ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

An educational paradigm shift: Technology-enhanced adaptive and hybrid education

Alexandra Irina Pînzariu [1+]

[1] University of Bucharest, Romania

Abstract. *Barnett R. (2000) argues that educational institutions need to prepare students for "super complexity", where "the very frameworks by which we orientate ourselves to the world are themselves contested" (p. 257). Learning to think through practical methods develops critical thinking skills for dealing with super complexity since the frameworks the students use to consider when learning is contested and likely to change. There are some questions about whether educational institutions actually shape graduates prepared for practical and ethical engagement with their scholarly, professional, and personal worlds. The overall aim of this research paper is to provide the reader with insights trough the review and exploration of various current and emerging new technologies that might be adapted and used in high school education in order to help the development of a better educational system which is aligned with the requirements of the jobs market. Additionally, based on this research's results and further improvements based on new developments, a competitive business value proposition has been created, and together with several educational organizations, a proposal for a public policy on the topic will be developed in order to generate a qualitative paradigm shift and technological (r)evolution by reaching the attention of key decision-makers and stakeholders in the high school education in Romania' environment.*

Keywords: Artificial Intelligence, digitalization, hybrid education, technology, Romania.

JEL Codes: I00, I21, P46

1. Introduction

"We cannot educate the citizens of tomorrow based on the requirements of yesterday."
— Abhijit Naskar, Every Generation Needs Caretakers: The Gospel of Patriotism

"If we are going to succeed in education, we must do more than everyone else."
— Aaron L. Smith, Ph.D., Blank Check: What Would You Do If You Were Asked to Reinvent Public Schools?

These educational technology approaches have evolved from early uses and one-to-many types of pre-digital learning (of audiovisual aids to individual and networked computers) into various forms, intended for regular use at a single location (immobile) or to smart portable technologies (mobile), as well as virtual, augmented or mixed realities, avatar-based immersive environments, wearable, and location-aware devices and cloud computing. Different terms have been utilized en-route to allude to educational technologies, such as learning advances and environments and instructional-systems innovations. It is

[1+] Corresponding author. *E-mail*: alexandra-irina.pinzariu@s.unesco-chair.unibuc.ro
Personal Address: Street Valea Oltului no. 21, Bucharest, Romania

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

specifically within the scope of an overview that this paper is naming these technologies and exploring them to present a wide translation to cover instructional frameworks, learning techniques, and software and hardware. The view is that anything that reliably can bolster learning and guidance can be considered as an educational model of technology innovation. Few educational technologies are basic and have existed for a long time now; others are mind-boggling, and new ones are finding their way into instructive educational settings daily. Educational technology alludes to the utilization of tools, apparatuses, procedures, processes, techniques, assets, and methodologies to improve learning encounters and experiences in an assortment of settings, for example, in formal and non-formal learning, lifelong learning, need related learning on request, work environment learning, and just-in-time as well as just-in-case learning.

Educational technology approaches evolved from early uses of teaching tools and have rapidly expanded in recent years to include such devices and approaches as mobile technologies, virtual and augmented realities, simulations and immersive environments, collaborative learning, social networking, cloud computing, flipped classrooms, and more. Instructive innovation approaches advanced from early employments of showing apparatuses and have quickly extended as of late to incorporate such gadgets and approaches as portable advances, virtual and expanded real factors, recreations and vivid conditions, collective learning, long-range informal communication, distributed computing, flipped study halls, and that's just the beginning. Educational technology is an umbrella term that includes a variety of technological tools and resources and their use through procedures and approaches that aim to enhance learning experiences in a number of different settings, including formal and informal learning. Educational technology is often characterized as a 'game changer' because it is considered as a tool that has the power to positively impact the current pedagogical approaches to teaching and learning (Selwyn, 2016; Vaughan and Beers, 2017), starting even from early childhood. With the advent of such advanced technologies as the ones that will be presented below, it can also become a one-to-moment learning delivery (Cognizant, 2018, p. 5).

Educational technologies such as Artificial Intelligence (AI), Robotics, the Internet of Things, Augmented, Virtual, and Mixed Reality (AR, VR, respectively MR) have been raising the eyebrows for the past decade and are considered as key components for fostering the investments in the Information and Communication Technology (ICT) and for emphasizing on the study of educational technology in order to facilitate the learning and the improvement of performance by shaping, using and managing the appropriate type of technologies in terms of resources as well as processes. The ICT investment occurs in both "classical" Information Technology (IT) as well as in Telecommunication Services. The forecasted investment in this industry is supposed to jump from $4.3 trillion in 2016 to $5.6 trillion by 2021. Therefore, as a society, we are witnessing a considerable increase in spending on new technologies, overall, in various domains, including education, for the future of the classroom. Whereas the investment in the more traditional Information Technology is stagnating or even decreasing, it is expected that the investment in the emerging new technologies will be about three-quarters of the total Information and Communication Technology by next year (Dignan, L., 2017). The amount that is spent globally on technology in education is expected to increase by US$ 342 billion by 2025 (Goodwin, J., 2020). This does not necessarily mean it is precisely the technology itself that improves learning. Various digital solutions to introducing technology in education only reinforce bad habits and obsolete practices.

As a research field, Artificial Intelligence was conceptualized already 75 years ago, with eloquent work done to show whether machines can feature human-like behavior. It was 70 years ago when English mathematician Alan Turing delivered his test of whether machines can think. About 65 years ago, Artificial Intelligence became a distinct field of research in Computer Science (Southgate, E., et al., 2019, p. 18). Artificial Intelligence's initial years, however, can be considered as deceiving in terms of progress. Although hardware achievements progressed even more, so did the ones in Artificial Intelligence, eventually. About 50 to 40 years ago, humanity was already talking about Knowledge-Based Systems (KBS-s). Artificial Intelligence was presented 30 years ago as a mixed form of automatic translation, natural language processing, voice recognition, and also game theory. That was it, back then. Nowadays, however, the

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

Artificial Intelligence moniker encompasses almost everything related to the use of science and technology combined. For instance, the scientific community considers other research fields from 30 years ago, e.g., Computer Vision and Image Processing, Pattern Recognition, Neural Networks, Fuzzy Algorithms, Bayesian Approach, Kalman Filtering, as actually merged with Artificial Intelligence. under the Machine Learning moniker.

Artificial Intelligence (AI) is a computer's ability to reason, learn from experiences, and solve tasks as if it were an intelligent being. However, in practice, this ability will not give the powers to outrun or be smarter than its creator. Millions of years of evolution in a continuous non-digital environment cannot be beaten by their truncation on a finite number of bits in a digital system.

Artificial Intelligence can be commonly classified into three categories, such as the following:

Type	Position	Short description
Weak	1. Narrow	Single Task - Reality with no uncertainty or diversity
Strong	2. General	Perception of mind theory and self - awareness
Super-intelligence	3. Singularity	Hypothesized and abstract only, uncertainty accepted but classified as temporary in a search for absolute answers

Source: Retrieved from ThinkAutomation.com

Augmented Reality (AR) is a virtual interface between the user and the real world that enables the user experience with otherwise missing capabilities. It is now extendable from its “classical” form of tech gadgets onto devices such as smart goggles, high-definition 3D screens etc.

Virtual Reality (VR) is the human experience’s immersion into a simulated environment and uses computer technology to create something similar or completely different from the real world. Unlike traditional user interfaces, Virtual Reality places the user inside an experience. Instead of viewing a screen in front of them, users are immersed and able to interact with 3D worlds.

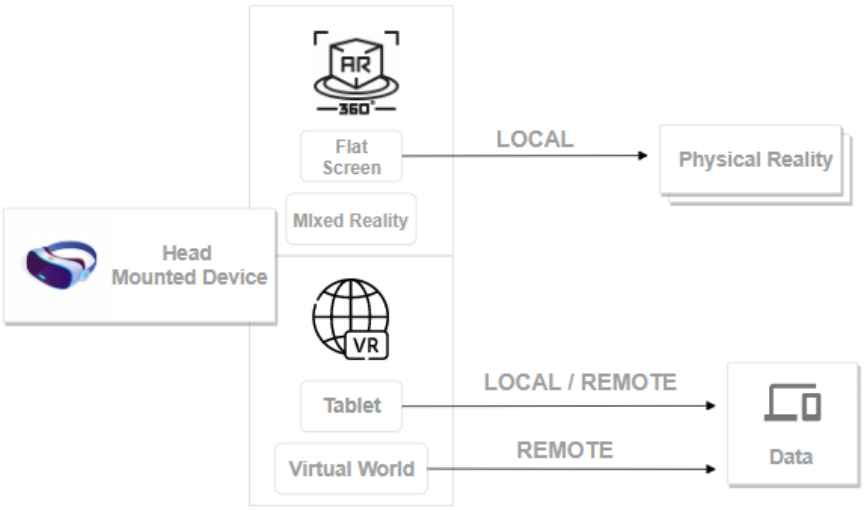
Mixed Reality (MR) is a hybrid reality which forms between Virtual Reality worlds and the real world with the scope to produce new environments and visualizations, where physical and digital objects co-exist and interact in real time.

Needless to say, the design and the user experience of these four technologies are rather different. Whereas Artificial Intelligence is an inbuilt software, the other technologies actually augment or even replace the real environment with virtual objects, backgrounds, and information. However, all four (AI, AR, VR, and MR) can be combined and merged into one; one such emerging technology may be called augmented hyperreality, defined as "the generation by models of a real without origin or reality referent" (Baudrillard, 2015); in which entertainment, information, and communication technologies provide intense experiences by involving scenes of ordinary everyday life, as well as the codes and models that structure everyday life. It is a combination of Artificial Intelligence, Augmented Reality, Virtual Reality, and Mixed Reality. Others, however, use the moniker extended reality (Marr, B., 2019). From the perspective of these types of technologies used in education, educational technology could be translated and understood as the use of emerging and existing technologies with the scope to improve learning experiences in a variety of instructional settings, such as formal learning, informal learning, non-formal learning, lifelong learning, learning on demand, and just-in-time learning. This research paper, as previously stated, will briefly cover only the formal as well as informal learning within the high-school cycle in Romania.

Figure 1 illustrates a possible environment applicable for classroom interaction that combines the aforementioned technologies.

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

Figure 1. Technology-based Classroom Interaction Environment



Source: Interpreted and adapted by the author from *Virtual Technologies Trends in Education*

However, the "intrusion" of these technologies in day-to-day life raises various philosophical, social, and economic natures. In the education industry, in particular, an adequate amount of time is needed in order for both teachers and sometimes also the students to get properly skilled and knowledgeable regarding the integrative use of such technologies. Section 1 of the paper provides literature and historical overview, key definitions and principles, various perspectives, and representative developments, all of which will be explored and elaborated in the subsequent paragraphs. Sections 2 and 3 will help explore a bit in-depth the potential curriculum reform based on the perceptions and reflections of the descriptive questionnaires' respondents regarding the future of the high school classroom in Romania.

The expected findings of this research paper consist of reinforcing the assumption that there is a fundamental and technological need to improve the quality of learning and teaching within Romanian high schools in order to have better-skilled youngsters who can properly meet the 21st-century workforce requirements, tackling the school dropping and the migration phenomena because of the lack of the educational act' appealing as well as the practicality of the curriculum. There is definitely a “war of talent” undergoing, in view of the strong demand for highly innovative employees, but how could this need be meet, considering that the current educational system is not accelerating innovation, does not emphasis the use of new technology and does not effectively collaborate with the main Business Industries and the Civil Society?

2. Research objectives and methodology

This research paper systematically reviews some of the most important achievements in bringing advanced technology into the classroom, implicitly into the educational process, and for learning purposes. Case studies of the technological revolution in educational reforms in several EU countries are being reviewed. The research methodology used consisted of descriptive questionnaires and a comparative case study based on Romanian high school students' and teachers' reflections and projections on the future classroom through digital technologies. This research paper's expressed mission is to promote the understanding and the enabling of innovative use of theoretical and practical principles of digital technologies in teaching and learning, and the improvement and sharing of interactive and future of skills-

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

oriented practices throughout Romania. To achieve this, a number of primary aims and objectives have been defined, one of which focuses on the improvement of curriculum and practices, another on increasing public understanding of technologies testing, integrating and effective implementation of technology into the classroom. Before embarking on conducting these two surveys, it is relevant to mention that a focus group analysis with participants from both parties was planned to take place, but it was postponed because of the COVID-19 pandemic. This showed that the topic tackled is even more pressing and current in the context of closed educational institutions and the emphasis on online schooling. Consequently, these questionnaire surveys were carried out as a more independent study than initially intended. That is why the surveys have had several open-ended questions to identify values and beliefs that are decisive when discussing a potential high school educational reform, contributing greatly to the understanding of public attitudes and the crafting of relevant conclusions as proposals for several solutions.

The research covers a slightly significant and wide range of public opinions on Romanian high school education from the direct beneficiaries as well as the providers, and begins with a summary of the key findings drawn from each survey analysis, followed by a comparative analysis of the explored different experiences, followed by the main conclusions and the identified strategic recommendations for communication and possible actions, based on the highlighting of some good practices. This research's scope was to collect responses from a number of Romanian high school students and teachers on educational teaching and learning assessment and practices, overall, as a system as well as individually, in order to describe and analyses the results from two survey questionnaires circulated among these two societal categories as part of an elaborated dissertation thesis for the master programme of Business Administration within The University of Bucharest, UNESCO Chair.

3. Results and Discussions

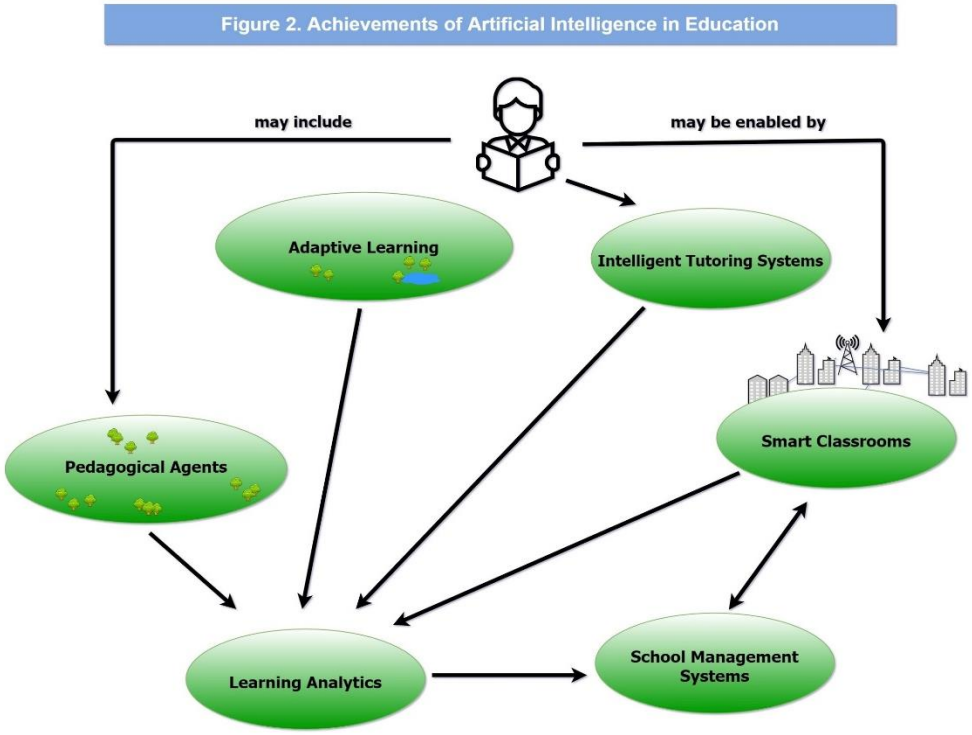
3.1 Artificial Intelligence in Education

We review below elements of advanced technology that are already used or that could be used for educational purposes. Particular attention is given to the possible issues that this use can raise, especially related to ethical and practical concerns. The advent of advanced technology into education was not a smooth or carefree one. In practice, multiple concerns are raised and need to be addressed. For instance, care should be taken in selecting the appropriate technology for educational purposes, as to respond to the following selection criteria (Huang, R., et al., 2019, pp. 60-66): be appropriate, be genuine, have a reasonable cost, be of interest, be organized and balanced, and be effective.

In various parts of the world, Artificial Intelligence in Education occurred even as early as the 1970-s, as a need to bring together technology, teaching, learning, and instructional processes. In this respect, it was desired first to automate tedious tasks like assessment, evaluation, testing, etc. This was based on the assumption that, true or false, automatic feedback could help parents as well to monitor the educational progress of their children.

Current achievements in Artificial Intelligence in Education according to (Southgate, E. et al., 2019, pp. 26-34), include: Intelligent Tutoring Systems – simulate one-to-one human interaction, Pedagogical Agents – virtual characters that are integrated into educational environments in order to facilitate instruction, Smart Classroom Technologies – based on the Internet of Things, and Adaptive Learning – an important instructional goal. A possible relationship among them is shown in Figure 2. Achievements of Artificial Intelligence in Education (AIED). Furthermore, in the following, we provide a brief presentation of each of them to offer a broader view.

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu



Source: Interpreted and adapted by the author from *Artificial Intelligence in Education*

3.1.1. Intelligent Tutoring Systems

Intelligent Tutoring Systems (ITS-s) have been envisaged because, whereas tutoring is very highly effective instructional, in practice, students never take full advantage of the potential interaction with a human instructor/teacher. Before Intelligent Tutoring Systems, however, there was also Computer-Aided Instruction (CAI), which was capable of giving only a limited and conditional form of feedback to students, namely only after they answered the required questions. Intelligent Tutoring Systems consist of several types of scientific model: An expert model; A pedagogical model; A student model; A communication interface. In practice, Intelligent Tutoring Systems are highly effective and generally used within well-defined domains because of their simplicity with both pedagogical and student models but are not widespread yet. This is still a new development area within computer science and still raises some ethical issues, although it could still be, however, also a useful tool for teachers.

3.1.2 Pedagogical Agents

Pedagogical Agents (PAs) are lifelike virtual characters built into learning technologies to facilitate instruction. This was a step towards fostering the human-machine interaction in a more human-like direction. These are fully instructional to users through multimedia learning environments. PAs are not just conversational agents (such as chatbots) like in other fields of activity, but they can also have navigational functions and offer guidance because they are defined in relation to the context of their employment as

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

"learning partners" or "virtual tutors" in educational software. In practice, the educational systems can have multiple PAs that implement various roles: motivator, expert, coach, mentor, tutor, peer. An interesting feature of theirs is that, whereas they are generally designed as learning companions, PAs can become subjects to instruction. Opinions on their effectiveness as learning tools, however, vary. Views are mixed even on which way PAs are more effective – in speech or in writing. PAs are yet to be "taken advantage" of in their full purpose and capacity. However, if the emphasis is placed on their visual appearance instead of their instructional capabilities, then their meaning and significance are out of their intended scope.

3.1.3 Smart Learning Environments and Smart Classrooms

Smart Learning Environments are physical environments that are augmented with digital devices in order to foster better and faster learning (Huang, R., et al., 2019, p. 160). Key features of a Smart Learning Environment are Showing, Manageability, Accessibility, Real-Time Interaction, and Testing. Smart Classrooms (SCs) can be viewed as technology-rich, IoT-based customizations of smart environments which are aimed at: analyzing student learning behavior, facilitating student engagement, feedback to the teachers about how they are working, evaluating the impact of the curriculum activities, and research and development regarding smart environments for instructional purposes. However, it is still at an early stage, and it is not spared by ethical issues either.

3.1.4 Adaptive Learning

Adaptive learning is a customized instructional method aimed at developing the previous components of Artificial Intelligence in Education. Whereas Intelligent Tutoring Systems and Pedagogical Agents are rather user interfaces, Adaptive Learning consists mostly of invisible processes that run in the background rather than be witnessed as actions. It alters the way of teaching to tailor it according to the learner's needs and is also gradual as to be able to reach stages from hint-giving to the stage of competence acquisition. A particular detail and perhaps a drawback in the performance of such learning environments is that they rather use a large volume of data and visuals, witnessing the development of an educational data mining approach. Whereas the field is still growing, it has the potential of offering useful insights related to individual learning processes and to which approaches are better suited.

3.2 Artificial Intelligence in Education and Ethics

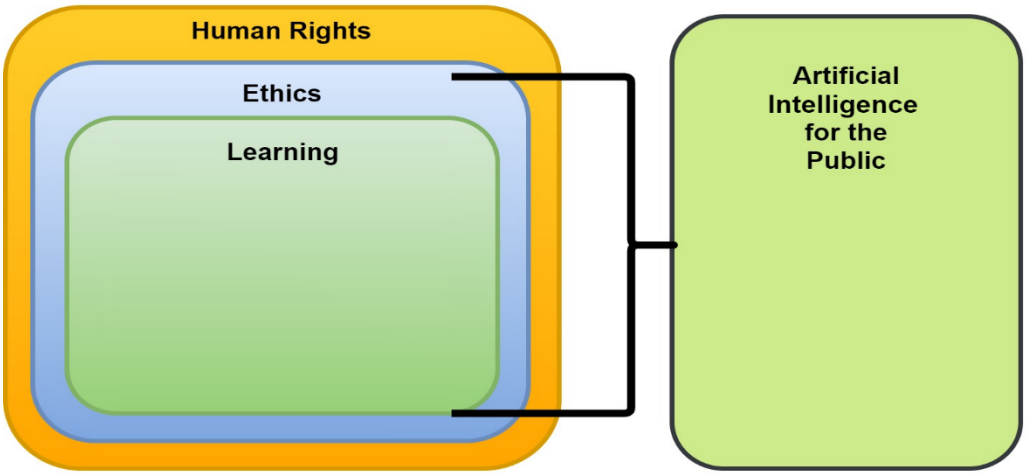
Artificial Intelligence in general and Artificial Intelligence in Education in particular, are not spared with regard to ethical questions. Those questions generally revolve around: Is Artificial Intelligence / in Education allowed to make decisions concerning human lives? What will be the impact? Will this do any harm? What values will be used to this end?

Various considerations on the ethical implications of AI or AIED usage spans several decades already; thus, the major questions that are to be addressed concerning ethics are: What means for Artificial Intelligence to decide? What are the consequences of these decisions? Is AI accountable for its actions or not? Is AI still controllable if its learning process brings its system into states that barely resemble their original setup states? How is such a development properly regulated? The ethical concerns about Artificial Intelligence are increasing and require considerable attention, especially with respect to the large collecting of data. A growing such concern is: what if the algorithm that influences the human decision eventually causes harm as well? By nature of their roles, educators are mandated to act in students' interest, so they should also become engaged in shaping the public trust in the new technologies that are used. Such a trust

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

can be built upon the Artificial Intelligence system's capability of providing equal, fair opportunities of learning for the students, as well as to guarantee their well-being. Artificial Intelligence in Education requires immediate attention to ensure that the technology is used not detrimental to all those involved: e.g., for the benefit of students and not as a Big Brother for monitoring teachers' performance. Also, Artificial Intelligence in Education should be designed to enhance performance, not to bring performance to that same level for everybody. Ethics should be inbuilt into the curriculum in order to avoid faults of Artificial Intelligence in Education like, e.g., fake news or deep fakes. Also, AIED should not be used to force or coerce people's choices. Therefore, a possible Ethical Artificial Intelligence in Education (EAIED) framework could look like in Figure 3. (Southgate, E., et al., 2019, p. 40).

Figure 3. A Framework for Artificial Intelligence in Education



Source: Interpreted and adapted by the author from *An Integrative Framework for AI Education*

Artificial Intelligence in Education is, in fact, a pedagogical project aimed at developing a formal curriculum in an accessible manner yet considering all of its possible implications. It involved both sharing AI knowledge and ensuring that checkpoints are established to prevent misunderstanding or even misuse of technology. The main questions that should be addressed are the following: What can AI do? What was it trained for? What is it based on? Is there evidence of the efficiency of its use on students? Is there a need for data harvesting? Is there compliance with ethical principles? Are rights respected? Is there full disclosure of both all potential benefits and harms?

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

There is also a possibility that Artificial Intelligence in Education will disrupt the educational world and, contrary to what was actually intended, to bring in social inequality in learning opportunities. On the other hand, as in social media, humans that use Artificial Intelligence in Education also get digital identities, a fact that also brings in a whole lot of new issues in education too. One of these, and perhaps just a minor one, is the overloading of the student with the digital burden (login, credentials, timing, etc.), which defies itself the purpose of education. Last but not least, as already stated before, a machine is not smarter than its creator. As such, it is possible that the AI system has a bias, having inbuilt in itself various forms of discrimination like, e.g., racism, profiling, sexism, etc., which, of course, is itself a fact that needs to be cut off at an early stage of design already. It should always be possible to find out why an Artificial Intelligence in Education system took a particular decision, especially when that decision may have possibly caused harm. Especially wherein people in education are involved, one cannot rely on the assurances of an industry that usually does not open up to customers too with respect to its design. Such designs are usually "black-box"-ed, and it is not uncommon that their developers do not always fully understand them. These facts can be looked upon by: Traceability – the technical inspection of the implemented norms, Verifiability – via mathematical proofs, Honesty – the accurate and non-deceiving representation of what the system can do, and Intelligibility – the ability of the system to explain itself to a user in the case of confusion, and this at an appropriate level of human understanding.

The distributed development of Artificial Intelligence in the Education system makes it also difficult to check specifically who was responsible for an action that was taken, particularly when the action was harmful. It should be widely accepted that the accountability of the development is not just a set of standards. In Table 1, explicitly stated are some of the guidelines for implementation, along with questions that need to be addressed regarding the design (Southgate, E., et al., 2019, pp. 48-49).

Table 1. Ethics of Artificial Intelligence in Education

Type of principle	Design	Implementation	Governance
Awareness	Manufacturers engaged with the education?	Students, parents, caregivers aware of data harvesting?	Parental consent and student assent before system deployment?
Explicability	The system explains to students, parents, teachers its purpose, design, and outcomes?	Artificial Intelligence in Education information shared and discussed?	Policy, procurement, school leaders can advise on Artificial Intelligence in Education?
Fairness	Is bias addressed and documented?	Are there inequality, unfair burden, and surveillance involved?	Are there adequate policies and procedures in place to guarantee the non-exacerbation of bias effects?
Transparency	Is the system designed and implemented according to the above four principles?	Can Artificial Intelligence in Education systems be inspected by human users that can respond to them?	Does procurement ensure the above four principles before purchase and during implementation?
Accountability	Are responsibilities of the use of Artificial Intelligence in Education	Procedure for reporting and responding to Artificial Intelligence in Education is harmful?	Early warnings of harm occurrences that can trigger impactful actions?

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

	stated clearly and understandable?		

Source: Interpreted and adapted by the author from *The Institute for Ethical AI in Education*'s research and secondary articles, interpreted and adapted by the author

3.3. Artificial Intelligence in Education within several EU countries

A summary of what other EU countries, including the EU itself as an executive and legislative body, proposes and accomplishes in Artificial Intelligence, Augmented Reality, and Virtual Reality is synopsized in the following table.

Table 2: Synopsis of undertaken actions on AIED in EU countries

Country	Undertaken Actions
Austria	➔ Developed and integrated platform with free textbooks study materials ➔ A national mobile application with personalized advisers for local communities of parents and children
Bulgaria	➔ 90% of the students are involved in an e-learning system for 6 studying hours per day ➔ An educational call-center created for offering student support
Croatia	➔ Free Internet cards for underprivileged children
Czech Republic	➔ National platform and television course - lectures
Estonia	➔ An integrated online educational system ➔ Free access to the Estonian "99math" educational platform, also for all the EU member states (the Republic of Estonia, 2020) ➔ Webinars and support for parents and teachers
Finland	➔ All the educational curricula were adjusted to an online format ➔ Physical education classes use trackers ➔ Teacher support for homework in an integrated way
France	➔ Tablets for underprivileged children ➔ Virtual workspaces for teachers and students ➔ Online monitoring and support for homework accomplishments
Germany	➔ National mobile application for online education ➔ Online resources and support offered by institutions
Greece	➔ Free access to educational platforms ➔ Data traffic at zero cost for educational purposes
Italy	➔ Implementation of online educational platform ➔ Twinning system for school - teacher peer support

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

	➔ Webinars support for teachers
The European Union as a body	➔ A European platform of educational resources for teachers and students

Source: Information collected from various secondary articles and from the works cited in the Reference List

During 2006 and 2012, there were more computers per student in classrooms in Sweden, Norway, and Denmark than in Italy and in Greece (Avvisati, F. et al., 2013, p. 28). Most common for Italy during that time was to have computers in the computer lab, whereas Lithuania, Spain, and Portugal were the ones with the most computers in classrooms. Italy and Romania had fewer data projectors in classrooms at that time, whereas this type of equipment in classrooms was the norm in Finland, Slovenia, Sweden, Estonia, and Ireland. Italy, Romania, and Turkey had the least number of digitally equipped schools at that specific time. For instance, smart boards were introduced in the United Kingdom as of 2003. A company that developed them (named Smart Technologies, nowadays Nureva) existed in Calgary, Alberta, Canada, as early as the late '90s, with a subsidiary in Ottawa, Ontario, Canada. In 2012, the Netherlands and Australia already had about half of their classrooms equipped with smart boards. Denmark was not far behind, introducing smart boards in municipal primary and lower secondary schools in 2006. There were plans to introduce them at that time in Portugal, Mexico, and Turkey. During the crisis of about a decade ago, Portugal, Spain, France, and Slovenia still continued to invest in ICT. In contrast, the UK reduced the support for ICT in schools and closed down its agency for educational technology development. Furthermore, in 2019, Slovenia had the highest number of AI researchers per capita in the world (UNESDOC, 2019, p. 13).

Another good initiative and practice in education consist of prizes and awards for innovative teaching. A few such examples are (Avvisati, F. et al., 2013, p. 52): *Journées de l'Innovation* – A contest for French annual pedagogical innovation projects; five of them are awarded therefore each year via the Expérithèque website; *Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado (INTEF)* in Spain – Annual Award for learning material developed by teachers, non-profit organisations or schools; *Innovo en Clases Integrando Tecnología* in Chile – a competition for best teaching practices in the form of a short videos' competition.

By 2013, as an average, about 40% of the teachers would have reported that students use ICT frequently or for all or nearly all lessons (OECD, 2016, p. 73), although this figure would differ per group of countries. For instance, more than half of them would report that in Australia, Chile, Denmark, Mexico, New Zealand, Norway, and Abu Dhabi (the United Arab Emirates), whereas less than a quarter of them would report that in countries such as Croatia, Finland, France, Israel, Japan, Malaysia, Serbia, and the Shanghai area of China. Alarming, nonetheless, is that, in several European countries, there is already a shortage of teachers in ICT-related fields, for instance, in science, technology, engineering, and math. (EC, 2019, p. 9)

As of now, there are no coherent plans yet to introduce Artificial Intelligence in Education into the National Information Communication Technology plans (UNESDOC, 2019, p. 14). Countries are at different stages of development. For example, South Sudan, which is a relatively still new country, introduced an ICT plan in 2018 but lagged behind in embracing Artificial Intelligence. In the following, the Italian experience in Information Communication Technology (Avvisati, F. et al., 2013) as of at least a few years ago will be detailed.

3.4. Technology-enhanced education within Romania

Previously to the joining of the European Union, Romania's education system was at a crossroads (World Bank, 2007). In particular, there were some curriculum changes undertaken. In addition, student assessment as well as teacher training needed to be reevaluated in order to continue the improvement of the educational outcomes. Furthermore, Romania's joining the EU has posed new educational demands. In spite of educational

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

reforms, student performance was still low by the EU standards. This was particularly worrying when referring to the low levels of enrolments in secondary and post-secondary education. Worrisome was also the gaps between rural Romania and urban Romania. At that time, it was

thought that the uneven spread of the resources could cause those differences. Staffing was considered too high, and the decline in student enrolment would also cause a decrease in the student and teacher numbers ratio. Teacher workloads were considered as being low, but so were their remunerations.

However, Romania's education changes took place over a decade (EC, 2019b), even though public spending on education was still low compared to other EU countries. There is still a need for better support for teachers. Although, as already stated that one decade ago there were too many teachers. Nowadays, there is a social and career-wise shift, as fewer and fewer people want to become teachers, according to the reviewed literature and statistics. According to the European Commission's reports, the considerable discrepancies with respect to the rural and urban areas are still present and have not been tackled. Teachers' preparation in view of their career - the choice is found still poor and sometimes even obsolete. There seems to be a real and consistent challenge in regard to modern and technological teaching approaches. The early school leaving rate in Romania is unfortunately still high, calculated at an all-time low in 2019 - 15.7% (from 16.4% in 2018 and 18.1% in 2017) in the context of the 2020 Strategy (Eurostat, 2020). The acquirement of digital skills sometimes poses various problems because of lack of sufficient funding as well as due to lack of technological infrastructures. In the fourth section, we have observed what other European Union countries did lately in the fields of Artificial Intelligence, Augmented Reality, Virtual Reality, and Mixed Reality. In particular, an overview for Romania, consisting of what has been done in the previous school year, is shown in Figure 4, below.

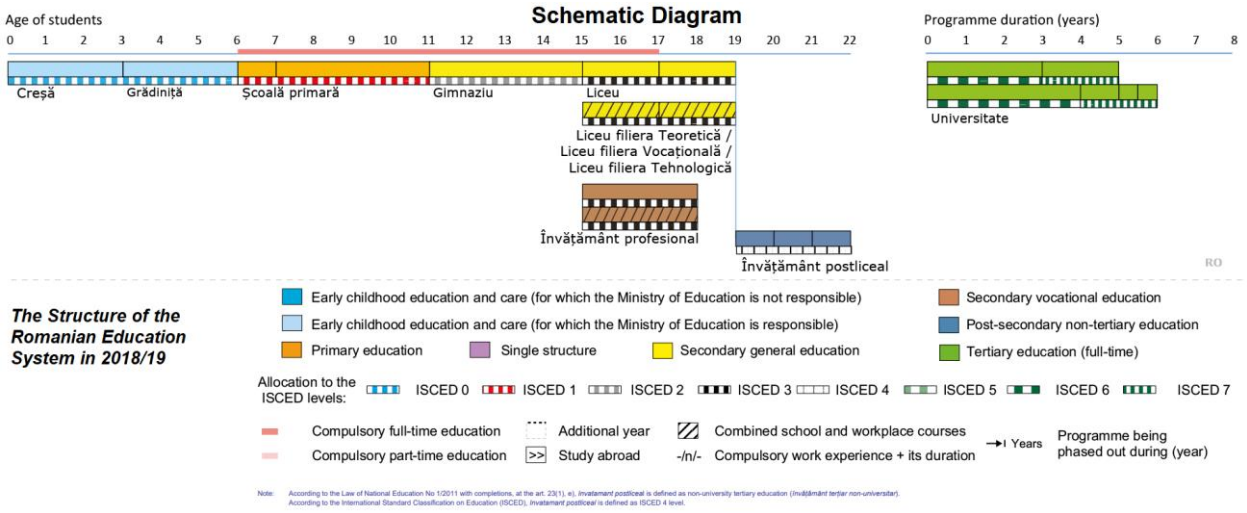


Fig. 4: "The 2018/19 Structure of the Romanian National Education System"
Schematic Diagram, Source: Eurydice 2018/19

It needs to be mentioned that a possible strategy for the integration and automation of Artificial Intelligence in the educational system in Romania is briefly outlined and proposed in (Ion, M., 2019).

4. Conclusions

The educational crisis that was generated by the COVID-19 pandemic and the thereof adjustments did not occur without inherent issues. For instance, there are technologically challenged teachers as well as blank and disconcerting times for both teachers and students during virtual classes. Moreover, and more seriously,

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

many Romanian students cannot afford the home technology that is required to pursue online education, which would have otherwise been pursued only in the classroom environment. According to an IRES study, 12% of the children in Romania stay out of networks, and 32 % cannot afford technology devices. Therefore, state intervention is required to improve on this major drawback. Otherwise, there is the risk of an increase of illiteracy in an era in which functional illiteracy is already being witnessed in various fields of activity, as a result of a precarious education that occurred for various reasons in its time already. Whereas literacy is seen as a precondition in several societies, digital literacy is also becoming a workforce and a societal requirement. This is contradictory to the fact that most teacher respondents in several conducted surveys during the pandemic time admitted they were caught unprepared by both pandemic waves and the adjustment process to new circumstances of teaching (EXPERT FORUM, 2020; SOCIOUMANE, 2020).

The COVID-19 pandemic impact on education is well captured in a recent analysis (Burgess, S., and Sievertsen, HH, 2020; Rae, J., 2020). The main lessons that are to be learned about education in a post-COVID-19 world (if any), can be summarized as follows (SCOONEWS, 2020): Citizens will have to be educated in an interconnected world and with emphasis on the interconnectedness of all nations toward quality (UN, SDG 4) and technological education; The role of the educator needs to be redefined as well as the teaching techniques; Reiterate on practical soft and hard skills as well as on teaching the life skills of the future; Technology has to be in the service of education rather than vice versa. In particular, the lessons post COVID-19 to be learned in international education can be outlined as follows (Burquel, N., and Busch, A., 2020): Education, as well as other industries, had to follow an as of yet never seen path of lockdown, implicitly restricted mobility; There will be an economic collapse, unemployment and a time of recession; Educational institutions will be reopening but with regulations for social distancing; New forms of personalized education will emerge; About 40% of the international students are changing plans of studying abroad, because of the pandemic crises; Business schools may not be fit enough for the education of the future and therefore, even deemed for possible closure.

Education is a fundamental human right, and currently, 1.2 billion people are deprived of this right because of the COVID-19 pandemic (Normandin, A., 2020). It caught many unprepared or underprepared; therefore, further actions for future improvements are needed. Customized blended and experiential learning is suggested as an educational approach in a post-COVID-19 world (if any) together with technology-enhanced learning (Khan, S., 2020; Warrier, BS, 2020). There are, however, other ways in which the pandemic could also change the face of education as we know it (Luthra, P., and Mackenzie, S. 2020): Drawbacks should be changed into opportunities for success, the pandemic-related educational disruption gives educators time to rethink their field and practices (Kanoria, J., 2020; Henry, G., and Agbadi., M. 2020); This niche just started being filled in by technology too (Lim-Lange, C., 2020). In Malaysia, for instance, concerns were addressed too, and effects were investigated, along with envisaged measures as follows (Education International, 2020): There will be a move towards online teaching and learning (Barton, J., 2020); There already are several concerns over the latter above; Couple public exams were canceled (an issue that is currently under ongoing evolution in Romania as well); Mental health issues need to be addressed; The Sarawak (a Malaysian province) Teachers' Union will begin to be home-based.

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

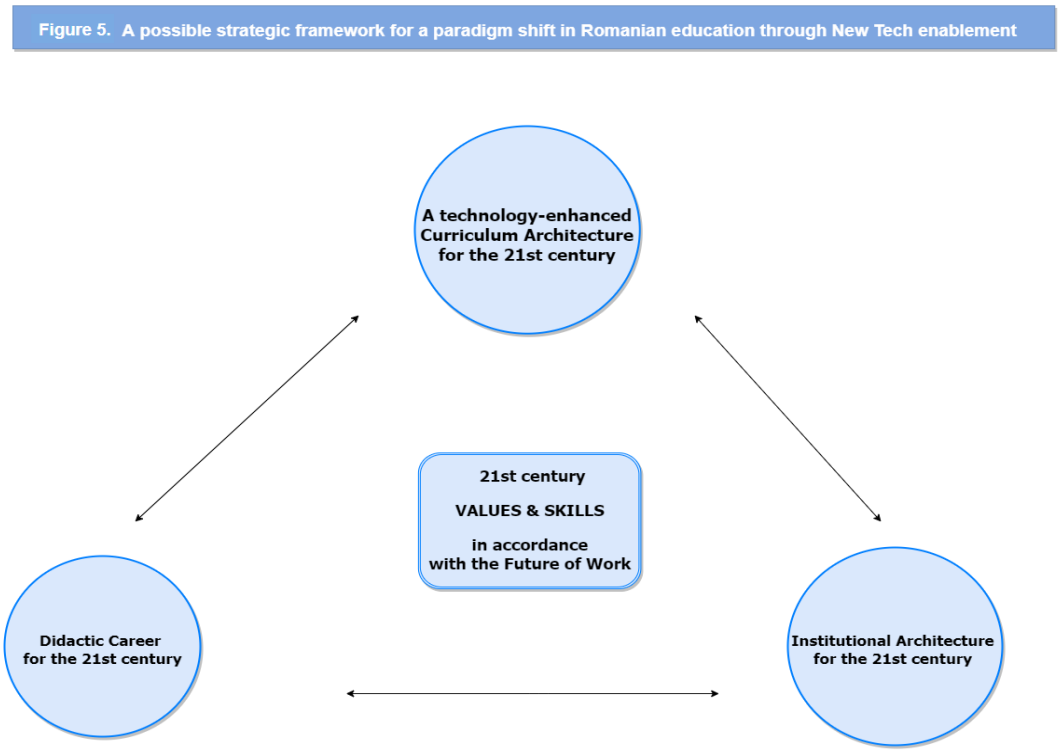
Research conclusions of key findings from both case-study surveys

Table 3: Research questions key findings extracted from the surveys' analysis

Research question(s)	Key findings
What are the differences and similarities of students' opinions in developing a new high school curriculum and starting an educational reform?	• Similar responses and a generally agreed need for reform • No significant difference in response between disciplines and technological development in education was mentioned. • There is a dramatic situation in the educational system, which fails to keep up with reality.
Which is the extent to a needed progression if not reform in the curricular development through digital technologies?	• Similar opinions of both students and teachers concerning the implementation of technology in education • There is a reticence on behalf of teachers and students, but they are open to change and improve. • Teachers and students agree that they do not get a fair chance to demonstrate their performance and skills-built.
How might variations in and of educational technology improve high schoolers' experiences in the classroom?	• There are various understandings regarding a Practical Educational Framework and significant differences between the levels of agreement concerning the betterment of the high school curriculum and system, although the COVID-19 pandemic has highlighted the need for modern technological implementation in terms of shaping the future of education and skills closely linked with the developments of the new future of work.
Which digital technologies would be appropriate for use in enabling their innovative use for education fit for 2030 and beyond, with emphasis on qualitative and interactive blended teaching and learning?	• The main revealed and agreed idea from the two survey's results is that bringing ourselves to the present needs thinking about the future. • This leads us to the validation of the statement given to both students and teachers - "21st-century children are taught by 20th-century adults, using the 19th-century school calendar and techniques," citing Tom Hierck, author & educational policy consultant. • Therefore, an eventual educational reform for the high school system in Romania would need to respond to the demand for an updated curriculum based on tomorrow's requirements and not those of yesterday, both from an industry-oriented perspective and a life-skills perspective. • Furthermore, independent of the chosen digital technologies, Interactive videos, and webinars, Virtual and Augmented Reality, Artificial Intelligence or Intelligent Applications, it is the manner they are being integrated into the educational reality and the beneficial objectives which will set the path towards a more inclusive, cohesive, qualitative and societal needs-based teaching and learning, therefore personalized learning as the ultimate goal in the field of education, globally.

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

Fig.5: Envisioning a possible strategic framework for educational reform through the enabling of current and new digital technologies



Source: Interpreted and adapted by the author from various articles, especially from *Approach to Artificial Intelligence for Education and Training*

In conclusion, Figure 5 suggests a possible strategic framework for an educational reform by enabling current and new digital technologies, which would require a thorough and substantial joint-research effort to be sustainably developed and applied.

5. Acknowledgements

I would like to thank my supervisor, Professor Dr. Mihai Korka, for his insightful, detailed, supportive comments and suggestions for improvements in the preparation of my Master in Business Administration dissertation. I would also like to acknowledge and present my thank-you's to the high school students and teachers who took part in the questionnaire surveys from the case study research for their valuable and crucial contributions to an increased understanding of issues related to high school' teaching and learning for the betterment of the future of education in Romania. Together with those who supported me. Finally, I would like to thank all the cited authors included in the References section; their works have inspired and helped this research materialize and help me develop it into a public policy.

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

6. References

1. Avvisati, F., S. Hennessy, R. B. Kozma, and S. Vincent-Lancrin (2013), "Review of the Italian Strategy for Digital Schools", OECD Education Working Papers, No. 90, OECD Publishing.
2. Barnett, R. (2000), Super complexity and the Curriculum, *Studies in Higher Education* 25(3): 255-265.
3. Barrie, S (2004), A research-based approach to generic attributes policy, *Higher Education Research and Development* 23 (3): 261-275.
4. Barton, J., (2020). Intelsat And Mindset Delivering Covid-19 Education Across Africa [online] Developingtelecoms.com. Available at: <https://www.developingtelecoms.com/telecom-business/humanitarian-communications/9577-intelsat-and-mindset-delivering-covid-19-education-across-africa.html> [Accessed 27 May 2020].
5. Baudrillard J., (2015) *From Hyperreality to Disappearance: Uncollected Interviews*, Richard G. Smith, and David B. Clarke, eds., Edinburgh, UK: Edinburgh University Press.
6. Berwick, C. (2015), The Great German School Turnaround [online] The Atlantic. Available at: <https://www.theatlantic.com/education/archive/2015/11/great-german-scool-turnaround/413806/> [Accessed 15 May 2020].
7. Bolívar, A., (2015), The comprehensive School in Spain: A Review of Its Development Cycle and Crises *European Educational Research Journal*, 14(3-4), pp.347-363.
8. Burgess, S. and Sievertsen, H., (2020). *The Impact Of COVID-19 On Education | VOX, CEPR Policy Portal*. [online] Voxeu.org. Available at: <https://voxeu.org/article/impact-covid-19-education> [Accessed 19 May 2020].
9. Burquel, N. and Busch, A., (2020). *Lessons For International Higher Education Post COVID-19*. [online] University World News. Available at: <https://www.universityworldnews.com/post.php?story=20200424085018 36> [Accessed 20 May 2020].
10. Cognizant.com (2018), Whitepaper on Bringing Learning to Life through Immersive Experiences https://www.cognizant.com/whitepapers/bringing-learning-to-life-through-immersive-experiences-codex3774.pdf
11. Cezar, M., Grama, C. and Pârvu, S., (2020). *Școala Virusată. Cum Arată Educația Online În Viziunea Profesorilor Din România Și Moldova*. [online] Expertforum.ro. Available at: https://expertforum.ro/raport-scoala-virusata/, in Romanian [Accessed 10 May 2020].
12. Dignan, L., (2027) *AI, Robotics, IoT, Augmented And Virtual Reality To Bolster ICT Spending | Zdnet*. [online] ZDNet. Available at: <https://www.zdnet.com/article/ai-robotics-iot-augmented-and-virtual-reality-to-bolster-ict-spending/> [Accessed 20 May 2020].
13. EC (2019a), Education and Training Monitor 2019 https://ec.europa.eu/education/sites/education/files/document-library-docs/volume-1-2019-education-and-training-monitor.pdf
14. Engage., (2019). 4 Ways Virtual Reality Is Disrupting Education In 2019. [online] Cdn2.hubspot.net. Available at:<https://cdn2.hubspot.net/hubfs/5510717/4%20Ways%20Virtual%20Reality%20is%20Disrupting%20Education%20in%202019.pdf> [Accessed 13 May 2020].

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

15. Fullan, M. and Langworthy, M., (2014). *A Rich Seam How New Pedagogies Find Deep Learning*. [online] Turninglearning.nl. Available at: <http://www.turninglearning.nl/images/a_rich_seam.pdf> [Accessed 11 May 2020].
16. Goodwin, J., (2020). *Learning Through Play: How Schools Can Educate Students Through Technology*. [online] World Economic Forum. Available at: <https://www.weforum.org/agenda/2020/01/technology-education-edtech-play-learning/> [Accessed 05 May 2020].
17. Harvard Business Review. 2020. The Business Of Artificial Intelligence. [online] Available at: <https://hbr.org/cover-story/2017/07/the-business-of-artificial-intelligence> [Accessed 22 June 2020].
18. Henry, G., and Agbady, M. (2020). *Rethinking Inclusive Education: COVID-19 Realities, Post Implications On Education*. [online] Nairametrics. Available at: <https://nairametrics.com/2020/05/21/rethinking-inclusive-education-covid-19-realities-post-implications-on-education/> [Accessed 06 June 2020].
19. Holm-Nielsen, L., et al. (2013), "Talent development as a university mission: the quadruple helix", Higher Education Management and Policy, vol. 24/2, https://doi.org/10.1787/hemp-24-5k3w5pdwdzjg.
20. https://www.ipsnews.net/2019/07/finlands-education-system-leads-globally/
21. Huang, R., Spector, J. M., & Yang, J. (2019). Educational Technology: A Primer for the 21st Century. Singapore, Singapore: Springer Singapore. Retrieved April/May, 2020, from https://link.springer.com/content/pdf/10.1007%2F978-981-13-6643-7.pdf
22. International, E., (2020). *Malaysia: Education Union Pivots To Address New Situations Caused By COVID-19 Crisis*. [online] Education International. Available at: <https://www.ei-ie.org/en/detail/16801/malaysia-education-union-pivots-to-address-new-situations-caused-by-covid-19-crisis> [Accessed 18 May 2020].
23. Ion, M., 2019. *Strategy - Romania In The Era Of Artificial Intelligence - RBL&Repatr…*. [online] Slideshare.net. Available at: <https://www.slideshare.net/MonicaIon1/strategy-romania-in-the-era-of-artificial-intelligence-rblrepatriot> [Accessed 02 June 2020].
24. Jordan, E., (2019). *Education Reform In Finland And The Comprehensive School System - Centre For Public Impact (CPI)*. [online] Centre for Public Impact (CPI). Available at: <https://www.centreforpublicimpact.org/case-study/education-policy-in-finland/> [Accessed 15 May 2020].
25. Marr, B., (2019). *What Is Extended Reality Technology? A Simple Explanation For Anyone*. [online] Forbes. Available at: <https://www.forbes.com/sites/bernardmarr/2019/08/12/what-is-extended-reality-technology-a-simple-explanation-for-anyone/#6d0c80337249> [Accessed 08 June 2020].
26. Milgram, P. and Kishino, F., 1994. *(PDF) A Taxonomy Of Mixed Reality Visual Displays*. [online] ResearchGate. Available at: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.32.6230&rep=rep1&type=pdf> [Accessed 14 May 2020].
27. Monitorul de Cluj (2020a) *Un Institut De Cercetare În Inteligență Artificială Va Fi Înființat De UTC La Cluj, Cu 80 Mil. Lei*. [online] Available at: <http://www.monitorulcj.ro/actualitate/80563-un-institut-de-cercetare-in-inteligenta-artificiala-va-fi-infiintat-de-utc-la-cluj-cu-80-mil-lei#sthash.lbJJ64gU.dpbs> [Accessed 27 May 2020].
28. Monitorul de Cluj, Tămaş, B., (2020b) Chaos in Education. Requests for Sacking the Minister of Education. In Romania, Ministers of Education Are Changed As Often As One's Socks Available at: <http://www.monitorulcj.ro/educatie/80615-haos-in-educatie-se-cere-capul-monicai-anisie!-in-

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

romania-ministri-educatiei-sunt-schimabti-ca-sosetele#sthash.WerdxWjw.dpbs> [Accessed 28 May 2020].

29. Nikolai, R., (2018). *After German Reunification: The Implementation Of A Two-Tier School Model In Berlin And Saxony*. [online] Taylor & Francis. Available at: <https://www.tandfonline.com/doi/full/10.1080/0046760X.2018.1545932?af=R> [Accessed 10 June 2020].
30. Normandin, A., (2020). *Ensuring The Right To Education In Times Of COVID-19*. [online] Leidenlawblog.nl. Available at: <https://leidenlawblog.nl/articles/ensuring-the-right-to-education-in-times-of-covid-19> [Accessed 03 June 2020].
31. OECD (2016), Innovating Education and Educating for Innovation The Power of Digital Technologies and Skills http://www.oecd.org/education/ceri/GEIS2016-Background-document.pdf
32. OECD (2018a), The future of education and skills Education 2030 https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf
33. OECD (2018b), Bridging curriculum design and implementation https://www.oecd.org/education/2030-project/contact/Bridging_curriculum_redesign_and_implementation.pdf
34. Otsmaa, S., (2020). *Estonia Offers Its Digital Education Solutions For Free To Support Other Countries | Estonian Ministry Of Education And Research*. [online] Hm.ee. Available at: <https://www.hm.ee/en/uudised/estonia-offers-its-digital-education-solutions-free-support-other-countries> [Accessed 22 May 2020].
35. Rae, J., (2020). *The Impact Of COVID-19 On Education*. [online] Easy Reader News. Available at: <https://easyreadernews.com/the-impact-of-covid-19-on-education/> [Accessed 11 June 2020].
36. Reichert, D., (2019). *The Role Of Universities In Regional Innovation Ecosystems*. [online] Eua.eu. Available at: <https://www.eua.eu/downloads/publications/eua%20innovation%20ecosystem%20report_final_digital.pdf> [Accessed 04 June 2020].
37. Rothman, B., (2017). *After The Shock: The German Education System In 2017 - NCEE*. [online] NCEE. Available at: <http://ncee.org/2017/09/after-the-shock-the-german-education-system-in-2017/> [Accessed 04 June 2020].
38. Sahlberg, P. and Johnson, P., (2019). *What Is Really Going On In Finland'S School Reform? – Pasi Sahlberg*. [online] Pasisahlberg.com. Available at: <https://pasisahlberg.com/what-is-really-going-on-in-finlands-school-reform/> [Accessed 15 May 2020].
39. Sánchez Simón, M., (2013). *The Story On Current Education Reforms In Spain: The Past Will Come Back : Worlds Of Education*. [online] Worlds of Education. Available at: <https://www.ei-ie.org/en/woe_homepage/woe_detail/4729/the-story-on-current-education-reforms-in-spain-the-past-will-come-back> [Accessed 07 June 2020].
40. Scoonews.com. (2020). *World Economic Forum Predicts The Future Of Education Post COVID-19*. [online] Available at: <https://www.scoonews.com/news/world-economic-forum-predicts-the-future-of-education-post-covid-19-8930> [Accessed 2 June 2020].
41. Socioumane.ro. (2020). *Educația La Distanță În Perioada Stării De Urgență. Sondaj Național*. [online] Available at: <https://socioumane.ro/blog/ccs/2020/04/09/educatia-la-distanta-in-perioada-starii-de-urgenta/?fbclid=IwAR0Kf6cK-nAjaJhtluT5XDp5tgduELwTKBPBX8DZDnrIgeXCyVSiYP_sJF8> [Accessed 16 June 2020].
42. Southgate, E., Blackmore, K., Pieschl, S., Grimes, S., McGuire, J. and Smithers, K., (2019). *Artificial Intelligence And Emerging Technologies In Schools*. [online] Docs-edu.govcms.gov.au. Available at:

ISSN: 2247-6172, ISSN - L: 2247-6172
Review of Applied Socio- Economic Research
(Volume 20, Issue 2/ 2020), pp. 41-59
URL: http://www.reaser.eu
e-mail: editors@reaser.eu

https://docs-edu.govcms.gov.au/system/files/doc/other/aiet_final_report_august_2019.pdf> [Accessed 09 June 2020].

43. UNESDOC (2019), International Conference on Artificial Intelligence and Education, Final Report - Planning Education in the AI Era: Lead the Leap https://unesdoc.unesco.org/ark:/48223/pf0000370967
44. Walsh, J.D, (2020) The Coming Disruption Scott Galloway predicts a handful of elite cyborg universities will soon monopolize higher education https://nymag.com/intelligencer/2020/05/scott-galloway-future-of-college.html
45. Warrier, BS (2020) COVID-19: What Next for the Education Sector? https://www.theweek.in/leisure/society/2020/05/26/covid-19-what-next-for-the-education-sector.html
46. Yiu, C., Laurie, E. and Hutchinson, G., (2019). *Technology And Innovation In Global Education Systems*. [online] Institute for Global Change. Available at: <https://institute.global/policy/technology-and-innovation-global-education-systems> [Accessed 15 June 2020].
47. Ziarul de Iaşi (2020) 20th May TUIASI Virtual Tour https://www.ziaruldeiasi.ro/stiri/video-experimenteaza-virtual-viata-de-student-la-politehnica-ieseana-p--253216.html, in Romanian
48. Types of AI: Distinguishing between weak, strong, and super AI. (2019, August 05). Retrieved November 12, 2020, from https://www.thinkautomation.com/bots-and-ai/types-of-ai-distinguishing-between-weak-strong-and-super-ai/
49. Virtual Technologies Trends in Education. (n.d.). November 12, 2020, from https://www.ejmste.com/download/virtual-technologies-trends-in-education-4674.pdf
50. Lane, H., Yacef, K., Mostow, J., & Pavlik, P. (2013). Artificial Intelligence in Education. Springer-Verlag Berlin Heidelberg.
51. Langley, P. (2019). An Integrative Framework for Artificial Intelligence Education. Proceedings of the AAAI Conference on Artificial Intelligence, 33(01), 9670-9677. https://doi.org/10.1609/aaai.v33i01.33019670
52. IRES: 32% dintre elevi nu au acces la echipament electronic.Retrieved 24 November 2020, from https://romania.europalibera.org/a/ires-jum%C4%83tate-dintre-elevi-nu-au-participat-la-%C8%99coala-online-32-nu-au-acces-la-echipament-electronic/30601273.html
53. Aiken RM, Epstein RG (2000) Ethical Guidelines for AI in Education: Starting a Conversation International Journal of Artificial Intelligence in Education 11:163-176
54. The Institute for Ethical AI in Education | University of Buckingham. University of Buckingham. (2020). Retrieved 24 November 2020, from https://www.buckingham.ac.uk/research-the-institute-for-ethical-ai-in-education/.

Manuscript received: 6.11.2020

Manuscript received in revised form: 15.11.2020

Manuscript accepted: 30.11.2020