



Digital competence learning in secondary adult education in Finland and Poland

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Abstract:

Nowadays, the digital competence is becoming as important as literacy and numeracy skills. For children and youths these competences seem to be natural and the role of teacher is to direct students in their learning and to develop cognitive curiosity. For adults, the learning process is different. It is not only developing of digital skills but sometimes even grass roots teaching.

The article presents a two different approaches to teaching/learning process provided in the field of secondary education- Finnish and Polish systems. Documents containing curricula, school programmes and course grids were analysed. Both systems have been assessed in terms of their relevance to adult learners.

The main discoveries and the key conclusions indicate that the Polish system does not adapt to the real needs of adult learners and the changing needs of the labour market.

1. Introduction

The information society of the third millennium is in the continuous process of the creation. The comparison of research on basic skills levels in different age groups is not optimistic. It is difficult to divide society into groups of digital natives and digital immigrants, generation Y and Z.

When today's preschoolers become university graduates, the world will be very different from what previous generations have experienced. Nearly 80% of the professions in which today's preschoolers will work do not yet exist. Those that exist today will disappear in the future. What challenges does this situation pose for the education sector and how to prepare young people for their debut on the labour market of the future?

The process of creating the information society has been, is and will be a complex and multi-stage process requiring a comprehensive insight not only into the life of an individual but into the life of entire societies. At the beginning of the information societies it was believed that communication specialists and computer scientists should fully engage in scientific reflection on the development of the information society. Over the years, these issues have been discussed many times in separate analyses by economists, politicians, psychologists, educators and sociologists in scientific and popular science publications. With the development of information society and intensification of research on it, new areas and questions are emerging. M. Castells (2013) is an author who approached the problem in a much broader scope than researchers who perceive the foundations of the development of the information society only in the intensive development of IT tools. His concept of a network society was an attempt at a comprehensive analysis of the changes taking place in today's global world. In his opinion, the transformations were the result of three independent



processes: the IT revolution, the economic crisis of capitalism and Soviet socialism, and the development of social movements in the sphere of culture.

The information society is created mainly in highly developed countries, where information management, quality and speed of information flow are the basic factors of competition in both industry, services and education. Progress requires new methods of collecting, processing, transferring and using information (Ministry of Communication, 2001).

The omnipresence of requirements for digital competences are undisputed. It is not only a matter of the form of spending free time any more but it is a question of efficient functioning in contemporary world. In many cases it is almost impossible not to use digital skills, for example to buy a public transport/flight tickets, submit official application or apply for a job. The Information and Communication Technologies are present in majority spheres of our life. There are as many positive aspects of this phenomenon as negative ones (Gudanescu 2009, Borysiuk 2013, Younes & Al-Zoubi 2015, Jankowska & Tanaś 2016). Still, we cannot avoid or even ignore the influence of ICT in the workplace, education, healthcare, social life and many others of human activity.

Modern technologies are becoming more complex. Using them requires advanced skills. The price of technological novelties is often very high. People, who do not follow to gain up-to-date knowledge, upgrade software they use, buy modern computers or electronic equipment are in danger of exclusion from access to public services, well-paid jobs, good quality education or medical care.

In this context the idea of putting as much effort as it is possible to get to people who require learning support is highly justified. Teaching digital competences should be treated as equally important as literacy or numeracy competences (Griffin, McGaw & Care 2012). Undoubtedly, learners of general upper secondary schools for adults, which are the second chance schools, belong to the group of people who require special attention in the regarded issue.

2. Theoretical framework

The term “information society” was first used in 1963 by Tadao Umesao in his article on the evolutionary theory of information-based society. This expression was used by Yonei Masuda in the early 1970s in his work on social transformations related to the development of the information and telecommunication sector (Nowak 2005; www.marekzawadzki.prv.pl).

The issue of the European specificity of the transition from an industrial society to an information society was reflected in 1978 in the report prepared for the French government by S. Nora and A. Mine. They described the development trends of social systems in post-industrial society. However, the year 1994 is considered the beginning of the creation of the information society in Europe. The Bangemann Report (*Europe and Global Information Society. Recommendations for the Council of Europe*) was published at that time. The report launched a public debate on the information society. It proposes 10 initiatives for the development of modern information and communication technologies. It covers areas:

1. teleworking,
2. distance training,
3. networks connecting universities and research units,
4. ICT services for small and medium enterprises,
5. traffic management,
6. air traffic control,
7. networks for the health sector,
8. computerisation of the public procurement sector,
9. the trans-European public administration network,
10. infostrada for urban areas.

The emergence of a new type of society has led to many changes in the social, cultural, economic and political spheres. Numerous definitions of information society have been presented in literature in Poland and abroad, and their authors, in vain, tried to find an up-to-date description, referring to technical, professional, spatial, cultural and economic reasons. J. Gnitecki (2005) pointed to the complexity of this definition, because in his opinion this concept describes a society in which knowledge and information are fundamental; a new



technological civilization goes beyond the technological, information and organizational systems that once were, as a civilization generates new processes of creation, collection. Dissemination and use of information: civilization is based on methods of information processing and goes beyond the current state of consciousness, civilization is based on the process of human improvement updated during the processing of bit, qubit or subqubit information: changes in the bit, qubit or subqubit IT are the source of civilization transformations. Unfortunately, despite the multitude of definitions, none of them is specific enough. The need for an appropriate definition, covering all possible aspects, has been highlighted by A. Bógdoł-Brzezińska and M. F. Gawrycki (2003), who, however, consider it as an “ungrateful (task), because the concept of information society is a “catch-all” concept, and thus indifferent and unclear”.

The proposal put forward by Polish authors is a definition specifying the information society as “a society which not only has the means to process information and communicate, but also for which information processing is the basis for the creation of national income ensuring the livelihoods of the majority of society”. (Goban-Klas, Sienkiewicz 1999). Another definition identifies “information society” as a society in which information is intensively used in economic, social, cultural and political life: this society has rich means of communication and information processing, which are the basis for the creation of most national income and the provision of the livelihoods of most people. (Krzysztofek, Szczepański 2002).

According to the definition prepared by European Commission “digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet” (European Parliament 2006, p. 15).

In the same document more specified information focused on knowledge and skills are provided: “Digital competence requires a sound understanding and knowledge of the nature, role and opportunities of IST in everyday contexts: in personal and social life as well as at work. This includes main computer applications such as word processing, spreadsheets, databases, information storage and management, and an understanding of the opportunities and potential risks of the Internet and communication via electronic media (e-mail, network tools) for work, leisure, information sharing and collaborative networking, learning and research. Individuals should also understand how IST can support creativity and innovation, and be aware of issues around the validity and reliability of information available and of the legal and ethical principles involved in the interactive use of IST” (European Parliament 2006, p. 16).

The analysis of numerous definitions allows the identification of four fundamental pillars of the information society, namely:

- “(a) technological: created by ICT, i.e. hardware and software, accessibility;
- (b) economic, the strength of which is directly proportional to the share of sectors involved in information production and processing and the share of information technologies in the economy and distribution of GDP;
- (c) social, whose stability is closely linked to the users of new technologies, e.g. in most cases, is linked to the level of education of the population and inversely proportional to the indicators of the digital divide;
- (d) cultural: a characteristic which in most cases is unfairly ignored because the information flow should not be ignored because it involves the acceptance of information as a form of goods and products; when discussing information culture, one should bear in mind its essential component, namely an information culture adapted to the level of ability to use software and hardware’ (Stachowiak 2012).

One of the main skills necessary in the life of every person is the use of information and communication technologies. Key ICT skills are:

- efficient and effective use of modern tools continuously improved by technology;
- use of modern means of collecting, processing, generating and transmitting information;
- effective direct and indirect communication with the use of modern communication software;
- critical reception of multimedia information and its use in the educational process or at work;
- fluency in cooperation and collaboration in various task forces, ability to work for the success of the group;
- ability to present the results of teamwork, case of self-presentation (Furmanek 2002).



The digital competence means ability to use the ICT very widely, not only by searching and collecting but most of all analyzing and processing information in creative way. It is also defined as “the set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, and socializing” (Ferrari 2012, p. 30).

Some of definitions emphasize the educational context of discussed competences. In accordance with such a considered approach to the issue “digital competence is the application of acquired knowledge, skills and attitudes when using ICT in order to perform a task adequately in a specific context, such as education, work, and personal or professional development. (Balanskat & Gertsch 2010, p. 3).

In the academic discourse we can find various concepts of regarding and naming the skills (in broad way) of using ICT (Ala-Mutka 2011, Gallardo-Echenique et al. 2015). They are called, inter alia, as e-competences (Schneckenberg & Wildt 2006, Breyer, Hook & Marinoni 2007), e-skills (Hüsing & Korte 2010), technology literacy (Amiel 2004, Kahn & Kellner 2005), digital competences (Calvani, Cartelli, Fini & Ranieri 2008, Krumsvik 2008, Ilomäki et al. 2016).

Instead of different naming and understanding, there is one common goal in all European educational systems. To create the best conditions for teaching/learning process, adjusted to students’ capabilities and needs in order to develop their digital competences.

3. Methodology

The adult formal system of education differs in various European countries. However, between many the similarities can be easily found. This article will focus on the upper secondary school stage, so-called start qualification (Edzes & others 2015), the minimum level of education enabling inclusion in the labour market. Dominant number of professional activities in Poland requires the secondary education level certificate.

The idea of this article is to analyze the different organizational solutions and emerge the most effective ones, that can be regarded as examples of good educational praxis. Further, the elements of the most effective ones can be applied in the process of adult teaching/learning of digital competences.

The basis of the comparative analysis has been documents containing curricula, school programs, course grids. The qualitative analysis has been accomplished in the base of secondary data provided by Survey of Adult Skills (PIAAC 2015), the European Digital Progress Report. The analysis has been carried out only in relation to the Finnish education system which is corresponding to the Polish system in the organizational aspect.

4. Adult upper secondary education

As education is one of the significant factors influencing the development of the society, it undergoes to numerous analyzes. In 2014 The Economist Intelligence Unit conducted research to collect data and analyze 50 global educational systems. Published report, entitled “The Learning Curve. Education and skills for life” was carried out on the basis of research analysis PISA coordinated by OECD, International Assessment of Adult Competencies PIAAC, Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS). Table 1 presents the ranking of the best education systems published in “The Learning Curve”, limited to European countries. The ranking is based on the cognitive skills and school performance index.

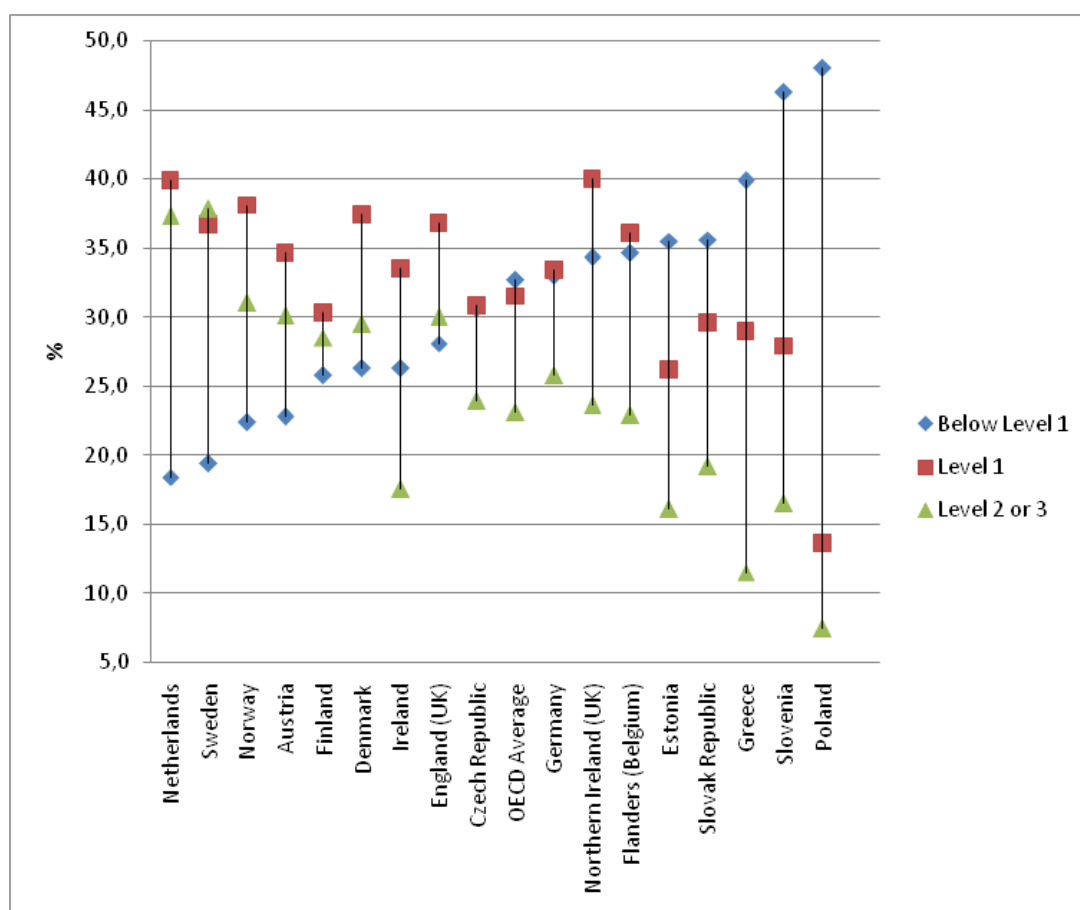
Between European countries Finnish education system is ranked on the highest position. It can be assumed the same tendency could be applied to the formal adult education. There is nothing more deceptive. Unfortunately, comparison among results of Matriculation Exams indicates that Poland is not so highly ranked any more. However PIAAC Survey does not directly presents the image of quality of education in schools for adults, but provided data confirm existing issue in our society. The percentage of Polish adults (aged 25-64) with upper secondary attainment who had no experience in using computer to solve problem, failed core test or solve problem below level 1 is very high on the background of European results (see Figure 1).



Table 1. The ranking of the best education systems published in “The Learning Curve” (2014).

Country	Place in the ranking in a year 2014	Place in the ranking in a year 2012
Finland	5	1
United Kingdom	6	6
Netherlands	8	7
Ireland	9	11
Poland	10	14
Denmark	11	12
Germany	12	15

Source: “The Learning Curve”, Pearsons 2014

Figure 1. Percentage of adults with upper secondary educational attainment at each proficiency level in problem solving in technology-rich environments.

Source: Own elaboration on the base of Survey of Adult Skills PIAAC (2015), Table A3.3(P).

Adult upper secondary school offers the opportunity to complete the formal education to those who, for various reasons, have not completed a youth school. A large part of the learners in this type of schools had serious learning difficulties in previous stages of education or had long break in learning in formal system (Dziurzyński & Duda 2018). In consequence, their basic competences, including digital competences, require significant growth. However, in contrast to youth schools, in adult education less time is dedicated for compulsory contact teaching. Majority of learning time is realized as a student self-learning.

The education in upper secondary school predominantly takes from two to four years. To finish the school learners need to accomplish courses of general subjects such as National Language, Foreign Language, Mathematics, History, Physics, Chemistry, Biology, Geography, ICT chosen on basic or advanced level. The



attendance on courses is compulsory. The learning progress is assessed by respective subject teachers. The National Curriculum of courses have the content mostly independent of the learners' decisions. The School programme is leading to the Leaving Certificate or Matriculation Certificate, entitled to enter the University stage.

5. Finnish upper secondary school for adults

An education in general upper secondary school in Finland is realized in the form of chosen courses. Every course is a compact part of the full curriculum in particular subjects. Student/learner can choose the topic of the courses, the order of realized subjects, the number of simultaneously carried out courses fitted to ones needs.

In youth school every student need to complete at least 75 courses, including 47/51 (depending on the chosen short or long mathematics) at the basic level and at least 10 at the advanced level. A course in a youth school lasts an average of 38 teaching hours (seven weeks). The adult school learner need to complete at least 44 courses, including 33/37 at the basic level. The course in an adult school lasts an average of 28 teaching hours (National Core Curriculum, 2015). Learners in the school for adults need to pay for courses they attend.

In the main group of subjects chosen by students, there is no typical ICT course. Digital skills are developed through practical activities in various thematic courses. As an example, the general goals of "Mother tongue and literature" course, among others, are: "to express yourself orally and in writing as required by different situations. The teaching aims at knowledge of mother tongue and literature as well as language, text, multidisciplinary, interaction and media skills. Teaching is based on a broad concept of text that may consist of words, images, sounds, numbers, or combinations thereof, or other symbol systems. [...] The aim of the teaching is to integrate the subject, as the different areas of knowledge and skills are interconnected. The study uses diverse methods and varied learning environments, such as online environments, libraries and cultural institutions, and students with meaningful, experiential and learning joyful tasks. The texts are produced, interpreted and shared both individually and collectively, including through the use of information and communication technology" (National Core Curriculum for General Upper Secondary Schools 2015, p. 40).

The Mathematics syllabus emphasizes the necessity of using the ICT as well. According to it "students are trained to use computer software as tools for learning and researching mathematics and problem solving. Mathematics studies include software for dynamic mathematics, software for symbolic computation, statistical software, spreadsheets, word processing, and, where possible, digital information sources. It is also important to evaluate the usefulness and limited use of the aids. The aforementioned aids will be referred to as technical aids" (National Core Curriculum for General Upper Secondary Schools 2015, p. 129).

The aims of every other subject also contain important part dedicated to digital skills:

- "Biology teaching is characterized by the acquisition of information based on observation and experimentation, research and activating and interactive work and action. Biology teaching is done in labs and working in digital and out-of-school learning environments" (National Core Curriculum for General Upper Secondary Schools 2015, p. 140).
- "Geomedia's versatile use supports students geographically information acquisition, analysis, interpretation and visual presentation. Geomedia refers to maps, location data, charts, images, videos, written sources, media, oral presentations, and other geographic information gathering and presentations versatile use. Teaching also takes advantage of out-of-school learning environments and online environments" (National Core Curriculum for General Upper Secondary Schools 2015, p. 146).
- "In Physics Information and Communication Technologies are used inter alia as a tool for modeling, research and production" (National Core Curriculum for General Upper Secondary Schools 2015, p. 152).
- "Psychology on the one hand an empirical and, on the other hand, a reflective approach creates the opportunity for the student to develop their own critical thinking. Information and Communication Technology is widely used in studies opportunities" (National Core Curriculum for General Upper Secondary Schools 2015, p. 165).
- "Visual arts teaching creates conditions for versatile use of working methods and learning environments. Students are encouraged to experiment with tools, materials and means of expression and their creative



application. New technologies and media environments are both investigative phenomena as well as visual production tools” (National Core Curriculum for General Upper Secondary Schools 2015, p. 214).

As we can see, the Finnish approach to ICT education is not only to possess basic digital skills but what is more important, to apply these skills in practical context. The learning process of the ICT using is correlated with learning objectives and key content of each school subject. It is a holistic approach.

When learner decide to expand the curriculum he/she can attend the Information and Communications Technology course (Finnish: Tietotekniikka) as a course specific to given school.

6. Polish upper secondary school for adults

The adult general secondary education in the Poland is realized mainly as a copy of youth school system. The learning process lasts three years (if learner does not have to repeat the grade from various causes). The adult education is not payable. The curriculum is indicated by Ministry of Education and is the same for every Polish school. Teachers and learners have a very little influence on teaching programmes.

The Information and Communications Technology is taught during first year of learning. In full-time system (3 school days per week) there is one 45-minutes school hour per week (about 30 hours per school year), in part-time system (8 weekends per semester) there is 20 school hours. At least 50% attendance is required to be entitled to take the final exam. In educational reality teacher has 10 contact hours with particular learner. During this time she/he should provide learners the opportunity to gain the following general learning objectives:

I. Safe use of the computer and its software, use of a computer network; communicating via computer and Information and Communication Technologies.

II. Searching, collecting and processing information from various sources; computer-based development of drawings, texts, numerical data, motifs, animations, multimedia presentations.

III. Problem solving and decision making using a computer or using an algorithmic approach.

IV. The use of computer, educational programs and games to broaden knowledge and skills in various fields and to develop interests.

V. Assessment of threats and limitations, appreciation of social aspects of development and applications of ICT” (Regulation of the Minister of National Education, 2012).

The teaching content of the Informatics course is very extensive. It contains seven main points and 26 sub-points with description of skills and knowledge which should be gained by learners. In educational praxis 20 school hours make impossible to reach that goal. Additionally, learners very often came to school without skills or knowledge, that should be gained on previous school levels. It limits the ability to achieve high quality learning outcomes even in reference to a few selected educational requirements.

Moreover, the core curriculum of other school subjects assumes the integrated learning of ICT only theoretically. As the Informatics course is realised only during the first year of the upper secondary education it is not possible to solve advanced mathematical or physical problems which appear on higher grades of these subjects. The classrooms, apart from IT classroom, are usually not equipped with individual students’ computers, then the using ICT in teaching/learning process is limited to one teacher’s computer or sometimes interactive white board. In that point the integrated learning of ICT is highly ineffective.

7. Comparison of digital skills level

How do digital skills of adults compare to the above presented educational organisational solutions?

Polish people are one of many examples of societies who struggle with galloping technological progress. According to the European Digital Progress Report (2016) “Poland ranks 25th out of the 28 EU Member States in the European Commission’s Digital Economy and Society Index (DESI) 2016. Poland belongs to the falling behind cluster, meaning that Poland’s performance is below the EU average and improved slower than that of the EU as a whole” (EDPR 2016, p. 1). While the Poles are at the end of the ranking, the Finns rank very high. They are placed on 2nd position.

In the same report we can read that “in the Human capital dimension, Poland performs below par and is making moderate progress. Only 40% of individuals have basic digital skills¹. Around 30% of Poles obtained ICT skills through formal education (school, college, university, etc.)” (EDPR 2016, p. 2). However, in the whole Europe the level of digital competence is not impressive. 19% of EU population has no digital competences (European Commission 2018).

As the DESI ranking is prepared regularly, in addition to the current location, it is worth to point out the country progress. When Poland ranks in general on the same low position, Finland even highly ranking has managed to improve its position (Table 2).

Table 2. Digital Economy and Society Index (DESI) 2014-2019 ranking

	Finland		Poland		EU
	rank	score	rank	score	score
DESI 2019	1	69.9	25	41.6	52.5
DESI 2018	3	66.3	25	38.8	49.8
DESI 2017	2	63.7	25	36.1	46.9
DESI 2016	2	61.6	25	33.0	44.4
DESI 2015	2	60.2	25	31.2	41.8
DESI 2014	3	56.2	24	28.9	39.0

Source: <https://digital-agenda-data.eu/datasets/desi/visualizations> (access from 07/08/2019)

The DESI index is the sum of five main dimensions: Connectivity (the deployment of broadband infrastructure and its quality), Digital skills (needed to take advantage of the possibilities offered by digital society), Citizens use of Internet (the variety of activities performed by citizens already on-line), Business technology integration (the digitization of business and development of the on-line sales channel) and Digital public services (the digitization of public services, focusing on e-Government) (International Digital Economy and Society Index 2018). Taking into account the Human Capital indicator (the Digital skills dimension) Finns achieve much better results than Poles, their score is twice as high every year (Table 3).

Table 3. Human Capital score

	2014	2015	2016	2017	2018	2019
Finland	16.8	18.1	18.4	18.7	19.0	19.4
Poland	7.8	7.9	8.0	8.6	9.1	9.2
EU	10.6	11.0	11.1	11.4	11.9	12.0

Source: <https://digital-agenda-data.eu/datasets/desi/visualizations> (access from 07/08/2019)

8. Conclusions

The digital skills are the base of activeness in the contemporary world. The educational system should provide broad opportunities to gain basic competences, especially for people at risk of social exclusion. Maybe the Finnish rule “the less means the more” would also work in Polish system.

The main problem of Polish teachers in schools for adults concerning to small number of lessons in reference to overloaded school curriculum should be seen not only by learners frustrated by their inability to gain significant amount of knowledge or skills. Above all, it should be noticed by decision makers. Teaching/learning of ICT would be more effective if could be connected to other subjects and especially in adult education it should have practical context.

¹ based on 4 digital competence domains: information, communication, content-creation and problem-solving



Finally, we would like to address a few issues related to the vision for the future. Yuval Noah Harari in her book “21 lessons for the 21st Century” stated that the only thing that is certain in the future is change. And today, as a result of the changes taking place in all possible areas of life, we are unable to describe not only the world in 30 or 80 years’ time, but also individual countries. Harari asks the question: how can we prepare ourselves and our children to live in such a changing and uncertain world? How should school and education be organised to cope with this change? We even do not know the orientation of the change. We have an equation where all its variables are undefined.

Firstly, the school should not provide further information, but should develop the ability to understand the present, to distinguish what is important from what is irrelevant and to combine a lot of information into a broader picture of reality. Without a vision, the future will turn into a case of chaos.

Secondly, the school has to educate students in mental flexibility and emotional balance. We should create in young people an attitude of acceptance of change but also of resistance to change when it is.

Thirdly, the rejection of the school as a “Ford” information tape. Conventionally understood school subjects share knowledge artificially and make it difficult to understand the complexity of today’s and tomorrow’s world. It seems necessary to introduce integrated knowledge learning, where the world and its components are more interlinked. Apart from the Internet, other people are to be the source of knowledge and motivation, the emphasis on cooperation and joint problem solving becomes an important task of the school. One of the most important goals of the school is to stimulate curiosity, commitment, creativity and courage to take risks in the search for non-standard solutions, which is associated with the right to make mistakes.

Fourthly, the school is to teach non-conformism understood as opposing the existing order and understanding of the world. Of course, this task is a utopia, as the school is an institution for the manipulation of man in accordance with the accepted system of values. Non-conformism may be a side effect of the educational and educational activity of a school. This is not about the “mass” production of nonconformists.

And finally, by teaching adaptation to change, the school aims to create a susceptibility to mobility in the student. Today the world is facing the problem of “shrinking labour market”. Already today, automation, computerisation and robotization will cause that employees in some sectors of the economy will no longer be needed. They will be replaced by machines. And where will they move themselves? This is where professional reorientation and self-education in cyberspace will come in handy. Ergo, the school is to produce an unbridled hunger for “new” knowledge and “new” skills and competences.

The place where all this can be found and all this can be learned is cyberspace. Present continuously here and everywhere, accessible to everyone.

REFERENCES

- Ala-Mutka, K. (2011). Mapping digital competence: Towards a conceptual understanding. Seville: European Commission, JRC-IPTS. Retrieved from http://ftp.jrc.es/EURdoc/JRC67075_TN.pdf
- Amiel, T. (2006). Mistaking computers for technology: Technology literacy and the digital divide. *AACE Journal*, 14(3), 235-256.
- Balanskat, A., & Gertsch, C. A. (2010). *Digital skills working group. Review of national curricula and assessing digital competence for students and teachers: Findings from 7 countries*. Brüssels: European Schoolnet.
- Bógdoł-Brzezińska, A., & Gawrycki, M. F. (2003). *Cyberterroryzm i problemy bezpieczeństwa informacyjnego we współczesnym świecie* (Cyberterrorism and problems of the information society in the modern world). Warszawa: Oficyna Wydawnicza ASPRA-JR.
- Borysiuk, A. (2013). Benefits and disadvantages of the use of information technologies in education. *Edukacja-Technika-Informatyka*, 4(2), 110-114.
- Breyer, J., Hook, T., & Marinoni, C. (2007). Towards a European e-Competence Framework. Interim Report. Retrieved from http://www.ecompetences.eu/site/objects/download/4217_CENWSEUeCompFWInterimReport.pdf
- Calvani, A., Cartelli, A., Fini, A., & Ranieri, M. (2008). Models and instruments for assessing digital competence at school. *Journal of E-Learning and Knowledge Society*, 4(3), 183-193.
- Dziurzyński, K., & Duda, E. (2018). Grade repetition as a consequence of school failures. *Journal of Modern Science*, 38(3), 133-148. Retrieved from <https://doi.org/10.13166/jms/95080>



- Economist Intelligence Unit (2014). *The Learning Curve. Education and skills for life*. London: Pearsons.
- Edzes, A., Hamersma, M., Venhorst, V., & Dijk, J. (2015). Labour market performance and school careers of low educated graduates. *Letters in Spatial and Resource Sciences*, 8(3), 267–289.
- European Commission (2018). Proposal for a Council Recommendation on Key Competences for LifeLong Learning. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018SC0014&from=EN>
- European Digital Progress Report (2016). Retrieved from <https://ec.europa.eu/digital-single-market/en/news/european-digital-progress-report-edpr-country-profiles>
- Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks*. Sevilla: Joint Research Centre (JRC), European Commission. Retrieved from http://jiscdesignstudio.pbworks.com/w/file/fetch/55823162/FinalCSRReport_PDFPARAWEB.pdf
- Furmanek, W. (2002). *Kluczowe umiejętności technologii informacyjnych – eksplikacja pojęć* [w:] Edukacja medialna w społeczeństwie informacyjnym (ed.) S. Juszczak. (Key ICT skills – explaining the concepts) [in:] Media education in the information society). Toruń: Wydawnictwo Adam Marszałek.
- Gallardo-Echenique, E., Minelli de Oliveira, J., Marqués-Molias, L., & Esteve-Mon, F. (2015). Digital Competence in the Knowledge Society. *Merlot Journal of Online Learning and Teaching*, 11(1), 1-16.
- Gnitecki J. (2005) *Przemiany informatyki oraz cywilizacji edukacji informacyjnej* (Transformation in computer studies, civilisation and IT education). Poznań: Wydawnictwo Naukowe Polskiego Towarzystwa Pedagogicznego.
- Griffin, P., McGaw, B., & Care, E., (Eds.). (2012). *Assessment and Teaching of 21st Century Skills*. Dordrecht: Springer.
- Gudanescu, N. (2009). Using modern technology for improving learning process at different educational levels. *Procedia Social and Behavioral Sciences*, 2(2010), 5641–5645.
- Harari, Y.N. (2018). *21 Lessons for the 21st Century*. New York: Spiegel & Grau.
- Hüsing, T., & Korte, W. B. (2010). *Evaluation of the implementation of the communication on eSkills for the 21st century*. Bonn: European Commission and the European e-Skills Steering Committee. Retrieved from <http://ec.europa.eu/smart-regulation/evaluation/search/download.do;jsessionid=NNIq5Q2UuwMDffV2pttbKt1N0VLadtqKwOJ473fBgLXbsHRj4ja!1168777535?documentId=4470>
- Iilomäki, L., Paavola, S., Lakkala, M., & Kantosalo, A. (2016). Digital competence – an emergent boundary concept for policy and educational research. *Education and Information Technologies*. 21(3), 655–679.
- International Digital Economy and Society Index 2018 (2018). Retrieved from <https://ec.europa.eu/digital-single-market/en/news/international-digital-economy-and-society-index-2018>
- Jankowska, D., & Tanaś, M. (2016). New Technologies as a Tool for Changing Academic Communities in the Global Context. *Comparative Professional Pedagogy*, 6(4), 34-40.
- Kahn, R., & Kellner, D. (2005). Reconstructing technoliteracy: A multiple literacies approach. *E-Learning and Digital Media*, 2(3), 238-251.
- Krumsvik, R. J. (2008). Situated learning and teachers' digital competence. *Education and Information Technologies*, 13(13), 279-290.
- Krzysztopek, K., & Szczepański, M. S. (2002). *Zrozumieć rozwój – od społeczeństw tradycyjnych do informacyjnych* (To understand development – from traditional to information societies). Katowice: Wydawnictwo Uniwersytetu Śląskiego.
- National Core Curriculum for General Upper Secondary Schools (2015). Helsinki: Opetushallitus. Retrieved from <https://www.ellibs.com/fi/book/9789521362675/national-core-curriculum-for-general-upper-secondary-schools-2015>
- Noga, H. (2011). *Kompetencje nauczyciela informatyki – doniesienia z badań* [w:] Technologie informacyjne w warsztacie nauczyciela. Nowe wyzwania edukacyjne. (eds.) J. Migdałek, A. Stolińska (IT teachers competencies – research reports [in:] Information technologies in the teacher's training. New educational challenges). Kraków: Wydawnictwo Naukowe Uniwersytetu Pedagogicznego.
- Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning OJ L 394, 30.12.2006, p. 10–18. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006H0962&from=EN>



- Schneckenberg, D., & Wildt, J. (2006). *Understanding the Concept of Ecompetence for Academic Staff*, [in] Mac Labhainn, I., McDonald Legg, C., Schneckenberg, D., Wildt, J., (Eds.). *The Challenge of E-competence in Academic Staff Development*. Galway: Centre for Excellence in Learning and Teaching.
- Siuda, P. (2015). *TIK jako pomost między światem nauczycieli i uczniów* (ICT technologies as a bridge between the teachers' and students' worlds) Retrieved from https://www.ore.edu.pl/attachments/article/6244/TIK_jako_pomost_miedzy_swiatem_nauczycieli_uczniow_artikul_P.Siuda.pdf
- Stachowiak, B. (2012). *Socjalizacja studentów do społeczeństwa informacyjnego na przykładzie Litwy, Niemiec, Polski. Republiki Czeskiej i Ukrainy* (Socialization of students for the information society, the examples of Lithuania, Germany, Poland, Czech Republic and Ukraine). Toruń: Wydawnictwo Naukowe UMK.
- Survey of Adult Skills PIAAC (2015). Retrieved from <http://www.oecd.org/skills/piaac/>
- Younes, M. B., & Al-Zoubi, S. (2015). The impact of technologies on society: A review. *IOSR Journal of Humanities and Social Science*, 20(2), 82-86.