

EWA CZERNIAWSKA

University of Warsaw, Faculty of Psychology

IS THE INTERNET A GOOD OR A BAD EDUCATOR? A COGNITIVE PROCESSES PERSPECTIVE

Abstract: The paper discusses the impact of modern technologies, especially the internet, on the functioning of young people. The following thesis was formulated: usage of modern technologies have both a negative and positive influence on cognitive processes. The internet is taking educational functions, that were to date reserved to the family and school. It is

a great challenge for the society and scientific reflection. For a positive educational influence of the internet to happen, it is necessary to take into account in teaching and educating the development of meta-cognitive knowledge and skills.

Keywords: Internet; modern technologies, cognitive processes, electronic dementia.

INTRODUCTION

Considering the whole history of mankind, modern technologies that triggered rapid expansion of the internet have emerged relatively recently. The first major revolution that increased the amount of information was the invention of a printing press, which made the data accessible to considerably more people. Yet, it was the common availability of personal computers and the internet that made the amount of information to increase steeply, and to such an extent that it became impossible for an individual to absorb it. Additionally, thanks to electronic media, the processes of globalization have accelerated (see e.g. Ledzińska, 2012). Like any revolution, also the technological one arouses hopes, but raises doubts, as well. One of them regards the fact that the internet is taking over educational functions that had been so far reserved for family and school environment. Does the pervasiveness of the internet in the life of the young generation really affect their development? If yes, is this a positive or negative impact? And finally, what are the mechanisms underlying this process? Considering the Author's scientific interests, the paper focuses mainly on the impact of the internet on cognitive functioning, with little reference to emotional and social functioning.

One of the first publications describing the internet was published in 1999 (Wallace, 1999) and it focused primarily on social functioning in the virtual world. It shall be noted that there are still more papers on this aspect of human's life than on the potential impact of modern technologies, including the internet, on cognitive functioning (Castells, 2003, 2007; Van Dijk, 2010). The public also concentrates more on the risks related to social life and emotional state that result from the pervasiveness of

electronic media. However, more and more findings indicate that using modern technologies affects cognitive functioning. Nicholas Carr (2013) presents an unequivocal viewpoint in this respect, which can be seen in the title of his book *The Shallows: What the Internet Is Doing to Our Brains*. So does Manfred Spitzer in his *Digital Dementia. How do we deprive ourselves and our children of reason?* Potential negative and positive consequences of using modern technologies for cognitive functioning are discussed further.

COGNITIVE CONSEQUENCES OF USING THE INTERNET

Long time spent online is commonly agreed to have numerous potentially negative consequences, such as: shallow information processing, quick attention shifts, poor skills of selecting information as regards their importance, difficulties in assessing the reliability of information, equating information with knowledge, multitasking, or finally, digital dementia (see e.g. Ledzińska, Czerniawska, 2011b; Spitzer, 2012).

At the same time, education theorists and organizers analyse the possibilities of using modern technologies to facilitate the process of learning and teaching, including sharing curriculum content or running courses *on-line*. They assume that such activities are beneficial to gaining knowledge and skills and offer practical recommendations (Hill, 2003; Petty, 2010; Tanaś, 1997). Nowadays, the majority of authors do not ask whether modern technologies shall be used in education, but how it should be done effectively (Dinevski, Radovan, 2013; Sijko, 2012). In general, information and communication technologies are defined as computer (hardware and software) and communication technologies using the latest electronic solutions (Matusiak, 2011). The variety of particular solutions used in education is enormous. The authors mention: text editors, software for brainstorming and organizing ideas, tools to gather, analyze and visualise data, software for communication and collaboration, educational multimedia, interactive educational applications, databases, internet resources, motion detection technologies (Pitler, Hubbell, Kuhn, 2015).

In her studies, Joanna Piechocka offered a different classification (2015), distinguishing: interactive boards, educational mobile applications, webinars, online tutorials and courses. These were distinguished based on the medium and the kind of user's activity. According to a survey (Batorski, 2009) and statistical data (CSO, 2015) published a few years ago, the vast majority of the Polish society uses new technologies and has access to the internet, and pupils and students admit to frequently use computers to learn. Undoubtedly, these indices are even higher nowadays. A study of Piechocka (2015) showed lack of differences as regards knowledge of various educational technologies between secondary school students and university students, yet, the latter declared to use them more often. Interestingly, the awareness of particular technologies differed considerably. For instance, 95% of secondary school students and 84.7% of university students were familiar of educational mobile applications, whereas only 9% of secondary school students and 24.7% of university students declared to have known webinars. Also the percentage of those declaring to use particular technologies varied considerably. For example, 60% of secondary school students and only 24.7% of university students had not attended online courses, interactive boards were not used by 21% and 45.9%, respectively. These examples support the thesis that changes related to the spread of new technologies are extremely rapid.

Therefore, the words of Noam Chomsky come as a warning (2012, p.37): “Education is all about developing skills of searching for what is important, about constant readiness to ask questions whether you are on the right track, regardless of what you use – computers and the internet or paper and books”. The issue of teaching how to use the internet wisely is considered further in the text.

Nevertheless, some concerns are raised about the possible negative consequences of the long-term use of electronic media for learning processes and achievements. For example, Jomon Paul, Hope M. Baker and Justin D. Cochran (2012), who conducted a study on this subject among students, identified a significant negative correlation between the time spent in social media and academic achievements. Interestingly, students having greater attention span spent less time on the internet. There are two possible directions of this relationship: either the smaller attention span promotes being online longer or being online longer negatively affects the attention span. However, not all data show a negative relationship between time spent in the digital environment and attention. Some research including people playing online suggest different relationships, described later in the article.

It is worth considering the selected empirical data on the impact of using modern technologies on cognitive functioning. Does using modern technologies influence memory processes? In a series of studies, Betsy Sparrow, Jenny Liu and Daniel Wegner, 2011 (as cited in: Mills, 2016) showed the impact of taking notes on a computer on remembering the original content. For example, they presented participants with 40 statements and informed them about the possibility to type them on a computer. Some respondents were warned that the files would be deleted. These participants remembered significantly more than those convinced that their records would remain available. Typically, people have problems with monitoring the source of information, whereas in this case, an adverse memory effect was found (cf. e.g. Jagodzińska, 2008). Previous studies have shown that in general, people remember the information better than where they got it from. In contrast, people who took notes on a computer remembered the file where they could find the information better than the information itself. In a broader sense, transactional memory has its benefits – numerous data do not have to be memorized as they can be found in external sources, e.g. in other people, in printed works or electronic media (Szpunar, 2015). Therefore, not remembering the information but knowing its location online can have positive and negative consequences. The positive consequences include relieving memory of enormous amount of data, usually of little use, which people deal with everyday. Maria Ledzińska (2009) points to the experience of informational stress emphasising the problems resulting from information overproduction. Because of the electronic media, we encounter a cognitive economic phenomenon of no need to remember “everything”. On the other hand, negative consequences include the lack of intentional cognitive efforts to remember, which may further limit the ability to use one’s own memory.

Studies on false memories suggest other unexpected consequences of using the internet. Previous data from laboratory and field studies indicated how easy it was to implant false memories (cf. Jagodzińska, 2008; Piotrowska, 2005). Numerous studies were conducted particularly in the 1990s, addressing the issue of the reliability of eyewitness testimonies and the so-called recovered memories. In general, it was concluded that the utmost caution shall be exercised as regards the trust in the accuracy of memories. The expansion of social media provoked research into the

possibility of forming false memories with the use of these media. Kimberly Fenn, Susan Ravizza, Nicholas Griffin, Mitchell Uitvlugt (2014) analysed the impact of false information presented via Twitter on previous memories. It occurred that the effect was weak and the participants had doubts about the credibility of the provided information. The authors indicate that shallow processing of information is the one that dominates when using social media, which is not conducive to creating permanent memory traces. However, such an explanation raises doubts, because usually it is the shallow processing that fosters the formation of false memories. The false fame effect would be a great example – it emerges mainly when the information is provided in a situation of divided attention (cf. e.g. Anderson, 1998; Gluck, Mercado, Myers, 2016; Jagodzińska, 2008). Perhaps other factors play a crucial role: the multitude of retrieved data, not paying attention to the information provided, or the lack of trust for certain messages.

The changes in some aspects of cognitive functioning discussed earlier raise questions about their mechanisms. Does long hours online affects brain functioning? The previously-mentioned titles of the two books on the subject (Carr, 2013; Spitzer, 2012) seem to answer this question clearly. The authors assume that the internet is a permanent and infinite source of data that is easy to obtain at any time (obviously, if an individual has access to the internet). Knowing that one can always reach for this huge and constantly expanding ocean of data, people might lose motivation either to remember them or to process them deeply. “Digital dementia” was first mentioned in Korea, where doctors described severe memory problems in young people who often used digital technologies (Carr, 2013). The term was adopted and popularised by Spitzer. In his opinion, the flood of information prevents from their deep processing, which contributes to poor cognitive activation. Thus, various neuronal circuits in the brain are stimulated insufficiently to create permanent memory traces. However, an alternative conclusion can also be drawn. The flood of information makes people deal with more data, which means they could potentially benefit from staying online longer in search for information, even if the information is processed shallowly. Yet, probably Spitzer’s claims are closer to the truth because of the characteristics of human cognitive system. First of all, the capacity of attention and working (operational) memory is limited (Nęcka, Orzechowski, Szymura, 2013). With the rapid flow of new information and the disappearance of older ones, it is not possible to concentrate only on the selected data, and thus, to process them deeply. In addition, the awareness of the availability of data online inhibits the tendency to consider them longer, because it is always possible to return to them, at least, theoretically. However, new data arrive over and over again and thus, distract from returning to previous ones and processing them deeper.

The limitations of the cognitive system are a fact, but can such a ubiquitous medium like the internet change the functioning of the brain? Internet users spend a lot of time online, the stimuli it provides are strong, diverse, but also repetitive. Considering the plasticity of the brain, it can be expected that the delivered stimulation and its processing will translate into changes in the brain activity as well. Some research indicate that prolonged use of the internet increases the brain activity, and even a fairly short, several-day training changes the level of activity, e.g. in the prefrontal cortex (see Carr, 2013). It should be assumed that such changes will take place even faster and produce a greater effect in the youngest internet users due to the lower maturity of their central nervous systems, and much more frequent contact with new technologies, both at school and in the out-of-school environment.

Some findings suggest that the internet usage can have a positive impact on cognitive development by providing numerous stimuli and interactivity (Johnson, 2010). In particular, it contributes to the acquisition of visual-spatial skills, accelerating the learning of reading. Moreover, the use of the internet is not limited to images, but it forces reading, thus positively influencing the further development of this skill.

It is also worth referring to the data on the influence of computer games on various aspects of functioning. Primarily, negative effects are considered, including the increase in aggression through priming emotions and scripts stored in memory (Anderson, Bushman, 2001) and reducing sensitivity to violence (Carnagey, Anderson, Bushman, 2007). However, one can also easily find studies that show the beneficial effects of computer games. Earlier in the text the positive impact of the internet on visual-spatial skills was mentioned. Similar relationships are also found for computer games. C. Shawn Green and Daphne Bavelier (2012) showed that people who often play action games have better visual selective attention, are more efficient in making mental rotations and allocating attention. It was also shown that players, compared to non-players, have higher achievements as regards performing multiple tasks simultaneously (Boot, Kramer, Simons, Fabiani, Gratton, 2008). However, based on their meta-analysis, Walter R. Boot, Daniel P. Blakely and Daniel J. Simons (2011) recommend caution as regards drawing far-reaching conclusions on the positive impact of games on the functioning of attention due to methodological doubts concerning some research. Nevertheless, numerous empirical data seem to confirm that playing computer or video games, besides negative effects on emotional and social functioning, may also have positive effects on cognitive development and functioning.

Considering the impact of new technologies on people's lives, the issue of multitasking shall be also discussed. The use of mobile devices in various life situations requires shifting attention between tasks, e.g. listening to lectures and reading text messages or emails. Studies on the possibility of performing two activities at the same time confirm that if one of them is automatic, doing them simultaneously does not necessarily deteriorate the performance (see e.g. the review in: Nęcka, Orzechowski, Szymura, 2013). However, this requires a long-term training. It is commonly believed that young people who have had contact with mobile devices for most of their lives are much better-prepared for multitasking than representatives of older generations. Laboratory research including simple tasks as well as studies conducted in school or university environment confirm that numerous pupils and students engage in activity on mobile devices during classes and self-study. Most results indicate the deterioration of performance in a multi-tasking situation, or at least an increase of the time needed to perform a specific task. Again, this can be explained by the limitations of the human cognitive system, having insufficient resources to successfully perform two tasks engaging thinking simultaneously. A comprehensive overview of the data on this topic can be found in the book by Jeffrey Holmes (2019). It is worth noting that in fact, there is no evidence that representatives of the younger generations are more efficient in multitasking than people of earlier generations.

How can changes in cognitive functioning resulting from long time spent online, translate into the educational role of the internet? First of all, it shall be underlined that these changes include both negative as well as positive effects. The multitude of data processed shallowly can result in excessive trust in the received information and taking unverified information for granted. Therefore, the internet is perceived as a source of true knowledge, which does not have to be verified. This might lead to val-

uing this knowledge more than the wisdom of educators and thus, questioning their competence. At the same time, the internet provides a lot easily accessible resources that can be used for deep processing and building own knowledge, with no need to use any other types of sources. Undoubtedly, the internet becomes a source of knowledge or even authority for many people. It is rightly believed that everything can be found online, but some also wrongly assume that all the information online is reliable. The latter assumption is especially worrying because it confirms lack of critical assessment of the available data.

EMOTIONAL AND SOCIAL CONSEQUENCES OF THE FREQUENT USE OF THE INTERNET

How does using the internet impact the emotional and social functioning? Like in the case of cognitive functioning, also here, the potentially negative consequences are commonly considered (e.g. Brignall III, Van Valey, 2005). The sense of being anonymous online encourages exhibitionism, and establishing shallow social relationships that are hardly controllable (contact can be started or terminated at any time). Limiting social relations to the virtual ones can hinder the development of social skills in real life situations, or even replace them. Online communication is fast but also brief, which provokes frequent use of schematic formulas or emoticons. Some results confirm negative impact of contacts established online on social functioning, but some others prove that virtual contacts can contribute to deepening relationships in the real world (Žurko, 2018).

It is also worth considering the issues of potentially positive effects of using new technologies on emotional and social functioning. First, the aforementioned computer games can model aggressive behavior and lead to desensitization, but they can also serve as a catharsis for some people, helping them release negative emotions in a symbolic way. Second of all, and more importantly, modern information and communication technologies require the activity of the person using them. It is up to an individual to initiate the contact, control its course or decide on its termination. The same applies to computer games, which, additionally, seem to promote determination in achieving one's goals (Adachi, Willoughby, 2017). Thus, internet user or player learns to regulate social behavior on their own and the sense of autonomy and competence, being extremely important, is strengthened (see Ryan, Deci, 2000). Thirdly, the virtual world offers both, negative and aggressive as well as positive content. For example, some computer games for children teach how to take care of pets, which promotes the desired social behavior. Fourthly, staying online does not necessarily mean loneliness or isolation, but it can contribute to establish and maintain social contacts. For example, social media might play such a role – thanks to them, many people find long-lost and unheard friends or acquaintances from near or far. Computer games requiring cooperation between players are evidenced to strengthen pro-social behavior towards other players, even if they contain aggressive content (Ewoldsen et al., 2012; Gentile et al., 2009) and to satisfy the need to be a part of the community (Stoll, Colett, 2014). Considering the above, the use of modern technologies can have numerous positive consequences for emotional and social functioning, and play a beneficial educational role.

In extreme cases, however, negative effects might occur and lead to internet addiction, which might manifest itself in various ways. One of them is the belief that being

online is a *sine qua non* for existence. “If you’re not on Facebook, you don’t exist.” As a result, people might suffer from difficulties in postponing reactions, especially those related to using electronic media. They might feel the need to be online constantly, check messages sent via the internet or a mobile phone. Social media allow for an immediate update of data. In response to restricting the access to the internet, strong negative emotional reactions might occur.

WISE USE OF THE INTERNET

Pedagogical inversion, being the younger teaching the older, is more pronounced nowadays than it used to be in the past. This results from younger generations having better digital skills and thus, their tendency to treat the older as inferior. They often underestimate the wisdom of the elderly (Google knows better ...) and do not let them into their virtual world. Older people may experience a sense of exclusion and being not adapted to modernity. Dominik Batorski (2009, p. 49) describes a digital division that “refers to the differences between those who have regular access to digital and information technologies and are able to use them effectively, and those who do not have such access”. Such a crisis is considered positively solved when the older take on the role of students, learn how to use modern technologies, and undertake digital activity together. The last leads directly to the conclusions on supporting young people in wise use of the internet.

The idea of teaching to use the internet wisely requires defining wisdom first. Jacqui Smith and Paul B. Baltes (1990) list the following characteristics of wisdom: broad life knowledge, broad procedural knowledge, life-span contextualism, and uncertainty. These might be referred to educational interactions related to using the internet. As opposed to children and teenagers, adults certainly have richer life, declarative and procedural knowledge, as well as greater chances for contextualism and coping with uncertainty. Thus, they can and should play a crucial role in teaching children and young people the approach to the internet and its content that would reduce risks and increase the chances of reaping benefits of using it. This might be possible when they use the internet together. Adults should take on the role of a critical analyst, showing that some of the data available online are true, but the false ones might be found just as easily. Young people, in turn, should use their technical skills to support the older. However, stressing the differences in the quality of data available online is not enough. It is necessary to develop the skills of information selection, criticism and deep information processing. In general, this also means there is a need for developing metacognitive competences, understood as awareness of one’s own knowledge as well as the ability to use cognitive strategies, strategies of planning, monitoring and regulating to optimize these cognitive processes (Ledzińska, Czerniawska, 2011a, 2011b).

It is essential to make young people able to distinguish between information, knowledge and wisdom. Information is like a brick that might be used to build knowledge and its accuracy shall be always carefully verified. This is not an easy task because to consider information accurate, it is necessary to have the appropriate prior knowledge. In addition, it is crucial to make a distinction between cold knowledge – the one that is scientifically verified and hot knowledge – the one acquired as a result of real-life experience. Sometimes they conflict with each other, and fake or wrong ideas or knowledge are difficult to eradicate. School should play a central role in this case

and encourage to process information deeply, but too often it does not properly fulfill this role. Shallow processing of the curriculum content results in the so-called fragile knowledge syndrome (Czerniawska, 1999), which consists of four components. First of all, the syndrome involves gaps in basic knowledge that usually result from the lack of knowledge consolidation. Secondly, it also includes dead knowledge that students cannot actually use. The third component includes naive concepts of the phenomena in the world, also known as misconceptions or synthetic models (Vosniadou, 1994). And finally, the last component refers to ritual knowledge that is useful only in the context of school education (Perkins, 1992). In the case of fragile knowledge syndrome, the possibility of using such knowledge to assess the data available online is rather problematic. What is even worse, attempts to analyze the available data having incomplete or false knowledge leads to considering them true, even if it is unjustified.

Furthermore, it is crucial to teach critical thinking, using active teaching methods, such as group discussions, problem-based teaching, etc. Numerous specific examples of such methods can be found in the generally available publications (e.g. Petty, 2010; Schwartz, Tsang, Blair, 2017). The cognitive activity of learners requires the analysis of information, referencing new information to their own prior knowledge as well as scientific data, drawing conclusions and convincing others. It should be noted, however, that the effectiveness of active methods is determined by numerous factors: the organization of education, prior knowledge, the appropriateness of the discussed problems to the current level of thinking development, individual differences, preferences ... Learning focused on learners places high demands on them because they must plan their activities very carefully and monitor the progress on an ongoing basis, ensuring that erroneous conclusions do not appear or persist. Learner-focused teaching principles are discussed further in the text.

It is also important to persuade young users that the internet is just a tool that can be used for or against the good of the individual or society. The commonly used concept of “digital world” penetrates into human consciousness making it seem like it is more than just a tool. Such deification certainly does not foster the education for a successful life “in real life”. If a young person with low skills of critical thinking believes that the virtual world is the only real one, the internet can become a “bad” educator. On the other hand, the belief that the virtual environment has positive as well as negative aspects is conducive to keeping the retrieved data in perspective, which reduces this risk.

What might be helpful when considering the wise use of the internet is cognitive approach, the one focused on the learner (Bednar, Cunningham, Duffy, Perry, 1991; Winn, 1991). The presentation of all fundamental assumptions exceeds the scope of this article, therefore, we focused on the most relevant ones as regards the discussed issue.

In contrast to the so-called conventional, “giving” education, in cognitive approach the priority is given to learners themselves and their cognitive activity, and the main goal of education is to teach how to think and act. It is not, however, about any kind of thinking or acting, but about situated cognition, anchored in a particular discipline, leading to acquiring and developing mental models relevant to the particular field of knowledge (Brown, Collins, Duguis, 1989). It is easy to indicate the usefulness of such an approach as regards the wise use of modern technologies – it is necessary to use the tools and resources used by the youth on a daily basis and that are attractive to them. Thus, teachers (but also parents) should organize numerous, diverse activities with the use of a computer or a smartphone.

As indicated previously, it is crucial to focus on the processes of learning and thinking of learners, including cognitive, affective and metacognitive processes. Cognitive processes involve processing content and lead directly to observable results: learnt facts, understanding, using the knowledge (see: Czerniawska, 1999; Dembo, 1997). Affective processes help coping with emotions and motivation, so as they facilitate the process of learning (Boekaerts, 1991). Metacognitive processes monitor and regulate the cognitive and affective processes. Even though they do not affect the outcomes of learning directly, they determine the conditions of the process of learning. Such processes include: planning, monitoring the process of learning, diagnosing problems, undertaking corrective actions (Czerniawska, 1999; Ledzińska, Czerniawska, 2011b). To refer this to teaching how to use the internet it is necessary to indicate different processes, strategies supporting these processes and ways of using them in digital environment.

Modern teaching also implies the need for a teacher to gradually relinquish the control over the learning process. Even though it is the teacher who plays a more important role in the early stages of acquiring new knowledge and skills, the learner should become his own teacher as he progresses. Therefore, teachers are responsible for showing learners how to exercise internal control and regulate learning processes (Palincsar, Brown, 1984; Vermunt, 1998; Volet, 1991). Such a principle is supported by the concept of the zone of proximal development of Lev Vygotsky (1971, 1978, 1989). Teaching shall aim at learners' independence in the wise use of the internet, and not at constant controlling the activity of young people.

Seemingly, the next postulate seems inconsistent with the demands placed on education. It refers to producing constructive frictions, i.e. provoking situations of lack of harmony between the demands related to the process of teaching and the used methods of learning (Vermunt, Verloop, 1999). Disharmony might foster the development if the given tasks require using different strategies than those used previously. An experienced teacher would easily find "online" tasks unknown to their students, making them learn new methods of acting.

It is crucial to pay attention to learners' motivation and promoting their cognitive motivation. Teachers should be aware of various motives for learning, be able to diagnose them, and propose open tasks that would encourage learners to choose the topic and the method themselves. People have various interests and that should be used in teaching. If learners want to spend a lot of time online, this should be taken into consideration to make learning attractive. Offering learners to express their own interests in the way they prefer, e.g. using computer presentation, indicates their taking responsibility for their own learning and thus, increases its effectiveness as well as students' motivation (McCombs, 1991).

The offered rules and methods are not the only ones available, but using them will considerably enhance the wise use of the internet.

FINAL REMARKS

Living in the times of the expansion of new technologies, pervasive internet and mobile devices pose new challenges to human's functioning, including cognitive and social functioning. The presented data indicate that their impact cannot be unambiguously considered positive or negative. There is no conclusive evidence that frequent

immersion in the digital world deteriorates the ability to think, even though many cues might suggest so. It should be noted that electronic media also have positive cognitive consequences that might be observed among adults as well as children. The older generations might find it comforting that even though they were not born knowing computers backwards and forwards, the potential interference caused by multitasking also affects the younger generation.

Another problem relates to cultural differences. One of the commonly considered dimensions is the individualism versus collectivism (Hofstede, 2000). In individualistic cultures the highest priority is given to the individual, individual needs and their realization. For example, the United States of America are this kind of culture. Collectivist cultures, in turn, e.g. in Asian countries, groups and their good are considered more important, and more attention is paid to the wisdom of older members of society. It might be assumed that in the latter type of culture, it would be more difficult for the internet to become the educator. However, the data on the frequency of using the internet and the number of people addicted to the internet indicate that it is not true. This seems particularly distressing considering the differences in perceiving abilities and wisdom in different cultures. Collectivist cultures praise developing skills through learning and working. They also underline the meaning of learning based on life experience, also the experience of other members of society. Wise are those who listen to the older and who use their previous knowledge. Individual cultures, in turn, consider skills as inborn and value originality, uniqueness and criticism higher. Wise are those who question the current knowledge and draw new conclusions (Greenfield, 1997). Since adverse consequences of using the internet are particularly severe in collectivist cultures, this might suggest the erosion of some traditional values, the internet becoming a mentor and internet users subordinating to what the internet offers. Thanks to the recognition of criticism, members of individual cultures have greater chance to get resistant to this impact. The indicated problem requires in-depth reflection as regards designing the activities teaching the wise use of the internet.

Finally, a “cunning” plan might be formulated – to defeat the enemy with his own weapons. Since the pervasiveness of modern technologies has become a fact and there are no prospects of reducing their role, they should be promoted in education as widely as possible, massively affecting learners by demonstrating proven knowledge and encouraging them to verify everything that appears online. Parents and teachers, grab your laptops, tablets, telephones and all other devices, and be the first ones to walk with them in front of the young!

REFERENCES

- Adachi, P.J.C., Willoughby, T. (2017). The link between playing video games and positive youth outcomes. *Child Development Perspectives*, 11(3), 202–206.
- Anderson, C.A., Bushman, B.J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: a meta-analytic review of the scientific literature. *Psychological Science*, 12, 353–359.
- Anderson, J.R. (1998). *Uczenie się i pamięć. Integracja zagadnień [Learning and memory. Integration of literature]*. Warszawa: WSiP.
- Batorski, D. (2009). Młodzi w sieci. Uczniowie, studenci i nauczyciele wobec nowych technologii [Pupils, students and teachers facing new Technologies]. In: A. Nowak, K. Winkowska-Nowak, L. Rycielska (Eds.), *Szkoła w dobie Internetu [School in the*

- internet era] (pp. 31–54). Warszawa: WN PWN
- Bednar, A.K., Cunningham, D., Duffy, T.M., Perry, J.D. (1991). Theory into practice: how do we link. In: G.J. Anglin (Ed.), *Instructional technology: past, present and future* (pp. 88–101). Englewood, Co: Libraries Unlimited.
- Boekaerts, M. (1991). Subjective competence, appraisals and self-assessment. *Learning and Instruction, 1*, 1–17.
- Boot, W.R., Blakely, D.P., Simons, D.J. (2011). Do action video games improve perception and cognition? *Frontiers in Psychology, 2*, Article 226. doi:10.3389/fpsyg.2011.00226.
- Boot, W.R., Kramer, A.F., Simons, D.J., Fabiani, M., Gratton, G. (2008). The effects of video game playing on attention, memory, and executive control. *Acta Psychologica, 129*, 387–398.
- Brignall, III, T.W., Van Valey, T. (2005). The impact of internet communications on social interaction. *Sociological Spectrum, 25*, 335–348.
- Brown, J.S., Collins, A., Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32–42.
- Carnagey, N.L., Anderson, C.A., Bushman, B.J. (2007). The effect of video game violence on physiological desensitization to real-life violence. *Journal of Experimental Social Psychology, 43*(3), 489–496.
- Carr, N. (2013). *Płytki umysł. Jak Internet wpływa na nasz mózg [The Shallows: What the Internet is doing to our brains]*. Gliwice: Helion.
- Castells, M. (2003). *Galaktyka Internetu [The galaxy of the internet]*. Poznań: Rebis.
- Castells, M. (2007). *Spółczesność sieci [Network community]*. Warszawa: WN PWN.
- Chomsky, N. (2012). Szkoła ludzi wolnych [The school of free people]. *Gazeta Wyborcza, 7–9 kwietnia, 37*.
- Czerniawska, E. (1999). *Dynamika zachowań strategicznych w uczeniu się z tekstów podręcznikowych [Dynamics of strategic behavior when learning from textbooks]*. Warszawa: Wydawnictwa UW.
- Dembo, M.H. (1997). *Stosowana psychologia wychowawcza [Applied educational psychology]*. Warszawa: WSiP.
- Dinevski, D., Radovan, M. (2013). Adult learning and the promise of new technologies. *New Directions For Adult & Continuing Education, 138*, 61–69.
- Ewoldsen, D.R., Eno, C.A., Okdie, B.M., Velez, J.A., Guadagno, R.E., DeCostner, J. (2012). Effect of playing violent video games cooperatively or competitively on subsequent cooperative behavior. *Cyberpsychology, Behavior, and Social Networking, 15*, 277–280.
- Fenn, K.M., Griffin, N.R., Uitvlugt, M.G., Ravizza, S.M. (2014). The effect of Twitter exposure on false memory formation. *Psychonomic Bulletin & Review, 21*, 1551–1556.
- Gentile, D.A., Anderson, C.A., Yukawa, S., Ithori, N., Saleem, M., Ming, L.K., ... Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviors: international evidence from correlational, longitudinal, and experimental studies. *Personality & Social Psychology Bulletin, 35*(6), 752–763. doi:10.1177/0146167209333045.
- Gluck, M.A., Mercado, E., Myers, C.E. (2016). *Learning and memory. From brain to behavior* (edition 3). New York: Worth Publishers.
- Green, C.S., Baveiler, D. (2012). Action video game modifies visual selective attention. *Nature, 423*, 534–537.
- Greenfield, P.M. (1997). You can't take it with you: Why ability assessments don't cross cultures. *American Psychologist, 52*, 1115–1124.
- GUS (2015). *Spółczesność informacyjna w Polsce. Wyniki badań statystycznych z lat 2010–2014 [Information society in Poland. Results of statistical surveys from 2010–2014]* Retrieved from: [https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spoleczenstwo-informacyjne/spoleczenstwo-informacyjne-w-polsce-wyniki-badan-statystycznych-z-lat-2010-2014,1,8.html](https://stat.gov.pl/obszary-tematyczne/nauka-i-technika-spoleczenstwo-informacyjne/spoleczenstwo-informacyjne/spoleczenstwo-informacyjne-w-polsce-wyniki-badan-statystycznych-z-lat-2010-2014,1,8.html).
- Hill, C. (2003). *Teaching using information and learning technologies in further education*. Exeter: Learning Matters.

- Hofstede, G. (2000). *Kultury i organizacje. Zaprogramowanie umysłu [Cultures and organizations. Software of the mind]*. Warszawa: PWE.
- Holmes, J.D. (2019). *Edukacja i uczenie się. 16 największych mitów [Education and learning. 16 great myths]*. Warszawa: PWN.
- Jagodzińska, M. (2008). *Psychologia pamięci. Badania, teorie, zastosowania [Psychology of memory. Research, theories, application]*. Gliwice: Helion.
- Johnson, G.M. (2010). Internet use and child development: The techno-microsystem. *Australian Journal of Educational & Developmental Psychology*, 10, 32–43.
- Ledzińska, M. (2009). *Człowiek współczesny w obliczu stresu informacyjnego [Modern human facing informational stress]*. Warszawa: Wydawnictwo Instytutu Psychologii PAN.
- Ledzińska, M. (2012). *Młodzi dorośli w dobie globalizacji. Szkice psychologiczne [Young adults in the era of globalization. Psychological sketches]*. Warszawa: Difin.
- Ledzińska, M., Czerniawska, E. (2011a). Prawidłowości rozwoju sfery metapoznawczej w teorii i praktyce nauczania [Rules of metacognitive development in theoretical and practical education]. In: J. Trempała (Ed.), *Psychologia rozwoju człowieka. Podręcznik akademicki [Psychology of human development. Academic Handbook]* (pp. 353–363). Warszawa: PWN.
- Ledzińska, M., Czerniawska, E. (2011b). *Psychologia nauczania. Ujęcie poznawcze [Psychology of teaching. Cognitive approach]*. Warszawa: PWN.
- Matusiak, K.B. (Ed.) (2011). *Informacje i transfer technologii – słownik pojęć [Information and the transfer of technology – dictionary]*. Warszawa: Polska Agencja Rozwoju Przedsiębiorczości.
- McCombs, B.L. (1991). Motivation and lifelong learning. *Educational Psychologist*, 26, 117–127.
- Mills, K.L. (2016). Possible effects of Internet use on cognitive development in adolescence. *Cogitatio Press*, 4, 4–12.
- Nęcka, E., Orzechowski, J., Szymura, B. (2013). *Psychologia poznawcza [Cognitive psychology]*. Warszawa: PWN.
- Palincsar, A.S., Brown, A.L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, 1, 117–175.
- Paul, J., Baker, V., Cochran, J. (2012). Effect of online social networking on student academic performance. *Computers in Human Behavior*, 28(6), 2117–2127.
- Perkins, D. (1992). *Smart schools. From training memories to educating minds*. New York: The free Press.
- Petty, G. (2010). *Nowoczesne nauczanie. Praktyczne wskazówki i techniki dla nauczycieli, wykładowców i szkoleniowców [Modern teaching. Practical recommendations and techniques for teachers, lecturers and trainers]*. Gdańsk: GWP.
- Piechocka, J. (2015). Stosunek i oczekiwania młodych dorosłych wobec nowych technologii w edukacji z uwzględnieniem perspektywy czasowej [Attitude and expectations of young adults towards new technologies in education considering time perspective]. Niepublikowana praca magisterska wykonana na Wydziale Psychologii Uniwersytetu Warszawskiego.
- Piotrowska, A. (2005). Rzekome wspomnienia – czy ufać swojej pamięci? [False memories – shall we trust our memory?]. In: E. Czerniawska (Ed.), *Pamięć. Zjawiska zwykłe i niezwykłe [Memory. Usual and unusual phenomena]* (pp. 125–144). Warszawa: WSiP.
- Pitler, H., Hubbell, E.R., Kuhn, M. (2015). *Efektywne wykorzystanie nowych technologii na lekcjach [Effective use of modern technologies for lessons]*. Retrieved from: https://ceo.org.pl/sites/default/files/pitler-hubbel-kuhn_efektywne-wykorzystanie-nowych-technologii_0.pdf.
- Ryan, R.M., Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and wellbeing. *American Psychologist*, 55, 68–78.
- Schwartz, D.L., Tsang, J.M., Blair, K.P. (2017). *Jak się uczymy. 26 naukowo potwierdzonych mechanizmów [How do we learn? 26 scientifically-proven mechanisms]*. Warszawa: PWN.

- Sijko, K. (2012). Nowe technologie w edukacji: dwa podejścia [New technologies in education: two approaches]. *Polityka Społeczna, numer tematyczny, 1*, 28–30.
- Smith, J., Baltes, P.B. (1990). Wisdom-related knowledge: age/cohort differences in response to life-planning problems. *Developmental Psychology, 26*, 494–505.
- Spitzer, M. (2012). *Cyfrowa demencja. W jaki sposób pozbawiamy rozum siebie i swoje dzieci [Digital Dementia. How do we deprive ourselves and our children of reason?]*. Słupsk: Wydawnictwo Dobra Literatura
- Stoll, N., Collett, K. (2014). Video games and wellbeing. Pobrano z: https://shiftdesign.org/content/uploads/2014/09/Shift_videogamesandwellbeing_final.pdf.
- Szpunar, M. (2015). Internet i jego wpływ na procesy pamięciowe [The Internet and its impact on the process of memory]. *Teraźniejszość – Człowiek – Edukacja, 18*, 149–156.
- Tanaś, M. (1997). *Edukacyjne zastosowania komputerów [Educational use of computer]*. Warszawa: Wydawnictwo Akademickie Żak.
- Van Dijk, J. (2010). *Społeczne aspekty nowych mediów [Social aspects of new media]*. Warszawa: WN PWN.
- Vermunt, J.D. (1998). The regulation of constructive learning processes. *British Journal of Educational Psychology, 68*, 149–171.
- Vermunt, J.D., Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction, 9*, 257–280.
- Volet, S. (1991). Modelling and coaching of relevant metacognitive strategies for enhancing university students' learning. *Learning and Instruction, 1*, 319–336.
- Vosniadou, S. (1994). Capturing and modeling the process of conceptual change. *Learning and Instruction, 6*, 95–109.
- Wallace, P. (1999). *The psychology of the Internet*. Cambridge: Cambridge University Press.
- Winn, W.D. (1991). The assumptions of constructivism and instructional design. *Educational Technology, 31*(9), 38–41.
- Wygotski, L.S. (1971). *Wybrane prace psychologiczne [Selected psychological works]*. Warszawa: PWN.
- Wygotski, L.S. (1978). *Narzędzie i znak w rozwoju dziecka [Tool and symbol child development]*. Warszawa: PWN.
- Wygotski, L.S. (1989). *Myslenie i mowa [Thinking and speech]*. Warszawa: PIW.
- Żurko, M. (2018). Przyjaźń zapośredniczona przez internet. Nowe zjawiska w rozwoju społecznym nastolatków i młodych dorosłych [Friendship through the internet. New phenomena in the social development of adolescents and young adults]. *Psychologia Rozwojowa, 23*, 103–123.

Transl. Aleksandra Jacukowicz