

School in the Era of the Internet

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Introduction

School systems are challenged by today's quickly changing world with new and complicated problems. We live in an era marked by an explosion of information, as illustrated by the fact that the amount of information doubles every year. The cultural change of a revolutionary nature we are now observing, one element of which is development of the Internet towards the Web 3.0 model, is associated with depletion the culture of writing and the cognitive apparatus associated with it; that is, cause and effect thinking, linear understanding of time, and an objectivist understanding of the world. The omnipresent electronic media, which use an entire range of audio-visual means of communication, are main "production techniques" of culture, including the current visual culture. They constitute the context in which schools function and, at the same time, they pose a considerable risk to them. The computer is almost as common today as a wristwatch, and the owner has immediate access, at any time, to all contents and services in all forms that are available on the Internet. It is worth considering how this popularization of access to the Internet influences education.

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1. Development of the Internet from Web 1.0 to Web 2.0

The indicator of changes in education on which this paper will focus is evolution of the Internet from the first-generation Web 1.0 into the interactive network of the second generation Web 2.0, with which we have been dealing since 2001. In Web 1.0, a one-way flow of information dominated; in network, there were static websites with “read only” options and there was no possibility of influencing their content. Traditional search engines and portals, thanks to which only a passive reception of ready information was possible, were dominant.¹

The network of the second generation Web 2.0 makes the user an interactive participant in the action, one who can change the content and form of the announcements. Internauts create active dialogues with information; not only do they receive them, they also ask, follow instructions and construct answers. They are no longer passive users of the Web 1.0 network, but interactive users of the Web 2.0 network. The Web 2.0 model allows the service user, like its authors, to shape the general image of the content dynamically by delivering articles, photographs, own video recordings, music, links to websites, blogs, etc. Development of the Internet towards the Web 3.0 model functioning in the form of so-called semantic networks is soon to follow. In the near or more distant future, network users will cooperate with the use of implants in the brain, without the participation of keyboards or even a computer as it exists today. The information that is needed will be searched in a semantic way (linked semantically) by computer programs.

2. Homo Sapiens or Homo Zappiens?

The contemporary young person who was born and raised in the Internet era is a so-called *dig-*

ital native, whose functioning at school is expressed by the statement: *If you want to teach me, you first have to reach me.*² The learning process of *digital natives* consists of watching and viewing web pages, searching and combing information, scanning it, hopping from website to website (“zapping”), getting in touch with other network users, copying and pasting files, discussing, chatting, taking part in projects and presenting their results, obtaining knowledge from others, but also creating and popularizing it.

The Internet researcher N. Carr indicates the linear logical mind, accustomed to focusing on printed texts for many hours, to which our civilization owes the Renaissance, the Enlightenment, the Industrial Revolution and modernism, departs from the past.³ New technologies are not only setting the course, but also influencing the way their users learn and think.

The *homo sapien* who is a network user is becoming a *homo zappien*. The first one thinks and the other zaps; he searches for information online, copies, chats, skips from information to information, etc. In the course of these activities, he acts holistically, not analytically and linearly; he develops the ability for broad but not long concentration.⁴ This can lead to ADT (attention deficit trait). The differences between *homo sapiens* and *homo zappiens* imply we are dealing with two completely different styles of cognitive action. The former concentrate on reality, while the latter focus on living in the world of fantasy. For *homo sapiens*, work and play are two separate kinds of activity; *homo zappiens* learn through fun. The former are disposed to act in the community,

¹ K. Krzysztofek, 2007. *WEBSki Świat: mądrość tłumów sieciowych czy zbiorowe nieuctwo? (Wstęp)*, [w:] A. Keen (red.), *Kult amatora. Jak Internet niszczy kulturę*. Warszawa, s. 15.

² M. Gawrysiak, 2009. *Homo zappiens i homo sapiens. O technicznym, ludycznym i intelektualnym dostępie do mediów*, [w:] K. Wenta, E. Perzycka (red.), *Edukacja informacyjna. Neo-media w społeczeństwie wiedzy*. Szczecin, s. 36.

³ N. Carr, 2011. *The Shallows: What the Internet is Doing to Our Brains*. New York.

⁴ M. Gawrysiak, 2010. *Nie dostarczanie, lecz pobieranie informacji. Jak komputery zmieniają pracę i szkołę?* „Szkoła – Zawód – Praca”, nr 1, s. 55.

but remain autonomous, the latter are disposed to competition and function as an element of the network (are networked). The *homo sapiens* is single-tasked. When performing any activity, he focuses only on it; the *homo zappiens* is multitasked (engages in multitasking) and, like the computer, he can perform several activities at the same time. The former was shaped in the era prior to the Internet; that is, in the culture of press and is oriented towards text; for the latter, an image is more important. The learning process for *homo sapiens* is linear in nature, as text in a book; they recognize the elements of text, join them together and develop logical reasoning. *Homo zappiens* work in non-linear order, according to the rules of the structure of hypertext, and demonstrate higher activity than *homo sapiens*. The network user is unable to focus his attention on a single issue for an extended period of time. His learning process consists of associating various items of information. His brain increasingly resembles a biological counterpart of the search engine Google in that it shows a list of associations with brief explanations.⁵ Moreover, *homo zappiens* react differently to stimuli. The reactions of *homo sapiens* are postponed, made after a longer time, are well-thought-out and calm. The reactions of *homo zappiens* are immediate.⁶

It can be assumed that access to knowledge through a text placed in a network and through a printed text are two different ways of thinking and two different visions of the world. The text in a book has a linear structure, is generally organized and proceeds from start to end. The knowledge gained from a network has a branched structure and usually involves a hypertext. Readers of a text in a book usually reach the same point, but it is not possible to say the same about readers of a hypertext. In a text with a linear structure, it is possible to distinguish main information from minor information quickly.

In a hypertext, the amount of threads is huge and they are not ranked in order of importance.

According to G. Small, who experimentally researches functions of the brain, the longer and more frequent a person's experiences with the Internet, the faster the subsequent change in brain function. In other words, the person programmes himself to perform tasks that are forced by the network.⁷ Among others, these include superficial (discontinuous) reading, distracted thinking, continuous interrupting of concentration and constant distraction of attention to other objects, simultaneous performance of a few activities, and exercising hand-action coordination. Long-term network users are characterized by the speed of their reaction rate, the chaotic nature of their action, superficiality in assimilation of information, and a mind-set that responds to the fragmentary nature of the incoming information.

The cognitive costs of using the network are considerable, because intellectual processes are being simplified. Absent-mindedness undermines a process of transmitting information to the short-term memory, and from there to the long-term memory. The ability to concentrate on a text at length is being suppressed. Also, processes that are the essence of human intelligence are in disarray; namely, abstract thinking, problem solving and assimilating information with understanding. Working with a hypertext makes it difficult to comprehend the entire problem and to build more complicated structures. The development of visual-spatial skills unfortunately does not accompany development of the ability for deep processing stimuli, intuitive analysis, imagination and reflection, which are processes that lead to a deliberate acquisition of knowledge.

The presence of interactive multimedia in the social world creates a new feature in the educa-

5 P. Stasiak, 2010. *Zgooglowany umysł. Dlaczego Internet zmienia nasz mózg?*, „Ja, My, Oni”, nr 13, s. 103.

6 M. Gawrysiak, 2009. *Homo zappiens i homo sapiens...*, op. cit., s. 37.

7 G. Small, G. Vorgan, 2008. *iBrain: Surviving the Technological Alteration of the Modern Mind*. New York.

tional process, but also implies many threats to the way schools function. It is occasionally claimed that schools cannot stay abreast of these changes, mainly because of the generational differences between pupils and teachers. The former are digital natives; the latter are digital immigrants. Analogue teachers formed in the culture of the press are teaching digitally formed pupils. Digital immigrants, strangers in the new reality of communications, were trained for a linear perception of announcements. The classical way of reading a text is more natural to them. They are not adapted to the reception of interactive media, because when a technological change occurred, the hypertext was already fully formed. They understand knowledge as an organized set of information.

The generation of digital natives grew up in the world of interactive technologies; it is their product and the product of a culture created by them. Their brains were formed by cyberspace with its multichannel attraction and short forms of impression and expression. They live in two realities: real and virtual, and the borderline between them is fading. They move in a world saturated with modern technologies at different levels: an Internet search is a more obvious source of knowledge for them than a library. It is hard for them to imagine life without the Internet, because it always has been a part of their lives.

3. Why is a Revolution in Teaching Necessary?

What does it all mean for the educational system? Redesigning education is needed, K.G. Wilson writes.⁸ It cannot be limited to giving up the era of chalk and moving on to the era of new information and communication technologies. The issue concerns a change not only in the tools used at school, but also a profound change in the philosophy of education. It is necessary to follow on the heels of Boeing or Apple. They owe their development to “starting

from scratch”. They formulated a fascinating vision of their future and began the process of research and development simultaneously. Who is called on to bring about a revolution in education? Let us remember Benjamin Franklin’s words. He divided people into three kinds. First, there are unchangeable people who get nothing, because they want nothing and do nothing with it. Second, there are those who see the need for change and are ready for it. However, Franklin believed there also are people who simply change the world and, thanks to them, things happen. For the first kind of people, it is merely necessary to provide an opportunity for work, even of the simplest variety. For the second, it is necessary to restructure universities, while those in the third category will design and make everything.

In the chaos of the reality of information, the school in its current form is an anachronistic relic inherited from forgotten ancestors. As such, it requires a radical change. This diagnosis has been reached by others, such as Ken Robinson, the famous British educationalist, and Geoffrey Canada, – the activist and the class tutor from New York who was acclaimed by *Time* in 2011 as the one of the most influential people in the world.

Robinson gives some thought to how to escape from the “educational valley of death”. He claims most contemporary educational systems were based on the mechanical concept, according to which education is an industrial process that can be improved only by obtaining more precise information.⁹ Canada asks, “Why is it we learn today as we did in the era when we had rotary dial telephones and people had polio? And, why do people regard you as radical when you propose a plan for change?”. He goes on to add, “I don’t know a lot about the fiscal cliff, but I do know that, at this moment, we are walking on the

8 K.G. Wilson, B. Daviss, 1994. *Redesigning Education*. New York.

9 K. Robinson, 2009. *The Element: How Finding Your Passion Changes Everything*. London.

educational cliff.”¹⁰ It probably is even worse and we are hanging from that cliff already.

On May 8, 2013 a report by the International Labour Organization, an agency of the United Nations, was published in Geneva.¹¹ It appears unemployment among young people has grown (from 12.4% in 2012 to 12.6% in 2013, which implies 73.4 million are now jobless). It is forecast that, despite the slow emergence from the world economic crisis, unemployment will continue to grow and will amount to 12.8% in 2018. The director of MOP, José Manuel Salazar-Xirinachs, says one main reason for this state of affairs is that employers, schools and young people live in parallel worlds.

There are masses of educated and frustrated young people in the job market whom no one wants to employ. It is the fault of no one: neither the unemployed, nor employers. The educational system originating in the Industrial Age is guilty. It is artificially based on in the conditions of the era of specialized services and advanced technologies. Michael Schrage proves the gap between the qualifications graduates possess and the skills that are required in the job market makes them extremely difficult to employ.¹² The belief that higher education leads to a better job and enhances one’s chances of employment is, in his opinion, a myth.

The industrial system of education, with its omnipresent tests and basis in standardization, linearity, conformism and “portioning of people,” produces millions of dependent, disorientated and helpless orphans of today’s market. In a postindustrial reality anchored in the creative world of new technologies, they are rejected immediately. No one wants to employ a worker who thinks algorithmically and is unable to perform any activity without

the instruction. In an e-book published in 2012 entitled *Stop Stealing Dreams (What is school for?)*, Seth Godin, an American expert on marketing and new technologies, writes: “If you perform work in which the employer tells you exactly what to do, in the end he will find somebody cheaper to [take] your place.” Meanwhile, schools prepare people to look precisely for such jobs, where the boss will tell them exactly what to do .

4. Skills Sought in the Job Market

Message transmission is no longer the main function of the school . Even the most mainstream experts say that school should impart skills, including those that enable young people to handle a deluge of information. In the European Union, eight important skills are listed: intercommunication in the mother tongue and foreign languages; mathematical, scientific-technical and information technology skills; social and civil skills; initiative and enterprise; awareness and cultural expression; and an ability to learn throughout life. The American “movement for education in the 21st century” talks about the four “Cs”: critical thinking and problem solving, creativity, communication and cooperation, as well as information and media skills, and practical professional abilities (flexibility, self-reliance, responsibility, leadership).

Today, employers look for self-reliance and skills in candidates, not for submissiveness and diplomas. The ability for critical thinking and teamwork are particularly sought after in the job market, because they are rare qualities. Jobs are obtained by those who are able to show what they can do and present a multimedia portfolio concentrated on achievements, rather than a linear summary of their educational background. In such a portfolio, there are links to blogs, printed articles, PowerPoint presentations and podcasts the candidate has created. The traditional two-page résumé is being replaced by a “personal productivity portal”. Yet, neither

10 G. Canada, 2013. *Our failing schools. Enough is enough!* TED Talks Education.

11 Raport Międzynarodowej Organizacji Pracy „Światowe tendencje w zatrudnieniu młodzieży”. Genewa, 8 maja 2013 r.

12 M. Schrage, 2011. *Higher Education Is Overrated; Skills Aren't*. Harvard Business Review.

schools, nor universities are teaching students how to do something like that.

Are elite universities losing their competitiveness? E. Han Kim and Luigi Zingales asked that question in a 2006 study and the answer was affirmative. The potential for which graduates of universities in the 80s were sought on the job market is disappearing. One of the main reasons is the Internet revolution and the development of information technologies that are “reducing the need for cooperation within the physical bounds of colleges and enabling cooperation at a distance.” Even a prestigious degree regarded so far as the most reputable is devaluating and, not only here, but even in the country that has the best universities in the world. In 2005-2008, as many as 94% of the graduates with an MBA from the Stanford University found jobs. Today, the proportion is 75% and is diminishing, even though Stanford has one of the best MBA programmes in the world. The situation for less prestigious universities is much worse. The failure of MBA programmes aptly illustrates the source of the problem: the current system of education, even at its best and with high standards, is far removed from reality. MBA programmes were designed to prepare people to work in corporations, not in small companies or start-ups using modern technologies. As a result, such companies look down on candidates with MBA diplomas, who are regarded as “insufficiently rebellious” and devoid of fundamental technological skills and the ability to obtain funds.

Today’s new and different world demands openness to changes and permanent development, emotional intelligence and the ability to solve problems. It also necessitates the ability for continuing education, mutual understanding and building the shared cultural codes without which society cannot exist, and cultivating the legacy of the past, so it can be respected and improved. It is necessary to communicate with one another and, to form relations quickly, as well as virtually. Hard knowledge and soft skills are needed. such as communicativeness,

cooperation in a team, management of one’s time, managing under stress, assertiveness, flexibility and the ability to adapt.¹³ Experts at the Californian Institute for the Future predict that, in the next decade, the global job market will place increasing importance on the ability to build relationships and teamwork, intergroup communication, critical thinking and empathy. The ability to cooperate with others also underscores the so-called crucial educational skills that are applied in the countries of the European Union.

The modern job market needs creative rebels, not humble, villain workhorses. The problem is that, in the Facebook reality and start-ups, there still exists a school based on obedience and swotting information, as opposed to making pupils cleverer or more independent. In this situation, reform of the educational system is not a luxury but a precondition for democracy to survive.

5. What Education? What Teacher?

The pragmatic purpose of education is to provide people with the ability to make the right decisions, particularly those on which the quality of their lives largely depends. The accuracy of decisions made by a person depends on possessed information, knowledge that allows the person to interpret that information appropriately, skill in using possessed knowledge, and a system of values. The school must prepare students to make the right decisions in their lives.

In the era of an electronic flow of information, the essential role of the school is still to create conditions for joint learning. The school should teach what the Internet will not provide; namely, logical and creative thinking, and the ability of making sensible use of information. Helping students introduce order in the chaos of information becomes an important task for the school. The Internet is a mishmash of honest and false information. We need the school to teach

¹³ *Life in 21st Century Workforce*, 2012, San Diego, Executive Summary.

students how to search for information at their own initiative, which can help to distinguish honest knowledge from dishonest information. If a student does not understand the information that is found or does not know what he is searching for and what is important, then using the Internet is only a means of collecting accidental and secondary information. For that reason, it is necessary to develop the ability to seek what is essential and to be ready always to ask whether it is appropriate.¹⁴

In a world where it is possible to find every sort of information on the web, there is less need to learn something by heart. Apart from that, computer circles are more understandable to a contemporary student and more hospitable than the school classroom. Entering the virtual world enhances possibilities for learning complicated problems, because students can change their perspective or practice new skills in various situations created by the computer. However, it is important not to overrate new technologies. It is necessary to help children understand that technology is only a tool to help in our lives and cannot be a lifestyle. It is only an addition to the world in which we live. In short, it is crucial not to forget that children should learn to connect and communicate with the real world.

For Ken Robinson and many other reformers, one key to transforming education is to escape from standardization and personalization of learning.¹⁵ The Finns pursued this track and they now have one of the best school systems in the world today. It is not based on corporate management models, tests and increased amounts of information students must assimilate. Their model promotes cooperation, as opposed to rivalry. And, to become a teacher, which is a well paid and prestigious profession, only the best are allowed. It is a wise approach, because

positive selection in this profession will be inevitable. Kyle Peck, a professor of pedagogy at Penn State University, warns that teachers who are able to provide only information will be substituted by technology within 10 academic years.¹⁶ Teachers performing the traditional role of dispensing knowledge will die of hunger. The Internet, as a platform for transmitting knowledge, is immeasurably more effective and cheaper than schools and universities.

The success of hundreds of educational platforms proves it, from the Khan Academy to MOOC's, MIT OpenCourseWare, Udacity, Voxy, Knewton, Grockit, Socrative and Coursera. Prestigious colleges are great firms, but fiends, and visionaries create them. In the free Internet course "Introduction to Artificial Intelligence" conducted in 2011 by Peter Norvig and Sebastian Thrun, who are scientists from Stanford, 160 000 people participated, and 23 000 people passed the course.

"It is the end of the age when a student entered one door, acquired the same experiences as everyone, and left through another door, supposedly equipped with all that was needed to be "a successful man" in the future," Becky Takeda-Tinker, President of Colorado State University, writes.¹⁷

Nowadays, the economy is increasingly dependent on the specialized skills of competent people. However, the development of these skills requires professional evaluation, precise reviewing of progress, and consultation. A man acquiring knowledge in the rich information galaxy of the Internet also needs navigation tools, so as to separate solid knowledge from rubbish. In the first and second instances, the help of a teacher will be essential. The teacher of the future will be an adviser, a consultant and a guide, rather than an all-knowing moralizer who delivers secret spells from behind the lectern.

14 N. Chomsky, 2012. *The Purpose of Education* (Wykład wygłoszony 1 lutego 2012 r. na Konferencji "Learning Without Frontiers" w Londynie).

15 K. Robinson, 1998. *All Our Futures: Creativity, Culture and Education* (Raport Robinsona). London.

16 K. Peck, *The Evolving Role of "Teacher" in a MOOC's and Badges World*.

17 B. Takeda-Tinker, 2013. *What Does the Future Hold for State Higher Education?* Colorado State University-Global Campus.

Since the computer affords immediate access to the ocean of information on the Internet, it seems that students do not have to remember facts, because it is possible to google every sort of information. This is true, except for the fact that the Internet contains all and denies everything: all good and all bad, all beautiful and atrocious, ethical and unethical, valuable and worthless, important and unimportant. Someone must teach students what is what and explain the reason for transmitting a certain system of values, which lets them judge. Ease of access does not replace values; the larger the sea, the more we need a compass. Transmitting values to students is difficult, because there is no single system of values and there will never be social agreement on which system of values to transmit. However, the student should not be left alone without a compass in the middle of an ocean where opposing currents clash. This demonstrates the extent of the challenge facing educators; that is, both parents and teachers, who will have to stand up to questions and arguments about worldwide trends they might never have heard of.

A quality education should equip students with the ability to access knowledge and to understand and use it through analysis, synthesis, comparison, interpretation and evaluation. A teacher can impart everything and this role is irreplaceable, provided the teacher relinquishes the function of an omniscient master who transmits knowledge one-way. Rather, the teacher should be a guide in the maze of information, one who instructs on how to distinguish important information from that which is unimportant. The teacher must encourage a critical approach to information and discussion, create an opportunity for thinking, combining facts, expressing opinions, and verify the knowledge acquired by students. The teacher must instruct on how to select, to rank and to estimate information, and how to have one's own opinion.

This requires a completely different style of teaching, one that implies being in touch with the

individual developmental needs of each student (so-called personalized teaching adjusted to individual predisposition), the use of non-school forms of instruction, teaching cooperation, problem solving, and application of the project method. Don Tapscott tells teachers: "Stop lecturing. You do not need to know all the answers. Now, the network knows everything."¹⁸

Googling for information is meaningless if the student is unable to interpret it. For example, it is easy to google information on the fact that Merval was up by 1% yesterday. But what does this say to someone who does not know what Merval is? Of course, by goggling, one can learn that Merval is a stock exchange index in Argentina. But, the problem is still one of interpretation. Is being 1% up good or bad for me, is it big or small? Is there a relationship between the stock market in Argentina and life in Colombia? To answer these questions, one needs knowledge obtained in the course of education, preferably earlier rather than at the last minute when it is strictly necessary to interpret important information.

It is impossible to google reasoning, which is necessary for decision-making ; that is, the ability to associate facts, the skill for deduction or induction and, in a more advanced form, the derivation of mathematical formulas or the creation of computer algorithms. It is often possible to google the result of someone's reasoning, but a competitive advantage is created by something that is not possible to google, or what the person (a current or former student) independently associates, deduces, induces, infers and / or arrives at on the basis of an algorithm.

6. New Trends in Education

Curtis J. Bonk, a professor of computer science at Indiana University, says new information and communication technologies have flattened the

¹⁸ D. Tapscott, 2010. *Cyfrowa dorosłość. Jak pokolenie sieci zmienia nasz świat*. Warszawa, s. 31.

world.¹⁹ This allows education to occur in an open way: anyone can learn anything from anyone, in any situation, and at any time and place (on the tram, in the park, in the mountains or in a sports arena).- Bonk lists ten key trends in education and technological development that will determine the shape of education in the future (so-called extreme education). They include: online education and blended learning, open access to information and free software, open and free online courses, participation in communities of open information, mobility and portability in real time, and a personalized learning network. On his website, Bonk amassed hundreds of links to enable learning in different fields and in all sorts of ways,- from language learning on the bike to the materials from expeditions to Baffin Island, contacts with other course participants, tips on more effective learning, and the possibility to assess progress in learning. Initiatives undertaken by reputable universities such as Harvard and MIT, which invested 60 million dollars in free joint online courses called edX, are examples of activities in the field of extreme education. Stanford and Yale joined them recently.

It is difficult to predict what the school of the future will look like. Perhaps in 50 years it will be a place where students and teachers create a learning community, have common access to modern information and communication technologies, work mostly with the research method and social, civic and artistic projects, and communicate with each other via the school learning platform. Conceivably, the school will be an intellectual center available all day and visited virtually as well. We possibly we will depart from an overloaded curriculum. Perhaps the school will focus on teaching students how to think, with an emphasis on collective and interdisciplinary projects. Perhaps children will write, read and debate, but also have fun and get lots of exercise, take part in local events, become involved in global issues, do experiments, stage plays and organize philosophical debates. According to K. Robinson, the school is faced with two paths: either merge with the virtual world and preserve the status of an adviser, or become a place of direct educational and social contact, a place where people cooperate, discuss, experiment and think.²⁰

19 C.J. Bonk, 2009. *The World is Open. How Web Technology is Revolutionizing Education*. San Francisco.

20 K. Robinson, 2010. *Oblicza umysłu. Ucząc się kreatywności*. Kraków, s. 20. (K. Robinson, 2001. *Out of Our Minds: Learning to Be Creative*. Capstone).

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