Technological determinism and new media

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Abstract— *Technological determinism is the belief that technology is the principal initiator of the society's transformation. The emergence of this theory is usually attributed to the American sociologist Thorstein Veblen, who formulated the causal link between the technology and the society. According to the supporters of technological determinism, any social changes are controlled by the technology, technological development, communications technology and media. The modern information society arises as a result of the development of innovations, new technologies and their social and political implications. Since the establishment of this direction in the early 20th century, two different branches separated: radical and moderate (hard, soft) technological determinism. According to the radical version, the technologies represent a prerequisite for changing the society, the second branch regards the technology only as a key factor that may or may not mean a change. Today, we can quite confidently say that the Internet and the nature of new media is fundamentally changing the structure of the society. The expansion of computers, networks and the Internet has radically changed many aspects of not only human communication, but also the entire society's life. The rising popularity of new media has changed the nature and the way our society and the individuals act – the way we do the shopping, recruit staff, pay taxes, use the library, gain academic degrees and educate ourselves.Through a philosophical analysis, the text examines the nature of contemporary technological determinism, the features of new media and the method they use to affect the creation and distribution of information and knowledge in the education process.*

Keywords— Education, technological determinism, education process, social changes, new technologies.

I. TECHNOLOGICAL DETERMINISM

The concept called technological determinism denotes the approach promoting the thesis that the use of educational technology is influenced both by the user and his surroundings, but also, above all, by the technology itself. It means that technologies as such are not neutral to the learning process. They structure information in a manner typical of them (the world is structured differently by the medium called writing and the medium called the technical image), they affect the psyche of the user, and even cause social change. The proponents of technological determinism argue that the society is influenced and shaped by technological development. It has to adjust and adapt to new technologies and innovations. The negative consequences of the technological development are the result of poor use by the people, not of the very nature of technology. Toffler understood the technology as a determinant of all changes that have a fatalimpact on all areas of human life. The computer has the ability to take control of the entire mechanical age. Today's situation is called the "third wave", a period of significant changes and acceleration of life pace, which is faster due to the continuous development of technology. He believes that the changing society has a major impact on the human psyche and talks about the "shock of the future"[1]. Negroponte has a more optimistic, however, somewhat utopian view of the issue, when he likens the situation to "replacing atoms with bits". The qualities of the digitization process(decentralization, globalization, harmonization and strengthening) are too strongfor it to be stopped [2].On the contrary, social determinism argues that the social sphere conditions and determines technological development. Introduction and use of new technologies is the result of social order. However, proponents of this concept emphasize the bi-directionality of this process in their theory. The technology on one hand and the social aspect on the other hand do not exist as two heterogeneous worlds or processes. The society is modelled by the technical change and the technical change is created by the society. Technical innovation comes from within the economic system gradually introduced by supply and demand, and it is not simply adapting to external transformations. As the work of man, it passes unnoticed only if he allows it. The society is thus defined both by means of technologies which it is able to create, and those which it decides to use and develop rather than others. In this sense, technology is one of the many social processes.

M. Castells took a similar stand on this issue. He rejected the idea of ICT as something that the society must adapt to. He understood the technology as a social process, when the societyis formed by the technical change, and the technical change is shaped by the society. This two-way process is called social embeddedness. In his publication, Castells also comments concerning the issue:

"The technology does not determine the society, the technology is the society"[3]. Pierre Lévy also refused to accept the concept of one-sided technological determination: "The technology is an analytical angle of global socio-technical systems, a view that emphasizes the material and artificial part of human phenomena, and not the actual quantity that would exist independently of the rest,would have diverse effects and work by itself" [4]. He said cyberspace was a part of a social movement, it had its group leaders, its passwords and its logical aspirations. Furthermore, Levy argues that if one takes into account any relationship, it will be much more complicated than determination. According to him, social and cultural state of affairs is infinitely complex and partly indeterminate set of interacting processes that are automatically maintained or suppressed. Instead of determination, he, therefore, uses the concept of conditionality. The society is influenced by technological developments, the negative effects are caused by poor use by the people, not by the nature of the technology itself, and also the introduction and use of new technologies is the result of the social order.

II. NEW MEDIA SUCH AS DIGITAL MEDIA

In a broader sense, the term new media "covers the entire field of computing, computer technologies and the associated data contents, in the strict sense, it only applies to computer, digital technology-mediated communication. At the same time, the technological nature of new media at the hardware level is most notably specified by the fact that these communications technologies are based on digital (numerical) encoding and data processing. To record information (character, image, sound, action description), the digital technology uses numerical coding – digitalisation is therefore a process of transforming information into a numerical code. Currently, for a number of practical reasons, it is based on a system with two numbers (i.e.a binary system), with one and zero, to which all the information is transferred. Compared to analogue media, the contents transmitted and processed by new media are thus numerically coded – they consist of separate, quantified samples represented by a binary code. This digital basis of new media has a number of important implications, which are addressed from different perspectives in the theoriesby Lev Manovich (2001) and Tony Feldman (1999).

In connection with new media, Lev Manovich (2001) talks about the five principles that arise from their digital nature,namely*numerical representation, modularity, automatization, variability and transcoding*. According to Manovich, the fact that the data carried by new media are *represented numerically* is the most important feature of new media –in fact, new media can be described formally, mathematically, and the new media objects thus represent an objectof algorithmic manipulation (such as images, curves or sounds can be expressed through mathematical functions, and according to Manovich, contentscarried by new media do not have the character of constants, but modifiable variables). Since they are based on the same numerical code, they are also the *modular*new media – the individual components, various objects can be, given their discrete nature and numerical representation, changed and modified as modules without the necessity to reproduce the medium as such. In these two respects, new media most fundamentally differ fromanalogue media[5], whereas the numerical representation and modularity de facto herald the other three principles of new media defined by Manovich.

The numerical code and the modular structure of new media on the one hand allow *to automatize*a series of operations in an access to the medium, in its formation and while handling it. New media are also *variable*– they are not fixed once for all, but may exist in different, potentially infinite variations. They are not necessarily tied to a specific physical medium and its unique characteristics. While traditional media are "hardwired" with a concrete material structure, with a particular carrier, the new media objects can be transported and updated on multiple types of material artefactsoperating with the numerical representation of the contents and, in addition, with respect to the numeric character of the code, they can be recorded in the form of variables.

A set of distinctive characteristics of new media designed by Manovich can be supplemented with the concept of digital information formulated by Tony Feldman (1999). Feldman's goal is not creating a comprehensive definition of new (digital) media, but identifying those features of digital information that, in his opinion, help to promote the digitization as the dominant mode of recording and processing data and communication. Feldman's ambition is apparently not to present an analytically precise, consistent concept, but rather to highlight some specific features of digital technologies that have a positive impact on their spread. According to Feldman, any discussion about new media is always associated with computer technologies or with the computing process and its rules – the logic of the computer technology is simply constitutive for new media. When we use digital media,wespeak, as Feldman notes, the "exclusive language of computers"[6]. Feldman therefore identifies five key factors characterizing this "exclusive language",five properties specific for digital information – *manipulability*,*networkability*,*condensability, compressibility, and impartiality*.

Reflections on digital technology foundation of new media and their relationship to the process of creation and

dissemination of knowledge in education underscore the essential role of their intangible technological component, which we refer to as the code. It is this code that together with the nature of the hardware determines how new media in education allow us to operate with the data. The code means all protocols, machine codes, programming languages, operating systems and programs that enable new media to function in the sense that they carry the inputs that instruct the hardware, the material component of new media how to handle the data entered. The philosophical nature of the code can basically be regarded as that it is the code that enforces the existing form of skills and literacy in education as an essential upgrade and its advancement into the digital realm.

III. DIGITAL LITERACY

The continuous dynamic development of ICT in education brings ever new tools and options. The rapid pace of changes is probably the reason that many people see the technology as something that people are "given" while the sense of the existence of such technologies or the sense their use in teaching and learning is not entirely clear. But as stated by Levy [7], the technology must be understood as products of a certain society and culture. We cannot talk about the impact of the technology on man, but it is always necessary to consider their existence and use in relation to human activities. Digital technologies must be seen as a product of the human culture and technologypartly forming the contemporary society and the life of all people, and therefore life in schools as well. Technologies are not neutral, because in education, they have been the cause of a number of changes and allowed activities which would not be possible without them. Technological, but also social and cultural transformations in recent decadeshave led to suggestions on whatshould be the competences of twenty-first century man – the so-called twenty-first century skills. At the same time, reflections on skills and competencies for the twenty-first century indicate the possibilities of innovation in teaching and in education, whose integral part is the digital technology. The considered skills for the twenty-first century usually include:

Communication. This is the case of, e.g. constructing logical arguments in a discussion, drawing conclusions from different sources, or susceptibility to participants of the communication. It is also important to use adequate digital technologies (tools and services) to support various forms of communication.**Creativity and innovation.** Thinking and working creatively, be innovative[10], be able to bring news and innovation to life – these are otherimportant competences of modern man. Tradition is also taken into account here, e.g. in the form of learning from mistakes (which can arise in connection with creativity and innovation).**Cooperation.** The current style of work and learning requires more work in teams and well-coordinated team members. Digital networks, various network services and tools based on networks are thus becoming not only the foundation and means of cooperation, but also the environment for (virtual) cooperation. It is important to be able to work in various teams, be flexible, and share responsibility. **Critical thinking and problem solving.**This is the case of, e.g. a critical approach to available information and knowledge, including their evaluation and their use in solving problems. This area also it includes systems thinking, i.e. the ability to analyse how parts of a system work, how they interact with each other, including the synthesis of how the whole system works, etc. **Technological competence.** In this area, it is not about managing the individual tools of digital technologies (which become relatively quickly obsolete), but about general readiness (to learn) to use such computer programs and tools that extend the capabilities of people and without whichit is no longer possible to study or work today. Within this area, it is required that the individual was able to process information from different sources and in different formats. It also includes ethical and legal issues of using the digital technology, as well as the principles of the functioning of the media, etc.The key aspect to our topic is that **the competence in the use of digital technologies and media is one of the pillars of modern education**[8]**.** They are therefore not something exclusive or supplementary, or a toy, but an integral part of twenty-first century man. The school or university should play an important role in the acquisition of all of the above-mentioned competencies.

The topic of twenty-first century skills is often associated with **the issue of so-called new literacy**. As in the case of competencies, in the changing world, it is necessary to think about the transformation or the need for new literacies. The basic skills of individuals to read, write, count are still a prerequisite for further learning, but in the digital age it will probably not be enough. We define the so-called **digital literacy** as "knowledge, attitude and ability (skill) of individuals to appropriately use digital tools and equipment to be able to identify, acquire, organize, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media messages and communicate with others in the context of various life situations in which they will be able to carry out constructive social activities, and they will also be able to reflect these processes. Digitally literate people [9]thus are supposed to manage any activities with digital technologies that must be addressed in the context of various life situations, whether we mean work, learning,

leisure, or other aspects of daily life. Within the new literacy, it may be, e.g.,the case of the skills and knowledge to understand, create and grasp the importance of the digital media communication, which combine words, images, diagrams, audio and video.

Moreover, the importance of processing and the use of non-linear knowledge representation is increasing, whether in the side of the consumer/receiver, or the creator. An interesting problem is represented by skills and methods requiring understanding phenomena in their complexity, studying them in this way and understandingthem (including thinking about alternatives to the phenomenon, etc.), and including such complex understanding of the phenomenon in handling it (coping with it, solving it). These complex digital literaciesinclude **Internet Literacy**. This literacy adds to the ICT literacy knowledge, skills and abilities enabling to be knowledgeable in and to meaningfully use not only the Internet (technically), but also the environment of digital networks conceived in a more complexway. **Information literacy.**The attention is focused here in particular on finding, organizing and processing information. Finally, **Media Literacy**. It focuses attention on the knowledge and skills to interpret, use and generate media communication that users can apply in different life situations.

IV. CONCLUSION

The technological progress, rapidly growing in the 21st century, also asserted itself in the ways in which we create, distribute and evaluate knowledge, skills and information today. Thus, in the very nature and structure of the education process. Compared to other theories, the technological theory does not focus on objectives of teaching, but in consists in the arrangement of means used for the organization of teaching. The basic defining characteristics of the technological theory can be described as follows. The terminology containing the words process, engineering, communications, computerized environment, interactive lab, hypermedia. Great emphasis is put on planning and organizing formative processes, emphasis on communication elements, such as feedback in the process of transferring knowledge, the use of communication technology, audio-visual equipment, videos, compact discs, and computers. The emphasis on the need to pre-identify observable manifestations of the target behaviour of the student, the attempt to systematize the various phases of training (definition of objectives, targets, evaluation, etc.) in the general perspective of applied science or engineering. The use of descriptions and standardization of training operations, an effort to use systematic procedures, and finally, a critical view of the romantic and humanist perspective on education that does not care much for planning and organization.

REFERENCES

[1] A. Toffler, Alvin. 1980. *The Third Wave*. New York: Bantam Books, pp. 45-49, 1980
[2] N. Negroponte. *Being Digital*, Coronet Books; New edition edition, p. 74., 1996
[3] M. Castells, Manuel, *The Rise of the Network Society, The Information Age: Economy, Society and Culture* Vol. I. Cambridge, MA; Oxford, UK: Blackwell, pp. 158-163, 1996
[4] P. Lévy**,** *Becoming Virtual*. New York: Plenum Trade, p. 45, 1998
[5] L. Manovich, Language of New Media. Cambridge: MIT Press., pp. 36-42, 2001
[6] T. Feldman,*An Introduction to Digital Media*. New York: Routledge, p. 3, 1999
[7] P. Lévy, Becoming Virtual. New York: Plenum Trade, p. 76, 1998
[8] J. Chambliss, Philosophy of education: An encyclopedia. New York & London: Garland Publishing Company, pp. 35-36, 1996
[9] J. P. Palgrave, *Learning about learning from a video game: Rise of nations*. University of Wisconsin-Madison, pp. 45-48, 2003
[10] J. Bransford, R. Cocking, *How people learn: Brain, mind, experience, and school.* Washington, D.C.: National Academy Press, pp. 123-126, 1999.