Digital Education as a Strategy for the Protection of Intellectual Property Rights

Cristina LAZARIUC*

Abstract

The spiritual, scientific and cultural potential of society have always been the driving force of sustainable development, which determines the economic competitiveness of any state. Today we are witnessing a race of "digital armament", in which human rights are becoming less and less valuable, including intellectual property rights, which are systematically subjected to cyber-attacks by "data thieves". In this race, both IT giants and users with a high degree of digital literacy are driven by the maxim "purpose excuses the means", namely they admit that they may violate the limits of privacy, the limits of the principle of confidentiality, the limits of data integrity, the safety of persons, the limits of private property, including intellectual property, and all these in the name of profit. Under these conditions, the development of an efficient ecosystem for guaranteeing intellectual property rights, adapted to meet the challenges of the digital economy, requires both a strengthened regulatory environment and better competences. In this context, this article aims to address digital education, both as a mandatory requirement and objective to be achieved in the process of human adaptation to the challenges of the digital revolution, and as a strategy, whose concrete steps would ensure better protection of intellectual property rights, through the digital competences it forms.

Keywords: digitalization, digital economy, digital skills, ICT, OER.

JEL Code: I21, I23, I25, I28, O34

1. Introduction

In the past, two great inventions have profoundly changed culture and the transmission of knowledge: writing and printing. Today, a new innovation is

─────────────
*Cristina LAZARIUC is university lecturer at Technical University of Moldova, Chisinau, Republic of Moldova. E-mail: cristina.lazariuc@ssu.utm.md

revolutionizing knowledge and relationships in every society, namely, *digitalization*. Today we talk about the digital revolution not only as a simple concept, but also as a reality that involves and affects us every day, regardless of the country or continent where we come from, whether we want it or not. On the one hand, the digital revolution, has widened access to information and communication resources, making them available to an increasing number of individuals, and on the other hand, it has concentrated certain resources in the hands of interest groups. Thus, even if the number of users who have some access to development resources is constantly increasing, the number of those who can concentrate a critical mass of these resources and can control them is decreasing. Therefore, if previously it was considered that whoever has the information has the power, in the new circumstances, this maxim should be reformulated as follows: whoever has the critical mass of information, has the power: of decision, of governance and of control.

So, we live in a world that is built around us continuously, including a multitude of interconnected devices, a grandiose infrastructure that communicates with both vehicles and human users, ensuring efficiency, speed, resilience, adaptability, interaction, interdependence, cooperation, development, innovation, but also facing multiple data security issues, still unresolved. If we can barely intuit some of these problems, others, however, are part of our daily life, affecting both our public and private life, both the results of professional activity (products, services) and future projects, in particular, those which refer to intellectual property. Technology changes rapidly, making previously secure systems progressively less secure. For these reasons, the need to create highly reliable software so that the new infrastructure does not become a gateway for unauthorized and malicious people becomes vital.

Under these conditions, as a shield against the dangers of the information boom is the information itself, transformed into a system of knowledge, skills, attitudes and competences, cultivated and refined as a result of the education process, including the digital one. This article discusses the opportunities and challenges involved in delivering digital education. Based on these findings, the main aim of this paper is to approach *digital education* as a strategy for the protection of intellectual property rights, through which users of the virtual

environment become aware of the vulnerabilities of this environment and able to face them. In this sense, in the following, we aim to reflect on the phenomenon of *digitization*, both in terms of advantages, opportunities, perspectives and vulnerabilities, which, not being overcome, generate obstacles and challenges in daily human activity. We also undertake the analysis of the specifics of *digital education*, both as a mandatory requirement and objective to be achieved in the process of human adaptation to the challenges of the *digital revolution*, and as a strategy, whose concrete steps would ensure better protection of intellectual property rights, through the competences it forms. The need for such an analysis is underlined, on the one hand, by the transformations with galloping rhythms in the field of technology and, on the other hand, by the increasing importance that the resources of digital technologies have in our daily activity.

2. Digit(al)ization and digital education: defining concepts of the 21st century

Currently, *digitalization* and *digital education* are two concepts that define the specifics of the 21st century realities. According to the DEX, "digitalization" means the act of *digitalizing*, which means "converting analog signals into digital signals". Although confusions are quite common, *digitization* is not identical in meaning to *digitalization*. If *digitization* involves a set of processes by which a physical format is converted to a format compatible with the computing system, *digitalization* is the use of technology to store and process, search and retrieve information between online users. Therefore, digitizing a domain does not mean digitalizing that domain. In a nutshell, digitization refers to information, while digitalization refers to processes. Ainslee J. claims that *digitization is the integration of digital technologies into everyday life by the digitization of everything that can be digitized*. Indeed, today we are witnessing a phenomenon of oversaturation of both scientific and everyday language, with "digitized" terms, such as *digital society, digital age, digital education, digital economy, digital competence, digital literacy, digital culture , digital system, digital development, digital transformation, digital strategy, digital communication, digital signature,*

digital platform, digital identity, digital television, digital library, digital Moldova, digital Europe, digital environment, digital world, etc.

Digitalization enhances and amplifies other factors of development, affecting all spheres of society, including education. The digital transformation in education is being driven by advances in connectivity; the widespread use of devices and digital applications; the need for individual flexibility and the ever-increasing demand for digital skills. The COVID-19 crisis, which has heavily impacted education and training, has accelerated the change and provided a learning experience. According to tech writer K. Utermohlen, the technology's impact will exist anywhere from Kindergarten through higher education, offering the opportunity to create adaptive learning features with personalized tools to improve the student experience (Utermohlen, 2018). Australian researchers S. Wills and S. Alexander, on the other hand, believe that technology, by itself, does not alter or improve teaching and learning. The key to the successful introduction of technology in education is to pay more attention to process management, strategy, structure and, most importantly, roles and skills. (Wills and Alexander, 2000. p.57).

In this context, C. McLaughlin define *digital education* as the innovative use of digital tools and technologies during teaching and learning. According to the European Commission Action Plan (2021-2025), there are two interrelated aspects to digital education: firstly, the deployment of the vast and growing array of digital technologies (apps, platforms, software) to improve and extend education and training and secondly, the need to equip all learners with digital competences (knowledge, skills and attitudes) to live, work, learn and thrive in a world increasingly mediated by digital technologies (European Commission, 2020). Thus, as the whole society changes, as a result of the deep implementation of information technologies, all industries and professional fields follow the same trend, and the academic environment is constantly concerned with bringing educational content closer to the requirements of employers, focusing primarily on improving graduates' digital skills.

3.Methodology

The research was conducted by examining the literature in the field of digital education, including EU official documents (*Agenda for Europe (2016);*

DigComp 2.0 (2016); Digital education Plan (2020-2021)) that set the main digital competences necessary for specialists to integrate and become competitive in the labor market of the EU Member States and not only. Also, the analysis of the digital competences' framework is examined in relation to the risks associated with the assumption by the Republic of Moldova, in the framework of the Open Government Partnership launched in 2011 by the USA, of the commitments on opening public data and waiving intellectual property rights, in order to encourage the creation of services and new products based on existing data in the Open Government Partnership launched in 2011 by the US. Finally, the research is carried out by combining the method of analysis in the approach to digital competences, as a goal of digital education, and the synthetic method focused on highlighting the relevance of promoting the development of digital skills, both individually and as a key to access and defense in the world of the future, for creators of intellectual property, as well as at the institutional level, in order to improve the way universities and public research organizations manage intellectual property and knowledge transfer.

4. Digitalization and digital education: challenges and perspectives

Today, in the context of the digital revolution, we are also talking about a new economy that needs the 5G network to be able to function, considered a vital technology for the next 20 years, with a high capacity for computing and data transfer. On the one hand, the new type of network will bring us closer, will make us more productive, more efficient, but on the other hand, this accessibility will make us more vulnerable, through the possibility of manipulating or even attacking our personal lives. For these reasons, it is necessary to carry out an in-depth analysis to anticipate the effects of the digitalization of the economy, especially given that new trends in the field of future work relate to technology, digitization, robotics and artificial intelligence.

Thus, when we analyze the social relevance of the digital economy, we find that the application of digital technologies can promote greater efficiency in the functioning of administrations, institutions, organizations in relations with citizens, creating opportunities for more participatory governance. Digital

technology has the particularity of accelerating progress, intensifying the production of goods, facilitating the storage, sorting and processing of data, making processes more reliable, eliminating distances and opening markets, reducing corruption by limiting human intervention, reducing budget costs, by changing the way of working, increasingly based on sharing and collaboration, facilitating the processing and circulation of information (Nabagné Kone, 2019). On the one hand, this revolution has a considerable influence, because it acts on the processes of production, launch, promotion, marketing, communication, socialization, knowledge transfer, wealth accumulation, professional growth, processes that lead to improved living conditions of populations. Today, information and communication technologies (ICT) are not only a modern tool for communication and information management, but also essential factors in development. ICT is a cross-cutting sector, with a direct multiplier effect on all other sectors of human activity. They are also a means of strengthening human and institutional capacity, both in the administration and in the business environment.

On the other hand, digitization offers opportunities to track and monitor people at work or on the street, shopping, etc. endangering their autonomy and privacy. This is an element with profound negative consequences for human society as a whole. Other vulnerable points of digitalization are: 1) the need to constantly adapt the normative-legislative framework to the rhythms of technological progress, which in addition to actions focused on improving human life, also involves cybercrime, which needs to be prevented, identified, monitored and sanctioned; 2) the risks related to cyber security and the need to guarantee secure transactions; 3) the fragility of the interconnection of networks and systems; 4) simplifying the ways of using different programs, applications and utilities; 5) accessibility of services for everyone, be they illiterate, disabled, poor, etc.; 6) management of false information, which endangers the interpersonal social and interstate political balance; 7) accessibility and efficiency of digital education, especially for people who want to find work, or 80% of tomorrow's jobs will require a minimum of ICT knowledge (Banking and finance, insurance, agriculture, security, medicine, administration, education, etc.).

In other words, the growth of the digital economy has both obvious advantages and disadvantages, at least in terms of developments so far: on the one hand, digitalization promotes economic growth, the transmission of information, knowledge, improving efficiency, accessibility and operability, creation of new public service platforms, facilitation of daily life, through quick 24/24 access to public services, projects, work tasks, activity reports, databases, digital libraries, working groups, chats, platforms etc., and on the other hand, it causes information insecurity, difficulties in regulating information, internet fraud, avalanche or information deficit caused by differentiated access to resources, infringement of intellectual property rights, intrusion into privacy and other new challenges.

Thus, the promptness, speed and virality of the flow of information have transformed our planet into a village, with clear advantages, but also challenges. As a consequence, we find that in the new IT infrastructure, the space has ceased to exist since we became interconnected in a vast network with an infinite number of tentacles, which expand to generate new opportunities, but at the same time, not guarantees the protection of ordinary users, provided that the risks can outweigh the benefits offered. So, practically, our whole life depends on digital technology, and the boundaries between what is public and private life are becoming blurred. As a result, we are currently witnessing a race of "digital armament", in which human rights are less and less valued, including intellectual property rights, which are systematically subjected to cyber-attacks by "data thieves". In this race, both IT giants and users with a high degree of digital literacy are driven by the Machiavellian maxim "purpose excuses the means", namely they admit that they may violate the limits of privacy, the limits of the principle of confidentiality, the limits of data integrity and security, and of the safety of persons, the limits of private property, including intellectual property, and all these in the name of profit, measured in money, goods, power and influence.

Consequently, at the crossroads of globalization, we are caught disoriented between the information society and the knowledge society, and after more than a year of pandemic, which has isolated us and made us even more dependent of technologies, what we understood, for sure, is the fact that space no longer matters, but time, both free time necessary for recreation and

time invested rationally, by trying to balance family life with professional life. On the other hand, it has already been observed that the impact of digitization can be very diversified depending on various factors, and these factors can be monitored and influenced. In the context in which many European countries tend to have strategies for digitization, and for this they create the necessary bodies for digitization at national level, we consider it important that the authorities take into account the risks associated with both existing networks (3G, 4G) and the new type of network (5G), regardless of the provider of the equipment that will compose it. At the same time, intellectual products, information and knowledge, the spiritual, scientific and cultural potential of contemporary society are the driving force of sustainable development and determine economic competitiveness. All this demonstrates the growing role of intellectual property in modern society, and the Government's efforts to invest in strengthening intellectual property regimes are seen as "value-added investments and economic growth, which also involve financial efforts to use modern information technologies, including by creating an information system to ensure the activity of all authorities with responsibilities in the field of enforcement of intellectual property rights" (Government of the Republic of Moldova, 2020, p.5). Yet the same technologies that provide vastly enhanced access to information also raise difficult fundamental issues concerning intellectual property, because the technology that makes access so easy also greatly aids copying—both legal and illegal. As a result, many of the intellectual property rules and practices that evolved in the world of physical artifacts do not work well in the digital environment (National Research Council, 2000). Thus, due to the proliferation of data processing, we also need to know how to protect this data, and for this we need new requirements for computer security. The most important example, with regard to the possibility of managing these factors, is that of public policies and, in particular, of education, including ***digital education.***

Education, as the foundation of culture and the source of value of civilization, remains the only guarantor of harmony, necessary for the development of the person, groups or communities regardless of their size. Education plays multiple roles, both for the individual and for society. First of all, "education has significant implications in ensuring the economic prosperity

of each individual, of each community, of each nation" (Ministry of National Education. Government of Romania., 2019, p.2). Secondly, education has an essential role and cultural implications, being the main way in which knowledge, values and traditions are preserved, passed down from generation to generation and revalued. Over time, education is shaped to reflect cultural and economic developments and is anchored in contemporary social realities. Third, education plays a significant social role by giving each individual the opportunity to accumulate the knowledge and develop the attitudes, skills and competences needed to become a competitive specialist and an informed and active citizen who contributes to the advancement of his community. In this way, education ensures stability and social development. And last but not least, a fundamental role of education refers to personal development, giving each individual the opportunity to develop and integrate socially in correspondence with their own potential. (Ministry of National Education. Government of Romania, 2019). To this end, educational practitioners, faculty, staff and administrators must pay sufficient attention to academic integrity, human rights, and intellectual property protection that have become major concerns in the educational environment (Delgado Kloos et al., 2017), (Habiburrahim, 2015).

Therefore, the new digital age determines not only a new type of approach to the economic sphere, but also a new perspective on the educational phenomenon through new communication and information technologies. Digital education has recently become one of the priority concerns of education around the world, by supporting literacy and digital communication for any participant, both in the instructional-educational process and in the process of professional activity, in any field. ICT's growing pace and distribution already shows that our local universities and learning and science groups are no longer purely local, but have gone global (Nawaz & Qureshi, 2010). Thus, at present, training systems must contribute to meeting the growing need for refining and continuous updating of knowledge and competences, in the context of an expanding international labor market, while pursuing greater accessibility, efficiency and equity.

In this context, digital education aims to facilitate access and the permanent exchange of information through modern technologies. Digital

education also referred to as Technology Enhanced Learning (TEL) or e-learning, is the creative use of digital resources and innovations while teaching and learning. Exploring the use of emerging technology offers teachers the ability in the classes they offer to design interactive learning environments, which can take the form of mixed or entirely online programs and courses (Delgado Kloos et al., 2017), (Banerjee et al., 2015).

In other words, electronic resources, online content and the virtual educational environment provide the newest and most diverse opportunities for continuing education and training. This has meant that, in recent years, issues related to open educational resources have been widely addressed in the international educational community. For example, the Republic of Moldova, along with more than 50 other states, has made commitments to open up public data and waive intellectual property rights, precisely to encourage the creation of new services and products based on existing data (Open Government Partnership, 2020). This initiative, called the Open Government Partnership, which currently brings together 78 states, was launched in 2011 by the United States. Also, at European level, a series of actions have been implemented on the promotion of open data, in order to improve the quality and promote access to education. For example, the European Commission has developed a number of public policy documents that encourage the re-use of information in innovative ways and the design of open-ended educational materials (Bezede, 2015). David Wiley, one of the promoters of these ideas, emphasizes the need for open education, which also includes an open pedagogy with certain key components, including *Open Educational Resources (OER)*. The term was adopted at the UNESCO Forum in Paris (2002), which analyzed the impact of Open Courseware projects on higher education, OER including both different types of learning materials, from course materials, reference lists and reading lists, experiments and demonstrations, up to school programs, curricula and guides for teachers, but also educational materials such as articles, modules, simulations, available outside the courses. In addition to the materials themselves, the concept of *Open Educational Resources* may also include "specialized tools such as software necessary for the development, use and delivery of educational materials, including the search and organization of

content, and virtual learning and training communities" (Burloiu, Chirvase, Manolea, Voicu, Bucur, Holotescu, 2014, p. 3).

The advantages of promoting and applying this concept (OER) in the education system are impressive. For pupils/students this means access to diverse and quality educational resources; applying knowledge in a broader context; increased accessibility (not only in academia, but also from work/home, wherever there is internet access) which generates new and new opportunities for learning. For the author/s of the OER, this means professional recognition and notoriety, the possibility of self-improvement and improvement of the OER due to access to feedback from users, as well as intensified dialogue within the organization/institution, but also outside it, in order to initiate interdisciplinary partnerships and to create new OERs adapted to the new requirements of the knowledge society. All in all, educational institutions will also benefit from enhanced recognition and reputation through increased ability to support distance learners, greater availability of academic content, sustainability of old materials, all while respecting intellectual property rights.

Therefore, the transformation of educational resources into digital resources, offers, first of all, extended opportunities to a very large number of people, and *Creative Commons (CC) licenses* allow the dissemination of these resources. The Creative Commons copyright licenses and tools forge a balance inside the traditional "all rights reserved" setting that copyright law creates. These tools give everyone from individual creators to large companies and institutions a simple, standardized way to grant copyright permissions to their creative work. The combination of the Creative Commons tools and their users is a vast and growing digital commons, a pool of content that can be copied, distributed, edited, remixed, and built upon, all within the boundaries of copyright law (Creative Commons, 2017). In other words, the *free license* is a document that describes, how a freely exposed creation of a person can be used: an audio material, a text, an image or a video material, a presentation. Under normal circumstances, when a photo, a song, an article, etc., are placed in the online environment, they are protected under copyright law. Beneficiaries may not use them without first seeking permission from the author. *Free licenses* explicitly state the conditions of use and the restrictions provided, namely they

are those that provide access to the work in question, the possibility to reuse and redistribute it without restrictions or only with certain restrictions. For example, a text on a web page, under a free license, can be used by others to: print or distribute it; take over another website or include in a publication; to make changes or additions; insert partially or completely in another written work, in a work on another medium (for example, audio or video), etc. (Bezede, 2015). Thus, open licenses are not an alternative to copyright, but they are built on copyright law itself, modeling, by the terms adopted, those freedoms and permissions that authors grant to all. In other words, a license is a document that specifies how you can use a creation. Basically, by applying an *open license* to a work, the author chooses to reserve a limited number of rights from the copyright suite conferred by law (Burloiu et all, 2014), and thus creates favorable conditions for those materials to be easily distributed, reused and improved, thus contributing, in a participatory way, to the optimization and improvement of procedures, activities, concepts, etc. In this way, *Open Educational Resources* become a catalyst for creativity and social development (UNESCO, 2015). In other words, open licenses legally allow the use of a work without the permission of the author. However, it should be noted that the use of a work without the express permission of the author is a violation of copyright. That is why there is a need to improve and manage the way universities and public research organizations manage intellectual property and knowledge transfer, through policies designed to encourage the use of publicly funded scientific research results for commercial or further research purposes, and to facilitate the transfer of knowledge and the absorption of innovations, while allowing the protection of intellectual property.

5. Digital skills: access key and defense shield in the world of the future

In addition to the above, digital education has become "the distinguishing factor between young people ready to integrate into the digital society, which requires increasingly competent people for the digital environment and those who have been provided in elementary education only in schools" (Chicu, 2018, p.8). But what does it mean to be prepared to integrate into the digital society? We consider that relevant in this sense are the accumulated *knowledge* (the

outcome of the assimilation of information through learning; the body of facts, principles, theories and practices that is related to a field of work or study), the formed *skills* (the ability to apply knowledge and use know-how to complete tasks and solve problems, which can be cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments)), the manifested *attitudes* (motivators of performance, the basis for continued competent performance, including aspirations and priorities) and developed *competences* (the combination of knowledge, skills and attitudes appropriate to the context). In that sense, A. W. Bates emphasizes that knowledge involves two strongly inter-linked but different components: *content* (facts, ideas, principles, evidence, and descriptions of processes or procedures) and *skills*. The skills required in a knowledge society include the following: *communications skills; the ability to learn independently; ethics and responsibility; teamwork and flexibility; thinking skills* (critical thinking, problem-solving, creativity, originality, strategizing; *knowledge management* (the key skill in a knowledge-based society which refers to: how to find, evaluate, analyze, apply and disseminate information, within a particular context) and *digital skills* (Bates, 2005). H. Chaouchi and Th. Bourgeau define *digital skills* as a set of technological abilities that may be fully or partially acquired before entering the workforce (Bourgeau, 2020).

All these represent the purpose of education, including the digital one, in which digital skills are the key to access and the shield of defense in the world of the future.

This is due to the fact that the world of the future is one in which *digital skills* are part of compulsory education anywhere in the world, which allow those who possess them to adapt to the rapid pace of digitalization, to integrate into the increasingly competitive field of work, to become a valuable employee and to stand out through original and innovative products and services, with all recognized intellectual property rights, preventing situations when "data thieves" would threaten their integrity and security. In this regard, we consider it relevant to mention the European Commission's Communication *"A new skills agenda for Europe: Working together to strengthen human capital, employability and competitiveness",* that proposes ways to address the skills

challenges that Europe is currently facing. The aim is for everyone to have the key set of competences needed for personal development, social inclusion, active citizenship and employment. These competences include "literacy, numeracy, science and foreign languages, as well as more transversal skills such as digital competence, entrepreneurship competence, critical thinking, problem solving and learning to learn". Therefore, according to the agenda for Europe (2016), in a fast-changing global economy, skills will to a great extent determine competitiveness and the capacity to drive innovation. "They are a pull factor for investment and a catalyst in the virtuous circle of job creation and growth. They are key to social cohesion" (European Commission, 2016).

In the same vein, it is important to highlight the Action Plan (2021-2026), initiated by the European Commission to adapt education and training to the digital age, especially given that following the crisis caused by the COVID-Pandemic 19, the technology is used to an unprecedented level. The new Action Plan launches two strategic priorities (European Commission, 2020). The first priority is to encourage the development of a high-performance digital education ecosystem, involving digital infrastructure, connectivity and equipment, effective planning and development of digital capabilities, including up-to-date organizational capabilities, motivated and competent teachers and trainers in the digital field, high quality educational content, as well as accessible tools and secure platforms that respect standards of confidentiality and ethics, including intellectual property rights. The second priority highlights the importance of developing *digital skills and competences* relevant to digital transformation. In this respect, the European Commission distinguishes two types of complexity of these competences: 1) *basic digital skills and competences* from an early age, which include digital skills, indispensable for combating misinformation; computer training and a good knowledge and understanding of data-intensive technologies, such as artificial intelligence; and 2) *advanced digital skills and competences* that can increase the number of digital specialists, including a balanced representation of both sexes and all ages in studies and professions in the digital sector.

These competencies are also found in *The European Digital Competence Framework for Citizens* (also known as *DigComp 2.0*), which was developed by the Joint Research Centre (JRC) of the European Commission as a scientific

project based on consultation with, and active input from, a wide range of stakeholders and policy makers from different social fields: education and training, employment, industry, social partners, etc., in order to offer a tool to improve citizens' digital competence. According to Detlef Eckert, the Director of the DG Employment, Social Affairs and Inclusion, the origin of this work goes back to 2006 when the European Union proposed 8 key competences for lifelong learning, one of which was *Digital Competence.* Also, in the fields of education and training, and employment, there was a need to have a common reference framework of what it means to be digitally savvy in an increasingly globalized world. As a result, *DigComp 2.0* identifies the key components of digital competence in five areas (Vuorikari, Punie, Carretero, Brande, 2016) (Table 1):

1. Information and data literacy;
2. Communication and collaboration;
3. Digital content creation;
4. Safety;
5. Problem solving.

These areas include the specifics of all types of *intellectual activity/intellectual property* (creations of the mind: inventions and creative expressions, literary and artistic works, drawings, names and images used in commerce), *social interaction* (oral/written communication and socialization, face to face or through communications and digital programs/platforms), creating *levers for their optimization* (intellectual creation, creativity, research, development, innovation, originality, truth, authenticity, transparency, exchange of ideas, knowledge, visions, theories, paradigms, launch , promotion, protection) and *tools for overcoming vulnerabilities and risks* that may arise (infringement of intellectual property rights by *counterfeit goods*, infringing a trademark or geographical indication and/or *pirated goods*, copied without the approval of the design, copyright or connected rights). *Intellectual Property Rights (IPR)* refers to the legal rights granted to certain types of intellectual property, to protect the creations of the intellect, including *Industrial Property Rights* (eg patents, industrial designs and trademarks), *Copyright* and *Related Rights* (rights of performers, producers and broadcasters). *IPR protection* is an essential parameter of progress in the field of research, innovation and employment, especially in the digital age when

counterfeiting and piracy are increasingly common phenomena, having a negative impact on promoting innovation and competitiveness in business, on ensuring consumer protection and on maintaining public order.

In this regard, the training and development of *digital competences*, corresponding to each of the 5 areas systematized in *DigComp 2.0*, is both an effective *strategy for protecting intellectual property rights* against risks and threats in the *digital environment*, and a strategy for growth, continuous development and training of the personality of the contemporary man who can meet the requirements of the digital age, adapt to new criteria of professional growth, integrate into the ever-changing digital society and protect himself against new threats that will arise in the future (Table 1):

Table 1. DigComp 2.0 – the Conceptual Reference Model

Competence areas Dimenssion 1	Competences Dimenssion 2
1. Information and data literacy	**1.1 Browsing, searching and filtering data, information and digital content** To articulate needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies. **1.2 Evaluating data, information and digital content** To analyze, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyze, interpret and critically evaluate the data, information and digital content. **1.3. Managing data, information and digital content.** To organize, store and retrieve data, information and content in digital environments. To organize and process them in a structured environment.
2. Communication and collaboration	**2.1 Interacting through digital technologies** To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context. **2.2 Sharing through digital technologies** To share data, information and digital content with others trough appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices. **2.3 Engaging in citizenship trough digital technologies**

	To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.
	2.4 Collaborating through digital technologies To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of resources and knowledge.
	2.5 Net etiquette To be aware of behavioral norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.
	2.6 Managing digital identity To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools and services.
3. Digital content creation	**3.1 Developing digital content** To create and edit digital content in different formats, to express oneself trough digital means.
	3.2 Integrating and re-elaborating digital content To modify, refine, improve and integrate information and content into existing body of knowledge to create new, original and relevant content and knowledge.
	3.3 Copyright and licenses To understand how copyright and licenses apply to data, information and digital content.
	3.4 Programming To plan and develop a sequence of understandable instruction for a computing system to solve a given problem or perform a specific task.
4. Safety	**4.1 Protecting devices** To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy.
	4.2 Protecting personal data and privacy To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used.
	4.3 Protecting health and well-being

	To be able to avoid health risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g., cyber bulling). To be aware of digital technologies for social well-being and social inclusion.
5. Problem solving	**5.1 Solving technical problems** To identify technical problems when operating devices and using digital environment, and to solve them (from trouble-shooting to solving more complex problems). **5.2 Identifying needs and technological responses** To asses needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customize digital environments to personal needs (e.g. accessibility). **5.3 Creatively using digital technologies** To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments. **5.4 Identifying digital competence gaps** To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.

Source: European Commission, (2016)

Also, it is important to highlight that the DigComp 2.0 framework is descriptive rather than prescriptive. Yet, the framework should be used both in the formal education system (from primary school to higher education) as well as in non-formal education and lifelong learning. Several aspects of digital competence may include legal and ethical issues, for example, issues related to illegal sharing of proprietary digital content. The person who engages in this illegal activity may be competent and aware of the licenses and rules being broken. Therefore, in this framework ethical aspects are included in terms of competences (i.e. knowledge of rather than correct behavior).

It should be noted that the mechanisms for defending intellectual property rights in the physical world differ to some extent from those used in the digital world. if in the physical world intellectual property rights are regulated and

protected by legal norms and principles of professional ethics, in the digital world, in addition, the creator can prevent the infringement of his intellectual property by continuously improving personal digital skills (corresponding to the 5 areas of the DigComp 2.0 framework) or by requesting the support of an IT specialist. For example, there are few reasons in the physical world to reproduce an entire work, other than to make a copy that can substitute for an original and, hence, potentially harm the rights holder. One important consequence of this ascertainment is that, in the physical world, reproduction is a good predictor: The act is closely correlated to other actions, such as distribution, that may harm the rights holder and reduce incentive. A second consequence is that, because reproduction is routinely necessary for distribution (and thus exploitation of the work), control of reproduction is an effective means, a convenient bottleneck by which to control exploitation of the work. Finally, because reproduction is not necessary for ordinary use of the work (e.g., reading a hard-copy book), control of reproduction does not get in the way of intended consumption of a work (i.e., reading it). All of these consequences are not valid in the digital world: reproduction is not a good predictor of infringement in the digital world because there are many innocent reasons to make a copy of a work, copies that do not serve as substitutes for the original and hence have no impact on the rights holder. For example, digital works are routinely copied simply in order to access them. Code must be copied from the hard disk into random access memory in order to run a program, for example, and a Web page must be copied from the remote computer to the local computer in order to view it. More generally, in the digital world, access requires copying. The numerous ways in which copies get made in the digital world also cloud the question of whether a copy (in the legal sense) has been made. Arguments have arisen, for example, as to whether the copyright in a work can be infringed by the two actions noted above—copying a program from the disk into random access memory to run it and accessing a Web page from another computer. In both cases the information has been copied in the technical sense, but it is unclear whether this constitutes legal infringement.

In the new IT infrastructure, space has ceased to exist since we became interconnected in a vast network with an infinite number of tentacles from whose nets only time can save us. Understanding how valuable time is, we

come to realize the importance of the values, knowledge and skills we want to cultivate through (digital) education, as the essence of successful integration process in digital society, especially in the wake of the global pandemic, when the importance of digital skills has never been so evident, nor so urgent. As a result, programs and initiatives addressing the digital skills gap are mushrooming (Bourgeau et all., 2020).

6. Conclusions

In conclusion, digitization has created new opportunities for research, discovery and innovation, but at the same time it has opened a dispute over traditional methods of pedagogy, over the prospects for intellectual development and memory, and over the distinction between information and knowledge. Representing an essential component of our existence, transforming the essence of the notions of learning, communication, socialization, space, time, play, storage and transmission of information, the use of technology is not only an option, but is mandatory in training and harmonious development of future adults, who are to come up with new intellectual products. The pandemic spurred innovation in digital tools and platforms and increased digitization of business processes, products and services. As the pandemic continues, the need for a digitally competent population and the demand for a digitally skilled workforce it is becoming more and more prominent. Policy-makers, industry, academia and other educational institutions, as well as the international development community are developing new strategies to cater this challenge.

In addition, worldwide, there is a continuously transformation of cultural content into a digital form, promoting accessibility to educational products, information resources and national and international cultural heritage, to anyone, anywhere and anytime, and thereby thinning the line between originality-creativity-innovation (opportunities) and plagiarism-counterfeiting-piracy (risks). People need digital skills to be able to participate more deeply in our digital society and economy, and benefit from digital opportunities – but also to mitigate possible risks.

Therefore, the possession and refinement of the digital skills are essential, especially in the context of the global health crisis, when we are aware that we have become so dependent on technologies, the use of which is possible only by improving our digital skills, which also helps us overcome the challenges and obstacles encountered in strategic social spheres, such as: ensuring efficiency, quality, accessibility of education, guaranteeing employment and professional growth, quality, safety and security of products, services and data, both from the perspective of the producer/author/creator and the client/consumer/user.

Since the end of the 19th century, the world has recognized the right of people to obtain recognition or financial benefits for what they invent or create, a so important principle that intellectual property rights (IPR) are emphasized as a fundamental right in Article 27 of the Universal Declaration of Human Rights. More recently, in today's digitalized world, intellectual capital has become an extremely valuable asset, and intellectual property infringement cases have consequently become more frequent. Therefore, it is not surprising that the stakes in an intellectual property dispute are extremely high. The development of an effective ecosystem for guaranteeing intellectual property rights, adapted to meet the challenges of the digital economy, requires both a strengthened regulatory environment and better skills. In this regard, all countries all over the world join forces to protect IPR both by strengthening the regulatory, legislative and ethical framework for regulating these rights, which are fundamental to the development and innovation of global society, and by training and refining knowledge and skills, including digital ones, necessary for the contemporary man-creator who activates and integrates in the era of information accessibility. Background Knowledge and skills in the areas of information security, information privacy, and copyright/intellectual property rights and protection are of key importance for organizational and individual success in an evolving society and labor market in which information is a core resource. The accelerated speed towards digitization in the corporate sector goes hand in hand with a growing demand for employees with specialized digital skills who need to install, maintain and secure information and communication systems and provide technical support to the workforce. As, a result, organizations require skilled and knowledgeable professionals who

understand risks and responsibilities related to the management of information privacy, information security, and copyright/intellectual property.

By identifying the right balance between the public interest and the interests of innovators, the IPR system aims to promote and optimize an environment in which creativity and innovation can thrive and, as a result, the protection of intellectual property, through all possible levers (legal, political, economic, ethical, educational), stimulates economic growth, creates new jobs and industries, increasing the quality of life and well-being of society.

References

Banerjee, P. M., Belson, G., & Clugston, D. (2015). Digital Education 2.0: From Content to Connections. *Deloitte Review DELOIT*, Issue 16, pp. 130–145.

Bates, A. W. (2016). *Teaching in a digital age. Guidelines for desgning teaching and learning.* Retrieved from: https://teachonline.ca/sites/default/files/pdfs/teaching-in-a-digital-age_2016.pdf.

Bezede, R. (2015). Promovarea educației deschise și a resurselor educaționale libere. In: *Didactica Pro*, 1(89). Retrieved from: https://red.prodidactica.md/en/about-oer/.

Bourgeau, Th., Brudvig, I., Calmi, E. et all (2020). *Digital Skills Insight.* Geneva: International Telecommunication Union.

Burloiu, V. P., Chirvase, T., Manolea, B., Voicu, O., Bucur, A., Holotescu, C. (2014). *Ghid de Bune Practici resurse Educaționale Deschise (RED).* Retrieved from: https://www.apti.ro/sites/default/files/Ghid-Resurse-educationale-deschise_0.pdf.

Chicu, S. G. (2018). *Forme de utilizare a noilor tehnologii educaționale pentru nativii digitali.* Retrieved from: https://www.psih.uaic.ro/wp-content/uploads/activ/III_doctorat/teze/chicu_smaranda_rezumat.pdf.

Consiliul de Administrație și Adunarea Generală. (2019). *Raport de activitate: Impactul revoluției digitale asupra omenirii. Tema principală de lucru a Președinției Române 2017-2019.* Conferința Internațională OIM-AICESIS-CES România, 9-11 octombrie 2019, România, București Retrieved from: https://www.ces.ro/newlib/PDF/Raport-activitate-AICESIS-RO.pdf

Creative Commons. (2017). *About the licenses.* Retrieved from: https://creativecommons.org/licenses/.

Delgado Kloos, C., Rodriguez, P., Velazquez-Iturbide, A., Gil, M. C., Fernandez-Manjon, B., & Tovar, E. (2017), *Digital education in the classroom.* IEEE Global Engineering Education Conference: EDUCON.

European Commission (2020). Digital Education Action Plan 2021-2027. Retrieved March 2, 2021 Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0624.

European Commission (2016). A new skills agenda for Europe: Working together to strengthen human capital, employability and competitiveness Retrieved from: March 2, 2021, from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52016DC0381.

Guvernul Republicii Moldova. (2020). Hotărâre cu privire la Platforma informaţională în domeniul protecţiei drepturilor de proprietate intelectuală. Retrieved from: https://gov.md/sites/default/files/document/attachments/subiect03_40.pdf.

Habiburrahim, H. (2015). The Internet and ICT: Opportunities or Threats to the Education World? *Englisia Journal*, No.3(1), pp.1–8.

Ministerul Educaţiei Naţionale. Guvernul României. (2019). *Educaţia ne uneşte. Viziune asupra viitorului educaţiei în România.* Retrieved from https://www.edu.ro/sites/default/files/Educatia%20ne%20uneste%20-%20Viziune%20asupra%20viitorului%20educatiei%20in%20Roma%CC%82nia.pdf.

Open Government Partnership. *Moldova Design Report 2019-2020.* (2020). Retrieved from https://www.opengovpartnership.org/documents/moldova-design-report-2019-2020/.

National Research Council (2000), *The Digital Dilemma: Intellectual Property in the Information Age.* Washington, DC: The National Academies Press.

Nawaz, A., & Qureshi, Q. A. (2010). Eteaching/Epedagogy Threats & Opportunities for Teachers in Heis. *Global Journal of Management and Business Research*, No. 10(9), pp. 23–31.

UNESCO (2015), *Guidelines for Open Educational Resources (OER) in Higher Education.* France. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000213605

Utermohlen, K. (2018), 4 ways AI is changing the Education Industry. Retrieved from https://towardsdatascience.com/4-ways-ai-is-changing-the-education-industry-b473c5d2c706.

Vuorikari, R., Punie, Y., Carretero, S., Brande, L. Van den, (2016) *DigComp 2.0: The Digital Competence Framework for Citizen. Update Phase 1:*

The Conceptual Reference Model. European Comission: Joint Research Centre. Retrieved from https://op.europa.eu/en/publication-detail/-/publication/bc52328b-294e-11e6-b616-01aa75ed71a1/language-en.

Wills, S., Alexander, S. (2000), *Managing the introduction of technology in teaching and learning*. Changing University Teaching: Reflections on Creating Educational Technologies. UK, London: Kogan Page Limited, pp.56-72.