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Pedagogy of Robotics in the Social Professions in Europe

Scoping Paper [5]

[Scoping review: **Pedagogy for technological change**]

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Abstract

This paper deals with the problem of technological change perception in pedagogy. The text is a synthetic description of the field of pedagogical (more broadly educational) discourse on the subject of technological change and social change caused by technological progress. It is not a systematic review of scientific literature, but a problem-oriented synthesis based on expert knowledge and a problem-oriented literature review.

PRoSPERo – Pedagogy of Robotics for the Social Professions in Europe
Scoping review: Pedagogy for technological change

Mikiewicz.P, Barzak J., Minta J.

Assuming that the objective of the PROSPERO project is to develop appropriate educational curricula for students in order to prepare them for work in an environment saturated with modern digital technologies - artificial intelligence and robotics - we indicate here the main currents of educational discourse, which should be taken into account when designing the pedagogical approach finally adopted in the project. The theses, therefore, concern a wider problem area than social robotics. Talking about the relation between education and technological change, we will show potential opportunities as well as limitations/difficulties in adapting new technologies in formal education.

The main conclusions:

- 1) In educational discourse, when we talk about modern technologies, more often we talk about the use of technology in the improvement of traditionally understood educational processes and not about creating programmes that are to prepare graduates to work in a technologically saturated environment.
- 2) Effective implementation of a curriculum preparing graduates to work in a technologically saturated environment requires the use of technology in the very process of education and preparation of staff able to use technology and learn about technology.

New-technologies in education

In pedagogy, the term technology or technological change refers primarily to the use of modern technologies in education - in teaching and learning processes. New technologies are changing school reality by allowing teachers to use more attractive methods for students, using online materials and ready-made lesson plans. Not without significance is the possibility to consult with other teachers through social media. Dedicated educational platforms enable effective distance learning.

One of the most visible aspects of the implementation of the modern technology is the change of the dynamics of education, especially the relationship between teachers and students. Teachers are using technology to replace old models of standardized learning and create more personalized, self-directed experiences for students. There's more multi-

device synchronization with software that supports collaboration and more support for virtual conversations, both within and beyond a classroom. And more students and teachers are creating their own digital content, including animations and videos. Much of the information is now available to students on the Internet, which changes the role of teachers. Technology helps them use their time with students to work on problem-solving, communication and collaboration. Blended learning programs combine online and face-to-face interaction. Furthermore it changes the wider educational community – as blended learning changes the role of the educator to become more of a facilitator and coach, there's a growing use of para-educators who work alongside teachers to manage online learning and help with classroom activities.

The use of new technologies allows for the implementation of new pedagogy – it seems that technological saturation allows for a real transition from the traditional model of education, with the central role of the teacher as the owner of knowledge and responsible for passing it on, towards pedagogy focused around the student and his/her activity, staffing the teacher as a stimulator, coach, guide.

This corresponds to the importance of inter- and intrapersonal competences in education. The so-called *21st century competences* presuppose having skills in group work, effective communication, problem solving, perseverance, conscientiousness, etc. The organisation of school work with the use of new technologies allows to shape these skills by removing the obligation of the teacher to provide all the necessary knowledge to the student. The methods of projects with the use of Internet resources, trowels in groups with the use of remote links are only the most common examples of this type of activities.

Basic skills list:

<https://opentextbc.ca/teachinginadigitalage/chapter/section-1-3-the-skills-needed-in-a-digital-age/>

New technologies are therefore seen by educators as an opportunity for an educational revolution. Advanced technologies enabling the use of virtual reality in educational settings open new fields for the training of skills so far limited by the physical attributes of a given school - its location or equipment. Virtual reality enables "leaving school" and "entering"

into the "reality" of the realm we are learning about. This creates conditions for education through immersion.

Virtual and augmented reality allows students to travel to ancient history, explore the universe and visit museums in different countries without leaving class. One of the greatest achievements of such technologies is that they make science more engaging and inspiring. They allow us to change attitudes through engaging experiences. It is assumed, that these immersive experiences can contribute to faster learning.

(see: google expeditions program https://edu.google.com/products/vr-ar/expeditions/?modal_active=none)

The use of virtual reality is increasingly important in vocational education, where the learning of practical skills is of particular importance. Real-world education is not always possible due to cost and safety considerations (mines, altitude work, maritime engineering, etc.). Training on simulators also makes it possible to cope with legal conditions – e.g. training for lorry drivers with students aged 16.

Finally, the development of technology enables a progress of lifelong learning. The requirements of the modern world cause that education should not be something that is done in a specific institution for a certain period of time. Instead, it should be a lifelong journey of exploration and self-discovery. Equally important is the fact that the labour market requires repeated retraining and adaptation to the reality of work, which is changing due to technological progress. Usage of the educational platforms and new forms of skills validation thanks to the digital sources enables, at least potentially, smoother and more adequate relocation of the workforce.

Teacher and technology integration

Teachers are responsible for managing knowledge of where students are and where they are supposed to steadfastly press; having insights into students' particular requirements and development; selections of curricular activities and materials; procedures that govern students' involvement; expectations from parents and communities; and the standards and guidelines that govern them as teachers.

Reflectivity plays the most essential role in the search for modern, professional perceptions of the teaching profession. It can be seen as a personality trait or professional competence, which means the teacher is able to reflect either on his or her pedagogical activity or on the teaching and upbringing practice and its conditions. In this take, reflectivity is prone to promote the disclosure and development of the teacher's personality and individuality, as well as the acquisition of his or her own personal practical knowledge. Generally speaking, the Case Based Reflection Method perceives reflectivity in education due to two competences: the ability to self-create and the ability to understand the social and global relationships of life and action in the contemporary world. It should be noted, that both issues are inextricably linked and relate to the quality of the internal, subjective development of the individual. The emphasis in education on internal development is related to the assumption that this is a condition for successful social growth on a global scale. There is the need to move in studying from the "culture of communication" to the "culture of understanding", in which subject or object-subject teaching dominates. It is sort of teaching not for expert knowledge as for wisdom, which is missed by human being.

The world hit the digital age particularly hard in the last decade of the 20th century, triggering the sequence of events changing the nature of human's work and life. From the analog society the idea of digital society has been realised in a relatively short time. We are increasingly surrounded by digital products using the up-to-date electronic, information and communication technologies. Although it is difficult to resist the reflection that contributing technology exceeds the readiness of the community, the nature of these transformations should basically be seen in the perspective of definite categories.

Generally speaking, education comprehends all technical innovations at its own slow pace. As it comes to IT, this process has gone fairly quickly. It is worth recalling the great organisational and financial effort that was needed to create IT labs at schools. However, no one doubted the legitimacy of the steps taken as a matter of fact the period of computer literacy in society was carried out gradually and smoothly. Part of the population regrettably remains at risk of digital exclusion.

The need for IT preparation

According to amateur public and to a greater part of teachers, the term educational technology refers to the didactic use of computers, television, and other kinds of electronic hardware and software. Authorities in educational technology, especially college and university faculty who teach courses on educational technology, select the term *instructional technology* as it emphasises the instructional use of educational technology. This expression signifies both a procedure and the specific devices that educators apply in their classrooms. Association for Educational Communications and Technology states that one of the main competent connotations characterising educational scientists, "*Instructional Technology is a complex, integrated process involving people, procedures, ideas, devices, and organization for analyzing problems, and devising, implementing evaluating, and managing solutions to these problems, in situations in which learning is purposive and controlled.*" (ASSOCIATION FOR EDUCATIONAL COMMUNICATIONS AND TECHNOLOGY. 1996: 6). Educational technologists often make use of the expression instructional media to exemplify all of the devices that tutors and students employ to reinforce learning. Though, for numerous teachers the terminologies educational technology, instructional media and instructional technology are applied correspondingly. Besides, the main attention will be to the most contemporary communication devices and tools involving the use of computers, that are used in schools nowadays.

The last thirty years have shaped a relatively new generation of young individuals. People in their thirties said to be part of the so-called "Y" generation. Their differentiating feature is, in general, an increased variety of IT skills. Generation Y is the first generation that is brought up using e-mails, instant messengers and mobile phones from an early age. Generation Y did not perceive the world without the Internet. It is unmanageable for them that 30 days are needed to open a bank account, a clerk with a typewriter is impossible to exist and a black and white television without a remote control is a myth (Fazlagić, 2011). The "Y" generation is not defined like the end of the classification. Modern junior high and high school learners are already indicated to as the "Z" generation. "Z" formation comprises individuals born between 1995 and 2010, i.e. in times of dynamic development in the significance of the Internet and new communication technologies. Representatives of this generation perceive new technologies like those that have always existed, they were regular and common. It can be said that contemporary technology is for them an ordinary

setting essential for smooth performance. Users are continually linked to the network: at home, away from home, when they work, talk, rest, travel (see more: Trend Scout 2012)

Although the young generation can be considered as well organised to function in the information society, depending on the actions they will undertake in the future, it will be possible to differentiate:

- 1) those unable to use computers – perceiving traditional forms of its communication as the fundamental source of information (ie press, radio, television), the incapability to apply new opportunities often causes declining of social position, escalation of hesitation and sense of danger, and gradual lessening of their activity;
- 2) those operating openly on available means of communication and employing the information resources contained therein,
- 3) those adopting the full possibilities of modern information technologies, in order to construct some economic, social or political alternations that produce or obtain information in a jiffy in order to be able to manipulate it efficiently (Czerniachowicz, Marek, Szczepkowska, 2008)

As a matter of fact, above dissimilarities signify some social groups that are conceivably prone to digital exclusion. The problem of exclusion in digital civilization is nevertheless more convoluted and partly inevitable, because every dynamic development either social, economic or economic runs raggedly. Unfortunately, some parts of the population are incapable of maintaining the pace of revolutions or refraining to these changes.

Adjustments in the labor market can be perceived as an indicator of school changes in which highly competent teachers play a significant role. The value of education and the performance of future professional staff are dependent on educators. Since pedagogues assist learners in gaining competences that allow them to integrate in a constantly changing world, society defines expanded anticipations for the teaching profession. The new prospects and requirements that are currently emerging for teachers in Europe result in teachers being at the center of the discussion. Attention is being paid to improving the quality of teacher education and lifelong learning strategies.

The expansion of the market economy is related to an increase in the role of education in the labor market. Not only do the employees need to fulfill higher requirements but also

they are supposed to gain new professional qualifications and competences. Hence, it is crucial to associate education with the labor market, which expects employees to be adaptable and adjustable in rapidly changing conditions. An essential role in that matter is played by both competent substantive and methodical education of teachers. They can indicate young people how to learn individually and how to make use of all the feasibilities determined by technology and thus adapt young people to operate in the information society, thus.

There are many aspects and actions that enrich the success of building the society that is based on information technology and on established to support economy. Education is said to be an accelerator in the era of the information society, knowledge culture, information and communication (Stopińska-Pająk,2006). Besides, education should be up to date, not only in school or university teaching but in lifelong learning as well. In Human Development Report „Poland on the way to a global information society" both the objectives of schooling and education of citizens were clearly specified: informing, communicating, learning, creating under more ordinary admission to information and communication methods and, consequently, to inform. Contemporary information and telecommunications technologies affects the development and changes as well as the quality of life and opportunities of the society to live.

Implementing technology in school curriculum

A number of studies have implied that the effective educational use of technology depends on educators' attitudes and acceptance towards technology. In order to predict and understand teachers' technology use and reception, a well-defined context is essential. During the past decade there has been an awareness developed that teaching technology abilities alone is not acceptable- teachers must also learn how to incorporate the use of technology into their curriculum.

The significance of didactic effectiveness lies in the work and methodical preparation of the teacher. The teacher ceases to be the only authority with knowledge and becomes a programmer and initiator of education. The effectiveness of computer-assisted education determined by the expected attitudes, skills and knowledge, is tremendous and simply

justifies the use of a computer (Molga, 2003). Even the most flawless computers and the most genius software cannot replace a form of communication with a teacher who apart from knowledge, contributes his or her own personality and value system, which is related to the introception of values in the student. It means assigning value to one's own consciousness; approving as their own aims, standards and convention not created by themselves but recognised by the environment (Furmanek, 2011). The current paradox is that information and communication technologies that were shaped with a view to bringing people together actually move them away from each other. According to the assumptions of the J. Delors report, education should be established around four pillars of knowledge: learn to know-to obtain tools of understanding; learn to act- to be able to affect your environment; learn to live together- to participate and cooperate with others at all levels of human activity; finally, learn to be- the pursuit of a compilation of the previous three pillars. These assumptions correlate very well with the capabilities of modern information technologies. Certainly, it is an opportunity to enlarge human potential in every area of its activity, including education (Kerkhove de, 2001).

To sum up, technological devices introduce a dare that educators cannot afford to neglect. Properly integrated into a regulated environment, these tools need not accomplish any dehumanization of the schools. Conventional teaching methods, classrooms systematised by grade level may let control over what is acquired, but not over what is learned. Hence, the schooling machinery must be entirely transformed. While the suitable sides of education's common methods must be preserved, the technology must be properly combined into a man-machine system.

Teaching with technology: foundations for success

According to the currently adopted human perception, shaped as the cognitive concept – human being is distinguished as an information processing system. Human's reflection depends either on the ongoing information flowing to him or her from all angles or on the so-called cognitive structure, as the knowledge is encoded in memory and acquired in the course of understanding and considering. Besides, human is also an independent and creative being. Learning and teaching should enable an individual not only to process information, but also to create new cognitive structures based on basic information and to

develop skills of continuous learning and dealing with emerging new information resources, too. Therefore, a valuable skill is the capability of choosing what has a high chance of remaining, and the additional qualification should be the development of continuous learning skills.

The education system is supposed to include information technology at least for two reasons:

- due to the importance of this technology in manipulating the information, the task of the education should be to provide learning groups with an opportunity to gain a fully understanding its basis and applications;
- this technology provides new methods and means of getting a varied and enriched view on the content transmitted so far in teaching, and there are also very important contents and skills for education that cannot be implemented without the assistance of computers.

The function that information technology carries out in teaching process cannot be compared with the role of other technologies, except for printing. Technology distinctiveness is determined by the importance of computers. Unlike previous technological breakthroughs in the history of humanity, related to, for example, the emergence of a steam engine, ways to transfer messages and means of transport, the essential purpose of computers is to increase feasibilities of the human mind. Computer methods and means have become a human's intellectual help understood as assistance in his or her intellectual ability.

As the student is exposed in the process of his or her physical and development in the contemporary views on education, the expansion of his or her personality should subordinate the selection of content and the curriculum. That has been confirmed in the concept of using computers in teaching- determined by the ideas of Seymour Papert presented in his work *"Brainstorms"*. He states that the child is the one who programs a computer, and as he or she is acting like that, he acquires both a sense of control over a fragment of the most contemporary and effective technique, as well as he or she sets up close contact with some of the inmost ideas of natural science or the art of building intellectual models (Papert, 1996). But Papert does not overestimate the computer and

technology. Although he defines technique as an indispensable role in the fulfilling his vision, he emphasises the role of mind. The computer is a drive that transmits cultural “seeds” that intellectual output would exist without the technological support, as the “seeds” have rooted in an actively developing mind.

Implementation of common programming practice with robots creates further challenges in the field of teaching, as the matter of fact computer classes have existed for only few years. Robots present spectacular assurance when teaching limited topics, with impact sizes on cognitive results almost corresponding those of human tutoring. However, the application of robots in academic environment is limited by procedural and logistical confrontations for now, the profits of physical realisation may move robots upwards above encountering learning technologies, and classrooms of the future will presumably mark robots that support human teacher. Social robotics designers create their robots in order to let them function as social agents in interacting with people and other robots. Although it is undeniable that both technical parameters and of the robot and their software are essential to achieve this goal, the importance of spatial organization and processes of coordinating robot interaction with people should be emphasised, as well. It is said that the social nature of the designed machine is significantly linked to the subtlety of human behavior in the laboratory. This human involvement in the process of creating social robot agency is not a matter of individual will. The reason is based in fact that cooperation of machines and people requires some situational dynamics in which the robot is embedded (Krämer, Bente 2010).

The use of social robots has recently been explored in the educational domain, with the expectation of positive influences on learners. As artificial intelligence and robotic technology proceed to progress, the idea of a robot as a tutor or an assistant for a child is no longer confined to science fiction. The examples of robot implementation for teaching purposes are necessary to be presented. In Polish schooling can already be observed some elements of robotics, such as MAOR-12T designed by Mobot company or Tracking Robot Car. The first mentioned is in principle, the robot designed for miniSUMO fights. In addition, it can be programmed as an alternative to Line Follower. The great advantage of the set is the freely available SPAR-TA software and PANEL that each student can use at home to prepare their own program that will be tested during school activities. It can also be moved

to the higher programming stage of the MAOR-12T robot to C programming language. Tracking Robot Car is a sort of technological advancement that operational algorithm is based on the electrical regulation of the system. After being assembled and soldered, it can be made clear to students that robots can operate not only on the basis of computer programs, but also through the proper implementation of conditional loops in electrically controlled systems only. The regulation that allows the robot to travel as a Line Follower can turn out to be as time consuming as programming system with a microcontroller (see more: http://edu.mat.umk.pl/archiw/iwe2016/materials/II_Drukarnia_lwE/19.pdf)

A robot needs some attributes for a child to count on and feel complacent with it. NAO is a humanoid robot constructed by French company Aldebaran Robotics. It has been adopted to teaching environment for kids with autism in schools for already six years. There are two principal desires of the program: enhancing both social interplay and verbal skills with interactive gaming. While L2TOR is the abbreviation of a research project, known as Second Language Tutoring applying Social Robots, which was financed by the European Commission Horizon 2020 programme and created as a kid-friendly robot aiming at teaching youngsters a second language (see more: <http://www.l2tor.eu>).

Certain real-life social robots, or autonomous machines that cooperate and interact with humans, are already functioning and assisting people in places like schools, hospitals, and the home. AvatarMind's iPal also should be mentioned as an example of companion for senior care, hospitals and children's education. Old people often suffer from keeping track of daily routines, the robot can enrich basic care services or even it alters medical help when necessary. Moreover, iPal can be treated as a teacher's support and augmentation in the process of teaching (see more: <https://www.ipalrobot.com>).

There are a growing need and interest in implementing social robots in a range of care settings to enhance dementia care. PARO (the robotic seal) is the first social robot that has already been taken under the clinical research and its implementation will definitely lower blood pressure, one who face with PARO can be relaxed and there can be a boost in one's cognitive reserve. The robot is used mainly as a therapy for those demanding health care, including especially people with severe intellectual disability, physical disability, autism, after injuries, mental disorders. Moreover, it can be a form of treatment for seniors who are capable cognitively, but also for those who suffer from dementia, oncological patients

or people who are exposed to stress. PARO is also relevant to play the role of a pet in places where its stay is impossible or even prohibited, e.g. in hospitals or old people's homes (see more: <http://www.parorobots.com>).

Virtual pedagogical agents and intelligent tutoring systems have been applied for many years to transfer education. In addition, robots have embellished the process of learning and influenced later behavioral decision more considerably than virtual agents. Social interaction intensifies learning between humans, in terms of both cognitive and affective consequences.

Although robots that do not show off social actions can be used as educational tools to teach students about technology and be useful in many different social domains see more.

Technologies as a threat – pedagogy as a remedy

The world with a great impetus entered the last decade of the twentieth century into a digital age, raising certain events changing the nature of work and human life. From the analogue society, in a relatively short period of time, we have been transformed into a digital society. We are increasingly surrounded by digital products using developed electronic, IT and communication technologies. The nature of these changes is generally to be seen in positive categories, although it is difficult to rely on the reflection that often technologies and the willingness to make use of them are ahead of the society's readiness.

In papers on social change and contemporary culture, technological change is presented first of all as a factor that transforms models of social relations - this is usually assessed negatively. However, education generally assumes all technical innovations at its own right pace. According to J. Delors' Report, education should be organised around four pillars of knowledge: learn to know, f.e. to acquire the tools of understanding; learn to act to influence our environment; learn to live together to participate and cooperate with others on all the levels of human activity; finally learn to be a striving as a compilation of the previous pillars (Delors 1996). These assumptions correspond very well with the possibilities of modern information technologies. Undoubtedly, this is a chance to multiply human potential in the area of education. It is very good that we are able to use new technologies, new tools in everyday work and study. However, we do not understand the meaning of their existence. Without a second thought and without creating some limits,

we trust both computers and information technologies entrusting them at the same time a patent for "knowledge" and relying on their supposed intelligence.

The emergence of new technologies not only made it easier for us to carry out various practical tasks, but also had a significant impact on the quality and shape of social relations. The proliferation of the Internet and mobile phones has enabled rapid mass communication at a distance, but it has changed the way we perceive the basic dimensions of social life: social bonds or concepts such as loyalty and honesty. An outstanding Polish praxeologist T. Kotarbiński says that a nation that would be neglected or removed from computer science, would be condemned to a miserable easement in relation to other nations, and ultimately even to exclusion (Piecuch, 2008). If the information is the foundation for the informational society, then the ability to work with information becomes necessary. Currently, this goal is primarily used by computer science, or more precisely by its sub-discipline - information technology, or to be more exact by information and communication technologies. Efficient use of the computer in the technological sense is no longer enough to carry out effectively own actions in the society. The appropriate digital competences must be imposed on technological skills (Piecuch, 2011). They are now necessary at school, at the university, but their importance is far greater in the long-term. The complexity of the modern world and also dynamic technological progress already enforce the process of self-education, and further speeding up is expected in the future. From this perspective, lifelong learning becomes a fact. Hence, the priority task of the teacher is to educate young people on the attitudes and habits of lifelong learning. It relies on continual gaining new knowledge and skills, independent use of information resources and the ability to cooperate with others and solve problems (Sielatycki, 2005). Today, the reality of the network has become an alternative sphere of young people's lives to off-line reality, in which they move freely and build relationships according to patterns incomprehensible to older generations. So to be said, socialisation in a reality saturated with modern technologies leads to the decrease of traditional forms of social life – it puts at risk basic social relations, business and the educational sphere, in the family, in a peer group, in the local community.

- Business

Obviously, technology has opened a new dimension for business. Not only companies involved in the production of smartphones appreciate the significant role of smartphones, but also care about the creation of appropriate domains for companies to develop a mobile application, improve Internet services or focus on other aspects of life in order to use smartphones optimally and gain new ones, potential customers, thus raising the bar for other competitive companies.

It is foreseen that within the next few years there will be an even greater increase in the quality of Internet access services, and the only and cardinal cause of this phenomenon is the increasingly excessive application of smartphones, internet services and various applications. Due to a significant increase in the demand for smartphone phones in a relatively short time, the companies had the opportunity to invest in the development of applications on mobile devices and apply the same new business dimensions in the market area. Above all, the reason why different suppliers, including BlackBerry, Android, iPhone, are competing in creating programs is changing and adjusting smartphone settings for potential new customers. The mobile applications market is another investment sector that different operating systems have their own mobile application technologies, thus creating a different market (Bradshaw, 2017).¹ Depending on the needs, the user can download useful mobile applications free of charge or for a small fee. The smartphone has also had a huge impact on the advertising sector. Mobile application publishers or service providers earn high revenue from advertising as part of mobile application services. The situation has changed significantly over the years, when other computer technologies had to base their progress on suggestions coming directly from reinforced forces, security agencies or research centers. It was only in 2008 that the consumer market developed its own law, according to which the boom in the field of information technology first appears in the consumer space and only then goes into other areas. It is worth noting that the development of smartphones has seen its impact on the market related to the computer industry. The research conducted by Compete states that about 65% of the population uses smartphones to perform activities such as reading news, publishing photos or confusing

¹ Bradshaw, A.C. (2017). Critical pedagogy and educational technology, in A.D. Benson, R. Joseph, & J.L. Moore (eds.) Culture, Learning and Technology: Research and Practice (pp. 8-27). New York: Routledge, downloaded: 30.06.2019, <https://www.researchgate.net/profile/Amy_Bradshaw2/publication/314562569_Critical_Pedagogy_and_Educational_Technology/links/5924869d458515e3d41f5c41/Critical-Pedagogy-and-Educational-Technology.pdf>

posts. Computers become a relic of the past and make space for advanced mobile technology (Sarwer, Soomro, 2013)

- Education

The demand for smartphones, access to internet services can thus create new, alternative service channels for educational purposes. Distance education is one of the learning mechanisms that enables students to free themselves from time and place constraints, thus creating flexible educational conditions. The distance learning enables students to continue learning without interfering with their work or family life. In addition, the smartphone, both during and outside the classroom, lets students cooperate with the tutor or teacher, as well as not cause arrears in his learning due to unforeseen random events. The argument that the educational system in developed countries is the most common beneficiary of mobile technologies, but also may be their integral part, is indisputable. From the previous considerations, the increase in the possibilities of using smartphones, can be a reason for distracting students' attention. Due to continuous access to the Internet, mobile phones may encourage students to behave dishonestly, such as consulting with other participants using messengers, using advanced calculation applications or using notes stored on the phone. These devices may encourage the promotion of compulsive behaviors, among others, intimidation or harassment. This phenomenon is enhanced by the equipment of the telephone - a camera or a camera.

- Social life

Social life has undergone a radical change since smartphones and their domains were introduced into the technology market. the research presents that about 15% of the current population is struggling with some type of disability, as well as an increase in the middle-aged population. What's more, these studies show that by 2020 our planet will consist of 1000 million over the age of 60. Bearing in mind the current capabilities of phones, smartphones will certainly play an important role in the integration of people with special needs or in the last year. Smartphones provide this group with life more independently. The greater the ability to be independent, the greater sense of fulfillment and happiness, as well as the desire to enjoy life. Smartphone functions such as text-to-speech, GPS functions or access to social networking sites can help this group integrate with the public. These devices are excellent instruments for people who, as a result of

constant communication, remain in constant abundance with their family. In addition, they enable individuals to act as journalists at any time. Device functions such as camera, video capture, access to social networking sites give you the ability to capture any video at any time. Another aspect worth paying attention to is the ability to manipulate the actual content and distort that content by unauthorized users. This shows that problems with the authenticity of the information received through these channels require resolution and more research to ensure their credibility and authenticity. Other studies that show that organizations expect their employees to receive immediate responses even after business hours, make the employee feel obliged to immediately respond to official messages. A significant percentage of smartphone users are involved in constantly monitoring text messages related to their work, thereby provoking compulsive and chronic routine checks, which in the later stage may trigger a stressful situation. The data cited indicate that the use of technological devices is reflected in the blurring of the differences between work and family life, or even as a consequence may lead to a worsening of the balance between work and family. In conclusion, the higher the integration of work and home facilitated by telephones, the more visible the phenomenon of work-home interference (WHI), or work interference in private life, which is considered as a source of inescapable stress and having a disruptive effect on the employee's professional and family life (Hoffmann, 2017)

From this perspective, modern technologies are perceived as a threat and the task of pedagogy is to counteract the negative effects of technological progress on the personal and social development of young people. In pedagogical literature, such concepts as addiction and online activity dependence, cyberbullying, phonoholism, etc. appear.

- An addiction

The nomenclature of addiction is not homogeneous, it depends to a large extent on the individual, his specific behavior, the agent or the substance from which he is addicted to. An addict is a person who cannot do without a given activity or subject. He or she is so absorbed in it that he or she neglects the family, work and other important matters. C. Guerreschi claims that addiction is a kind of process that usually begins when an individual in contact with a given subject begins to receive himself better (Guerreschi, 2006). In this way, the operator is convinced of the constant compulsion of contact with a given object in order to meet his or her needs and desires. As to say, M. Jedrzejko says that addictions

are a manifestation of pathology, and therefore a disease that we should perceive in four dimensions - somatic, mental, social and moral. Each of these categories will be assigned an appropriate field (s) of science dealing with the symptoms of this disease, its analysis and counteracting - medicine; psychiatry and psychology; pedagogy and sociology; moral theology. The concept of **dependence and addiction** serves to formulate definitions of substance dependence and behaviors. The first of them refers to substance dependence, while the second one is more widely understood and covers all excess behaviors (including abuse of substances) (Jędrzejko, Janusz, Walencik, 2013). Reference is made to the definitions of addiction contained in the new ICD-11 classification, falling within the group of 6 " Mental behaviors or neurodevelopmental disorders ", where addiction is a disorder related to the use of addictive substances, these are behavior and psychiatric and behavioral disorders that result from the use of psychoactive substances, including drugs, as well as specific and repetitive behaviors that are reinforced and rewarded². The "Gaming disorder" is distinguished as one of the general behavioral disorders and disorders of habits. "Gaming disorder" is manifested by the limited ability to control games, the lack of control over the time and frequency devoted to games as well as the hierarchy of games over other life activities. Even with the increase of negative consequences resulting from this pattern of conduct, there is limited control over this phenomenon. The pattern of behavior in games can be continuous or episodic. A period of 12 months of observation is necessary to assign a diagnosis. The required duration may be shortened if the diagnostic requirements are met. " Gambling disorder " in terms of ICD-11 classification refers to continuous and recurring gambling behavior, manifested by increased gameplay frequency, its intensity and thus neglect of everyday life as well as continuation and escalation of gambling despite the occurrence of negative consequences. The pattern of behavior is harmful to personal, educational, or professional life or to other harmful areas of functioning. The pattern of behavior is continuous or episodic and recurrent. The spectrum of behaviors is observable within 12 months to assign a diagnosis.³

- Cyberbullying

² ICD-11 for Mortality and Morbidity Statistics, World Wide Web: <https://icd.who.int/browse11/lm/en#/http%3a%2f%2fid.who.int%2fcd%2fent%2f334423054>, 29.06.2019

³ ICD-11 for Mortality and Morbidity Statistics, World Wide Web: <https://icd.who.int/browse11/lm/en#/http%3a%2f%2fid.who.int%2fcd%2fent%2f1041487064>, 29.06.2019

Computer theorists says that the term "cyberspace" is a conceptual social arena that we can access using computers. In addition, "cyberspace" is defined in a general context, in relation to the way of life or the general type of culture created by means of advanced Information Technology (AIT), or relationships and practices that connect around computer technology (Hakken, 2002). Wall (2001) developed the most frequently cited typology of cybercrime and suggested four types of insults, observed in a virtual environment: pornography, fraud / theft, violence and cyber-cyberspace. This dissertation focuses on the problem of violence in the media and social networks, defined as "public spaces", which include Facebook, Instagram and Snapchat. Social media move the Internet towards a more focused one user 'and the same "generated by the user". It is worth noting that the media is called "spreadable " and is characterised by a significant "participation" of youth culture, while giving value and importance to the networked culture. The use of multiplatform or polymedia is widespread because users use different social media platforms, thus using different forms of communication (Peterson, Jillian, i James Densley , 2017).

- Phonoholism

Another equally new phenomenon is **phonoholism**. It is based on a mechanism analogous to that similar one in case of Internet addiction or chemical substances addiction, like cigarettes, alcohol or drugs. It is one of the behavioral addictions, which means addiction to a mobile phone (Węgrzecka-Giluń, Ostaszewski, 2014). It reveals excessive attention to the mobile phone and abuse of it in various everyday situations. Mobile phones users are exposed to the dangers of unreasonable use. Lack of rationality in using them leads to the abuse of a mobile phone and, consequently, get addicted to it. Phonoholism as an addiction to an activity, i.e. a behavioral addiction, has a symptom of a problematic conversation by a mobile phone, excessive short text messages sending, the necessity of always having the phone switched on, playing types of problem-solving games or having constant connection to the Internet on the telephone. This phenomenon is difficult to be easily recognised because the phone can be easily hidden, or quickly checked whether there is any new text message or phone-call and then gently put in a pocket or purse. B. Pawłowska and E. Potembska (2011) say that phonoholism is defined as an incorrect, dysfunctional way of using a mobile phone. The authors claim, it is enough that in the last 12 months, at least five of the following symptoms appear in a a case of a person who uses the mobile phone

excessively, and we talk about a pathology use then. These symptoms like a strong desire to use a mobile phone, conduct speaking or sending SMSs, expressed in constant thinking about the mentioned activities; the need to increase the frequency and duration of telephone calls and increase the number and frequency of SMS sending; or repeated ineffective attempts to stop or reduce quantities conversations and sent SMS messages (Pawłowska, Potembska, 2011). However, it is highly possible to counteract phonoholism, it is both to conduct educational and upbringing activities among students, as well as to raise awareness about and sensitise them to mobility problems, especially students who are particularly vulnerable to psychological risks due to their specific personality traits. The effectiveness of proposed pro-health programs is influenced by their methodological and methodological coherence as well as adequate planned activity in relation to programs, target groups and resources owned by the implementers (such as financial, factual, substantive, and service ones) (Ostaszewski, 2016). In the case of adolescents, it is primarily about a holistic development in the areas of all psychic, spiritual, biological and social spheres (see: Grzelak 2009, Drzewicki 2009). A key aspect of prevention is the creation of a potential empowering situation in which individual life experiences are possible. The context for this type of activity is non-meditative activity under the supervision of a teacher. Cooperation of educational environments (school, family) in pro-health activities related to addiction is the basis for effective learning of social competences and prevention of undesirable behaviors.

The OECD analyses present significant changes in the labour market as a result of technological developments are specific supplements to this threatening atmosphere. Up to half of current occupations are automated within twenty years (Arntz, Gregory, Zierahn 2016). Not without significance is the term "risk of automation" used by the authors of such studies. This is accompanied by press titles such as: "Will robots take our jobs?" The characteristics of modernity proposed by Ulrich Beck are a "risk society". However, it is not limited to state the fact that modern social life carries new threats that humanity faces. Life in the "risk society" is also life with an analytical attitude to possible ways of acting, either positive or negative, towards the face of which, it came to live as an individual and global (Giddens, 2006). Modernity radically transforms the nature of everyday life and changes the human experience, even the most personal ones. In its conditions, reflexivity and

reflective undertakings are being developed. In contemporary social conditions, the more individual tries to reflectively give back the shape of his or her biography, the more he or she is aware, the more the future is determined by what is happening now. Being a "here and now" and reflective experience of each moment means increased awareness of one's own thoughts, feelings and sensory impressions. This awareness creates the conditions of change and causes change. Effective actions in this field should also be based on a specific vision of a human being.

The last dimension is a kind of civilization fear of becoming dependent on advanced technology – "machines will take control". The progressing digitalisation is tightening the globalisation of interdependence. Ulrich Beck puts this dimension in the centre of the concept of the risk society. The author emphasizes the interrelations between continuation and translation on the example of wealth production, but also the production of risk. In an industrial society, the logic of wealth production dominates over the logic of risk production, and in a society of risk this ratio changes. The increase in the power of technical and economic progress is counterbalanced by the production of risk, which only in the early stages can occur as a latent side effect. The veil of latency falls with the universalisation of threats, public criticism and the progress of scientific research, which in social and political discussions begin to take on a new meaning. In the industrial society, science, and hence methodical doubt, are institutionalised. This doubt, however, is limited to the external objects of research, while the foundations and consequences of scientific work remain with this scepticism untouched. Scientific and technical development in its continuity breaks down in the relationship between what is internal and what is external. Scepticism also applies to the basics and risks of scientific work, as a result of which the reference to science is simultaneously generalised and under debate. The scientific and technical development are full of contradictions in the interaction between science co-created and co-influenced by science and their public and social criticism. Science becomes one of the reasons, a medium of definition and a source of solving the problem of risk, it opens up new markets of re-education, too (Beck, 2002). Although technological change is presented first of all as a factor that transforms models of social relations and has got negative association, so to be called is perceived, incorrectly, as a threat. Education and networking tools must be used in education, but only if they can help us in the process of helping our students to

develop the skills necessary in life. New communication technologies are perceived in the category of threats and eliminated from school, while a very important source of danger is the school's awkwardness towards new technologies and giving up the educational role in this area (wiser than warnings and prohibitions). There are examples of good practices that can be used to reduce this distance. The processes consisting in initiating changes should be unambiguously assessed positively, regardless of the value of the innovation itself.

Formal education as a framework for implementation of new technologies – structural and cultural obstacles

One thing is for sure - the reality of contemporary people's lives is technologically saturated. This makes it necessary to shape the competence to function in such a reality and use the opportunities offered by technology. There is also a need to ensure the necessary human resources for the development of technology in the global economic race.

This results in taking strategic steps in the field of education at the national and international level. An example of international guidelines is one of the OECD's:

<https://www.oecd.org/employment/emp/Skills-for-a-Digital-World.pdf>

At the national level, a good example is the work on the Strategy for the Development of Artificial Intelligence in Poland.

[https://www.gov.pl/documents/31305/436699/Za%C5%82o%C5%BCenia do strategii AI w Polsce - raport.pdf/a03eb166-0ce5-e53c-52a4-3bfb903edf0a](https://www.gov.pl/documents/31305/436699/Za%C5%82o%C5%BCenia+do+strategii+AI+w+Polsce+-+raport.pdf/a03eb166-0ce5-e53c-52a4-3bfb903edf0a)

There are two key aspects to this:

- 1) the need to create conditions for the development of staff for the development of modern digital technologies and AI
- 2) shaping citizens' competences in such a way that they are able to make safe use of technology at work and in their private lives.

However, education for technological change, or for the use of new technologies, must cope with structural and cultural problems:

- a) the conservative nature of education
- b) nature of formal education process organization - core curriculum, examination, certification
- c) the credential character of education - the rituals of awarding degrees are more important than the content of teaching (see John Meyer's neo-institutionalism).

So far, this paper has stressed the different dimensions of the perception of technological change through the prism of education. Therefore, we can see that

- a) technological progress opens up new opportunities in educational practice
- b) technological progress also raises societal concerns, which education should counteract
- c) technological progress regardless of moral evaluation, is a fact and the education system should stimulate the development of adequate skills to deal with this reality

At this point we would like to put attention on the the institutional context of implementing changes in education. It is the nature of the formal education system, which is resistant to changes.

Referring to the first point mentioned above, it should be noted that despite of the enthusiasm of educational innovators' in mass education we are dealing with a rather classical approach to education and modern technologies appear mainly in the form of multimedia presentation programs (e.g. PowerPoint) or text editors. Despite a number of technical possibilities, which are already available at an affordable price, the classic approach is still dominant, with the key role of the textbook and the teacher as the content provider.

The reasons for this are indicated as follows:

- technical problems - such as a frequent lack of adequate internet connection capacity

- no need for most teachers to use modern technologies - even if individual enthusiasts/innovators appear in the school, they face a lack of interest from others and are therefore not supported by the school administration
- technological solutions are at school but teachers do not have the skills to use them
- lack of ability to link the requirements of the core curriculum with the use of modern technologies
- lack of adequate methodological training on how to use modern solutions - solution providers show how to use equipment, but do not train methodically and do not show how to incorporate technological solutions into school logic.
- fear of losing control over the classroom - this is due to the fact that young people are more advanced in using modern technologies

Very often teachers argue that a new technological instrument is only a more advanced form of content realisation they already implement. Thus teachers perceive the necessity of mastering the new solution as an additional, unnecessary task. It should be noted that curricula integrated with technology are as important as technology itself. There is a problem of compatibility between the curriculum and the method.

The above mentioned suspicion of new technologies also does not facilitate their implementation in school life. If there is a fear in pedagogical discourse that children and young people are addicted to online activities or abuse of smartphones, it is difficult to expect that the methods based on these solutions will be implemented on a mass scale.

Not without significance is the aspect of fear of losing control over students. One of the classically defined tasks of a teacher is to control the time and content of student activity. The fear of unauthorized use of technology effectively prevents schools from mass implementation of it (in Poland, most schools prohibit the use of mobile phones by students).

More broadly speaking, school is a mechanism for allocating individuals in a social structure based on the assessment of students' achievements. The rigor of grading determines the rigor of the organization of educational content and determines the forms of their realization - subordinate to the logic of examination. Modern technologies and

accompanying pedagogies - transition from a teacher-centric to a student-centric model of education - clash with the culture of a school where traditional patterns dominate and the implementation of new technologies may be associated with fear of disrupting the process of preparing for the examination - which is important for the allocation of the individual at subsequent stages of education and, as a result, on the labour market.

The implementation of new methods based on the use of modern technologies therefore imposes an additional obligation on teachers to link technological innovation with the requirements of traditionally tailored school curricula and processes. This only increases the resistance of the teaching community to implement the change.

Conclusion:

The information society is defying itself as one that widely produces, processes, collects and uses information (Zacher, 1999). It can therefore be said that it is the basis of the gradually emerging knowledge society, in which knowledge that fills human consciousness is the result of universal education, training and the accumulation of experience of people capable of it effectively managing their own development and organization, creating values, principles and practices of humanism, democracy and justice. Increasing saturation with new technologies of the professional and social life naturally forces the necessity of shaping competences to use these resources and develop them. This opens the field for introducing technological aspects into education. Education is inherently conservative and has been burdened with institutional drift - the introduction of new content into education takes place with institutional and cultural resistance.

The process of lifelong learning requires preparation for working with computer and information. The most visible sign of a shift towards new technologies is the conviction that it is possible to increase the effectiveness of education through the use of new tools (including artificial intelligence and robots). Information technologies are a category of defining information society, hence their knowledge is particularly important for interpersonal contacts in a society of people learning, practicing and improving. The complexity of modern information systems is so large that it requires continuous improvement of skills and compatibility.

The main implication is to prepare teachers to be competent users of technological tools and guides to digital-social life. Moreover, their considering critical incidents may boost teachers reflections about how they teach and question their own teaching workshop which facilitates them to develop professionally. That engages to identify good applications of teaching a teacher is embracing.

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