not forget that online learning is much wider in context: these are video conferences, virtual reality technologies, chat bots, digital applications and other tools. Teachers are more likely to encounter problems such as a psychological barrier, the absence or lack of institutional support, the need for a lot of time for online courses, and the lack of electronic tools [Ocak].

There is also no confirmation of statistically significant differences in learning outcomes, expressed in standard grades, between students studying in traditional classrooms and students studying in hybrid online classes. The result is confirmed not only in different universities, but also in diverse student groups [Boen]. As research shows, the only difference is the region in which the student was born and is studying - there are obvious differences between the informational and communicative skills of the students from region to region [Gameel]. There is also a need for regular technical support and resource updates, because such learning is highly dependent on the university infrastructure [Garrison, Kanuka].

And, of course, there are types of student activities that are difficult or almost impossible to transfer into online

courses: drawing techniques, modeling techniques, performing techniques (singing, acting, playing an instrument, ballet, etc.), manufacturing technology (especially manual labor), physical exercises, creative tasks, role-playing games, various trainings. These are just a few examples of activities that are not suitable for online learning. It should be noted that this does not mean academic disciplines, namely the types of students' activities that develop appropriate skills, since there can be different types of activities within an academic discipline. For example, in physical education classes, an introduction to the basic principles of the human physiology theory (can be transferred online) can be provided, and in pedagogical classes, training (cannot be transferred online) can be provided.

3.5. Micro-Colleges

The increased demand for applied skills in narrow areas of professional activity, and more importantly - cost reduction in the form of time spent on obtaining such skills, provoke the emergence of new forms of short-term education at the university. One of these forms is Micro-Colleges. They allow to cut off unnecessary stages and fragments from the educational process. This form may be of most interest to employers who want to top up qualifications of their employees, including day-old university graduates. Moreover, this becomes relevant in the light of the growing likelihood of repeated career reloads, contributing to lifelong learning.

Micro-Colleges are any form of concentrated (post-) higher education, focused on the minimum period of entry into a particular profession [Frey]. It involves the development of a small number of professional competencies and obtaining a Micro Degree, another variant is Micro Masters. In Russia and a number of other countries, there is a similar form of professional retraining, but its peculiarity is that it merely provides for a reduction of academic hours in the plan, while maintaining the diversity of courses composition, which is also oriented towards general disciplines, i.e. discovers a horizontal type of educational process organization. Micro Degrees have a high demand potential in such areas as 3D food printer, pet day care, urban agriculture, online competition management, data visualization and analytics, drone pilot, crowdfunding etc.

In June 2018, students graduated from the Supply Chain Management program, who were trained as part of a mixed model. This model included a program for obtaining a Micro Degree in the online learning format on the edX digital platform, which consists of 5 courses, each of which lasted 13 weeks - 8-12 hours a week, and also a semester of study at the MIT campus. This new trend can be enormously developed thanks to a qualitative and quantitative change in the labor market during the transition to the fourth industrial revolution and the digital economy, with the introduction of high technology solutions which impact will be more tangible in the next

10-15 years and reduce hundreds of thousands of existing jobs.

3.6. Blockchain in Education

Blockchain appeared as a technological phenomenon in 2008, when Nakamoto (or a group of people under this pseudonym) introduced Bitcoin [Nakamoto]. Blockchain is a decentralized registry that records the history of transactions performed by completely different nodes on the network. Virtually, blockchain is a huge ledger in which all transactions are recorded. One of the key characteristics of blockchain technology is that it is public and, instead of being stored in one centralized place, it is distributed among all users. By making all transactions public, the blockchain sharply reduces the likelihood of fraud, because it is impossible to fabricate the existence of publicly displayed property [Ross]

Blockchain technology is beginning to penetrate into the higher education. That basically involves development of digital diplomas and certificates, confirming the skills acquired by the attendee. This protects documents from fraud [Mohanty]. The process of registration, receipt and verification becomes fast, convenient and possible from anywhere in the world where the Internet exists. Blockchain expands its presence in such documents and resources as portfolio and student information, profiles, resumes, job banks, payment verification, etc. (Gradbase, Echolink, Blockcerts, Successlife, Sony Global Education, etc.) [Hammed]. Basically, the technology is addressed to solving organizational and administrative problems, but it is able to change the usual everyday practices in the education system.

3.7. VR-Technologies

Virtual reality technologies, previously used in the computer games, are becoming an important element of the didactic system in universities. They enable to train and develop specific skills, especially in those areas where the cost of a mistake is extremely high: in controlling the aircraft, during surgical operations, mine clearance, etc.

Researches show that the use of virtual operating rooms, for example, for medical students, really increases their level of skill and awareness, makes it possible to gain unique experience in complex clinical cases, solves the problem of limited access to training on corpses, and makes training more widespread [Labovitz]. VR allows to visualize and improve the work with MRI, EEG, microdialysis, etc. [Lopatina], which allows students to be completely immersed in the process and make fewer mistakes.

VR are used to train and learn athletes, to develop skills such as driving a car, cutting fish and meat, taxidermy and several others. Currently, the use of such technologies is

limited, perhaps, by financial investments and the imagination of those who introduce them into the learning process.

3.8. Artificial Intelligence

Artificial intelligence develops and penetrates into all spheres of human life - from home cooking to satellite control. Obviously, in the near future, humanity will face the problem of ethics in the field of artificial intelligence and understanding of themselves, in order to reduce the risks of becoming a prisoner of their own passions and weaknesses [Coleman].

AI develops in the education. For example, since 2017 The Georgia Institute of Technology has been experimenting with a virtual assistant teacher named Jill Watson, which answers students' questions to help them overcome learning difficulties. And, while there are still serious gaps in this experiment - in particular, Jill Watson, for example, do not care about your health or pregnancy [Eicher] - further development and elimination of errors in the software can bring positive results. In the next ten years, AI will become a constant companion of students from leading universities in the world.

In 2019, the Rensselaer Polytechnic Institute formed a laboratory with 15-foot walls and a 360-degree projection system, which actually brings the students of Chinese to China. AI avatars recognize not only language, but also gestures, facial expressions of students. This is an immersive environment that allows to expand the boundaries of the learning context. The active participation of students in the dialog process helps to minimize the language barrier, immerse into the cultural atmosphere and quickly learn the spoken language.

3.9. Chatbots for Learning

In 1950, Alan Turing, the British scientist, published an article in which he wondered "whether a machine can "think"? [Turing], and also developed a methodology for the test, later named after him, to determine whether you are communicating with a machine or a person. Then speech synthesis programs with artificial intelligence – Dr. Sbaitso (1991), A.L.I.C.E. (1995) and etc. followed. In recent years, chatbots have become enormously widespread, becoming an integral element of everyday life, especially in the commerce and technology: Apple (Siri - 2011), Google (Google Now - 2012), Amazon (Alexa - 2015) and Microsoft (Cortana - 2015).

Chatbots are gradually starting to be used in learning - for example, in learning languages, economic topics, or multiple subject matter [Smutny] - and are expected to be widely used. We should highlight a number of reasons. Firstly, they are able to maintain the student's motivation by asking him questions and holding the conversation. Secondly, they involve providing feedback (especially on

technical issues related to working with the platform). Thirdly, they can accumulate important information for educational design in matters of updating and adjusting content. Fourth, they act as guides between content and everyday practice, helping students to consolidate their skills in professional and other activities upon completion of training. The effectiveness of using chatbots is significantly increased if the dialog between the person who completed the course and the chatbot takes place in messengers, because, according to data [Han], short text messages in messengers are read more often and more readily than more detailed ones in email, also requiring opening in each letter.

4. DISCUSSION OF RESULTS

The positive impact of the analyzed trends is that the higher education can become even more widespread, covering a large part of people, including the mature. Openness and transparency are the motto of the new rules of the game for the university system. This will strengthen their authority, increase the level of culture, create opportunities for experimentation and innovation, which can improve the quality of people's life. Education will certainly become more personalized, focused on the needs and personal capabilities of a human. This will form the basis for a more targeted interaction between the labor market, the university and graduates (even of the third age), which allows to organizationally provide for the combination of needs for qualifications, possibilities of their formation and implementation. Probably, this will become one of the impulses for establishment of the social meritocracy system. It is also significant that the digital technologies potential also contains obvious mechanisms to curb higher prices for higher education.

The negative impact of these trends will primarily lie in new large-scale risks, one of which will be various kinds of mental disorders. This is due to the fact that the human psyche noticeably lags behind in the speed of adaptation to a new reality from the speed of development and spread of digital technologies. Further, this gap will only increase. It is also obvious that mass education can be a surrogate: truly valuable knowledge and advanced technologies can become part of an elite higher education accessible to a smaller part of the population, which will strengthen the processes of social polarization.

The fragmented courses can also cause the problem of disharmony in a person's worldview, turning him into a hostage to everyday life and routine practices. The problem of social contacts, empathy and live communication in conditions of the total presence of artificial intelligence will be a significant problem for future generations. Targeted interaction between the labor market, the university and the student can lead students to feel their own futility and limitation, since predetermination of recruitment by more successful students will provoke apathy among less talented and successful graduates.

5. CONCLUSIONS

The digital transformation of higher education provides new opportunities for the organization of studying, interactions between a student and an employer, the issuance of diplomas, etc. Changes in technologies imperceptibly penetrate the higher education, becoming its everyday life. Its architecture is transforming, and what yesterday seemed like an illustration from a science fiction novel, today forms the basis for tomorrow's reality. Universities will have to accept changes, otherwise they risk to loose in competition with other institutions (perhaps

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traditionally not related to education) that offer alternative innovative options for obtaining knowledge and certificates. But the future is not predetermined. These are just projections. Technology experiments conducted at university campuses can help strengthen their position. And they will certainly provide new food for thought and decision making. Universities need to calculate the possible risks, identify the positive and negative consequences of the introduction and spread of technologies, building their own development trajectories in order to minimize the negative consequences.

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