

INFLUENCE OF CYBERSPACE ON CHANGES IN CONTEMPORARY EDUCATION

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ABSTRACT:

Cyberspace of digital media changes contemporary education in two ways: by a new approach to understanding information and a new way of organising this information. In the first case, it is objectification of information that favours the idea of a reduced type of education, based on certain extent of knowledge that is applicable in practice. In our approach, we emphasise the fact that information cannot be taken merely as an object, but also as a contextual and unlimited semantic unit which, through a new organisational level, becomes knowledge. Besides information and knowledge, higher level of cognition requires tacit human features – creativity and wisdom, as well as moral character of man. The second case brings a net-like structure of information, characterised by loop processing, prompt (almost immediate) linking of information that is predominantly image-based. This type of communication and organisation of information is useful because it gives us a fast way of searching for information and – perhaps – more creativity as well. However, it quite possibly implies a risk of weakening some of the cognitive abilities of man (such as logical and abstract thinking), vital not only in the scientific activities, but also in the everyday life. Under influence of communication within cyberspace, contemporary education is beginning to dramatically turn away from discursive (logical, abstract) thinking to associative (especially image-based) thinking. These new trends in education are reflected on really negatively by many authors, for example by M. Bauerlein, N. Carr, K. P. Liessmann or M. Spitzer, as they demand certain ‘counteraction’ which should be based on literacy, critical thinking, information hygiene and which should also become an important component of modern media education.

KEY WORDS:

cyberspace, education, information, media education, wisdom

Introduction

In the second half of 20th century, especially in its last decade, we saw rise of the Internet and acknowledged its tendency to significantly affect development of communication in cyberspace. Over the last two decades cyberspace has become literally a new existential dimension of man. Today we spend several hours a day in cyberspace communicating with other people, searching for information, having fun and learning. The basic communication unit in cyberspace is information; according to its technical realisation it can be text-based, image-based, sound-based or – characterised by genre – informative, entertaining or educational. Volume of available information in cyberspace of digital media has been growing enormously, which is the rea-



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son why information has become a basic symbol of this new society – information society – or rather its extension – knowledge-based society. Information is currently seen as a basic component for building a new digital society. Because of this, we naturally expect that with exponential growth of information volume, knowledge should also grow exponentially and therefore the whole society should be more educated and wiser. However, many authors, for example N. Carr, M. Bauerlein, M. Spitzer and others point out that there is no correlation between knowledge or recognition, let alone wisdom, and flood of information in cyberspace of the digital media. On the contrary, they warn that in many cases we experience the opposite effect; state of knowledge and quality of education are on decline. Taking into account other problems of the modern information society, they speak of our weakening ability to concentrate, memorise and use logical and abstract thinking, mentioning massive doses of entertainment and subsequent addiction. These and also other risks significantly weaken cognitive abilities of man. Therefore, serious questions arise here – what is the situation like with our knowledge and what is the quality of knowledge in general? What is changing and what is holding the same status, and what do we need to do to at least partly eliminate these negative tendencies? We would like to answer these urgent questions of our times, at least some of them.

Information and Knowledge as a Foundation of Education

Despite the already mentioned statement that there is discordance between increasing volume of information and education, it is still true that information functions as a foundation of education. If we imagined a pyramid-like representation of knowledge, then its base would represent information followed by more advanced knowledge, education and finally wisdom. Another thing we have to understand is how to process information and work our way through knowledge to finally reach education and wisdom. Firstly, we need to clarify the basic theoretical concepts that are related to information. Of course, the most important term is the term of “information” itself. The word is derived from the Latin *informatio* (forming, shaping the form into matter),¹ which corresponds with Aristotle’s Concept of Matter and Form (in Greek *hyle* – matter, *morph* – shape). Throughout the history of humankind, the word has taken many meanings and now one of its meanings is fixed and used specifically in the context of information and communication technology development in the second half of 20th century.

What is the basic, say ontological character of this term? Information in the broadest sense of the word is found in the nature (for example, genetic codes in fauna and flora). We first needed to find the code and understand it, only then it could be turned into a semiotic identification and thus information. We properly speak of information only in relation to cultural creations of man.² Our study of information is, of course, restricted – to being a human creation, to originating in culture. According to modern semiotics, information cannot be perceived merely as an independent ontological monad, but as something that is related. There is one universal rule here – information explains something or offers a cross-reference to something. Relying on the marking feature and especially on combination of this feature and other markers, we can imagine the given object (either physical or mental), which represents the so-called ‘reference triangle’. Then information represents a correlate of the marker and the object that we can understand only through other markers. In other words, there is no such thing as a single piece of information, isolated and atomised, because we need context to understand it. Even if we speak of a bit of information, we introduce an artificial and temporary isolation to favour clearer and more precise communication. In the background, however, still runs a ‘putting-together’ process, a process of combining information with other information that generates significant changes in meaning of the information.

Modern discourse on information introduces various usages of the word “information”; this term is most commonly and confusingly explained as data and knowledge. Inexplicitness of these terms may cause a serious

conceptual chaos, which can negatively influence comprehension of the term “education”. Data in a computer programme is often taken as information. However, in our concept it would be more precise to simply speak of data instead of information, since data is fundamentally different from information. Data is processed algorithmically and a volume of data can also be quantified. Data can change into information by entering the human world of symbols through a computer interface. In this human world of symbols, the process of comprehension is based on a principle that is different from the one in the computer world. Data is precisely defined and linked in a functionalistic manner in the world of software. The system is either well-tuned (and therefore working properly) or it triggers a fault warning and needs to be adjusted by man or by computer, since computers may also manage correcting measures that, once again, are defined. Precision and quantity really apply in the computer world. On the other hand, the human world of symbols applies a different comprehension process. It is the so-called ‘soft’ comprehension which is context-based, i.e. based on semiotic rules. Information can be ‘assembled’ through symbols that are meaningfully lined using specific grammatical, syntactic and pragmatic rules. Based on this meaningful arrangement, we get some relatively atomised information. Yet, we need to realise that the process of understanding information is contextual, therefore the background of even the simplest information consists of other information that may give the original information a specific meaning.

Similarly, J. Cejpek distinguishes data and information by saying: “Computers, in this aspect, are not machines to process information, but process data instead. We can only speak of information when it is a human being that receives it, man with his consciousness, that is when he starts to feel the text or image on the computer screen or printed on a sheet of paper.”³ Using a slightly different terminology (data-facts), but still in a similar way, M. Růžička also sees a clear difference: “It is possible to speak of data when something is measured, weighted or counted. (...) Facts are not seen as data, yet they can still be taken away from the context. (...) There is a statement that says that data is a child of (mostly) mathematically devised expression. (...) A fact is, in my opinion, an isolated evidence of the world and it is, within its own boundaries, non-problematic and indisputable.”⁴

Further confusions in terminology are associated with the terms “information” and “knowledge” (cognition). We define “information” as the basic semantic unit of contextual nature. This means that it is impossible to make a full numerical calculation here, unlike in the case of computer data. Effect brought by computers and language substantiality – using singular nouns to speak of information – causes certain problems when expressing quantity. Only quite inaccurately and aware of reducing can we speak of information as of a unit. The term “knowledge” represents a higher grade of information, a complex of meaningfully arranged information. We may take knowledge as a certain set of information about information. Knowledge, according to P. Rankov, provides answer especially to the question of “Why?” while information focuses on the questions such as “What?, Where? or How?”⁵ J. Cejpek says that “in more detailed comprehension of information, we need to distinguish information and findings.”⁶ Or, as he continues: “Information itself is not a finding, but it is its assumption and foundation”.⁷ He refers to philosopher J. Patočka who stated: “The term information cannot explain the phenomenon of comprehension and knowledge”.⁸ Similarly, M. Růžička speaks of knowledge as of the real quality of information: “Neither data nor facts equal to information. Their possible information value reveals only in a dialogue that carries the sense of the world they scrutinise, or: when the facts speak, questions must be raised.”⁹ Knowledge (understanding), similarly to information, is not a measurable constant, because it is generated in contexts in which information cannot be deprived of its own, broader context.

We place education above knowledge in the pyramid-like model of information that is arranged from the most elemental to the most complex information. We understand education as a set of meaningfully arranged bits of knowledge sufficient for practical life in a given field. In this context, we see education in its more narrow sense of the word. However, in the broader sense, education is taken as a general orientation, with a total of tacit knowledge, along with creativity and wisdom. The modern information society understands

1 RANKOV, P.: *Znalostní pracovník v informační společnosti*. Opava : Slezská univerzita v Opavě, 2014, p. 8.

2 ECO, U.: *Teorie sémiotiky*. Praha : Argo, 2009, p. 54.

3 CEJPEK, J.: *Informace, komunikace a myšlení. Úvod do informační vědy*. Praha : Karolinum, 2005, p. 33.

4 RŮŽIČKA, M.: *Informace a dobro*. Praha : Ježek, 1993, p. 38-39.

5 RANKOV, P.: *Znalostní pracovník v informační společnosti*. Opava : Slezská univerzita v Opavě, 2014, p. 12.

6 CEJPEK, J.: *Informace, komunikace a myšlení. Úvod do informační vědy*. Praha : Karolinum, 2005, p. 21.

7 CEJPEK, J.: *Informace, komunikace a myšlení. Úvod do informační vědy*. Praha : Karolinum, 2005, p. 23.

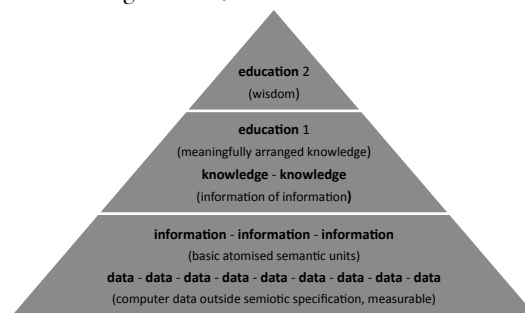
8 CEJPEK, J.: *Informace, komunikace a myšlení. Úvod do informační vědy*. Praha : Karolinum, 2005, p. 27.

9 RŮŽIČKA, M.: *Informace a dobro*. Praha : Ježek, 1993, p. 40.

education as training in a specific field, i.e. as a process of students being prepared for a career, or as life-long education, which is – once again – training for changes brought by professional life. However, this approach raises a number of questions and discussions among professionals. K. P. Liessmann is a well-known critic of this reduced approach to education. He states that modern education is being reduced to profession-based training and knowledge is being demoted to a measurable index of human capital.¹⁰ Surely, he is right, because education as such should not settle for knowledge restricted to profession but should take the highest possible position in our pyramid-like model, as close to wisdom as possible.

The highest possible level of knowledge is generally understood as “wisdom”. M. Potůček discusses this topic in detail: “*Wisdom represents the highest level of knowledge. It comprises of the awareness of general relations between various, even very different events as well as the virtue of gaining knowledge and experience and experience-proven value ladder.*”¹¹ Wisdom is then the total of theory and practice, but it should also include complex experience that man has with ‘value ladder’ and ethical actions. Wisdom, understood as a broader extent of education, should also be comprised of tacit knowledge, as it greatly affects human creativity. F. Murgáš characterises “tacit knowledge” as “*non-verbalised and generally unconscious*”.¹² It is very difficult to communicate this kind of knowledge in words; tacit knowledge communicates by the means of intuition and creativity. Information or knowledge cannot be totally expressible, objectified and quantified. A part of the meaning, emerging from the contextual nature of creation, always spreads in semi-darkness of becoming aware (or not becoming aware). A wise and educated person therefore commands a great extent of tacit knowledge that does not show directly, for example in creative attitude, in ability to see things in perspective, systematic work with knowledge and so on. Effects brought by tacit knowledge, as F. Murgáš continues, are especially seen in intuition and creativity. Intuition can be understood as direct and sudden awareness. Yet, this awareness usually results from preceding accumulated knowledge and experience. Intuition, as new and direct knowledge, also directly relates to creativity. Creativity, similarly to intuition, is a new synthesis of ideas; it is new knowledge that emerges from its predecessor – accumulated knowledge that we cannot access fully, consciously and willingly. This intuition and creativity based knowledge is leads to the highest grades of innovations.

We can, therefore, summarise that education is conditioned by meaningfully organised information but, in a broader sense of the word, this information is related to a great extent of tacit knowledge, intuition and creativity, experience, conscience – which we generally call wisdom. Frequent terminological confusions in the modern information or knowledge-based society originate in the fact that today’s society only favours a more specific understanding of education as a process of systematic approach to a certain area of knowledge that can be applied in practice. Intuition and creativity, along with other aspects of education, only come with broadening and deepening of the basic sum of knowledge since ‘the other’ or ‘not useful’ knowledge can sometimes bring a dramatic innovation into old lines of thinking. Therefore, we should not get stuck in the first level of education, but continue to reach higher levels, here seen as wisdom.



Picture 1: Education pyramid diagram
Source: own processing

10 LIESSMANN, K. P.: *Teorie nevzdělanosti*. Praha : Academia, 2012, p. 11.
 11 POTŮČEK, M. et al.: *Putování českou budoucností*. Praha : Centrum pro sociální a ekonomické strategie, Fakulta sociálních věd UK v Praze, 2003, p. 51.
 12 MURGAŠ, F.: *Znalostná ekonomika, tacitné znalosti, spillovers znalosti a ľudský kapitál*. [online]. [2014-10-10]. Available at: <<http://kdem.vse.cz/resources/relik11/sbornik/download/pdf/149-Murgas-Frantisek-paper.pdf>>.

Influence of Cyberspace on Contemporary Education

Information and knowledge are both seen as basic and conditional assumptions of education, but thinking and learning, along with education, are also influenced by technology that we use, especially by the media. M. McLuhan says that “*technologies do not operate in the level of ideas and concepts, but they constantly change the mutual ratio of individual senses and models of perception*”.¹³ He further paraphrases W. Blake and says: “*We become what we perceive.*”¹⁴ J. Lohisse also states that “*a medium is much more than a mere tool. It creates social structures, influences thinking and imagination, conditions of our understanding of the world*”.¹⁵ Similarly, J. Bystřický says: “*With ongoing using of technology, we also use a changed way of thinking, not by the means of changing possibilities of our own dispositions, but we significantly change strategies for their usage.*”¹⁶ In reference to M. Heim, K. Leidlmair also claims that by using computer technologies, especially the hypertext structure of the Internet, our everyday thinking changes dramatically. Our thinking needs to be adjusted to suit the technology used; when this shaping takes a long time we may end up with dependence.¹⁷ This dependence may grow into customs, which will quite constantly influence other cognitive processes. M. Spitzer even says that these customs get imprinted into our brain as neuroplastic changes.¹⁸

It is not only quality information and knowledge that is important for education, but also its structural organisation. We may assume that every medium will, in its unique way, shape collocation of information. J. Lohisse¹⁹ and similarly also S. Harnad²⁰ distinguish four revolutionary kinds of media: speech, writing, the press and electronic media (the Internet). Each of these media features its own semiotics which serves as a base for whole cultural epochs – epoch of the spoken word, epoch of the written word, epoch of mass communication and amorphous epoch. S. Harnad explains that the Internet, with its rapid development throughout 1990s, is the fourth revolutionary medium. The Internet has played an important role in creating the information-based or knowledge-based society. The heart of the Internet, as we believe, lies in its non-linear, net-like linking of information technologies. By the way, the idea of ‘net’ is also expressed in its English name – which, as we see it, best explains the principles of new technologies that are used to utilise non-linear communication. However, we need to realise the difference between our idea of ‘net’ and real net-based communication. The real Internet lies beyond the boundaries of our imagination, we may only create assumptions here by using certain symbolic ideas and descriptions. The Internet is three-dimensional and constructs something that we call cyberspace, a space in which information is multilaterally linked. The Internet is also characterised by possibility to communicate (especially) image-based data quickly and actively. This gives us an opportunity to define the Internet as interposing technological medium in which we can, through multilaterally linked technological net, almost immediately and actively communicate mostly image-based information.²¹ This raises a claim to study three dominant aspects of information on the Internet: net-like structure of information, speed of information flow and dominance of image-based information. We suppose these have the biggest influence on our thinking, knowledge and finally also on education of modern man.

1. Net-like structure of information. This way of thinking will favour the so-called rhizomatic thinking,²² which is a term used in philosophical and media-based discursive reasoning. This term was first used

13 McLUHAN, M.: *Jak porozumět médiím. Extenze člověka*. Praha : Mladá fronta, 2011, p. 32.
 14 McLUHAN, M.: *Jak porozumět médiím. Extenze člověka*. Praha : Mladá fronta, 2011, p. 32.
 15 LOHISSE, J.: *Komunikační systémy. Socioantropologický pohled*. Praha : Karolinum, 2003, p. 167.
 16 BYSTRICKÝ, J. et al.: *Média, komunikace a kultura*. Plzeň : Aleš Čeněk, 2008, p. 19.
 17 LEIDLMAIR, K.: From the Philosophy of Technology to a Theory of Media. In *PHIL & TECH*, 1999, Vol. 4, No. 3, p. 19. [online]. [2015-01-26]. Available at: <http://scholar.lib.vt.edu/ejournals/SPT/v4_n3html/LEIDLMAI.html>.
 18 SPITZER, M.: *Digitální demence. Jak připravujeme sami sebe a naše děti o rozum*. Brno : Host, 2014, p. 199.
 19 LOHISSE, J.: *Komunikační systémy. Socioantropologický pohled*. Praha : Karolinum, 2003, p. 12.
 20 HARNAD, S.: *Post-Gutenberg Galaxy: The Fourth Revolution in the Means of Production of Knowledge*. [online]. [2015-02-10]. Available at: <<http://cogprints.org/1580/1/harnad91.postgutenberg.html>>.
 21 GÁLIK, S., GÁLIKOVÁ TOLNAIOVÁ, S.: Influence of the Internet on the Cognitive Abilities of Man. Phenomenological and Hermeneutical Approach. In *Communication Today*, 2015, Vol. 6, No. 1, p. 9.
 22 The term “rhizome” is used in botany and means entwined root structure (remark by the author).

before the Internet's emergence by G. Deleuze and F. Guattari. They described it as follows: "Unlike trees or their root structures, a rhizome connects any given point with another given point, while each of the symbols does not provide a link to other symbols of the same kind; it introduces very different regimes of symbols, even non-symbol states."²³ Similarly, U. Eco followed the concept of rhizome and put it aside the previous tree-like (arborescent) thinking. The idea of a tree in, let us say, Middle Ages thinking (*arbor porphyriana*) represented the order of hierarchy-based and logical thinking from the essence of being to its marginal manifestations. Rhizomatic thinking, on the contrary, is non-systematic, fragmentary, net-like, with no beginning and no end. The Internet, with its own technological and net-base (rhizomatic) structure, directly supports "linking things that cannot be linked" and subsequent disintegration of the so-called "linear code". For example, U. Eco claims that rhizome justifies and supports even contradictions, since it creates non-linear loop processes. He even says: "In rhizome, to think means to advance blindly; to follow just assumptions."²⁴ The Internet, characteristic for its hypertext or let us say rhizomatic interconnection of information, does not and will not support abstract, linear and logical thinking, thinking on which the classic European education was based.

2. Communication on the Internet is getting close to the speed of light; therefore this sort of communication becomes almost immediate for a common user. The high speed of communication brings a sensation of permanent present time because the 'empty' periods of waiting for information are annihilated. This kind of communication also disintegrates the idea of time progression. On the other hand, high communication speed and exponential growth of information will cause troubles in timely processing of information. Cumulating information, as T. H. Eriksen notices, will lead to simplification, imperfections and information noise, which definitely does not improve quality of contemporary education.²⁵
3. Our ability to think abstractly can be weakened by the net-like character of the Internet, but also by dominance of images on the Internet. We do not have to speculate about images since their meanings are presented in integral complexes. We tend to simply consume these images, using our senses and mental power. G. Sartori even speaks of a new anthropogenesis of man, of his changeover from *homo sapiens* to *homo videns*. *Homo videns* is man who denies demanding rational approaches such as abstraction and logical argumentation and prefers images, emotions and entertainment.²⁶ In 1980s, when while studying television on basis of discourses of the 19th century modelled by the press, N. Postman came to a conclusion that society drifts from serious and rational thinking to a shallower, more amusement based thinking.²⁷ This fact is also evident in the Internet era. H. Pravdová, reflecting on the context of present media, agrees: "Though the phenomenon of entertainment has been one of the characteristic signs of human culture since its beginnings to the present time, an individual person has never been subject to such extent of amusement as now."²⁸ M. Solík believes that image that carries more information than text influences even emotions and mood because iconic communication basically implies entertainment.²⁹ For this reason, dominance of images on the Internet favours academic procrastination and multitasking.

We need to emphasise that there is a close relation between all of these three aspects. The internet content is of the iconic nature and changes very fast, with miscellaneous linking or net-like linking between individual bits. This kind of information linking is most visible in case of online social networks such as *Instagram*, where photography takes the primary role and other simple and short textual information can be added as well. This form of information linking is associative – unlike discursive thinking, which is based on linear development

23 DELEUZE, G., GUATTARI, F.: *Tisíc plošin*. Praha : Herrmann a synové, 2010, p. 30.

24 ECO, U.: *Od stromu k labyrintu*. Praha : Argo, 2012, p. 60-61.

25 ERIKSEN, T. H.: *Tyranie okamžiku*. Brno : Doplněk, 2009, p. 64.

26 SARTORI, G.: *Homo videns: La sociedad teledirigada*. Buenos Aires : Taurus, 1997, p. 11.

27 POSTMAN, N.: *Ubavit se k smrti. Veřejná komunikace ve věku zábavy*. Praha : Mladá fronta, 2010, p. 66.

28 PRAVDOVÁ, H.: *Determinanty kreovania mediálnej kultúry*. Trnava : FMK UCM in Trnava, 2009, p. 294.

29 SOLÍK, M.: Semiotic Approach to Analysing of Advertising. In *European Journal of Science and Theology*, 2014, Vol. 10, No. 1, p. 213.

of information. Associative information linking may be, on the one hand, more creative but, on the other hand, it might weaken logical and abstract thinking. Education – and especially its element represented by scientific thinking and knowledge – requires exactly this type of thinking based on linear succession of information. Having said this, if the associative type of thinking, growing with usage of the Internet, starts to dominate in today's culture, it will introduce a risk for the contemporary society, which is based on opposing linear thinking.

Conclusion

To conclude, we could summarise that cyberspace determinates contemporary education in two ways: by new understanding of information and by its new organising. In the first case, under influence of communication in cyberspace, we are able to seek and process information very efficiently, which is undisputedly positive and helps to increase education. On the other hand, it also brings a risk of objectifying information that may support the idea of reduced type of education for which a certain volume of knowledge would be sufficient. In life-long education it would be enough to simply change this volume of knowledge constantly. In our approach, however, we do not understand information purely as an object, but rather as a contextual and unrestricted semantic unit. Knowledge is supposed to push our understanding of reality to a higher level, to reflect on information in broader contexts. The complex of meaningfully arranged information then creates the first level of education aimed for a given specialisation, profession or branch. However, education itself requires also the so-called tacit knowledge, creativity and wisdom. Tacit knowledge comprises of hidden (unconscious) knowledge that is very important for new creative synthesis. Wisdom concentrates not only on knowledge, but also involves development of experience and conscience; it is crucial especially for regulation of our learning and particularly our deeds.

In the second case, cyberspace quite clearly organises information into a net-like structure, characterised by loop processes in linking of information, often outside classic logics. Besides this, in cyberspace – for example, in case of social networks – there is a dominance of images and net-like linking is particularly characteristic here. This means of communication and organisation of information may bring positives in form of greater creativity, which is an important segment of teaching and education. However, there is a real danger of weakening some of the cognitive abilities of man, e.g. logical and abstract thinking, crucial not only in scientific discourse, but also in everyday life. Excessive weakening of discursive (logical and abstract) thinking could cause serious undermining of the whole system of modern Western or European education.

It seems that modern education, influenced by communication in cyberspace, is beginning to change pragmatically, from discursive to associative thinking and consequently also to associative education. We are able to observe the global growth of what once was marginal in the history of European culture, of ways of thinking similar to labyrinth.³⁰ The question is, however, whether these changes will be positive or negative for the European education. Many authors such as M. Bauerlein, N. Carr, K. P. Liessmann or M. Spitzer understand these new trends in education to be very negative and call for a 'counteraction' that should be based on literacy, critical thinking and information hygiene. This counteraction needs to become an important component of media education.³¹ Absolutely crucial criteria for the future state of European education will be associated with critical reassessment and preservation of elements of the old attitudes towards education, i.e. the attitudes based on linear phonetic writing represented by, for example, reading habits, our ability to understand text, develop ideas in a logical and abstract manner. Since it is only this sort of education, says M. Spitzer, that leads towards freedom, critical and independent thinking.³²

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30 ECO, U.: *Od stromu k labyrintu*. Praha : Argo, 2012, p. 60.

31 PETRANOVÁ, D.: Rozvíja mediálna výchova v školách kritické kompetencie žiakov? In *Communication Today*, 2011, Vol. 2, No. 1, p. 67.

32 SPITZER, M.: *Digitální demence. Jak připravujeme sami sebe a naše děti o rozum*. Brno : Host, 2014, p. 58.

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