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# School and Education in the Digital Age

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**Abstract:** For the future, online training will gain a significant weight in terms of the instructional dimension (transmission of information) and, above all, it will address those segments of the population that have formed skills in the traditional training system. However, if for an adult it is more worthwhile to participate in an online training or professional conversion course, than an actual trip to a learning space, for those at the beginning of the educational process, presence in the classroom is indispensable. Change does not only mean technology and innovation, but, above all, communication, but also the teacher's ability to adapt and reinvent, to create an attractive and generous learning environment and in a virtual environment for his students, will contribute a lot to learning success.

Keywords: digitization; adaptation; change; innovation; artificial intelligence; information teaching

# 1. Introduction

Education will have to be rethought in relation to the new technical possibilities on the one hand, and according to the requirements of the new society, on the other. The mission of educational research is to advance the historical moment by formulating problems that are just emerging on the social horizon, to build plausible hypotheses, to verify them experimentally and thus to prepare the most suitable solutions for that moment. Computerization of education represents

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today's horizon and tomorrow's future. A classification of educational software is unanimously accepted according to the specific pedagogical function that they can perform within a training process: practice, interactive presentation of new knowledge, presentation of models of real phenomena (simulation), knowledge testing, development of capacities or skills through a game activity.

Young people and children are attracted to digital culture and the technical supports that promote it. To connect with these young people and children, teachers must speak their language, leverage their skills to provide new learning experiences. New information and communication technologies can facilitate training, can give it new dimensions in the virtual space (virtual games, discussion groups, mobile classes, online resources, group projects, digital portfolios, etc.). The integration of technology in education brings the learning experience to another level much closer to the language of the generation of digital natives.

The story of the Internet dates back to the era of the Cold War and the communications networks developed, with priority by America, following the launch by Russia of the first satellite, the first man-made object to reach Earth's orbit, in October 1957. Shocked by the achievement of the rival or, America has allocated large resources to the development of new communication technologies. The goal was to develop, in particular, communication networks capable of functioning even if an atomic disaster would destroy a large part of the network itself. And so, the Internet has become a vast, physical network, without which a large part of modern digital culture would not exist. It was conceived not so much as technology, but as infrastructure: a mass of equipment (hardware) and programs (software) interconnected by a multitude of specialized means: from deep cables and telephone wires for desktop computers and mobile phones to to communication satellites. In this way, computer systems from all over the world are increasingly connected. But the world has progressed quickly, changes have caught up with us, generations change as well, just like the times, the Internet (as it appeared in the 70s of the last century) can also become history. Artificial intelligence and the phenomenon of digitization and digitization are beginning to creep in, and society and individuals must adapt on the fly.

Due to the progress of digitization manifested in all parts of society, an everincreasing amount of information and knowledge is becoming almost ubiquitous. In an era of "cloud computing," blended learning, streaming, and license subscriptions for continually updated software, technology, and content are increasingly difficult to separate. Educators and trainers in Europe today frequently

use digital tools. However, digital applications are often not meaningfully adapted from a pedagogical point of view. Furthermore, the vast majority of teachers do not participate or participate only sporadically in professional development focused on digital education. Two reasons are often cited to support the urgency of these 21st century skills. First, the elimination of routine physical and cognitive work (e.g., commercial) in the labor market due to digitization. The second reason relates to the enormous amount of information, facts and opinions available at any given time. According to the OECD (Organization for Economic Co-operation and Development), both students and educators should learn to cope with them. Thus, it becomes important for them to recognize relevant and reliable sources, understand the information, process it for their own use and share their insights. The so-called "4 C's" are the basis of the competences of the 21st century. This model is about: critical thinking and problem solving, communication, collaboration and creativity - skills that will help train young people and allow them to enjoy the benefits of social and economic progress. The purpose of the "Future Skills" training program is to train and develop the knowledge base and skills necessary for teachers in developing 21st century skills for students in the classroom. The program is focused on training teachers in order to develop and promote in the classroom the skills of the future with its 3 components: basic literacy (literacy, numeracy, scientific, technological, financial, cultural and civic literacy), skills (critical thinking, creativity, communication and teamwork) and character traits (curiosity, initiative, adaptability, etc.) as defined by the OECD.

For the field of education, defined as encompassing school education, vocational training and higher education, this implies that facts no longer need to be learned by heart - instead, they can be accessed immediately using mobile devices. Much of the knowledge that people need to learn and retain can today be stored digitally and retrieved as needed, at short notice and from almost anywhere. Both our understanding of teaching and the acquisition of knowledge have changed fundamentally as a result and spanned all levels of education, from early childhood to adult learning. New technologies have created the challenge of revising long-term curricula, including learning content for schools, universities and vocational training. Emerging forms of self-education have the potential to become an important pillar in the education system. These possible developments directly affect teacher education, increasingly transforming the role of the teacher into a "knowledge facilitator" who integrates digital technologies and methods into the educational process. The outsourcing of information processing and information storage to machines also requires increased digital competence and media literacy

to enable unrestricted social participation and employability. At this time, it is not yet known how new occupations related to software and algorithm development, data analysis, and the management, monitoring, and maintenance of robots and networks will emerge, and how long the demand for such new occupations will last. However, there are signs that point to a huge increase in the new types of jobs that will be created under the digitization paradigm. Facilitating young people's access to these jobs through effective learning pathways and support is a crucial task for today's policy makers. For the future, online training will gain a significant weight in terms of the instructional dimension (transmission of information) and, above all, will address the population segments that have already formed skills in the traditional training system. For an adult, for example, it is more worthwhile to participate in an online training or professional retraining course than to actually go to a learning space. For those at the beginning of the educational process, presence in the classroom is indispensable.

### 2. Communication in the Digital Age

In the digital age we live in, texting and emailing are ubiquitous. These communication tools are proving to be so popular that they have revolutionized the way we interact, both professionally and personally. Texting and emailing are of major importance in long distance relationships. They allow not only basic communication but also the sharing of photos, videos and other media. Thus, they help maintain and strengthen personal ties despite distances.

It's no surprise that texting and email have become the primary methods of communication in our digitized world. Whether we're talking about efficiency, connectivity or adaptability, these communication tools have proven to be indispensable in an ever-changing world.

Criticized vehemently by the representatives of the education system, the couch, trainers and psychologists, the digital transformations, which have affected all fields, are a phenomenon impossible to stop or slow down. "The Internet, as an educational and creative tool, is one of the greatest wonders of the world" (Havey & Puccio, 2017, p. 69)?

The question raised by various studies was/and is whether all this digitization of communication in all the analyzed fields: economy, social and education will improve or paralyze the communication skills of future generations? The

conclusion is an optimistic one that reveals the fact that the benefits brought by the digital transformation of communication are capable of bringing added value to society. The communication context is going through major changes, as I mentioned before, both from the point of view of the channels through which the messages are transmitted, and from the perspective of the content that must be adapted to the new types of "call to action". Depending on the strategy adopted, communication tools and channels can be chosen. The channels through which the messages are transmitted and which can be used, successfully, within certain limits, and in the school in the process of teaching, learning and evaluation are: Website; social media; newsletter; Mobile applications; Interactive digital entities (the digital age comes with a strong exploitation of artificial intelligence).

The online communication strategy can be achieved in the following steps:

- 1. Who are you addressing? target audience
- 2. What are your goals?
- 3. What key messages help you achieve your goals?
- 4. What are the most pertinent means of communication?

# **3.** Artificial Intelligence (AI)

AI is the ability of a machine to imitate human functions such as reasoning, learning, planning and creativity. AI allows technical systems to perceive the environment in which they operate, process this perception and solve problems, acting to achieve a certain goal.

The computer receives the data (already prepared or collected through its own sensors, such as a video camera), processes it and reacts. AI systems are able to adapt their behavior to some extent by analyzing the effects of previous actions and operating autonomously.

Artificial intelligence can help advance collaborative learning. One of the most revolutionary aspects of computer-supported collaborative learning is in situations where pupils and students are not physically in the same location. It offers pupils and students variable options to the extent and in which they wish to study. In terms of computer-supported collaborative learning, online asynchronous discussion groups play a central role.

Learning through collaboration (cooperation) "represents an instructional philosophy rather than a separate method" (Negreţ-Dobridor, Pânişoara, 2005, 168), a "philosophy" that must be implemented in educational practice as it gives students the opportunity to "move" to the center of the didactic activity, to be effectively involved in the "construction" of one's own cognitive, instrumental, applicative and attitudinal skills.

Collaborative learning (cooperation) is "a pedagogical strategy that encourages students to work together in micro groups in order to achieve a common goal" (Oprea, 2006, p. 138). Cooperation/collaboration and competition are levers that I used in the instructional process, but assigning them different weights.

Collaborative learning allows:

- making multiple social interactions;
- improving interpersonal relationships;
- development of cognitive and social skills;
- development of communication skills;
- development of interpersonal intelligence;
- improving the quality of learning;
- active participation, involvement in the realization of (self)proposed learning tasks; sharing experiences;
- making the transfer of knowledge;
- confrontation of ideas;
- analysis, comparison of the ways of learning, of the purchases made; reformulation of ideas, opinions;
- assimilation of new values, cultural models; development of individual responsibility;
- development of autonomy; assuming and interpreting various roles within the group;
- cultivating tolerance, respect for diversity;
- training and strengthening the skill of active listening; development of critical thinking;

- developing a positive attitude towards learning;
- development of the motivational basis of learning;
- strengthening confidence in one's own strength; strengthening self-esteem, etc. (Drăghicescu & Petrescu, 2007).

Based on artificial intelligence techniques such as machine learning and text processing, artificial intelligence systems are used to monitor asynchronous discussion groups, thereby providing teachers with information about learner discussions and support for guiding learner engagement and learning. Artificial intelligence can help personalize learning in various ways. Artificial intelligence can help create a better professional environment for teachers to work more with struggling students. Teachers spend a lot of time on routine and administrative tasks, such as answering frequently asked questions that come up many times in the school. A dual-teacher model involving a teacher and a virtual teaching assistant who can take over the teacher's routine workload frees up teachers' time, allowing them to focus on student guidance and one-on-one communication. Teachers have already started working together with AI assistants to get the best results with their pupils and students.

But the problems related to the respect of intellectual property rights are just beginning to be realized, understood, approached from various angles. First of all, the very fact that, in the case of generative AI, texts, images, films are "re-created" and not made "from scratch" casts a shadow of doubt on the authenticity of the product, or at least on the correctness of presenting the result as original. In the United States, creators and owners of intellectual content are suing AI-tech companies for using proprietary databases to train AI programs, amid the discovery that not all images and (scientific) text generated are entirely new, with some replicating -a good measure of existing works in the database used for training.

Second, the use of artificial intelligence tools itself can be a problem in situations where the generated content is to be used for (intellectual) fraud. Third, presenting texts, images or movies made with specialized content creation software without specifying the contribution of AI is a moral problem.

All over the world, schools and universities have begun to take measures, some outright banning the use of AI or others inviting teachers to explore with students and pupils the potential of this new tool for intellectual work activities, productivity, human creativity. Being a teacher in the digital age involves the use of modern and attractive technologies in the school, this represents the natural evolution of learning and suggests a natural evolution to the modern challenges of learning and the needs of students. The use of interactive teaching-learning methods in the teacher's activity contributes to improving the quality of the instructional-educational process, having an active-participative character and a real active-formative value on the student's personality.

### 4. Informational Didactics

Didactics is that part of pedagogy that deals with the educational process, with all its components, the interactions between the components and the way in which it leads to the achievement of assumed goals. Mainly, didactics studies the educational process in a formal and institutionalized sense. There are opinions to expand the didactic sphere, by including the elements of formal and informal learning. In essence, however, didactics represents, from its formation, the discipline, the science and the art of instruction.

From the foundation of didactics as the central concern of pedagogy to its recent developments, there has been a continuous process of changing the educators' perception of this central concept and transforming its inner elements. Didactics is currently known as a part of pedagogy that deals predominantly with the organization of the instructional process. At the same time, didactics has a research dimension (investigating the new elements introduced by different social sciences and learning theories), a prescriptive and normative dimension (through the suggestions offered to educators) and an innovative dimension (by incorporating significant elements from the sciences and human practice that favors and optimizes training). Didactics was influenced by the more or less explicit formulation of some educational goals assumed by society at a given time. In the case of our country, the school programs went from "goals"-type objectives (until 1970) to "objectives"-type objectives (instructive - educational objectives, between 1970 - 1992, general objectives and specific objectives, between 1992 - 2000 and objectives - framework and reference objectives, after 2000).

We are currently discussing a new possibility, in the context of the digitization process, informational teaching. Information didactics is that branch of didactics that deals with the study of the expectations related to the realization of a modern, effective dialogue and that connects the two components of the educational binomial through the computer, as a means of education and as a medium of communication. Informational didactics aims to complete the study of the aspects related to the reception of the specifics of process programming, of the conceptual and procedural restructuring brought by programming to the act of teaching and learning viewed as an educational communication.

Two aspects must be mentioned regarding the formative role of informatics in the educational process:

1. training in the field of informatics through specialized classes and faculties, respectively, the teaching of informatics, with all its branches, both in the preuniversity education informatics classes and in the specialized faculties of university education;

2. the use of the computer as a didactic tool in the teaching-learning-evaluation process;

The proposed objective, regarding the formative role of informatics in the educational process, can only be achieved if the use of the computer, as a didactic tool, is carried out in the context of the use of appropriate didactic strategies. The field of information didactics, the new component of general and specialized didactics, must include modern means, procedures, techniques and methods specific to the education process and the education system.

# **4.1 Alternatives of Informational Didactics**

In the teaching-learning process, a multitude of alternatives can be used that respect the principles of modern didactics, but also of informational didactics. All these are an extension (through the use of electronic means in teaching) of the algorithmizing and programmed training techniques used more and more frequently today. Among the alternatives adopted by informational didactics, at least 4 can be considered:

- 1. computer-assisted training;
- 2. applying the principles of artificial intelligence in education;
- 3. the use of educational expert systems;
- 4. open distance education through the computer network.

Technology is becoming more and more common in the recent educational scenario. Using technology in the classroom enhances teaching and learning and adds a new dimension to the overall learning experience. Learning has already progressed from the traditional textbook-based approach to a technology-based one 146

more than before. It is estimated that educational institutes spend nearly \$13.2 billion on EdTech each year. Widespread access to technology and the internet through smartphones and computers has transformed the way the conventional education system works. Emerging technologies such as Artificial Intelligence, Big Data analytics, cloud computing, augmented and virtual reality are already finding their place in the learning industry. The application of emerging technological trends will lead to a transformation of educational models and completely recreate the way learners approach the learning process. Five ways information technology can impact education in the future.

1. An increase in blended learning environments. The preference for courses that combine conventional, face-to-face learning with the technological features of online learning environments is growing. Enhancing the current education system with smart learning methods using mobile apps, tablets and laptops is gradually becoming the norm. While this does not imply that the value of face-to-face instructional components will decrease anytime soon, the demand for courses that have incorporated online components is increasing the share of blended learning environments. They make learning interactive and easily accessible to learners. They no longer need to be contained within the confines of the classroom to have an engaging learning experience. The growth of virtual online courses has led to the incorporation of flexibility into the schedule of these types of courses. This gives pupils/learners/students the freedom to choose the length of the course that best suits their preferences compared to the traditional mode with a fixed timetable. With the gradual shift of the market to the gig economy, education methodologies must move from convention to innovation.

2. Personalization of learning. The use of AI algorithms in education has the potential to empower learners and customize curricula to meet the individual needs of a learner/learner/student. By comprehensively analyzing learning patterns and the history of study behavior, learning analytics can be applied to the collected data. The creation of education-based mobile applications that harness the power of artificial intelligence (AI) to drive student engagement and learning outcomes holds promise. In August 2019, Google announced the release of the revamped version of its AI-powered learning app, Socratic, which allows students/students to ask questions in the form of voice or images. The app then leverages algorithms to search the web for relevant answers, helping them understand the underlying concepts. It also allows users to effectively break down their lessons into smaller chunks for microlearning.

3. Automation in education. The incorporation of automation and artificial intelligence algorithms into the education sector has the potential to significantly reduce the administrative burden on educators. Using technology and AI to automate repetitive tasks can lead to faster project and task evaluations. The technology also has the potential to remove the issue of subjectivity from assessments and achieve a uniform classification methodology that is universally applicable, thus without human subjectivity. EdTech has the potential to increase the productivity of both teachers and learners. Using speech-to-text algorithms can help learners take notes in class more efficiently and quickly. Automation gives educators a chance to focus more on teaching and interacting with learners, freeing them from their administrative responsibilities.

4. Immersive learning experiences. By using technologies such as: Virtual Reality (VR) and Augmented Reality (AR), users are provided with a visually stimulating environment that makes learning a more immersive experience. VR/AR has been widely applied in early learning stages as well as advanced learning. Using this technology, pupils/learners/students can get engaging learning that simulates the experience right inside the classroom. Technology can also be harnessed by advanced learning, as in the field of medicine. Surgeons and medical professionals in training can visualize the components of the human body through the use of VR/AR, resulting in a vast and hands-on learning experience.

5. Smart learning environments. The use of interactive applications and devices can lead to the development of intelligent learning environments. The Internet of Things (IoT) based solution focuses on using smart devices to enhance skills and personalize learning. Using mobility strategies to motivate engagement and facilitate anytime, anywhere learning is an important component of smart learning environments. The use of IoT in education makes learning more accessible while increasing the effectiveness of teaching methodologies. The use of mobile applications, laptops and tablets is already becoming a part of the daily life of a pupil/learner/student. In the future, the use of connected devices such as smartwatches and eReaders has the ability to transform learning as we know it. Rather than being inhibited by time and place, knowledge transfer could move out of the classroom and into the reach of students, improving accessibility. The amalgamation of technology and education is definitely a step in the right direction.

### 5. Instead of Conclusions

The standards for the teaching profession can be a benchmark for the professionalization of the teaching profession. Some of the competencies targeted at the end of the first decade of the century:

✓ General and specific skills;

✓ Psychopedagogical skills;

✓ Didactic-methodological skills;

✓ Communication and relationship skills;

✓ Competences of organization and management of the class of students;

 $\checkmark$  Competences to evaluate the didactic activity and different educational situations;

 $\checkmark$  Reflective, critical (metacognitive) and innovation skills of educational practices;

✓ Skills for initiating and promoting the school-local community partnership;

 $\checkmark$  Competences to promote European values (cf. Finalization Programs and Degree II, 2008).

Summing up, the teacher's roles can be defined as follows (the specialist and university professor, Dan Potolea):

•Core (the role of instructional expert);

•Support (manager, adviser), efficient administration of the learning environment (Kenneth Moore). According to other authors, the teacher's roles can be defined in other ways, but the list of possibilities remains open:

oSpecialist who continuously learns;

oGuidance of the students;

oManager of conflict situations;

oGuidance counselor;

oLearning organizer;

oEvaluator;

oOrganization and management of the class as a social group;

oEducational and professional counseling and guidance;

•Guidance of the extracurricular activity;

•Professional training;

•Pedagogical research;

oSociocultural activity. (D. Potolea)

Relevant documents for the new "era in education":

I. The Action Plan for Digital Education (2021-2027) is a renewed political initiative of the European Union (EU) to support the sustainable and effective adaptation of EU Member States' education and training systems to the digital age.

Digital Education Action Plan:

- provides a long-term strategic vision for a high-quality, inclusive and accessible European digital education;

- addresses the challenges and opportunities created by the COVID-19 pandemic, which has led to unprecedented use of technology for education and training purposes;

- aims to strengthen cooperation at EU level in the field of digital education and underlines the importance of collaboration between sectors to adapt education to the digital age;

- presents opportunities, including better quality and quantity of teaching of concepts related to digital technologies, support for the digitization of teaching methods and pedagogical techniques and the provision of the necessary infrastructure for inclusive and resilient distance learning. To achieve these objectives, the action plan establishes two priority areas:

a. Encouraging the development of a high-performance digital education ecosystem This includes:

-infrastructure, connectivity and digital equipment;

-an effective planning and development of digital capabilities, including updated organizational capabilities;

-motivated and competent teachers and trainers in the digital field;

-high-quality educational content, accessible tools and secure platforms that comply with e-privacy and ethical standards.

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b. Development of digital skills and competences relevant to digital transformation.

This involves:

- basic digital skills and competences from an early age;

- digital literacy, including to combat disinformation computer training;

-good knowledge and understanding of data-intensive technologies such as artificial intelligence (AI);

-advanced digital skills to increase the number of specialists in the digital field guaranteeing a balanced representation of girls and young women in studies and professions in the digital sector.

II. The strategy regarding the digitization of education in Romania 2021-2027 (SMART.Edu - Modern, Accessible School, based on Digital Resources and Technologies).

According to this document on education, in Romania it is proposed to build:  $\bullet$  A flexible, digitized, adaptable, quality education system capable of responding to challenges and generating change;

• Active citizens, well integrated in the labor market from the perspective of using digital technologies;

• Sustainable economic growth, based on the jobs of the future;

• Digital development opportunities in the field of education and professional training for a digital society and a green economy;

• Strengthening the resilience and functional predictability of the education system in the digital age.

The public consultation of this "country project" focused on the following directions:

- Digital skills for pupils and students;
- Digital education throughout life;
- Initial and continuous training of teachers for digital education;
- Infrastructure and digital technological resources;
- Connectivity;

- Open educational resources;
- School curriculum for emerging trades;
- Cyber security, data protection, online safety and IT ethics
- Other topics subsequent to the digitization of education

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