INTERNATIONAL CONFERENCE RCIC'20
Redefining Community in Intercultural Context
Cluj-Napoca, 7-9 May 2020

DIGITAL TRANSFORMATION AND CULTURAL CHANGE OF HIGHER EDUCATION

Ioan CRĂCIUN*

*National Institute for Research and Development in Informatics, Bucharest, Romania

Abstract: *Given the contemporary technological development, student demands and requirements and budgetary pressure higher education leaders have to find ways to adapt their institutions to these realities and make a cultural educational shift, to include here promoting different approaches to teaching and learning, exploring the predictive value of data, and acquiring technological solutions. This article uses digital storm model to explore some digital transformation trends for education, including augmented reality, gamification, personalized learning and redesigned learning spaces which are revolutionizing higher education and lead to a cultural shift in this domain.*

Keywords*: digital transformation; higher education; cultural change; digitalization*

1. INTRODUCTION

The world has never faced such a virulent crisis as this one caused by a killer virus generically called COVID-19. No one can say how long this crisis will last, nor how strong its impact will be on our future existence. However one thing seems to be certain, once caught, the COVID-19 virus will generate a new world, a world more adapted to the digital age in which we already live. The signs are more than conclusive, it is clear that many of the socio-economic activities of these days have moved into the virtual space, and the option of working from home is becoming more and more widespread. We shop online, we communicate with our bosses and everyone close to us online and we relax online without realizing that all of these will change our mindset, work style and lifestyle in general. From these evolutions, education is no exception, especially higher education which contributes to the maturation of the characters and the perfection of the students' mentalities. We have seen these days the teachers' concerns related to finding additional ways to move the meeting with their students from amphitheaters into virtual classrooms, to ensure the continuity of the educational process. But beyond these steps remains the question, what should universities do in the face of such a challenge? and, especially, how should they look at their future and the higher educational programs they manage?

The reality of recent years shows that higher education institutions have faced many problems due to both the dynamics and the increasing complexity of the labor market, which have forced the adaptation of educational programs while optimizing their own funding sources, as well as meeting the expectations of the students related to the way they are carring out the teaching-learning-research process. To meet these challenges, higher education institutions had to take radical measures that would bring them financial stability and maintain their level of academic excellence. At the same time, universities have begun to introduce digital technology which they have gradually integrated as a catalyst for all academic transformations. But, the main purpose of higher education institutions is to train future specialists from different fields of economic and social life in both the government and private sectors. Therefore, the main concern of universities should be to create that educational environment that offers students and researchers the most appropriate learning experiences adapted to the demands of the labor market, and this highly dependant on the successful use of the best technological tools. At the same time, universities are aware that they represent entities of the contemporary society, a society increasingly based on knowledge in which the widespread dissemination of information and communication technology gives rise to new learning requirements and demands new skills, in particular digital skills needed for employment, education and lifelong learning, self-development and participation in social life. Therefore, as contemporary society

becomes more and more dependent on digital technologies, what people have to learn and know is changing. This reality has led to the conclusion that a new vision is needed on the role and importance of digital technologies and learning that takes into account the changes and tendencies that transform the way people work, learn or prepare to give sense to the society in which they live; a society increasingly digitalised, more connected in the network and more based on knowledge (Punie & Cabrera, 2005).

In this context, the article uses digital storm model to explore some digital transformation trends for education, including augmented reality, gamification, personalized learning and redesigned learning spaces which are revolutionizing higher education and lead to a cultural shift in this domain

2. CONTINUOUS LEARNING FACILITATED BY DIGITAL TECHNOLOGY – A HOLISTIC APPROACH

It is an undeniable fact that most of the debates on the future of academic education focus on instrumental objectives that are related to adapting learning institutions and the workforce to the demands of the digital economy. As a result, in the academic practice such instrumental concerns have already become a serious challenge for all the actors involved: students, teachers, researchers, auxiliary teaching staff, etc. and, although it seems that everyone is concerned and involved, there is still much to be done to make those necessary changes to the academic field that will lead to the results expected by the contemporary digital society. We need to be aware that learning is important because of its contribution to the emancipation, evolution of humanity and the self-fulfillment of people. Therefore, among its objectives should be found not only those aiming at the formation of professional competences, but also objectives that aim at the formation of social competences, the development of critical thinking skills, knowledge exchange or cooperation techniques. Therefore, reflections on the future of learning in a digital and knowledge-based society should not only address instrumental questions, but also should raise more theoretical, normative and ethical issues related to learning and education: what do we need to know and learn? why do we have to learn? what kind of society do we consider when we expect people to have certain skills and competences?

Thus, as we have already shown, we need to become more and more aware that a new vision of digital technologies and learning is needed, taking into account the tendencies that transform the way people work, learn and live. But, this vision should not be realized by an adaptive strategy based on reactions to the new requirements as they arise, but it must be realized by a proactive strategy that, considering the evolution of socio-economic trends of the future society, having the ability to anticipate future learning needs and requirements. Such a strategy should focus on the interaction between technology and changing environmental circumstances and allow the adaptation of higher education institutions through a real digital transformation. Only the mere acquisition of new digital technologies will not lead to the digital transformation of higher education institutions, as even the simple modernization of the educational management system will not achieve this goal. The digital transformation must be at the intersection of technology and institutional strategy and its main objective is to design the digital architecture of the university and the necessary IT applications, as well as to prepare the campus organizations and staff (students, teachers, researchers, auxiliary teaching staff, etc.) to achieve this objective.

Therefore, addressing the future of learning in a digital society must be a holistic one, as learning has become a lifelong activity that addresses future generations and a multitude of socio-professional fields specific to both the private and public spheres. Thus, implementing such a strategy should not be only the task of traditional formal learning institutions, such as existing schools and universities or training institutions, but should also encompass other forms of adult education, such as informal learning or learning the use of digital technology.

Experts of the European e-Learning Observatory HELIOS (Aceto *et al.*, 2006), advocate for a future strategy that will lead to learning beyond the traditional-sectoral approach based on digital technologies (HELIOS, 2020) promoted today. A knowledge-based society really creates the need for new digital skills and abilities. The European Commission has already identified digital skills as key competencies that people need for personal development, active citizenship, social inclusion and employment (LLP, 2007:7). It is important to note that the European Commission does not only refer to the so-called digital literacy, that is to learn how to operate this technology, but to the formation of higher order skills, such as knowing and understanding what it means to live in a digitized and networked society. This applies to both students and teachers, as well as trainees and training staff.

Given the European framework for lifelong learning, in the formation of digital skills and competences, universities play an essential role, which is why their digital transformation appears to be of prime importance. Moreover, the risks and threats to which contemporary society is increasingly subjected indicate the need to move many of the socio-economic activities into the online space, which means an acceleration of the digitalization process of the contemporary society. This statement is fully demonstrated by the recent coronavirus pandemic. We still do not know for sure what the company will look like after the COVID-19 crisis, but we know that the process of digitalization will continue and will increase both its pace and complexity.

3. GENERAL TRENDS FOR MODELING THE FUTURE PROCESSES OF ACADEMIC EDUCATION

In the years to come the world will face extremely important social and technological challenges, which will decisively affect future education and training processes. In the following we will present some of the most representative trends and challenges that significantly affect these processes. First of all, the processes of academic education specific to the knowledge-based society will be significantly modeled by the evolutionary trends of digital technology. Although such tendencies of modeling of learning processes exist and are already manifesting, it is expected that they will become more accentuated and set their mark more and more on all future education and training processes. Among these trends we can mention: the easier access to the broadband Internet, the use of blogs or web-blogs as major sources of information and communication by Internet users, the transformation of podcasting into the engine of so-called mobile learning, use of SMS and MMS services as sources of rapid information transmission, development of open source software/open source content, etc.

The development of digital technologies will also generate other tendencies that can contribute to changing the university educational landscape such as, for example, the convergence of digital infrastructures/technologies (integration of broadcast technologies, mobile phones, data and other computer networks), increasing the scope of alternative technologies such as wireless technologies (for example, wireless hotspots), convergence of content/media (eg newspapers, music, TV, blogs), development of multimodal devices (for example, mobile phones that take professional pictures and simultaneously receive radio programs / tv), etc.

In addition, we must also take into account the existence of the European vision on the future information society, called ambient intelligence (which is based on the ubiquity of computers) which refers to the use of all the technologies listed above for connecting people, machines, computers and sensors in heterogeneous and ubiquitous networks (ISTAG, 2001). This vision of a smart environment through which proactive and user-defined services are accessible in a very intuitive way has important implications for learning because it can facilitate social learning through media-based, virtual learning synchronous environments (Burgelman & Punie, 2006:17-33).

Secondly, the education and training processes specific to the future society, based on knowledge will be significantly modeled by some social tendencies and challenges, among which we mention the change of skills and competences in the workplace, individuals lifestyle and learning trajectory, demographics, migration and lifelong learning. In addition, globalization, diversity and alignment of education and training systems are trends that academic education in the future knowledge-based society cannot escape. Higher education institutions will compete for the best students in the world and possibly for those who can afford to study abroad or access renowned educational models and brands. In this regard, education based on digital technologies could support this trend, providing access to high quality education, without the need for students to move abroad.

4. DIGITALIZATION – THE MAIN TENDENCY OF MODELING OF HIGHER EDUCATION

From the ones presented above it is clear that digitalization is the main tendency to model higher education that the society will need in the future. In other words, any modern university must put digitalization in the forefront of its future goals. The ultimate goal should be the creation of a digital institution in which educators, students, researchers and all ancillary staff use digital technology tools continuously to increase the quality and efficiency of academic teaching-learning and scientific research processes, which are becoming increasingly integrated and more collaborative. In this context, digital technologies are becoming key factors in adapting learning

experiences to future socio-economic realities. This raises serious questions about the responsible use of digital technology, as well as how higher education institutions can provide an easy environment for digital transformation.

In general, the issue of digital transformation of higher education is the subject of in-depth scientific research, but it is also the subject of pragmatic articles, generally made by specialists from companies such as SAP, CISCO, SAS, etc. In their opinion, digital transformation refers to "process and strategy of using digital technology to drastically change how businesses operate and serve customers" (SAS, 2020). George Westerman, principal researcher at MIT and author of the book *Leading Digital: Turning Technology into Business Transformation*, shows that

> digital transformation marks a radical rethinking of how an organization uses technology, people and processes to fundamentally change business performance (Boulton, 2019).

Thus, digital transformation becomes a reality in all economic-social fields, including that of academic education, which can be understood as "changes that digital technology causes or influences in all aspects of human life" (Stolterman & Fors, 2004:687-692). This understanding of digital transformation as an intrinsic change - shows that digital transformation is not just about technology (Weill & Woerner, 2018) and even if it is a source of innovation, it is not synonymous with it (Kletzkine, 2018). This interpretation of digital transformation as the factor that affects all aspects of organization and functioning of an organization/university is decisive for how the leadership team of that organization plans and directs changes (Boulton, 2019). Therefore, the digital transformation of university education is a process by which the digital technologies introduced in a university determine a constant evolution of the working methods and the academic systems and processes within it, in order to produce an added value for students and beneficiaries. Often, the process has led to the adoption of new models of academic operation based on new revenue and expenditure flows.

As we have already shown, the digital transformation of higher education does not refer only to technology, but occurs through the interaction between university employees, academic teaching-learning and scientific research processes and digital technologies, being guided by a broader transformation strategy. Success comes when fundamental promotion of a new model of academic operation. Universities that succeed in changing their mindsets, strategies and culture will be successful in promoting digital transformation efforts.

5.TRENDS IN DIGITAL TRANSFORMATION OF HIGHER EDUCATION. TOWARDS A CULTURE OF DIGITAL TRANSFORMATION

As we have already shown, digital technologies will have an impact on all nalytics and data management technologies are used in conjunction with emerging technologies such as artificial intelligence, cloud computing and the Internet of Things that accelerate digital transformation. Even though many higher education institutions regard technology as a panacea for digital transformation, we emphasize once again that the success of this process is based on three main pillars: people, academic processes and technology (Kline, 2015).

A university can fully achieve its objectives of digitalization only if all three components of digital transformation - people, academic processes and technology - work in tandem. Approaching a digitalization strategy based on the three pillars means a major change in the organizational culture of higher education institutions that will ultimately lead to the socio-economic fields and will transform the way all socio-professional institutions and organizations operate. These technologies connect people and transform their way of social and professional interaction, and the current crisis caused by the COVID-19 virus seems to accelerate this process. Although it Figure 1 – Digital Storm model seems quite difficult to appreciate how digital technologies will evolve and influence the way in which higher education institutions operate, we will try to use the *digital storm model* (SAP, 2018), promoted by specialists from Systems, Applications, and Products in Data Processing - SAP to identify some evolutionary trends in digital transformation of higher education. The digital storm model was promoted by SAP specialists to describe the impact of digital technologies on some industrial areas. According to this model (see figure below), digital transformation involves three digital storm stages, so that all industries eventually reach what the model calls the *hurricane* stage. As can be seen, SAP specialists also refer to the higher education that they place directly in the third phase of digital transformation, a phase called *hurricane*. And this

is because, as in the industries mainly based on consumption (banking, commerce, tele-communications, media and entertainment) in higher education, as well, the key to success lies in increasing the added value of academic services and improving the overall experience of all their clients, especially to students, researchers and teachers. Thus, companies in these industries, for which digital transformation is crucial, will focus on business model innovation. This is also the case for higher education institutions.

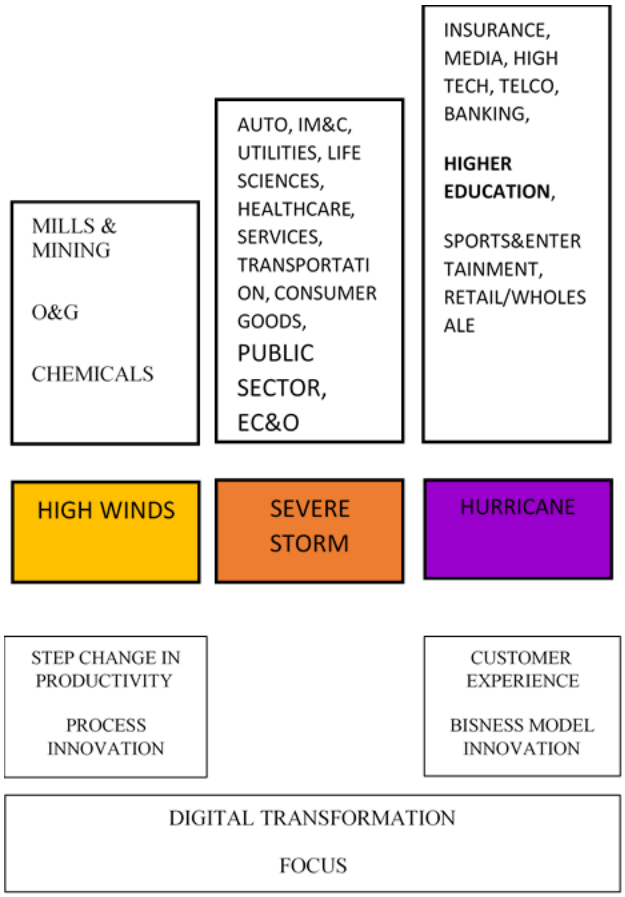

Fig.1 Digital Storm Mod. Source: SAP- The Digital Storm will Impact Every Industry (SAP, 2018)

For the other two digital storm phases the demands of digital transformation are more relaxed, although for the industries placed in these phases the final goal should be *hurricane*. For example, in the *high winds* phase are placed intensive industries which are more focused on innovating business processes and increasing labor productivity, while in the *severe storm* phase, we find those industries that focus on transforming the cost structure through automation and process innovation. However, in this phase we will find industries that have the objective of innovating the business model, but this will happen in time.

We consider the digital storm model as a suitable model for our analysis because it has been tested by SAP specialists on a number of approx. 500 (SAP, 2018) of their clients company and it turned out to be extremely realistic. Therefore, using this model, we place higher education in the hurricane phase, and we suggest that higher education institutions formulate their own digital transformation strategies whose main objective is to transform the traditional academic business model into a new one where digital technology connects all personnel for the implementation of academic and administrative processes that are much more efficient and adapted to the realities of the future labor market. Even if the general perception is that the mere introduction of technology is a panacea, we must be convinced that the success of a digital transformation strategy is based on three main pillars: technology, academic processes and, not least, people.

When it comes to technology, the success of the digital transformation strategy is ensured when fundamental analytical and data management technologies are used in conjunction with emerging technologies such as internet of things, blockchain, augmented and virtual reality, artificial intelligence and machine learning, chatbots or cloud computing (Ferdinko, 2019) that represent true catalysts for digital transformation. From the perspective of the academic processes, the successful digital transformation strategy will be ensured when these processes will be based on combining traditional with augmented and virtual reality, artificial intelligence, gamification, personalized learning and redesigned learning spaces (Newman, 2017). From a human perspective, the success of the digital transformation strategy will be ensured when teachers, researchers, auxiliary teaching staff and students concentrate their efforts on two main directions. The first direction involves the transformation of the academic teaching-learning and scientific research services, which would mean the creation of new educational products while digitizing the existing products (Ferdinko, 2019). This direction should also focus on the use of digital means of communication between teachers and students. The second direction will need to focus on digitizing all the common operations of higher education institutions (Ferdinko, 2019). This category should include the admission of students, their registration in the study programs and the record of their participation in the courses and examinations, the management of the study programs, etc. In this category should also be included administrative services such as classes and

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teacher allocation, educational and scientific research infrastructures management, etc.

It is more than obvious that technology makes a difference in the implementation of digital transformation strategies. However, without a change in the way people work and behave, technology cannot do much. In other words, without actively promoting a digital culture, that is, without breaking the barriers between traditional higher education and IT, digital transformation efforts will be doomed to failure. Universities should invest in IT culture and change management programs that prepare teachers and students, along with all academic staff, to work as comfortably with smart technology as they do with their colleagues. Increasing the share of digital technology does not mean that people will compete with these technologies for a job. On the contrary, when people learn to work with digital technologies, the prerequisites for improving the academic performance of higher education institutions are created.

Although cultural aspects decisively influence digital transformation, most organizations do not assume explicit attributions in this regard. Organizational change that aims to change the way an organization operates is not enough, it must be doubled by measures aimed at implementing new behaviors and attitudes of employees and which will cause a change in the culture of that organization. This will cause employees to give up old behaviors and adapt to new working conditions. Creating a digital culture within universities is difficult, but once created, the culture will support the adoption of digital technology. For true change to occur, it must be supported by all university staff, including students. Digital technology is important, but it cannot produce digital transformation without cultural change. Culture makes digital technology relevant, which is why culture cannot be overlooked.

6.CONCLUSIONS

Higher education institutions, as entities in the service of the contemporary knowledge-based society, have new learning tasks and requirements related to the widespread dissemination of digital technologies. Contemporary society is becoming more and more dependent on these technologies and this is reflected in what people have to learn and know. Therefore, the processes of academic education specific to the knowledge-based society will be significantly modeled by the trends of the evolution of digital technology. In this sense, in the education of future generations higher education needs a new vision that takes into account the influence of digital technologies on the way people work, learn or prepare to give meaning to the society in which they live. This vision must be embodied in a coherent and proactive strategy of digital transformation of the universities, which takes into account the trends of socio-economic evolution of the society and has the capacity to anticipate the future learning needs and demands. Such a strategy should focus on the interaction between technology and ever-changing environmental circumstances and be based on three main pillars: technology, people, academic processes. Approaching a digitalization strategy based on these three pillars produces a major change in the organizational culture of the universities that will ultimately lead to the promotion of a new academic education model.

Therefore, the mere introduction of technologies does not solve the problem of digital transformation of higher education institutions, yet the introduction of these technologies holds an important weight in this process. Therefore, it is important, although not easy, to make appraisals on how digital technologies will evolve and influence the way in which higher education institutions operate. In our research we used the digital storm model, promoted by specialists from Systems, Applications, and Products in Data Processing - SAP, to identify several trends in the evolution of digital transformation of higher education according to the evolution of digital technologies.

This model places higher education in the hurricane phase, and suggests that higher education institutions formulate their own digital transformation strategies based on three main pillars: technology, academic processes and people, whose main objective is to transform the traditional academic business model into a new digital model. Therefore, the digital transformation of higher education marks a radical rethink of the way in which higher education institutions use technology and people and shape academic processes to fundamentally change their educational performance. Universities must provide students and researchers with the most appropriate learning experiences tailored to future socio-economic needs, and this depends on the successful use of the best performing digital technologies.

BIBLIOGRAPHY

1. Aceto, S., Delrio, C., Dondi, C. (2006) *HELIOS Yearly Report 2005–2006.* Brussels: MENON Network EEIG.

2. Boulton, C. (2019). What is digital transformation? A necessary disruption. *CIO* [online]. URL: https://www.cio.com/article/ 321 1428/what-is-digital-transformation-a-necessary-disruption.html. [Accessed on March, 2020].
3. Burgelman, J.-C. & Punie, Y.. (2006). Information, Society and Technology. In E. Aarts & J.-L. Encarnacao (Eds), *True Visions: The Emergence of Ambient Intelligence.* , Berlin, Heidelberg: Springer. 17–33.
4. Fedirko, D. (2019) 8 Top Trends Of Digital Transformation In Higher Education. *eLearning Industry* [online]. URL: https://elearning industry .com/digital-transformation-in-higher-education-8-top-trends. [Accessed on March, 2020].
5. European Commission (EC). (2001). ISTAG; *Scenarios for Ambient Intelligence în 2010*; Final Report, Feb 2001, EC 2001. *Cordis* [online]. URL: http://www.cordis.lu/ist/istag. htm. [Accessed on March, 2020].
6. European Parliament/ Lifelong Learning Program (LLP). (2007). *Key Competences for Lifelong Learning – A European Framework*. Annex of a Recommendation of the European Parliament and of the Council of 18 December, 2006. Luxembourg: Office for Official Publications of the European Communities.
7. Kletzkine, J. (2018). Digital Transformation Doesn't Mean Innovation. *Forbes* [online]. URL:https://www.forbes.com/sites/startupnationcentral/2018/05/31/digitaltransformation-doesnt-mean-innovation/#61f4aa197c0f. [Accessed on March, 2020].
8. Kline, J. (2015). Three Pillars of Digital Transformation: Advancing Your Procurement Team to Best-in-Class. *Canon* [online]. URL: https://cbps.canon.com/insights/three-pillars-of-digital-transformation-advancing-your-procurement-team-to-best-in-class. [Accessed on March, 2020].
9. Newman, D. (2017). Top 6 Digital Transformation Trends in Education. *Forbes* [online]. URL: https://www.forbes.com/sites/danielnewman/2017/07/18/top-6-digital-transformation-trends-in-education/ #6f2ee3482a9a. [Accessed on March, 2020].
10. Punie, Y. & Cabrera, M. (2006). *The Future of ICT and Learning in the Knowledge Society*, Report on a Joint DG JRC/IPTS-DG EACWorkshop, Sevilla, 20–21 October 2005, DG JRC-IPTS, European Communities.
11. Stolterman, E. & Fors, A.C. (2004). Information technology and the good life. *Information Systems Research*, Vol. 143. 687–692.
12. Weill, P. & Woerner, S.. (2018). Digital Transformation is not about Technology – It's About Change. *Chief Executive* [online]. URL:, https://chiefexecutive.net/digitaltransformation-is-not-about-technology-its-about-change/. [Accessed on March, 2020].
13. *** (2020). HELIOS – European eLearning Observation System. *xplora* [online]. URL: http://www.xplora.org/ww/en/pub/xplora/eu_projects_new/eu_projects/helios_helios___european_elear.html. [Accessed on March, 2020].
14. ***. (2020). Digital transformation. What it is and why it matters. *SAS* [online]. URL: https://www.sas.com/en_us/insights/data-management/digital-transformation.html. [Accessed on March, 2020].
15. ***. (2018). The Digital Storm will Impact Every Industry. *SAP* [online]. URL: https:// www. sap.com/trends/digital-transformation. html?pdf-asset=6ca72e20-2a7d-0010-87a3-c30de2ffd8ff&page=1. [Accessed on March, 2020].