TRANSFORMATION OF THINKING AND EDUCATION UNDER THE INFLUENCE OF INTERNET COMMUNICATION

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Abstract: The contribution deals with the impact of Internet communication on contemporary thinking and education and has the character of a theoretical study. The paper reflects the primer technological bases and the current state of the presented problem and concrete expressions of the transformation of thinking in the context of the use of digital media, using several author´s approaches and opinions. The main objective of the paper is to define and in theory formulate changes of thinking and education related to the use and influence of the Internet and digital media. The author emphasizes the importance of maintaining a linear type of thinking to retain and stabilize education and knowledge, especially in the context of the young generation, which is the most affected and potentially threatened by digital media and information and communication technologies.

Keywords: Internet, thinking, education, cognitive processes, changes.

1 Introduction

Social notification means or mass media, in which we can partly include the Internet medium, perform now a very important role. It is no coincidence that we can meet also with their identification as a seventh great power. The impact they have on society as well as individuals is unprecedented. With constant development and emerging new ways of communication and exchanging information, we can assume that these impacts will continue to grow.

The Internet is currently understood to be the absolute certainty of our lives. Many people, especially teenagers and young adults, cannot imagine their everyday world without this media. It can be said that the Internet medium belongs to the most popular and the most used media of the present. It offers new forms of entertainment, job opportunities, it brings instant and constantly current and up-to-date information, communication over the Internet is constantly accelerating, it breaks the limits of time and space perception. It is similar with new types of media such as tablets or smartphones. Most of them already automatically provide their users with the ability to connect online, either via Wi-Fi or, for example, through data provided by a mobile operator, at any point and time, in order to take immediate advantage of the benefits of electronic media and the Internet.

We could say that today there are no formal restrictions on communication and other spheres of life resulting from slowness or geographical differences. We take it for granted that we are constantly "connected" through digital technologies. It is not a coincidence that children and teenagers are referred to as "digital natives". They are people, mostly born after 1990, which grew up with computers, the Internet and other technological achievements as a natural part of their native environment and living space. They represent a generation that spends every day on social networks, whether by online communication with their peers or by entertainment. They have been using the Internet, new media and technologies more or less since the beginning of their perception of the world. Tablets or other devices are already included in the equipment of some nursery schools, and it is common to see little freshmen with the latest smartphone models. Games and activities in the countryside or on the playground with peers have replaced digital games in the cyberspace. A very important aspect is the entertainment of life, which is also supported, for example, by the use of the Internet as well. In this context, N. Vrabec[1] very well defined the generation of digital natives as people who spend more and more time in the online world, bringing new friendships, preforming their hobbies, acquiring, sorting, and distributing information, communicate with a variety of channels, share their thoughts, build their identity and participate in the lives of a narrower or wider community.

Since it is a new specific form of culture, cyber-culture determined by electronic media, it is obvious that even man, his thinking, perception and behaviour are subject to various changes under these influences. The Internet and the new media cannot deny their positive aspects and characteristics – speed and illimitability of communication, overcoming geographical, sometimes linguistic or other cultural obstacles in communication, general digitization in all areas of life, new forms of entertainment, ease of searching for the most up-to-date information, new possibilities for job opportunities and many other benefits.

However, beside many positive aspects of electronic media, especially the Internet we must not forget on their negative side. The ongoing digitization and work with technologies also causes some changes in the thinking of a person and the way of his cogitation or education. By letting digital technologies and the Internet control all areas of life, it can have fatal consequences for our personality. In addition to physiological negatives and health risks such as insomnia, depression, anxiety or overweight, our mind is at risk as well. We must also face a phenomenon such as cyber-stress or cyber-addiction. The unfavourable consequence of excessive use of electronic media in the area of thinking and education is the weakening of cognitive processes, namely memory, concentration ability, abstract thinking, or attention, reading and learning deficit disorders. The main objective of the contribution, therefore, is to define, through a theoretical reflection, these changes in thinking and education related to the impact of Internet communication and digital media. To achieve this goal qualitative methods of investigation were used, primarily a hermeneutic method which aims to understand and interpret texts, as well as analytic-synthetic and induction-deductive methods of research. In the following section of this study we describe the way in which these transformations take place and what specific changes the medium Internet is causing.

2 Information media and electronic communication

Although we regard information, knowledge and attainments as the basis and determinant of education, we must not forget that especially technologies, namely media we use, change and influence also our thinking and cognition. T. Zaşepa and P. Olekšák[2] also point out in this context that the information media *"have a significant influence on the human mentality and the way of thinking"*. Similarly, J. Bystřický[3] argues that *"with the gradual use of technology, we use a different way of thinking, not by changing the capabilities of our own dispositions, but by fundamentally changing their usage strategies."* J. Lohisse[4] considers the medium to be more of a tool or instrument, he even introduces a new logos and says that *"it interferes with the way of thinking, directs imagination, underlie the understanding of the world"*.

Referring to changes in thinking, cognition, S. Gálik[5] points out that new cognitive habits may have a different structural pattern, such as network layout, non-standard links between information, or interrupted information flow, especially with entertainment information. We can assume that each medium will form information in the consciousness as well as the cognitive processes of the mind in a specific way. In this context, J.

[1] Vrabec, N.: Digitálni domorodci na Slovensku: komunikácia a nová identita mládeže v on-line prostredí. In*: Communication today,* 2010, 1, p.84

[2] Zaşepa, T. – Olekšák, P.: *Internet a globalizácia. Antropologické aspekty*. Ružomberok: Katolícka univerzita v Ružomberku, 2006, p.14

[3] Bystřický, J. et al.: *Médiá, komunikace a kultura*. Plzeň: Aleš Čeněk, 2008, p. 19

[4] Lohisse, J.: Komunikační systémy. Socioantropologický pohled. Praha: Karolinum, 2003, p. 167

[5] Gálik, S. et al.: *Vplyv kyberpriestoru na premeny súčasnej vzdelanosti*. Łodź: KSIĘŻY MŁYN, 2015, p. 17

Cejpek[6] mentions three basic stages of communication development:

a) a period of speech communication,
b) a period of documented communication with the phase of the manuscript and printed text,
c) a period of electronic communication.

Similarly, M. McLuhan (2011) divides human history into three stages – oral, phonetic, and electronic, with the decisive media being speech, phonetic writing, and electricity. However, in the context of the term "medium", we will understand the *communication medium* – that is, the form, means of communication of a certain historical stage. J. Lohisse (2003), in his publication *Communication systems*, describes four revolutionary communication media: speech, script, print, and the Internet, and each media epoch relates to several fundamental aspects: collective mentality (consciousness, category of time and space) and organization of society. By using and communicating over the Internet, our ideas about the space, time and organization of society collapse, for example in connection with the disintegration of the so-called linear code[7]. It is clear that the Internet is an electronic (technical) medium. By using different technologies (media), our perception changes, some senses are strengthened, others are, on the contrary, suppressed – their relationship is changing accordingly. The media theorist, M. McLuhan, describes this principle as a certain extension or auto-amputation of the physical body that causes these changes. As McLuhan[8] says: *"technology does not act at the level of opinions or concepts, but constantly and without any resistance changes the mutual relation of individual senses and models of perception"*. In this context, we may also mention J. Šušola[9], that refers to S. Harnad, who in 1991 already expressed the view that electronic communication represents another revolution in the history of human thinking and cognition. The essence of electronic communication has been poetically named as *electronic skywriting* and he in particular, considers its main benefit the fact that the element of interactivity in communication besides obstructing the distance barrier is being enriched. The Internet no longer has a solid background, such as a book, but it is characterized by spaciousness, capaciousness, plasticity, fluidity, which means that the texts can work in different ways, remove them or transform them again.

3 Transformations of thinking and education under the influence of the Internet

The Internet is a revolutionary medium that is completely different from its predecessors. S. Gálik[10] says that the essence of the Internet lies in the non-linear, networking of communication technologies, with the idea of the "net" best describing the basis of new technologies that serve non-linear communication. In addition to the image of the network, the Internet is characterized and specified in particular by the dominance of visuality, visual culture and information of a visual nature. On this basis, we can define the Internet as *"a medium in which we can instantly and actively communicate information, particularly of iconic (pictorial) nature, via a multilaterally interconnected technology network."*
Based on the above, it is necessary to pay attention to the various changes that the Internet medium and communication through it brings to life of each of us. We identify with S. Gálik, who formulated three major changes in this regard, which we will try to approach in the following text. The basis for the processing are his collective monographs Cyberspace as a New Existential Dimension of Man (2014), Influence of the Cyberspace on the Conversion of Contemporary Education (2015), and other contributions from proceedings related to the issue. Therefore, the individual changes and their context are presented as a synthesis and comparison of the mentioned sources.

1. Network arrangement of information. For this new type of communication, or the linking of information, we could use the notion of rhizomorphism, thus rhizomic thinking (rhizoma – the term from botany and represents the interwoven root system), which is relatively well captured in the philosophical – media discourses. Its authors are G. Deleuze and F. Guattari[11], who defined it in yet non-electronic era as follows: *"unlike trees or their roots, the rhizome joins any point with any other, while each of its signs do not refer to another signs of the same nature; it puts into play very different sign modes, and even non-sign states."* Well-known philosopher and theorist U. Eco[12] has similarly established this concept that distinguished it from the previous way of tree (arborescent) thinking. The image of the tree, for example, in medieval thinking (arbor porphyriana), represented the order of logical and hierarchical thinking – from the essence of the being to its marginal expressions. Eco even says that *"thinking means in the rhizoma to proceed on blind, and thus to be guided only by guesses."* In this context, we may also mention J. Šušola,[13] that defines the communication and cognitive process based on rhizomorphism of knowledge as dynamic, interactive and highly individual. Referring to Burnett (1993) he also mentions four basic principles that characterize rhizomorphic structures:

- the principle of association and heterogeneity – any point of the rhizome may be linked to any other point; the structure is implemented on two levels – physical (telecommunications, hardware and software) and contextual (association ties – messages, their structure and interconnections). Link perception is initialized individually – connectivity is a democratization principle that functions as a structure of individualisation, because at any moment the "centre" of the rhizomorphic structure is the position of the individual in this structure;
- the principle of multiplicity – the number of access points (compared to the existence of one point) and multiple structures over a single structure are preferred. This also applies within "one" text – the reader constructs new texts by linking and annotating existing texts;
- the principle of a semantic break - the rhizomorphic structure (knowledge) does not stand on the hierarchy, that is, it cannot be influenced by the definition/addition of new relationships that were previously foreign to it, nor can it interfere with the new relationship;
- the principle of cartography and decalcomania (pattern transfer) – the rhizomorphic structures are dynamic and interactive; they are constantly changing with each traveller's approach, as it is his position, which gives a view of the rhizomorphic structure at a given moment. The topology of these spaces requires other "maps" that constantly change with the movement of the traveller and with the current state of his understanding or misunderstanding of the problem (the influence of factors such as the cognitive context, state of mind, etc.).

Thus, we can state that rhizomic thinking is, unlike arborescent, non-systemic, incomplete, and networked, without beginning and ending. The Internet therefore, on the basis of its own technological and network – rhizomatic – structure directly supports the "bonding of unbondable". S. Gáliková-Tolnaiová[14] adds that thinking when using the Internet is adapted to the nature of the information flow as in surfing in the network and acquires some particularities: fragmentarity, disconnection,

[6] Cejpek, J.: *Informace, komunikace a myšlení*. Praha: Karolinum, 2005, p. 69
[7] Gálik, S. – Lancošová, V.: Disintegration of "linear code" in communication on the internet. In *Psychology and psychiatry, sociology and healthcare, education : sociology and healthcare : conference proceedings, Volume 2*. Sofia : STEF92 Technology, 2014, p. 252
[8] McLuhan, M.: *Jak porozumět médiím. Extenze člověka*. Praha: Mladá fronta, 2011, p. 32
[9] Šušol, J.: *Sociálne a humánne kontexty elektronickej komunikácie*. Bratislava: Stimul, 2009, p. 13
[10] Gálik, S. et al.: *Vplyv kyberpriestoru na premeny súčasnej vzdelanosti*. Łodź: KSIĘŻY MŁYN, 2015, p. 19
[11] Deleuze, G. – Guatari, F.: *Tisíc plošin*. Praha: Herrmann a synové, 2010, p.30
[12] Eco, U.: *Od stromu k labyrintu. Historické studie o znaku a interpretaci*. Praha: Argo, 2012, p.60
[13] Šušol, J.: *Sociálne a humánne kontexty elektronickej komunikácie*. Bratislava: Stimul, 2009, p. 18
[14] Gáliková-Tolnaiová, S.: Postmoderná transformácia edukácie a vzdelanosti v kontexte kyberpriestoru. In: Gálik, S. et al.: *Vplyv kyberpriestoru na premeny súčasnej vzdelanosti.* Łodź : KSIĘŻY MŁYN, 2015, p. 34

superficiality, shortness. Similarly, P. Virilio[15] states in his publication *Aesthetics of Disappearance* that our consciousness and thinking determine technology, which makes our perception and thinking become discontinuous, picnoleptical. The Internet therefore does not support the abstract, linear and logical thinking on which European education was founded. Therefore it is possible to talk about so-called "breakdown of the linear code", which was one of the basic forming principle of medieval but especially modern age European culture, with which, for example, it is related to the notion of linear time. There are no physical support points in Internet communication that allow time counting. The high speed of communication creates a sense of permanent presence; time is instantaneous, current, simultaneous. Strengthening the present may, however, lead to the rejection of the past (and of the future), thus traditions, religion, national pride etc. This is supported, for example, by M. Bauerlein's research, who has studied the education of American youth. He came to the conclusion that the knowledge that had some relevance to the past fell – it poses a risk for further positive development of society and education, wisdom.

American writer N. Carr[16], who has been dealing in the long term with the relationship and interdependence of thinking, technology and culture, draws attention to a research study from 2008, aimed at the impact of the Internet on a young population, attended by approximately 6,000 members of so-called "Internet generation". The author refers to D. Tapscott, who, in connection with the study's findings, stated that immersion in the digital world influenced the way young people absorb information. It is not necessary to read pages from left to right and from top down, instead it is possible to skip texts, quickly scan them and search for information that interests them. Carr also refers to media theorist M. McLuhan and his predictions and says that we have found ourselves at the crossroads of our intellectual and cultural history, at the moment of transition between two very different ways of thinking. For the wealth that the Internet provides us, we deal with what is referred to as "old linear thinking" in scientific discourse. Our peaceful, uninterrupted and concentrated linear thinking is by the action of the Internet embossed by new thinking that wants and needs to grasp and sort information into short, incoherent and often overlapping – the faster, the better. Many users feel they are becoming more intelligent at such times. These feelings are, however, so intoxicating that they can draw our attention away from the deeper cognitive effects of the Internet.

2. Communication in the cyberspace is approaching the speed of light; it is almost instantaneous and therefore has a dromotropic character. However, the high speed of communication creates a sense of permanent presence, immediateness, because the "empty" time intervals, during which we wait for further information, disappear. This type of communication also contributes to the decomposition of the concept of temporal, linear sequence. Geometric growth and expansion of information in combination with speed will, however, cause problems in their time processing, which may lead to some inaccuracies, simplifications or information noise. S. Gáliková-Tolnaiová[17] also refers in this context to the "information overpressure", or "information overload, repletion" – a problem related to the surplus of information. Information repletion can thus result in digital nihilism. Similarly, M. Haršanyiová[18] also points out and states that especially rhizomatic features of the electronic environment allow not only an unsustainable increase in information in a variety of forms (sounds, movements, linguistic expressions with semantic content), but also relations and interconnections between them. However, new information is often generated only by repeated or minor change of primary information. It is constantly repeated and has endless use – that way, it produces, processes and stores much more information than humanity can absorb. Information overload can be manifested by:

- demotivation, lack of perspective in the information environment and communication processes,
- cognitive and informational stress, techno-stress (fears and stressful feelings associated with managing new technologies),
- information fatigue syndrome (tension, anxiety, frustration, nervousness, anger and confusion)
- tolerance of errors, ignoring information and reducing professional satisfaction,
- inability to use information satisfactorily and efficiently.

It is therefore clear that stated factors do not contribute to improving the current education and scholarship.

3. The weakening of the ability of abstract thinking determined by the dominance of images on the Internet. Thinking in a cyberspace is influenced by constant discontinuity of images, short texts, etc., which does not support concentration and continuous development of ideas. Conversely, texts in newspapers or books require concentration and monitoring of logical continuity. It follows that books and texts are rather supportive of abstract and logically continuous thinking, unlike television or the Internet where the dominant thinking is figurative, discontinuous. We no longer have to speculate about the images, but their meaning is presented to us in complex entities, and consequently we can only consume them sensually and mentally. In this context, S. Gálik refers to G. Sartori, who believes that visual media change our thinking, imagination and knowledge. He even talks about the new human anthropogenesis, its transition from *homo sapiens* to *homo videns*. *"Homo videns is a person who rejects difficult rational approaches such as abstraction and logical argumentation, but rather emphasizes images, emotions and entertainment."* Image dominance on the Internet supports entertaining, multitasking and academic procrastination, which we can ultimately indicate as the decline of culture and education.

We also agree with the opinion of S. Greenfield[19], who claims that if the human brain, whom evolution literally commands to adapt to its surroundings, we place it in an environment where there is no apparent linear sequence, where everything can be reversed, where the time response between action and reaction is minimal, then the flow of ideas may be disturbed. Adding to this the fact that our senses are constantly scattered by various attractive audiovisual stimuli, resulting in a shorter focus – we can become a computer by ourselves: a system that is capable of responding efficiently and processing the information well, but it is not capable of deep and contemplative thinking.

S. Gálik[20] also accentuates that the individual aspects are very closely interconnected and linked. Internet contents have an iconic look; they change very quickly and connect in the most diverse, networked way. Current education is changing under their influence, from a discursive linking of information that is based on a linear approach to associative, to network thinking, and consequently education. Associative linking of information may be more creative, but on the other hand, it significantly weakens logical and abstract perception and thinking. Following S. Gálik, it can be underlined that education, and in particular its part in the form of scientific thinking and knowledge, requires thinking that is based on a linear sequence of information. If an associative type of thinking began to dominate in current culture as a result of the development of cyber-culture or the use of the Internet, it could pose a risk to today's society and education, which, on the contrary, are based on linear discourse thinking.

[15] Virilio, P.: *Estetika mizení*. Červený Kostelec: Pavel Mervart, 2010, p. 71
[16] Carr, N.: *Nebezpečná mělčina: Jak internet mění náš mozek. Analýza stavu lidské psychiky v době digitální*. Praha: Dauphin, 2017, p. 19
[17] Gáliková-Tolnaiová, S.: Postmoderná transformácia edukácie a vzdelanosti v kontexte kyberpriestoru. In: Gálik, S. et al.: *Vplyv kyberpriestoru na premeny súčasnej vzdelanosti*. Łodź : KSIĘŻY MŁYN, 2015, p. 28
[18] Haršányiová, M.: Informačné preťaženie v sieťovej komunikácii. In: Magál S., Petranová D., Solík M.: *Megatrendy a médiá – Nové diskurzy mediálnych štúdií*. Trnava: Fakulta masmediálnej komunikácie UCM v Trnave, 2011, p. 101-102
[19] Greenfield, S.: *Změna myšlení. Jak se mění naše mozky pod vlivem digitálních technologií*. Brno: Albatros Media, 2016, p. 31
[20] Gálik, S. et al.: *Vplyv kyberpriestoru na premeny súčasnej vzdelanosti*. Łodź: KSIĘŻY MŁYN, 2015, p. 21

In terms of standard education, these changes and tendencies are rather negative. Many authors, therefore, draw attention to the further negative consequences of these changes. One of them is also the German psychiatrist Manfred Spitzer, who in his works explores the impact of digital media and technologies on the learning, thinking and health of man and society. In one of his publications (2014) he claims that digital media deprives us of the need to perform mental activity. Everything we previously performed and realized simply through mind or memory now provides computers, smartphones, organizers or navigations. He emphasizes that this situation is very dangerous for both society and individuals. In digital media, we become addicted and, in the long run, they are detrimental to our body and, above all, our minds. As soon as we cease to develop mental activity and effort, our memory and attention is weakening and dull. Nervous connections die due to inactivity, and the new ones do not survive because they are not needed. M. Spitzer, on the basis of his research, also shows the concerns that this development evokes and encourages to limit the consumer's way of life, especially in children, to prevent "digital dementia". Spitzer[21], among other phenomena, also focuses on multitasking. He states our life in the "digital age" is characterized by the fact that we constantly do many things at the same time. Ultimately, however, it is solely about *media* multitasking: we search for information on the computer, listen to music, write e-mails or other text messages on the smartphone, all while actually we are reading an article. In the background, we can often hear a TV, while another phone rings... The author thus asks what kind of expressions such media treatment will leave in us. Does the multimedia environment make us smarter? He stresses that we cannot be indifferent to what we are experiencing because *"every mental activity leaves a trace in a brain that affects his future functioning."* Spitzer compares multitasking to the psychological notion of *cognitive control*. He claims that already in early childhood we learn to control our thoughts, for example by suppressing irrelevant things and focusing on specific tasks. This ability is given to the human brain, it is simultaneously taught, and each individual has more or less of it. He illustrates it on the example of our ability to speak – speech centres are also genetically determined, but to be able to function, they need to be activated. It succeeds – more or less – which also creates differences in coping with the language in spoken or written form. Thus, if the cognitive control is taught, and if the way in which thoughts and thinking are controlled by immersing themselves in the world of multimedia change, then multitasking should also influence the ability of our mind control. It can be positive – a person is improving through lots of tasks, but also a negative one, because if we constantly do many things at the same time, it can lead to superficiality or discontent. However, according to Spitzer's research, it is clear that intensive multitasking does not train our attention; on the contrary, we are increasingly distracting it. In the context of multitasking and distraction, Spitzer[22] states very simply: *"...no one reads two books at the same time to read them both faster."* It is clear that media leisure multitasking is very widespread in the youth. However, when we proceed in learning or working, it becomes ineffective, which verified several baseline researches in experimental psychology. Whoever performs multitasking daily or seeks for this mode of operation, will ultimately not be better at it, he even "trains attention deficit disorders". Spitzer therefore recommends that we do not lead especially future generations to multitasking, and do not support them in it.

In this context Spitzer's latest 2016 publication called *Cyber-sickness!* is also noteworthy. The author describes that by the constant use of digital media and technologies we become sick – *"cyber-sick"*. He describes various consequences of excessive work with them, such as various forms of cyber-phobia, cyber-addiction or cyberchondria – the fear and anxiety related to the disease that a patient creates when using search engines and "google" information or signs of his illness. One of the other negatives is cyber-stress. Many people consider stress as everyday part of a life. But what exactly is stress? According to Spitzer, it is an insufficient control. According to the author, stress is not caused by unpleasant experiences of itself, but rather the feeling that we are helplessly delivered to them. As long as we know that we cannot influence the situation, it causes stress in us – we are stressed every time we lose control. For the best recipe against stress, Spitzer considers self-reliance. A modern person suffers from loneliness, anxiety and stress as a result of digitized life. The emergence of digital and information and communication technologies in all areas of life, however, many people experience as a strong loss of self-esteem – they feel a fundamental loss of control. Whether it is stress in connection with smartphones, social networks or the risks of electronic communication, we can feel that we do not know the technique that we do not control it. *"Digital information technologies are causing us stress, precisely by now being penetrated into all areas of life in all sorts of ways, by controlling us."* [23]. This is accompanied by a constant fear that we will miss something, the fear of loss of "friendly" contacts on the networks or the loss of the device that allows us such contacts... Acute stress can save lives, chronic stress, where we can include cyber-stress (techno-stress), on the contrary, kills us.

Conclusion

We can state that one of the basic socio-cultural or anthropological characteristics of man is that he can adapt to the environment in which he lives. Our ancestors have always had to adapt to a changing world in which new inventions or technologies further determine their lifestyle, priorities, taste or thinking and understanding of the world. Why would it be in the "digital age" differently? Thus if the human brain, which literally evolution commands to adapt to its environment, we place it in an environment in which there is no linear sequence, where everything can be reversed, where the time difference between action and reaction is minimal, and especially where the time is generally perceived deficient, then the flow of thought and thinking itself can be disturbed. We agree with S. Greenfield[24] that if we add the fact that our senses are constantly dispersed by an incredible amount of audiovisual stimuli, the result of which is a shorter time of focus, we can become a kind of "computer": a system that is capable of responding efficiently and processing information well, but is not able to think deeply, contextually and logically, which poses a major risk for further development and direction of education.

The tax on the use of intellectual technology can be quite high. Individual tools of thinking alternately expand but also blunt our most intimate, most human and natural abilities – mind, perceptions, memory and emotions. At the same time, the process of learning and education itself is transformed. Based on multiple studies, it is confirmed that learning ability can be severely restricted when our brain is overloaded with various online stimuli. N. Carr[25] states in this context: *"More information may mean less knowledge."* The author also refers to John Culkin, a Jesuit monk and media expert, who in 1967 said: *"We form our instruments and then they form us."* In our contribution, we have repeatedly suggested that cybernetic clustering or blurring of boundaries between human mind and machines (technologies) allows us to perform certain cognitive tasks much faster. At the same time, however, it poses a threat to the integrity of our human being. Carr also states that the digital systems that our brain so willingly knows give us their power, but at the same time they put our limitations on us. Based on this, we can observe a certain parallel with Culkin's statement and, in partial adjustment, we can state: we program computers and they then program us.

It is, of course, naive to think that technological progress and the associated innovations in different areas can be stopped. Our

[21] Spitzer, M.: Digitální demence. Jak připravujeme sami sebe a naše děti o rozum. Brno: Host, 2014, p. 204
[22] Spitzer, M.: *Kybernemoc!* Brno: Host, 2016, p.54
[23] Spitzer, M.: *Kybernemoc!* Brno: Host, 2016, p.142
[24] Greenfield, S.: *Změna myšlení. Jak se mění naše mozky pod vlivem digitálních technologií.* Brno: Albatros Media, 2016, p. 31
[25] Carr, N.: *Nebezpečná mělčina: Jak internet mění náš mozek. Analýza stavu lidské psychiky v době digitální.* Praha: Dauphin, 2017, p. 294

thinking will need to be adapted to new technologies with which education and learning process will also change. As described by N. Carr[26], the five centuries since Gutenberg's book publishing, which made reading popular, linear – and also literary – thinking was the centrepiece of art, science and society. Flexible and yet fine linear thinking was imaginative thinking in the Renaissance period, the rational thinking of enlightenment, the inventive thinking associated with the industrial revolution, and even the disruptive thinking of modernism. Maybe, however, it will soon be thinking of past days.

In conclusion, therefore, we agree with S. Gálik[27] that it will be extremely important for the future form of European education to what extent original approaches to education (reading habits, the ability to interpret text, logically and abstractly develop ideas) will be maintained. It can be said that the Internet is becoming an epicentre of change, the extent and depth of which cannot be reduced to technological progress. It ceased to be a victor and became the cause of a fundamental social break. We therefore consider that the Internet and new media are the engine of the new paradigm of human education, thinking and perception of the world.

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