The premises of the digitization policies of the European Union: transposition approaches in the educational system of the Republic of Moldova

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Abstract

This article comes with a descriptive analysis of the political initiatives of digitization of the European Union in an operational and functional context of implementation in the reality of the Republic of Moldova in the field of education and training. The presentation of the implementation of educational experiences, which are currently taking place in the Republic of Moldova, is centered on the basic ideas of the article in which the author thinks that: in particular, digital education is essential for the regional, but also global development of the IT industry, and in general, digital education will ensure the proper and constructive insertion of children and adults in the social and economic life of the era of the fifth industrial revolution.

Keywords: digitization, policies, technological revolution, skills

1 Introduction

EU policies related to digital transformation, regardless of whether they have a narrower coverage, such as those dedicated to the business environment, or a broader one, such as those with a broad social destination area, are always launched, with the major aim of support the formation and development of human capital today, so that tomorrow it will be capable of a complete, adequate and constructive integration in the digitized society, pronounced characterized by the signs of the V-th technological revolution.

2 About the V-th technological revolution in notional and descriptive terms

Although currently there are researchers, from several scientific fields, who are concerned about both the concept and the characteristics and impact of the V-th technological revolution, general idea of it is not precisely defined.

The origin of the concept of the V-th technological revolution, obviously, derives from the general notion of a technological revolution. In particular, under the technological revolution, we mean a period when one or more technologies are replaced by another technology in a short time. It is an era of accelerated technological progress, characterized by new innovations whose rapid application and diffusion cause a sudden change in society. Traditionally, from an epistemological point of view, researchers, representatives of different fields of research, refer to various stages of technological development in their work. Totally on the surface is the information regarding the context of identification of the technological revolutions. Classical and representative, in this sense, is the classification made by Šmihula, D. (Šmihula Daniel, 2011).

According to the scientist, technological revolutions happened in the following way: (1.) The financial-agricultural revolution (1600-1740); (2.) The Industrial Revolution (1780-1840); (3.) The

technical revolution or the second industrial revolution (1870-1920); (4.) The scientific-technical revolution (1940-1970); (5.) The information and telecommunications revolution, also known as the Digital Revolution or the third industrial revolution (1975 - present).

The V-th technological revolution is characterized by the transition from mechanical and electronic technology to analog mechatronics and digital electronics. Schoenherr (E. Schoenherr, Steven 2004) argues that the initial stage of the given path took place, from the late 1950s to the late 1970s. During those 20 years, there have been extensive innovations and implementations determined by the process of adoption and proliferation of digital computers and digital recording, which continues to this day. The technological essence of this revolution consisted in the mass production and widespread use of the digital logic, transistors and integrated circuits, as well as technologies derived from the listed innovations, including computers, microprocessors, mobile and cellular devices, digital tablets, Internet and Web Technologies (Roy Debjani, 2014). Another author (Irena Bojanova, 2014) considers that the respective technological innovations have transposed the technique, which traditionally occupies a certain niche "[...] in a production and business environment". The common intention of the Council of Europe, of the EU member states, but also other states of the world is to create a favorable, constructive and functional legislative environment, which will ensure a decent life for all citizens (normally, "[…] without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, etc.") (United Nations, General Assembly, 1948), by including them in the labor market deeply marked by social attributes, economic, technological, etc. of the digital age.

3 EU policies related to the V-th technological revolution

Over the last decade, in the viewfinder of the high authorities of the European Union, there are a series of policies and legislative initiatives which development and implementation supports the preparation of the population for the challenges of following the technological intense digital transfer from the science and research in in all areas of human activity. Thus, with the approval of the new long-term budget, targeting the years 2021-2027, the EU formulates the modernized version of cohesion policy and approves the investment policy in a way that tends to form "A smarter Europe, through innovation, digitalization, economic transformation and support of small and medium-sized enterprises and a Europe connected with strategic transport and digital networks " (The European Commission, 2018). In the same document, the EU pleads a more personalized approach to regional development in which have been introduced "[...] new criteria" [ibidem] (such as, youth unemployment, low level of education) […]", for the more adequate analysis and reflection of the real regional situation.

On January 17, 2018 Brussels (The European Commission, 2018a) launches an information sheet on certain initiatives in the field of education and training, specifying the trends dictated by the digitized social reality in all aspects of human-technology interaction. Thus, its are:

I. The recommendation of the Council of Europe (The European Commission, 2012), on key competences for lifelong learning, where together with reading and writing skills or language learning are reviewed as being of paramount importance and digital skills.

II. In an other project (The European Commission, 2018a) is stipulated that the EU commission "[...] will also develop reference materials and tools in cooperation with the Member States, such as open online courses and Masses (MOOCs), assessment tools, networks including eTwinning, the world's largest network of teachers and the Electronic Platform for Adult Learning in Europe (EPALE) ".

III. This document also comes with the recommendation to EU Member States to apply education, training and learning focused on acquiring skills, where digital competence is passed as the core competence and for which an updated definition is stipulated that "[…] digital skills that include programming, cyber security and issues related to digital citizenship [ibidem]".

IV. Coming up with an action plan regarding digital education, the EU is trying to help people, institutions and education systems adapt to changes in the "digital universe". The plan is intended to be implemented in partnership with Member States and stakeholders by the end of 2020 in the context of the 2020 Education and Training (ET 2020) process [ibidem].

Relevant to the given document is the fact that it has three key objectives, as follows: **O 1:** better use of digital technologies for teaching and learning; **O 2:** developing the digital skills needed to live and work in an era of rapid digital developments; **O 3:** Higher quality education through better data analysis and forecasting.

V. The authors of the given legislative initiative are committed to working with the regional to ensure **the constructive insertion of girls in the activity of acquiring and training digital skills**. This experinece (Burlacu and Irimiciuc, 2018) "[…] would form serious premises to help ensure female students' participation in STEM studies and careers".

In this context, the EU commission (The European Commission, 2018a) **encourages the organization of more programming courses for girls** in the context of the EU Week of Programming initiative [ibidem].

VI. Because there is a clear difference in the digital domain in different countries: the European Commission guarantees **the modernization of the high-speed broadband in schools** through its active and direct involvement in the field [ibidem].

VII. EU Commission proposes to develop and implement a framework for digital certified qualifications, a mechanism which, according to the promoters of the idea, offers "[...] new ways to increase credibility and transparency of qualifications and to protect against falsification of documents" [ibidem].

VIII. Being interested in digitizing society on several dimensions, the EU is also concerned about the maximum avoidance and / or definitive removal of those risks that arise when students interact with technologies. In this sense, there are ongoing actions that tend to protect and make available to students the digital educational and training tools they need.

IX. At the level of the non-legislative decision of the EU Commission, it was decided that the EU Member States should be assisted in the implementation of digital education and ICT application fields in education. The cooperation between the EU commission and the EU member states, but also the ones that sign pre-accession agreements with the EU, will be done through the financing of Erasmus + programs in the post-2020 period, in order to ensure the cross-border mobility of a more imposing number of people: students, trainees, teachers, etc.

X. These initiatives obtain EU funding to increase the number of young people who will finish their studies and acquire skills that make them more competitive in the labor market. Obviously, in this context, it is the intention of the EU commission **to reduce the drop-out rates**, along with **improving the possibilities offered by vocational and tertiary education**. Thus, in order to achieve the objective set for the period 2014-2020, the EU has allocated over EUR 39 billion.

Equally significant, The European Parliament. (2018), in the context of digitization, but also of improving the educational and formative impact of digitization on the population (students, students, adults in continuous training, older people interested in the formation of digital and / or technological skills, etc.), there are other documents. In particular, it is worth mentioning the EUROPEAN PARLIAMENT RESOLUTION PROPOSAL on digitizing for development: reducing poverty through technology. The importance of the document is especially important because the authors of this document express their wish to support digitization in developing countries as well. The project is initiated to reduce the digital divide between different countries, between different socio-economic sectors of different countries and / or between the representatives of the different population groups of the countries for which the technical and financial assistance is intended.

4 The vision and actions of the Republic of Moldova on digitization

4.1 Legislative approaches

Among the number of countries that benefit directly and indirectly from the scientific, legislative, but also financial support from the EU, as well as from donors from other countries (USA, UK, Sweden, Liechtenstein, Estonia, North Korea, etc.), is the Republic Moldova, which is trying to comply with the educational and digital standards recommended by the EU. Noteworthy for the analysis of the political strategies and initiatives presented in the current material is the document with the generic "CONCEPT NOTE on the vision of the National Development Strategy" Moldova 2030 "", (Government of the Republic of Moldova 2017), which comes with numerous references to the essential opportunities offered by the "[...] global economy of knowledge based on technology [...]", these being achievable through "modernizing the curriculum in all educational cycles". In this context, the argument being raised, that "a new educational model is needed to prepare students and students for the demands and challenges of the information and innovation era" and "the rapid development of technologies, digitization, automation, and machine learning will radically change the place of traditional work "and" students, labor force and entire economies, taking into account the level of globalization, will compete for the best education, jobs, and economic growth" [ibidem].

Being in a permanent search for opportunities for continuous training of teachers who tend to train on certain dimensions that will determine their future involvement in the digital education of students, training and developing certain skills of interaction with innovative technologies, etc. The Republic of Moldova is attracting investments for human capital not only from the EU but also from other states of the world, with representatives of the academic world whose tangency. As an example, the collaboration with the academic community from Jeju Province (South Korea) can be brought in, starting with 2015, already in the 5th edition, organizing short-term local training for teachers in the Republic of Moldova, but also lasting 2 weeks and 1 month in South Korea to train students on: e-Learning; Implementation of algorithms in graphic-interactive programming environments; programming with Micro:bit and its use in the educational process; Robot programming, etc. The courses are organized according to the **Memorandum of Understanding on cooperation in the field of Information and Communication Technologies**, signed between the Ministry of Education, Culture and Research of the Republic of Moldova and the Ministry of Education and the Special Government Office for Education of the Jeju Province of the Republic of Korea.

4.2 Actions in the field of Robotics

In recent years, the interest in robotics and technology has been constant in the Republic of Moldova. Here, in the context of formal education, activities related to LEGO integration are recommended by the national curriculum (Ministry of Education of the Republic of Moldova, 2015) in the school discipline of Robotics. Currently, in the Republic of Moldova, we have schools in which the Technological Education lessons have been integrated the module of Digital and Robotic Education. As methods of working at the Robotic hours of the teacher are recommended for use "Regardless of the level and cycle of education [...]" some "[...] active-participatory learning" methods [ibidem], such as: educational games with robots (in the primary classes), exploration by robots of simulated working environments (in the secondary classes) and / or robot competitions (in the high school classes). In the Republic of Moldova LEGO WeDo 2.0 sets are used predominantly for Robotics lessons in the primary school. These sets are revealed to be didactic resources meant to initiate the young age school's students in the technologies of programming and control, using Robotics.

4.3 The STEAM actions

In the context of integrating digital education into the pre-university level of education in the Republic of Moldova, there is more and more talk about the integrated approach to learning through the STEAM concept.

In Moldova, the idea of promoting the STEAM concept belongs to USAID and UK Aid Moldova, the National Association of ICT Companies in collaboration with several partner institutions, including the Technical University of Moldova, and from 2018 and the State Pedagogical University " Ion Creanga". The authors of the initiative are, as in Romania, organizers, and hosts of national competitions and events related to the educational programs FIRST LEGO League, FIRST LEGO League Junior, which in the promoters' view are also considered application activities with an inter- and multi-disciplinary approach, as STEAM type.

In the autochthonous version, from the Republic of Moldova, the general approach of the STEAM concept is achievable through teaching-learning activities, which are organized/carried out in open training spaces, transformer rooms, environments/spaces where teachers and students experience teaching scenarios, In the during of didactical process are used innovative technologies, such as state-of-the-art digital equipment, robotics sets educational, tablets, sensors, various programming environments, digital tools for training creativity and implementing activities aimed at developing digital & soft skills, etc. Nowadays, the perception of specialists on digital education has gone much further than the classical and traditional vision that was reduced to studying Computer Science and ICT in school at the level of interaction with the computer and with some generic applications (very rarely with some educational software). Digital education both in the research environment, but already in the social environment, tends to go beyond just using the computer. Across the world, digital education is penetrated (but also the traditional teaching-learning process, with resources and / or strategies) by technologies as Robotics, Coding, Micro::Bit, Arduino, Adafruit, Raspberry Pie, etc. There are voices, which already have many followers who support the implementation of these types of devices in Digital Education, the study of Computer Science and ICT. Moreover, these three areas being component elements, but also catalyzing factors of successful inter-, multi-, cross-disciplinary learning, can ensure the interconnections between several school objects and/or academic disciplines that are in the same or the same. different curricular areas. For example: studying physics and/or chemistry and/or mathematics and/or modern languages, etc.

4.4 "Clasa viitorului" - The "Future Classroom Lab" project

An ambitious project that in itself combines many digital and didactic technologies. In the Republic of Moldova, the project is implemented within the framework of a public-private partnership (PPP) between the Government of the Republic of Moldova, the Competitiveness Project from Moldova funded by USAID, the Government of Sweden and Uk Aid, and the Orange Moldova Foundation. The project implementation partners are "Ion Creangă" State Pedagogical University, Tiraspol State University, and the Center of University Information.

The central idea of the project is based on the prototype that has existed for a certain time in the EU countries, named the "Future Classroom Lab". The implementation of the concept of classrooms of this type is related to the development of the teaching-learning activities in conditions other than the formal ones limited by the environment of a traditional study hall to the extended non-formal spaces of "transformer" type. The new classrooms designed and developed according to this idea are equipped with different work areas and suitable furniture which, being of a modular type, are flexible enough to accommodate simultaneously, but also autonomously both different activities: as a field of study, teaching methods to be applied in the classroom, school and / or academic contents proposed for research and implementation, as well as the integration within the classroom of various techniques and technologies as facilitative tools of the teaching-learning-

innovative evaluation process. Developers, donors, promoters and already project members are adept of the teaching-learning methodologies and strategies focused on active-participatory teaching activities, such as: Learning by doing; Learning through play; Discovery Learning (DL); Experiential Learning (EL); Problem Based Learning (PBL), etc.

Initially, the pilot project "Future Classroom Lab" in the Republic of Moldova was launched in 2017 in 11 institutions of general education, by renovating the spaces and equipping them with digital technologies and equipment useful for the study process. Actually, project has expanded the number of members from 11 pre-university educational institutions to 31. New members of the project are trained to implement in class the digital and technological equipment specific to fifth-grade education. technological revolution: Arduino, Micro::Bit, Adafruit, Raspberry Pie, etc. The pieces of training are organized by teams of experts invited by the project developers in the country and abroad (Estonia, Finland, Belgium, etc.), but also by the more active members of the project co-opted within the teaching staff of the pilot education institutions from the start edition of the project from 2017.

5 Conclusions

***MOTTO**:*
I like to limit myself to infinite things.
(Valeriu Butulescu)

The scientific and financial resources, as well as those of the legislative and political framework of the digitization initiatives launched by the EU, described in this paper, create premises with an area of beneficial and tangible actions for the population of the Republic of Moldova. These best practices can be implemented in the local educational system, creating a long-term model of pedagogical and social success, similar to those in the Nordic countries, such as Estonia and Finland. The implementation of the possibilities (materialized in methodologies, technologies, and equipment) currently offered by the numerous educational projects that are being implemented today in the Republic of Moldova is recommended and carried out within several school objects from different curricular areas, then just Computer Science and ICT- community.

The teachers involved in the operation of the equipment show so much creativity that they even exceed the expectations of the developers who have launched the devices listed above. Thus, in our opinion, in the Republic of Moldova, there is created a community made up of educational institutions, teachers, researchers, students, parents involved in the school life of its children, students and voluntary teachers from several universities and IT companies, etc. from our country. The community members, besides the fact that they are dealing with the integrated implementation of innovative teachers, also create and disseminate to the colleagues in the country new and unusual experiences of teaching-learning-evaluation assisted by the digital technologies of tomorrow.

By the way, tomorrow is a future so close that if we continue to ignore it, it will surprise us very soon, creating a totally inopportune situation for those who believe only in the potential of traditional school and learning and, from on the contrary, indulging in those who will be able to capitalize on those studied and explored until then only in a school and / or academic setting, already in a new reality, either daily or professional.

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