SOME FEATURES OF CHANGING THE ACADEMIC LANDSCAPE OF THE HIGHER EDUCATION SYSTEM IN DIGITAL TRANSFORMATION

Houghton R.
Ph.D., Professor of Informatics, Idaho State University

Usmanova N.
D.Sc., Professor of Telecommunications,
Tashkent University of Information Technologies

Summary. Higher education around the world is evolving, while modern teaching and learning approaches leverage innovations brought to the education environment by technologies, creating new challenges for the higher education, emphasizing the professional role of the specialists and changing demand for new qualifications. The changes concern not only the infrastructure of higher education, but also the ways of managing this system. At the same time, on the part of the student, the ability for cognitive adaptation is required - the ability to constantly learn new things and apply existing knowledge in new conditions. Some significant aspects of these changes are considered in this paper.

Introduction
According to definition, digital transformation represents the process of using digital technologies to transform existing traditional and non-digital business processes and services, or creating new ones, to meet with the evolving market and customer expectations, thus completely altering the way businesses are managed and operated, and how value is delivered to customers [1]. The digital transformation is reshaping almost all and every area of customer experience, operational processes, and business models allowing better performance, and creating wider range of evolving possibilities. Higher education (HE) does not stand aside, while altering the qualifications and skills that are sufficient to ensure the well-being of people in terms of emerging technologies.

In recent years, universities around the world have undergone rapid and meaningful changes, influenced by technological progress: the growing need for expertise in industries and markets are creating new challenges for HE, emphasizing the professional role of the specialists and changing demand for new qualifications. We see how education is evolving, while modern teaching and learning approaches leverage innovations brought to the education environment by technologies: the realities of the digital development attracted mainly by the widespread use and implementation of artificial intelligence, the Internet of Things, data analytic and other advanced technologies and solutions, related with literally all spheres of the social and political life of society, lead to the need to constantly change and adapt, no matter in what area or the direction of human activity, such changes occur. The digital economy is changing the structure of employment, styles of communication, ways of consuming services and methods of doing businesses. Higher education, as an important component of the economy, is actively involved with such advances: education is changing, because the digital economy changes the knowledge, skills and abilities necessary for the successful activities of people and increase personal well-being.

Modern society is experiencing a total appeal to a knowledge-based economy that is being emerged as a result of the proliferation of constantly changing information and knowledge, which require a
completely new information infrastructure. HE in the digital age presumes the formation of a fundamentally new information infrastructure for supporting and conducting the educational process, whereas science-intensive HE is emerged as a result [2]. The changes concern not only the infrastructure of higher education, but also the ways of managing this system. At the same time, on the part of the student, the ability for cognitive adaptation is required - the ability to constantly learn new things and apply existing knowledge in new conditions.

In addition, it is important to analyze the trends of digital transformation, which to one degree or another influence HE, substantiate the tasks facing higher educational institutions of developing comprehensive measures that allow them to compete and provide training for qualified graduates and master new innovative roles. That means that at the institutional level, HE must have a solid foundation for the development and improvement of all aspects of the educational process, taking into account crucial factors for improving the HE system in the context of digital transformation.

Leveraging digital transformation for changing HE policy

The realities of the 21st century and economic cycles demonstrate the more dynamic life, and diversity of career paths due to more fluid job markets, the emergence of new industries, and changing how we live and work. To stay relevant, people need to learn and update skills continually because the traditional knowledge value becomes developed and new tools raised to align better with the digital economy. Education models will need to reflect this change. In a digital age, HE has to be less about students acquiring knowledge, and more about offering an experience that builds the capacity to live and work in a world of artificial intelligence, connected machines and job markets that are more automated, fluid and boundless [3]. These bring issue of setting the appropriate correlation between HE policy and national governments.

Traditionally, the policies being implemented by national governments have in original mindset to produce knowledge, skills and graduates that would generate intellectual capital and innovative products and make their countries more globally competitive. However, such policy directives positioned universities as static entities within a market economy, while the role of university as a ‘knowledge leader’ in economy should be considered as a dynamic and fluid set of relations within a wider set of diverse interests and organizations [4]. In general, changes in HE in the terms of digital economy may attract three interrelated directions: (1) changes in the financing of education; (2) changing the duration of study; and (3) changes in teaching methods. Along with this, cooperation between industrial, government and educational institutions is becoming an important challenge and a hallmark of education in the digital economy.

To describe the complexity of the matter it is worth to refer to the ecosystem of digital economy given in [5]. The Digital Ecosystem Framework is arranged of three overlapping pillars:

- **Digital Infrastructure and Adoption** (resources for individuals and organizations);
- **Digital Society, Rights, and Governance** (digital technology intersections with government, civil society, and the media);
- **Digital Economy** (digital technology for economic opportunity and efficiency).

It is obvious so far, that to effectively and efficiently shaping the ecosystem of digital economy which is described by the complex interactions between different stakeholders, it is inevitable role for higher education can be assigned: the digital economy requires knowledge whatever call from the state, society, national culture and identity will be, while ‘traditional’ static, predetermined curriculum should be changed to a flexible, dynamic curriculum ‘to cope with the various socio-economic problems in a complex, uncertain new world. New skills to be developed would include critical thinking, creativity, self-efficacy, and regulation as well as self-regulation and autonomy’. So far, the global economy with its technological developments, market processes and knowledge-based production chains, dictates the necessity to reshape the way HE is provided, with alterations in relationship between the public and individual knowledge sets, when student needs to cover more sophisticated skills, reflect innovations and respond adaptively to the economic and technological advancements. The significance within above-mentioned is well demonstrated in [6] as well.

Appropriate institutional transformations matter: to respond the challenge of innovative education on place, knowledge technologies come to the arena to cope with complexity of teaching and learning in the digital transformation era. Higher education institutions should shape the culture of ecosystem planning, which is capable to deliver knowledge through educational services and products to the community via and through human (teachers and mentors, tutors and educators) and technology (platforms, artificial intelligence and machine learning enabled tools, etc.) resources, with conceptualization of structural and organizational changes ‘on how knowledge, education and learning need to be reimagined in a complex and uncertain world’. These require efforts for institutions to reimagine the strategy to planning those resources and expertise, including business intelligence and analytics, and strategic technology management, with timely adoption and integration of new solutions.

**Knowledge relevance in a new context**

In the knowledge era, it is important to understand the value of qualifications and skills that are sufficient to ensure the well-being of people in terms of emerging technologies. Some industries have been severely reshaped as a consequence of the introduction of products and services through technology applications [7]. The increasingly used term ‘The global workforce of the digital economy and Industry 4.0’ suggests new and complex competencies to master, which, accordingly, challenge of higher education institutions
to develop comprehensive measures that allow them to compete, provide qualified graduates, support the system of learning advanced technologies and mastering new innovative roles. One of these priority measures is the development of appropriate curricula, for which it is necessary to properly identify the significant institutional potential for the adaptation of HE to the new and constantly changing world of knowledge. At the same time, students need to have the ability for so-called cognitive adaptation, constant assimilation of new things and application of knowledge in new conditions. The future perspectives show the complex human-computer interaction and better interfaces to perform cognitive tasks when people are given new tools for analysis, evaluation and recognition of reality. While job markets are changing and new knowledge is being created, reskilling and reskilling become imperative for higher education.

This requires individuals and companies to continuously engage in re-training and re-skilling. For individuals to remain relevant and competitive in the labor market, there will need to be stronger and more continuous connections between education and employment [8]. In this regard, lifelong learning challenges the current higher education. Initial education (i.e. getting a degree) will likely be less important in the future labor market, while just-in-time learning – which allows learners to gain the specific skills they need whenever they need them, rather than forcing them to obtain a range of skills they might need – will be more important. This suggests a change in the market, with less focus on studying for degrees and more focus on lifelong learning as a permanent fixture of professional life. In turn, the shift to lifelong learning prompts employers to rethink the importance of training and professional development strategies [9]. ‘People will create the jobs of the future, not simply train for them, and technology is already central. It will undoubtedly play a greater role in the years ahead’ (Jonathan Grudin, Design researcher, Microsoft and professor at the University of Washington Information School). In addition, the traditional higher education role is arguable (In the next 10 years... we will see the emergence of new educational and training programs that can successfully train large numbers of workers in the skills they will need to perform the jobs of the future [10]. This indicates research found that ‘one more robot per thousand workers reduces the employment to population ratio by about 0.18-0.34 percentage points and wages by 0.25-0.5 percent), and central question about the future, then, is whether formal and informal learning structures will evolve to meet the changing needs of people who wish to fulfill the workplace expectations of the future, when education to provide people with the skills needed to compete in unpredictable job markets.

Since the university qualification will no more define a ‘guarantee of success’, there should be appropriate changes and rules applied for curriculum development for those ‘on-demand’ skills future graduates will require. Obvious shift from degree-based hiring to skills-based hiring is accelerating and traditional degrees may not be well suited to convince future employers that candidates possess new skills move towards a reality with more focus on acquiring skills, not degrees. University programs accordingly, should respond to this demand for new skills in the workplace.

Methodology to assign quality in a new format
From the point of view of traditional education, the quality of educational activity’ results depend mainly on the quality of knowledge and skills of graduates: good quality of the results can only be achieved with good quality of the educational process, defined on its content, but also on availability of different resources. At the same time the high quality of the educational process, especially when it come with qualifications for the ‘digital era’, can be achieved only with the proper functioning of the whole system of the university, including quality of management at all levels of the organization and the quality of supporting processes. Herewith some considerations are provided regarding the qualification framework definition within education and an approach is proposed to formulate requirements to educational program. Approach is based on Total Quality Management (TQM) concept for education [11] and can be applied to other areas of education, being an ‘universal’ way to set the grounds for defining the quality assurance and monitoring process, curriculum development, etc., with engaging creatively, through the use of analytical skills, ability to challenge the real-life problems.

The necessity to provide high-quality education based on modern educational programs is in line with the process of improving the efficiency of education, requiring continuous assessment of quality. There are several prerequisites of supporting education process, e.g. learning conditions (availability and condition of classrooms, provision of textbooks, electronic library, etc.), the organization of educational process (training schedule, amount of daily and weekly hours, the possibility of self-study, knowledge assessment system, evaluation criteria, etc.), the educational program (curriculum, list of subjects, content and scope of courses, the amount of course work, the organization and ratio of the theoretical and practical lessons, etc.), the level of teaching (teacher’s qualification and competence, fairness, etc.) to name a few. But there should be something more to cover different aspects of education process; to create specific framework allowing to combine different aspects of education becomes stronger so overall ‘picture’ could be seen through comprehensive and structured system of TQM.

Methodology is based on the statements of organizational excellence and comprises three level of TQM developing (it is suggested having such levels in order to combine different expectations of what TQM can give for institution and stakeholders).

Organizational level: the main idea behind this level is that TQM defines and designs the environment of quality organization. Structured approach to organizational management by which it is possible to improve the quality of institution (including
Educational products and services) makes it possible to satisfy the customers’ expectations; this is covered by appropriate techniques and methods to be used at institutional level.

**Logical level:** Knowledge management concept serves as basis for this level. Linkage between professional responsibility and quality accountability as the main factor to define the role of social and cultural context within educational process: it is seen here to track the relationship between elements of TQM (e.g. fact-based decision making, integrated system etc.) and knowledge management experience.

**Implementation level:** Educational institutions are pursuing quality improvement, so strategic planning measures should be envisioned and TQM implementation prerequisites should be clearly defined, as well as appropriate criteria and indicators for successfully implemented TQM be elaborated.

**Closing remarks**

With fast and incredible development achievements and trends in science and technologies during the last decade the role of teaching and training became crucial with strengthening requirements of current education standards and appropriate adaptation of education program to changing needs and challenges of digital economy.

Modern national education systems are going through a very interesting stage full of new unprecedented situations: this is the time of assessing educational organizations for sustainability provided by human and technical resources, the time of conflict between traditional and new/advanced approaches to organizing the educational process, the period of ‘change of generations’ in the field of education.

Proposed approach deals with qualification framework concept while the interested side (stakeholder) can assign the required level of competence within criteria to be assessed for educational program. Qualifications framework in turn, is defined as ‘the structure into which accredited qualifications are placed. This allows learners, training providers and employers to gain information about the broad equivalence of qualifications’ (https://unevoc.unesco.org/). In such a formalized structure learning level descriptors and qualifications are used in order to understand learning outcomes, so allowing for the ability to develop, assess and improve quality education in a number of contexts.

Technological innovations and digital transformation represent the significant driving forces for HE and justify the need to personalize HE (on-demand training), while appropriate policy and regulation means (methods for digital transformation) along with strategic planning approaches (including for HE business processes) are required to flexibly support the changing pace of HE, where alternative learning and adaptive experiences determine the new face of society.

**References:**

1. https://whatfix.com