

Competences 4.0 – How to Educate People Today to Live and Work in the World of Tomorrow?

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ABSTRACT

The 4th industrial revolution, also called 4.0 revolution, defined by full automatization of production processes alongside with the rapid development of big data, artificial intelligence, the Internet of things and increasing computing power on an unprecedented scale, will cause substantial changes in all aspects of social life worldwide and consequently will require redefinition of our approaches to education. This article discusses what competences, or the so-called competences 4.0, will be mostly needed in order to function effectively in this new reality.

1. INTRODUCTION

The fourth industrial revolution (also referred to as the revolution 4.0), characterized by automation, increased use of artificial intelligence, robotics, 3-D printing and blockchain shapes nowadays the labor market and the world of education. According to the World Economic Forum 2017 in the future up to 47% of jobs may be automated away [1]. For the first time in history, machines can see better than humans can, read street signs, and even diagnose cancer [2]. In consequence low-skilled jobs are automated and at the same time, new, high-skilled ones are created. This puts unprecedented challenges on the systems of education that need to rapidly equip learners with competences relevant to live and work in the digitalized world, including well developed technological skills, media literacy, creativity, social intelligence, critical analysis, virtual collaboration or intercultural skills [3]. Accordingly, one must draw the following conclusions which will constitute the underlying assumptions of our further discussion:

- (1) New jobs require new competences. However, new competences are not understood here as something literally new since, as stated before, we do not know exactly what new jobs will be like. They are understood as a specific set of the competences we already know and we assume that this set of the competences will help our learners to get prepared and survive in the new professional and social context.
- (2) The development of new competences must be also understood in the broader framework of lifelong learning concept since we also need to include the issue of upskilling of those who are already functioning on this fast-changing labor market.
- (3) Since service and production processes are becoming more and more complex and based on fast developing and sophisticated algorithms, future workers on different levels of social structure will need interdisciplinary competences.
- (4) The above-mentioned sophistication will require from future workers not only hard skills connected directly with the profession they are going to perform but also the so-called soft skills enabling them to communicate and cooperate effectively both with other workers, but also with machines. New professional challenges will require the engagement of different mixes of competences, which in practical terms will mean the cooperation of people whose competences are complimentary and suitable for new tasks defining new jobs.

2. COMPETENCES OF THE FUTURE

Before going into detail, it is worth mentioning the general typology of the forms of education [4]:

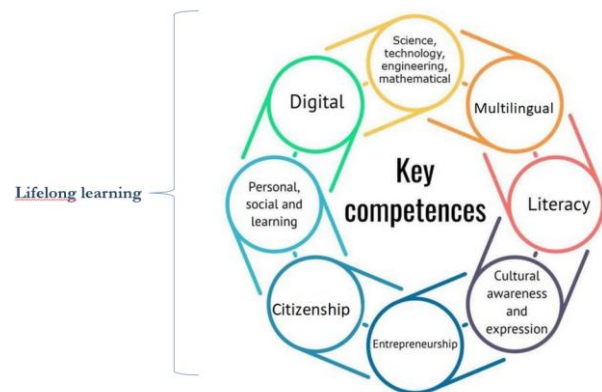
- (1) Formal education – school and university education where mainly, but not only, knowledge and hard professional skills are developed. This education is compulsory under a certain age, is provided by both public and private schools that follow a curriculum and is concluded by state exams.
- (2) Non-formal education – short forms of out-of-school education such as in-service professional training needed for a quick update of competences and skills in the place of work. This type of education is voluntary and takes place in free time, is provided by both public and private educational institutions and is concluded with exams and certification.
- (3) Informal education – education taking place in relation with others, especially the development of the so-called soft skills such as ability to communicate on different levels, cooperate and solve problems together in a creative way. This type of education is voluntary and sometimes unconscious.

It must be stressed at this point that in order to prepare students for future jobs we not only need to equip them with the suitable set of competences relevant for their future professional life but also, we need to provide them with an effective educational context in which they are educated. Namely, they need experiences within all three above-mentioned areas of education. Moreover, all these three areas are equally important and they form a coherent ecosystem for the development of the competences in question.

In addition, and in contradiction to general contemporary approach that future education should deal mainly with the development of practical skills and not gaining sheer knowledge or learning facts which can be easily obtained from the Internet [5], the authors of this article advocate the following model of skills acquisition and competences development, based on both Kolb's experiential learning and revised Bloom's taxonomy [6] [7]:



Putting all already discussed threads together, the following model of future key competences, proposed by the Council of the European Union, seems most plausible and relevant [8]:



Literacy:

ability to identify, understand, express, create, and interpret concepts, feelings, facts and opinions in both oral and written forms, using visual, sound/audio and digital materials across disciplines and contexts. It implies the ability to communicate and connect effectively with others, in an appropriate and creative way.

Multilingual competence:

ability to use different languages appropriately and effectively for communication. It broadly shares the main skill dimensions of literacy: it is based on the ability to understand, express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing) in an appropriate range of societal and cultural contexts according to one's wants or needs.

Mathematical competence:

The ability to develop and apply mathematical thinking and insight in order to solve a range of problems in everyday situations.

Competence in science:

The ability and willingness to explain the natural world by making use of the body of knowledge and methodology employed, including observation and experimentation, in order to identify questions and to draw evidence-based conclusions

Digital competences:

Involve the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions and problem solving.

Personal, social and learning to learn competences:

Ability to reflect upon oneself, effectively manage time and information, work with others in a constructive way, remain resilient and manage one's own learning and career. It includes the ability to cope with uncertainty and complexity, learn to learn, support one's physical and emotional well-being, to maintain physical and mental health, and to be able to lead a health-conscious, future-oriented life, empathize and manage conflict in an inclusive and supportive context.

Citizenship competence:

Ability to act as responsible citizens and to fully participate in civic and social life, based on understanding of social, economic, legal and political concepts and structures, as well as global developments and sustainability.

Cultural awareness and expression competences:

Involves having an understanding of and respect for how ideas and meaning are creatively expressed and communicated in different cultures and through a range of arts and other cultural forms. It involves

being engaged in understanding, developing and expressing one's own ideas and sense of place or role in society in a variety of ways and contexts.

Entrepreneurship:

Refers to the capacity to act upon opportunities and ideas, and to transform them into values for others. It is founded upon creativity, critical thinking and problem solving, taking initiative and perseverance and the ability to work collaboratively in order to plan and manage projects that are of cultural, social or commercial value.

3. EDUCATIONAL POLICY IMPLICATIONS

In the light of what has already been said, the following policy implications for future education are suggested:

- (1) Educational systems have to prepare young people for the jobs of the future by ensuring that they are equipped with the right type of skills to successfully navigate through an ever-changing, technology-rich work environment, and give all workers the opportunity to continuously maintain their skills, upskill and/or reskill throughout their working lives.
- (2) Labor market should be designed in such a way so that it could encourage employers to seize the opportunities offered by technological change and globalization, while making sure that the risks are not borne disproportionately by workers in the form of low pay, precariousness and poor working conditions.
- (3) Training and acquiring of new skills shall not only be provided within the formal education systems, but also, through non-formal and informal education schemes, with an increasingly important participation of employers, offering trainings and apprenticeships providing job-specific knowledge.

(4) New forms of social dialogue between the world of education and employers must be promoted, which will allow tailored solutions to new challenges to emerge at the firm-level, while strengthening the voice of those workers who are increasingly working independently and separated by distance, language and legal context.

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