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Chosen of Current Challenges in Educational System and Learning

Wybrane współczesne wyzwania edukacji i uczenia się

Introduction

These days, a success in the modern economy is not a function of education only, but rather a result of what one does with own education, and how a state or system enables and empowers the citizens to thrive. „The advent of massive open online courses (MOOCs), blended learning and an awareness of the tenuous place workers hold in the modern economy (CEDA, 2015, p.230)", leads even our Polish students to a logical question–regarding the influence

of a graduate degree on one's career. No industry or occupation is immune to change. It seemed that the popular remedy is to prescribe more training for students in technical disciplines consisting of the so-called STEM (science, technology, engineering and mathematics); in recent years, however, these have been expanded by arts creativity, so in the latest form the concept is defined as STEM+A. Before STEM+A, the graduates were believed to be the future, as only technical training should protect one from the winds of global change.

Although increasing STEM (only) graduates is by no means a bad thing, it is more akin to a first step than a sufficient and larger strategy for future. The rapid rate at which China and India are training STEM graduates provides more than enough evidence that the protected status of STEM graduates is withering (den Hollander, 2015, p. 228). Yet evidence from the United States (US) shows that these workers have not escaped the waves of change. Even for these workers, wage growth has not kept pace with economy-wide productivity growth. Prestigious and unique studying does not guarantee success on the labor market.

Polish colleges and universities are currently experiencing system and law reform conducted and imposed from the top-down by the Polish Ministry of Science and Higher Education. The change will affect the courses of study chosen by the students, but still, even with changes in such fundamental issues, one should not expect a revolution in the next few years. Having reviewed some social data the governing bodies realized that the popularity of a particular course is not that important for the alumniduring the decision-making process. Unfortunately, this year's academic offer prepared for Polish high school graduates remains largely unchanged and universal – just as it has beenfor the last ten or fifteen years. Such status quo was conditioned by illogical and irrational choices, mostly motivated by a general idea that higher education raises socially increases the social status and creates both civil and economic opportunities in professional life. Such a selection, however, was not in linewith requirements and predicted changes on the future labor market within the next ten or twenty years. Therefore, in such a context of conservative and closed circle of Polish higher education system, the 19-year-old alumni are mainly applying to study law, medicine, management, economy, English philology…and those who are not accepted settle for pedagogy, political or social sciences instead of supporting the so-called STEM courses.

Paradoxically, nowadays students do not delude themselves that even a popular and prestigious course of study will automatically open labor market resources to them. That's precisely why these days recruiters conducting job

interviews focus on slightly different aspects. Most of HR specialists point out that while recruiting new employees, it is the applicants' personality that is of key importance. Former workplace, last occupation or the motivation to apply for this particular post are equally significant, with the issues related to thecourse of study or a given university being far less relevant (Rojewski, 2018).

What is changing in education

Recent years have yielded significant advances in computing and communication technologies, which had a profound impact on society. Technology is transforming the way we work, play, and interact with others. From these technological capabilities, new industries, organizational forms, and business models are emerging (National…, 2017, p. 1). Advances in fields such as artificial intelligence and robotics are making it increasingly possible for machines to perform not only physical, but also cognitive tasks currently completed by humans. These developments have led to widespread interest in the future of work (Gould, 2018, p. 282).

Across all markets, young people are largely united in their view that those who are not skilled in technology will find it increasingly difficult to secure a job in the future. On average, two-thirds agree with this position – particularly in China, Brazil, Australia, UK and the US. Conversely, just half of German respondents share this view. At the same time, a growing number of young people are aware of the importance of technological and digital skills. For example, most expect that people who are better skilled in computer science are more likely to have successful careers.

Technological progress affects the demand for education and training and the way these are provided. In fact, a traditional model of schoolingis being challenged in many ways, including the basic definition of "education". The common perception that college students are all young adults who enrol in a 4-year college upon the completion of high school is no longer correct. "For the last 30 years, close to a third of students officially registered in post-secondary institutions have been over the age of 30, and they have pursued various types of professional credentials that include, but are no longer limited to bachelor's degrees. These students enrol to study for many reasons, especially to become more effective or competitive in their current jobs. In the 21st-century economy, higher levels of educational attainment correlate to higher salaries" (Information Technology…, 2017, p.107). However, earnings can vary greatly

from field to field, so skills and field of training are an important currency in job markets. If workers take on a larger variety of jobs over their career, or if skill requirements shift (whether due to technology or other economic factors), they will need to learn a more diverse set of skills over time. This requires an educational system that provides access to continuing education relevant to the changing nature of work (Information Technology…, 2017, p. 107).

Digitalization of everything

Machines are "consuming" humans' job talents. And this does not concern only those jobs that are repetitive and require low-skill. Automation, robotics, algorithms and artificial intelligence (AI) have recently shown they can do equal or sometimes even better work than humans who are lawyers (https://www.bloomberg.com), sports journalists (https://www.poynter.org) and financial reporters (http://www.theverge.comreporting), psychological testers (https://www.newscientist.com), retail sales specialists (http://nypost.com); they can also dispense medicine (http://www.nbcnews.com) and even replace those who program software – that is, the creators of algorithms (http://www.computerworld.com) (Raine, Anderson, 2017).

Technologists and economists have promoted several policy and market-based solutions have to address the loss of employment and wage forecast. A key idea emerging from many conversations, including one of the lynchpin discussions at the World Economic Forum in 2016, is that changes in educational and learning environments are necessary to help people remain employable in the labor force of the future. "Among the six overall findings in a new 184-page report from the National Academies of Sciences, the experts recommended the following: the education system will need to adapt to prepare individuals for the changing labor market. At the same time, recent IT advances offer new and potentially more widely accessible ways to access education" (Raine, Anderson, 2017)".

All of these global trends evoke the following issues:

Educational needs.

- Which skills will be the most valuable for young students, and which for employed and unemployed adults seeking better jobs?
- What new kinds of primary, secondary, university, and continuing education strategies will enable workers to acquire the skills needed in the changing employment environment?

Education delivery.

- What is the best way to deliver education?
- How can traditional classroom models be augmented by online education, workplace apprenticeships, peer-to-peer education, and other models for optimal success rates?
- How might new approaches leveraging IT, such as gamification or simulation-based learning, be deployed to improve learning outcomes?

Educational tools.

- How can technology, including its use to provide education over the Internet, improve the access and quality of education and workforce preparation for all?
- Let us at least refer to some of these in the following descriptions of the current situation in education systems.

Skills of the future

There are many great propositions of new sets of skills & competences which may create scenario of future change in skills activism – the way technological innovation drives the automation of professional work, leading to large-scale job losses and political pressure prompting an extensive government-led skills agenda. Even these days, the common expectation is that those with advanced computer science skills are more likely to have successful careers – reaching 68% in China and falling to 58% in Australia (Infosys, 2016).

If we look at the issue of future skills we can start from mentioning the ILO definition of employability which encompasses:

> […] the skills, knowledge and competencies that enhance a worker's ability to secure and retain a job, progress at work and cope with change, secure another job if he/she so wishes or has been laid off and enter more easily into the labor market at different periods of the life cycle. Individuals are most employable when they have broad-based education and training, basic and portable high-level skills, including teamwork, problem solving, information and communications technology (ICT) and communication and language skills. This combination of skills enables them to adapt to changes in the world of work (ILO, 2005).

We may stress that technological changes are not revolutions but rather constantly changing structures. Therefore, the most important skill of the future, a *meta-skill*, will be the ability to adapt to changes. In a recent report of Pew Research, L. Raine and J. Anderson (2017) argue further that:

> […] ability to adapt is what distinguished Homo sapiens from other species through natural selection. As the rate of technological innovation intensifies, the workforce of the future will need to adapt to new technology and new markets. The people who can adapt the best (and fastest) will win. This view means that any given set of skills will become obsolete quickly as innovations change the various economic sectors: precision agriculture, manufacturing 4.0, precision medicine, just to name a few. Therefore, the challenge is not only to teach skills, but also how to adapt and learn new skills (Raine, Anderson, 2017).

Thus, those who are not motivated to continue to expand their knowledgeand grow will be left behind. Therefore the first step is "learning to learn". This approach is all about acquiring the knowledge, skills, and aptitudes which enable individuals to set, plan and reach their own education goals and become independent, autonomous students. It allows young people to meet the demands of lifelong learning. They become self-directed learners and rely on their own capacities; therefore, the "learning to learn" strategies are about exploring what you know, what you do not know, and what to do about it. This approach involved knowledge of studying strategies, practice and attitudes, which are all interrelated. The youth will not acquire knowledge on information retrieval or effective reading strategies if they are not motivated to learn. They cannot develop positive attitudes towards lifelong learning or become self-directed learners if they do not perceive themselves as capable of succeeding in learning tasks. Skills and habits are important since developing better learning strategies takes time and requires training opportunities. Companies are looking for knowledge workers who take responsibility for their own professional development – lifelong learning is a duty for workers and it is a key element to being successful.

Despite lifelong education we will see the rise of the so-called *self-directed education*, where the learner will be aware of *how* to learn, *what* to learn, *for whom* to learn and *what needs* to be learnt.

In an online short article (2016), Gwen Moran quotes Antonia Cusumano, a people & organization leader at consulting PwC, who argues that learners also need to turn to more dynamic resources:

> You're going to have 10 minutes on your bus ride home when you're commuting. You're going to pull up an app from one of the many businesses out there that are doing these mini-clips of video learning. I'd like to learn 10 minutes on C++ so that I can brush up on my coding. You're going to see learning shift to these little mini bite-sized chunks of information that you can get on the go and when you need it and at any given time (Moran, 2016).

Despite the impact of technology that enhanced every aspect of our life and work, the most vital skills will not be easy to teach, learn or evaluate in any education or training setting available today. "Tough-to-teach intangible skills, capabilities and attributes such as emotional intelligence, curiosity, creativity, adaptability, resilience and critical thinking will be most highly valued. That is why learners must cultivate 21st-century skills, capabilities and attributes (Raine, Anderson 2017)". That is why there are calls for a transition from professional practice to volunteerism, from learning to co-workingin cooperative learning. The Corporation for National and Community Service, a federal agency that promotes volunteerism, tracked "more than 70,000 jobless people between 2002 and 2012, and found that those who volunteered had a 27% better chance of finding a job than those who did not" (Does Volunteering Increase…, 2013, p. 1). In this regard, it has been observed that:

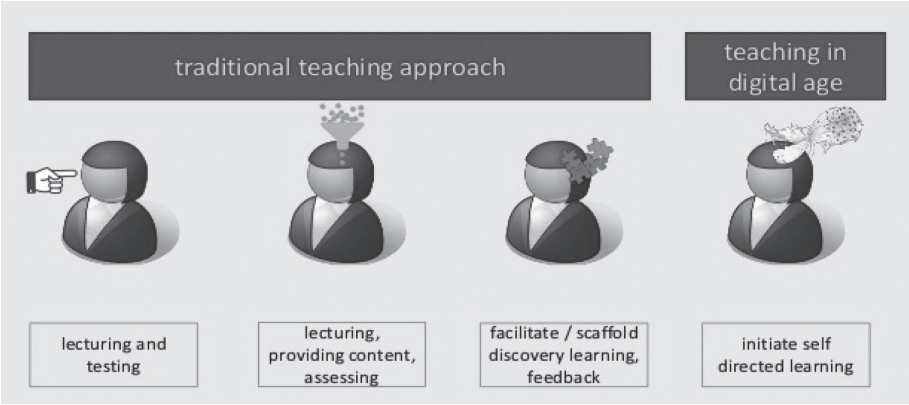
> The most important skills to have in life are gained through interpersonal experiences and the liberal arts. … Human bodies in close proximity to other human bodies stimulate real compassion, empathy, vulnerability and social-emotional intelligence. These skills are imperative to focus on, as the future is in danger of losing these skillsets from the workforce. Many people have gained these skills throughout history without any kind of formal schooling, but with the growing emphasis on virtual and digital mediums of production, education and commerce, people will have less and less exposure to other humans in person and other human perspectives. (Avent, 2016).

It is, however, very difficult to predict specific future skills needed for different components of the workforce; we can only try to present here the three areas of capabilities that can be emphasized:

- general adaptability, as evidenced by critical thinking and flexibility of the learning approach;
- capacity for lifelong learning
- social, "human" skills.

All these crucial trends will force modern society to change the traditional teaching and create a new model of education (see Figure 1).

Figure 1. Teaching approaches



Source: https://www.slideshare.net/AndreaLiner/national-event-sig-eportfolio-2016- keynote, (last accessed: 25.11.2017).

On-line education

Although recently we wereable to observe withdrawal from blended learning or e-learning as the only mean of holistic teaching, there are still very vivid smaller forms (courses, trainings, speeches, practices… etc.) of this approach of acquisition.

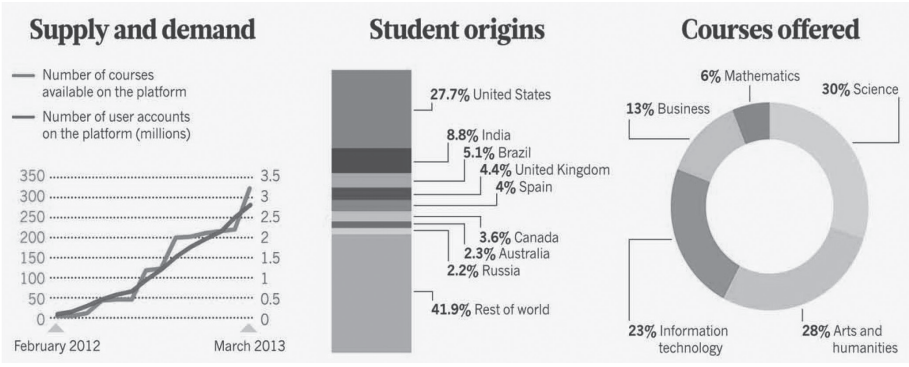
"Traditional models of higher education and training have been steadily augmented by technology for years, from the introduction of overhead projectors to current video streaming and real-time remote meeting technologies such as Google Hangouts or Skype. IT tools such as Webex, BlueJeans, GotoMeeting, Piazza, and Blackboard can be used by college faculty to record and distribute course content, often with asynchronous file exchange and chat features, to remotely located students. With the general availability of high-speed networks to people's homes, universities are now able to stream lectures to students across the world, and students can communicate with instructors and each other via the network. This new mode of online education with many students is called *a massive open online course* (MOOC) (Information Technology…, 2017, p. 31)".

"Online education is not new, but the rise of massive open online courses (MOOCs) from 2012 represented the first wave of disruptive change for educators. While the early MOOCs are certainly massive, they are not selective,

they do not carry academic credit, they are not particularly innovative in curriculum design, and they take no responsibility for learning outcomes but rather rely on their partner organizations for this. As the first wave of change hit, universities globally raced to adopt new technologies, with many universities developing purpose-built platforms to enable curriculum innovation in assessment and curriculum design. We are about to experience MOOC mark two, and while the US may have dominated the early MOOCs, the large Asian markets have shown great interest in the capacity for MOOCs to offer a cost-effective alternative for large populations previously without access to higher education. China and India are the economic powerhouses of the future and they certainly have the scale, energy and potential to become a digital laboratory and growth engine for the world" (den Hollander, 2015, p. 229).

For example, within over a little more than just a year Coursera, based in Mountain View, California – the largest of three companies developing and hosting massive online courses (MOOCs)- has introduced 328 different courses from 62 universities in 17 countries. The platform's 2.9 million registered users come from more than 220 countries.

Figure 2. MOOCs rising



Source: https://www.scientificamerican.com/article/massive-open-online-courses-transform-higher-education-and-science/, (last accessed 25.11.2017).

In the recent report, it has been argued that:

> The analogy with music is useful in understanding the impact of MOOCs on higher education. Since the invention of the gramophone, music lovers have seen the quality of sound as a primary goal. With the advent of iPods and smartphones, the focus shifted inexorably to accessibility – the particular songs

> we want, when we want and where we want to hear them have taken precedence over quality. Once the iTunes business model took hold, it fundamentally changed how people think about and buy music. MOOCs are the iTunes of education; they won't replace a quality campus-based education but they can provide all those with access to an internet connection with the opportunity to learn from the most charismatic teachers at the world's highest ranking universities with no travel costs, no accommodation costs and no fees. In the space of two years, online education has gone from poor relation to cutting edge, from drab and second best to sexy and 'must have' (den Hollender, 2015).

MOOCs present wonderful opportunities for universities to contribute to the megatrends like automation, Big Data and customization. They enable truly international "cloud classrooms" and cross-cultural learning (Deloitte, 2015). Therefore, we can expect the evolution of the training ecosystem with a mix of innovation within all education formats. We can also expect that companies will not pay for reskilling, and we do not have the political power to tax them at the level needed for public investment in such an activity. Therefore, MOOCs are an obvious cheaper alternative:

> We will definitely see a vast increase in educational and training programs. We will also see what might be called on-demand or on-the-job kind of training programs. They provide students with an opportunity to 'try before they buy', get customized feedback from peers and only engage when they want." (Reine, Anderson, 2017).

An online article of Pew Research Center, features a quote by Fredric Litto, a professor emeritus of communications and a long-time distance-learning expert from the University of São Paulo, where he claimed that:

> There is no field of work that cannot be learned, totally or in great part, in well organized and administered online programs, either in traditional "course" formats, or in self-directed, independent learning opportunities, supplemented, when appropriate, by face-to-face, hands-on, practice situations. This matters because we are now in the transitional stage of employers gradually reducing their prejudice in the hiring of those who studied at a distance, and moving in favor of such 'graduates' who, in the workplace, demonstrate greater proactiveness, initiative, discipline, collaborativeness – because they studied online. (Raine, Anderson, 2017).

To sum up, we realize that across countries, substantial changes in skill needs are challenging education and labor market policies as well as institutions, and contributing to skill mismatches and shortages. For example, across most G20 countries, large numbers of employers complain that they cannot find

workers with the skills that their businesses require. At the same time, in many countries a number of college graduates face difficulties in finding job opportunities matching their qualifications and their competences, and many lower skilled workers find increased competition for employment.

Consequences of innovations for the traditional model of education: post-primary schools and universities

Developing core employability skills and ensuring lifelong learning for all presents major challenges for education and training systems. Let us try to look at them from the perspective of some stages of education.

Secondary school

> It is crucial to ensure quality basic education; change learning practices to equip people for work, with more emphasis on learning by doing, working in teams and thinking creatively; and developing reliable and efficient assessment methods so the skills developed are recognized by employers. Primary and secondary education of high quality, complemented by relevant vocational training and skill development opportunities prepare future generations for their productive lives, endowing them with the core skills that enable them to continue learning (Enhancing employability, 2016, p. 19).

> Secondary school is an important channel through which young people acquire skills that improve opportunities of life. High quality secondary education that caters for the widest possible range of abilities, interests and backgrounds is vital to set young people on the path to the world of work, as well as to give countries the educated workforce they need to compete in today's technology driven world (Enhancing employability, 2016, p. 19).

> Lower secondary school extends and consolidates the basic skills learned in primary school; upper secondary school deepens general education and adds technical and vocational skills. Neither is possible, however, without ensuring that all children complete a good quality primary education as the first priority in building the skills those individuals, societies and economies need (Enhancing employability, 2016, p. 19).

Various methods have been included in modern teacher training to enhance the learning process of skills such as teamwork, advanced communication, critical thinking and problem-solving. One is interactive teaching through which instructors facilitate exercises that provide opportunities for experience, practice, reinforcement, and reflection. This approach requires skilled

instructors and a well-designed curriculum, but has the disadvantage that the exercises, no matter how well designed, lack the authenticity of the real workplace. Referring yet to the diagnosis of a secondary level of educational systems we should mention that:

> Given the evidence on the success of innovative quality secondary education and training in transmitting core skills for employability, more needs to be done to get young women and men into secondary education and help them complete it. An estimated 130 million young people lack the basic reading, writing and numeracy skills needed in everyday life. Many are emerging from education without these basic skills, making it difficult for them to obtain the technical skills needed to compete in the labor market or transition into secondary school. In addition, they are unlikely to have the knowledge or skills to get good jobs, to fully understand the elements of a healthy lifestyle or to negotiate business and legal systems (Enhancing employability, 2016, p. 23).

Access to education still remains a problem for many children. As of 2010, 71 million children of lower secondary school age were still out of school either because they had not completed primary school or could not make the transition to lower secondary school (UNESCO, 2010, p. 9). Within this context we should realize that for a part of adolescents the education system is not adjusted to their needs, and the quality of their basic education is insufficient to allow an easy transition; for others, their families simply cannot afford it due to high fees or, in case of those already working, due to low income. Below we present some suggestions regarding the possible improvement of such situation:

- make education affordable,
- reform policies that deny girls' participation,
- expand geographical outreach – distance education,
- assign an academic advisor responsible for supporting and monitoring student's progress,
- bring the classroom to the workplace,
- bring the workplace to the classroom.

Universities

Despite having a broadly positive view of education, significant number of young people across all markets questions how well did their academic experiences equip them for a career. Half of young people in Germany, Australia, and the USA believe that their educational experience did not prepare them for

whatever they shall expect from working life (Infosys, 2016). What is worse, over 40 percent of European employees claim that their level of skills and qualifications is higher than the lower skill jobs that they applied for or which they actually do.

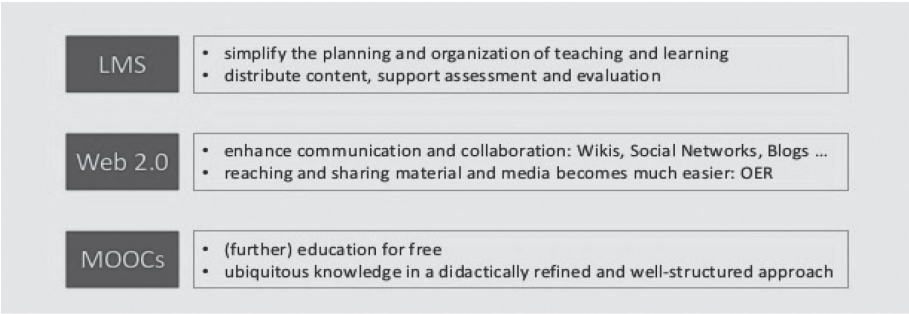
Writing on higher education, one should also highlight that higher education used to be a privilege reserved for the elite, but since the 1970s, this has changed once and for good. "Globally, the number of students enrolled in higher education is forecast to rise from 99.4 million in 2000 to 414.2 million in 2030, an increase of 314 per cent" (den Hollander, 2015, p. 227). The massification of university education is a global phenomenon. Towards the end of the last century, Clark Kerr (1982), an exceptional president of the University of California, wrote: "everything else changes, but universities mostly endure" (den Hollander, 2015, p. 227). "Kerr had calculated that since 1520, there were 85 institutions still in existence, all with similar functions and unbroken histories: the Catholic Church; the Parliaments of the Isle of Man, Iceland and Great Britain; several Swiss cantons and around 70 universities. Kerr (1982) reflected that those 70 universities were still in the same locations (often the same buildings), their professors and students were doing much the same things, their governance was much the same and they were producing essentially the same product" (den Hollander, 2015, p. 226). Comparing to current situation we may conclude that colleges and universities are now confronting transformational change in terms of their function in society, their business models and, importantly, a reassessment of the value they deliver to the communities they serve.

> The age-old established models of operation are being questioned in every corner of the globe. The second decade of the 21st century may well debunk Kerr's observation, albeit for some of us it is considered foolhardy to write off universities so quickly (den Hollander, 2015, p. 226).

Each painful turn of the civilization wheel from agrarian era to industrial one, and eventually to digital breakthrough has seen universities grow and prosper by aligning to national and international workforce needs. To be successful, universities need to adjust to a new world. The world where globalization and digitalization of knowledge caused human capacity and access to information to increase dramatically faster than ever before and where we have become witnesses of students who are educated for jobs that do not yet exist.

"Universities are now operating in the age of Google. The internet is the primary platform for creating and sharing information, and universities are no longer the gatekeepers of knowledge. Consumers of information are not passive observers but active contributors who co-create knowledge, evolve markets, have opinions, and influence elections and hence governments" (den Hollander, 2015, p.229). Therefore, let us look at Figure 3 below, which shows the main form of ICT-based education in higher education.

Figure 3. Higher education ICT-based education forms



Source:https://www.slideshare.net/AndreaLiner/national-event-sig-eportfolio-2016-keynote (retrieved: 10.03.2018).

The on-line education model forces competition, although the university's position, adjusted for rapid changes, will remain unchallenged. In the CEDA report (2015), it is noted that the Stanford professor Susan Holmes briefly stressed the conclusions of many in the last years:

> I don't think you can get a Stanford education online, just as I don't think Facebook gives you a social life. (CEDA, 2015).

In the above-mentioned online article of Pew Research Center, it is reported that Uta Russmann, communications/marketing/sales professor at the FHWien University of Applied Sciences in Vienna, said that:

> In the future, more and more jobs will require highly sophisticated people whose skills cannot be trained in 'mass' online programs. Traditional four-year and graduate programs will better prepare people for jobs in the future, as such an education gives people a general understanding and knowledge about their field, and here people learn how to approach new things, ask questions and find answers, deal with new situations. (Raine, Anderson, 2017).

A life-cycle influenced by technological modernization

Skill development can fruitfully be viewed from a life-cycle perspective of building, maintaining and improving skills. Policy interventions need to be designed accordingly.

The essential stages can be summarized as follows:

- Children: building important foundation skills through early childhood and initial education, keeping in mind that the benefits of these investments will be reaped in the longer term.
- Young people: consolidating the foundation skills, gaining important workplace skills and experience for a successful transition from school to work.
- Mature and older workers: maintaining and upgrading existing skills and gaining new abilitieswhile also certifying the skills and competencies acquired in the working life.

Thanks to technology we will change learning from a passive to an active, dynamic experience. VR (Virtual Reality) and gamification techniques will come together to create powerful new learning environments capable of personalizing and accelerating learning across a broad range of fields. It is expected that people who enter into the labor market today will pursue four or five different careers (not just jobs) over their lifetime. These career changes will require retooling, training and education:

> The adult learners will not be able to visit physical campuses to access this learning; they will learn online. I expect that we will see the further development of artificially intelligent teaching specialists such as 'Jill Watson' at Georgia Tech (https://pe.gatech.edu/news/11102016/meet-jill-watson-georgia-techs-first-ai-teaching-assistant), the virtual graduate assistant who was thought to be human by an entire class of computer science students. I anticipate the further development and distribution of holoportation technologies such as those developed by Microsoft using HoloLens (https://en.wikipedia.org/wiki/Microsoft_HoloLens) for real-time, three-dimensional augmented reality. These teaching tools will enable highly sophisticated interactions and engagement with students at a distance. They will further fuel the scaling of learning to reach even more massive online classes. (Raine, Anderson 2017).

Nowadays, a growing number of educators are facing new technology-based paradigms such as cloud computing and big data. Indeed, many companies offer disk storage and computing as a service over the Internet. For

example, companies like Dropbox and Box offer the ability to store data in the cloud (i.e. on their servers via the Internet). Learners should have the ability to understand, manage and manipulate data, as well as to find meaning and value in data combined with the problem, condition, or opportunity of outlining the data. Simply put, the greatest skill will be the ability to think through the cloud of facts, data, experience and strategic direction that products and services require. The challenge of the new education would be not to be informed - but educated and learned.

Furthermore, the Internet of Things (IoT) will increasingly influence the education process. IoT will further accelerate the trend toward digitization of everything, making it possible for the Internet to serve as a communication tool for capturing, sharing, and acting on even more digital information. Experts are persuaded that:

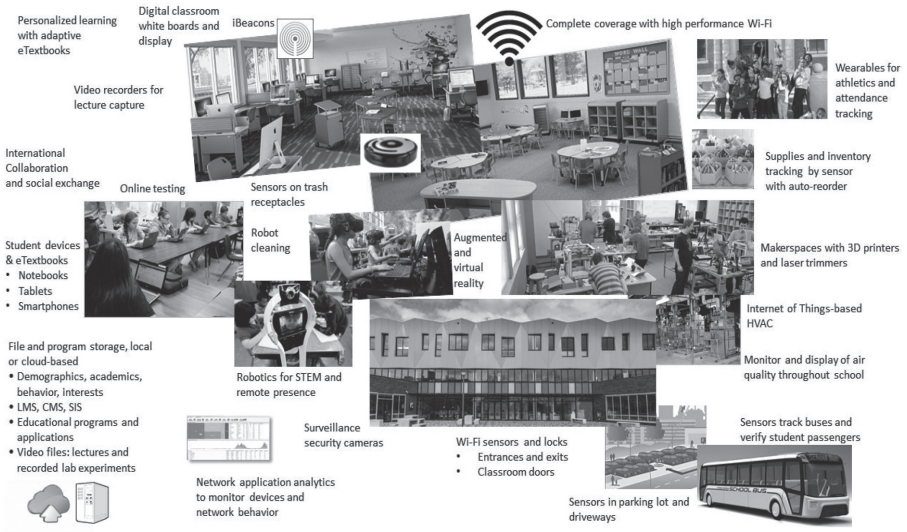
> By the year 2020, it is predicted that more than 50 billion connected devices will be on the Internet. If Facebook has its wish of connecting the other two-thirds of the world, this number could be predictably higher (Cajide, 2016).

It is expected that IoT will spread in education, allowing the construction of "intelligent instructional environments, to enrich experimental teaching, to assist educational management and to extend educational activities outside classroom." (Li Lu-yi, Zheng Yan-lin, 2010).

Predicted positive consequences of using Internet of Things are: students will probably learn faster and teachers will be able to do their job more efficiently; in parallel, however, it will be necessary to "drive the digital strategy and appropriately budget and allocate funding to create these products and products related to smart schools." (Cajide, 2016).

The concept of smart school is arousing the interest (and sometimes the concern) of researchers and educators.

Figure 4. Future digital school. Smart Internet of Things Schools



Source: Popa. B., Popa, D.A. (2015). The influence of the ICT and IoT in the teaching systems. Conference Paper (PDF Available). May 2017 with 269 Reads. Conference: New innovative approaches in teaching, At Vidin, Bulgaria. https://www.researchgate.net/publication/324454191_The_influence_of_the_ICT_and_IoT_in_the_teaching_systems (retrieved: 20.10.2019).

In some Finnish educational experiments as school without subjects and classrooms, maybe in near future without physical teachers we will be observing a large number of innovations in order to reach the most effective, as well as the friendliest didactic approach towards the students. As Barry Chudakov, founder and principal at Certain Research and Stream Fuzion Corp., predicted, education has been liberated because, thanks to digital innovation, everyone can embed learning in their everyday lives in a continuous way:

> The key to education in the next 10 years will be the understanding that we now live in a world without walls — and so the walls of the school (physical and conceptual) need to shatter and never go up again. In the (hopefully near) future, we will not segregate schooling from work and real-world thinking and development. They will seamlessly weave into a braid of learning, realization, exposure, hands-on experience and integration into students' own lives. And, again, the experience of being a student, now confined to grade school, secondary school and university, will expand to include workers, those looking for work, and those who want or need to retrain – as well as what we

> now think of as conventional education. One way we will break down these walls – we are already doing so – will be to create digital learning spaces to rival classrooms as 'places' where learning happen[s]. Via simulation, gaming, digital presentations – combined with hands-on, real-world experience – learning and re-education will move out of books and into the world. The more likely enhancement will be to take digital enhancements out into the world – again, breaking down the walls of the classroom and school – to inform and enhance experience (Raine, Anderson, 2017).

Conclusion

Social media gives university very important opportunities for a lifelong engagement: from future student to undergraduate or postgraduate to alumni. Forrester Research Principal Analyst, Julie Ask, advises smartly that organizations "think of being big mother and being helpful rather than big brother and creepy" (Mc Carthy, 2014). Other academic observers, Gallagher and Garrett, point out that technology-enabled higher education requires a mind set change (Gallagher, Garrett, 2013), for which universities must focus more strongly on what their students want and what employers are looking for in alumni.

It is obvious that technology is as important today in business as a well-defined strategy, business model or organizational culture. It is not enough to be able to manage it alone, but knowledge of technology is also critically needed. Japan at the time of the economic boom of the 1980s had as many students of technical majors as the United States, a country several times larger. The development of new technologies, including automation, means that students and graduates of technical faculties are still very valuable in many fields. But we also have to admit that governments, businesses and individuals alike are increasingly concerned with identifying and forecasting skills that are relevant not just today but that will remain or become so in the future to meet business demands for talent and enable those that possess them to seize emerging opportunities. It is clear that even if today's skill base would conform exactly to today's perceived skill requirements, the looming change would be substantial. In practice, however, we will see exactly in future which skills and competencies will really play the decisive role and take place, because – to put it simply - it is the future that will decide about it.

Within such a dimension of future skills, the academic staff is becoming more and more important for the future of universities, especially for technical faculties, including IT. Following1989, for instance, the number of students in Poland increased several times, but the academic staff at the universities remained virtually unchanged. As a result, higher education institutions, just like commercial companies, must take care of their employer branding, benefit programs and the development of career paths for lecturers. If they are able to offer a valuable proposal for the best people, it will also translate into the quality of education.

Abstract: The article was based on a part of a wider report entitled "The future of the labor market - issues and possibilities" prepared by a group of social politicians from WSP Korczak Pedagogical University in Warsaw together with an international team of partners as part of the "Transformers for the future Labor Market" project (EUSBSR – EU Strategy for the Baltic Sea Region). The article itself is a brief insight into the situation of education, and especially higher education from a global perspective, which has found itself in the context of technological and civilization challenges of recent years, especially its electronisation and globalization through the Internet and the latest information tools as well as communication. The authors try to capture the most important challenges and relationships in relation to teaching and education's innovations as on-line teaching, internet of things, education based on ICT, modern school. The context of necessary changes in the educational market and cultural and mental changes in relation to civilization challenges are also discussed.

Keywords: higher education, on-line education, internet of things, ICT-based education, modern school, innovations

Streszczenie: Artykuł powstał w oparciu o fragment szerszego raportu pn. "Przyszłość rynku pracy – zagadnienia i możliwości" przygotowanego przez grupę polityków społecznych z WSP im. J. Korczaka w Warszawie wraz z międzynarodowym zespołem partnerów w ramach projektu "Transformers for the future labour market" (EUSBSR – EU Strategy for the Baltic Sea Region). Sam artykuł jest krótkim wglądem w sytuację edukacji, a zwłaszcza szkolnictwa wyższego w ujęciu globalnym, w jakim znalazło się w kontekście wyzwań technologiczno-cywilizacyjnychostatnichlat, zwłaszcza jego elektronizacji i wpływów globalizacji za pośrednictwem internetu i najnowszych no-

śników informacji. Autorzy próbują uchwycić najważniejsze wyzwania i relacje w odniesieniu do nauczania i edukacji: nauczanie on-line, internet rzeczy, edukacja oparta o ICT, nowoczesna szkoła. Poruszony jest również kontekst koniecznych zmian na rynku edukacyjnym oraz przeobrażeń kulturowo-mentalnościowych w związku z wyzwaniami cywilizacyjnymi.

Słowa kluczowe: szkolnictwo wyższe, edukacja on-line, internet rzeczy, ICT, nowoczesna szkoła

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