

The Development of Digital Competence of Students of Teacher Training Studies-Polish Cases

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Abstract

The aim of the article is to bring together the various areas of debate in relation to digital competences being instrumental in helping modern people positively adapt to rapid changes in all areas of individual and social life. Using the findings from the previously carried out empirical research on the level of mastery of digital competences by Polish teachers and students, as well as the literature on the subject, the author analyses this area of education in relation to current educational needs. The author points to problems, but also challenges resulting from the dynamic development of information technologies and the possibility of their use in the education process. The author also addresses the risks related to navigating through the cyberspace, searching, sectioning and gathering of information.

Keywords: digital competences, teacher education, cyberspace, education

1. Introduction

In the age of digital civilization, everyone should have the opportunity to acquire and improve competences enabling them to adapt positively to the dynamically changing reality. This is particularly important for the generation, which leads a significant portion of their everyday life in the virtual world, and for which cyberspace has become a natural educational space. The literature on the subject uses a number of terms to describe it, ranging from the “Google generation” and the “Net generation”, through the “digital natives” and the “bit generation”, to the “homo informaticus” (Premsky, 2001). It is precisely this generation of people growing up in the world of electronic media since childhood that creates the culture metaphorically referred to as “instant culture” (Melosik, 2003). One of its exemplifications is the cyberspace in which contemporary people can freely juggle information, gain access to scientific and technological achievements (Kaplan, 1987), create new qualities and abolish differences between all types of culture - high, low, elite or popular - creating a new, fluid and undefined culture. An important role in this process is played by the media, which directly, cumulatively and subconsciously influence people’s personalities, determine the processes of upbringing, education and socialization, and shape not only attitudes and hierarchies of values, but also aspirations and life plans of people all over the world (Wolska - Długosz, 2006). This mechanism clearly explains the constructivist concept of representation systems by Jerome S. Bruner (1974). It is based on the belief that by storing past experiences and building a model of the world based on them, people become partly independent from direct stimuli. This is manifested by the fact that knowledge is included in cognitive structures, which are modified by a constant flow of new information.

2. Digital Competences - Key to Teacher Education and Training

In the 21st century, all areas of social life are changing dynamically as a result of the progressing process of digitization. Digital competences are becoming necessary to adapt to life in a world created by increasingly improved IT and telecommunication tools. However, the Eurostat data show that almost half of the EU population does not have the digital skills necessary to participate in society and the economy (EUROSTAT, 2015). Such a state of affairs has forced a change in the approach to understanding ways of shaping digital competences. It can be noticed, among others, in the implementation of individual research projects falling within the areas of digital competences listed in the EU document “DIGCOMP 2.0: The Digital Competence Framework for Citizens. Phase 1 of the update: The Conceptual Reference Model” (Vuorikari et al., 2016), which lists 5 areas of digital competences in which 21 specific competences have been defined.

Those presented below are the ones I consider to be basic in the education and training of teachers, taking into account

intergenerational differences, among others:

- **area 1:** Information and data literacy - Framework competences: browsing, searching and filtering data, information and digital content; evaluating data, information and digital content; managing data, information and digital content;
- **area 2:** Communication and collaboration - Framework competences: interacting through digital technologies; sharing information and content through digital technologies; collaboration through digital technologies for co-construction and co-creation of resources and knowledge; netiquette (including adapting communication strategies to specific audiences and awareness of cultural and generational diversity in the digital environment);
- **area 3:** Digital content creation - Framework competences: creating and editing digital content in a variety of formats (e.g. text documents, graphics, images, video, music); integrating and re-elaborating digital content; observance of copyright and licenses;
- **area 4:** Security - framework competences: protecting personal data and privacy; protection of physical, mental health and well-being against the risks arising from the use of information and communication technologies;
- **area 5:** Problem-solving (the ability of a person to engage in cognitive processing to understand and resolve problematic situations, when dealing with an unobvious method of solving them, and the readiness to engage in such situations in order to use your own intellectual potential) - Framework competences: creative use of digital technologies (engaging in cognitive processing to understand and solve problems; identifying digital competence gaps).

3. Shaping Digital Competences-Relational Approach

Gathering information from cyberspace requires a high level of digital competences from both students aspiring to work in the teaching profession and those already working as teachers, as well as from their students and their parents. High-level digital competences education is particularly important in the context of both the threats the Internet poses and the opportunities of acquiring the knowledge it provides. Careful and safe use of the Global Network is a key skill in enabling all parts of the school education obtain reliable information from reliable sources. Moreover, the use of technologies and information tools in education is clear and attractive for young people and may result in raising the current level of school teaching.

Over the last quarter of a century, we have witnessed the evolution of both the concept of digital competence and how research and initiatives aimed at raising the level of digital competence of Polish teachers, students and pupils are conducted. According to the authors of the report on the ex-ante evaluation of the operational program concerning digital development prepared as a part of the Operational Programme Digital Poland for 2014-2020, in the current “traditional” approach, digital competences form a catalogue of specific knowledge and skills. It is suitable for the age and educational level of its users, but it does not take into account individual criteria related to experiences, predispositions or individual expectations (Siadak, 2016).

In the report cited above, three subject priority axes were distinguished, which are coherent and complementary areas of activity aimed at the digital development of the Polish society. Axis I of the program is aimed at providing institutions, including educational facilities and higher education institutions with technical conditions for using the Internet. Axis II focuses on providing attractive content, while Axis III aims to shape the ability to move freely in cyberspace and remove mental barriers related to its use. As a part of the implementation of the strategic axis II, students were targeted with various measures in the area of information and communication techniques. Their aim is to support the development of advanced digital competences and exploit fully their potential. Therefore, the program activities were based on a relational approach, which is an extension of the normative perception of digital competences and their recognition and application in many areas of human life. This is due to, among other things, the fact that modern ICT technologies do not constitute an isolated area of human activity. They are integrated with every area of human functioning and are aimed at improving human activities in the areas of:

- education, finance, daily matters,
- health, tourism, recreation and interests,
- communicating and establishing relationships with others,
- work and professional development,
- social and civic activity,
- religion.

The model described above is based on the perception of digital competences as functional competences, based on IT, information and communication competences, which are used in various areas of human activity. However, in the digital world, the ubiquity and excess of information require developing critical reception skills, as well as the creative and active use of the Internet, in obtaining trustworthy and reliable information.

Information education is a measure aimed at shaping the ability to use information cautiously, as well as to use it during the course of education as a tool to learn the truth about the world in a selective and critical manner (Batorowska, 2009). Therefore, another noticeable change regarding the development of digital competences is a greater emphasis on the critical and reflective use of both these competences and the resources available on the Internet. This aspect of the measures has been highlighted, *inter alia*, due to the emergence of the information overload phenomenon. Unfortunately, this is a problem of Polish schools resulting from the lack of appropriate systemic solutions, both at lower and higher levels of education. Higher education institutions preparing young people for work in the teaching profession also face this problem. There are too few hours of IT classes in teacher training programs which do not help students to master digital competences at a high level, especially the ability to gather, process and use information in a way that is adequate to the changing social and economic realities, as well as the ability to use IT tools in education.

4. Review of Research on the Level of Digital Competences of Polish Pupils, Students and Teachers

The competences of Polish pupils, students and teachers, falling within the spectrum of the digital competences defined by DIGCOMP, have been studied since 1989 as a part of international and national research projects. The first research was conducted in 1999 among secondary school students before the educational reform. After the reform, the following groups were examined successively: students of secondary school, middle school and students of the 4th to 6th grade of primary school. Along with the technological progress and IT equipment of Polish educational facilities, both the schemes and research tools for measuring the level of these competences have improved. The research has also begun to cover younger Internet users - students from increasingly lower levels of education. It turned out that the results of competitions and other initiatives undertaken by associations and foundations conducting educational activity indicate that children at early school age are already able to perform basic programming tasks. However, there is still a lack of research on the topic of the recognition of the level of digital competences of students at the first stage of education and their predisposition to develop these competences (Siadak, 2016).

The results of the research from 2013 (ICILS), indicate the progress of Polish students in reading and interpreting electronic texts; information management (searching, critical approach); processing (creating multimedia presentations, short films, document editing, creating databases); and posting text and audio-visual materials on the Internet. Polish students achieve much lower results (e.g. in comparison to students from Hong Kong) with advanced activities, such as programming, creating computer networks or databases. Taking these data into account, there is a demand for teacher education in this competence area.

The progress of Polish students in the field of digital competences was also noted five years later in a report summarizing the results of the recent research conducted by PISA, TIMSS and PIAAC (Jakubowski, et al., 2017), which clearly indicates the progress and high effectiveness of Polish schools, which, in comparison with most European countries, work in less favorable socio-economic conditions. PISA examines the extent to which 15-year-old students are able to use the knowledge and skills gained at school to solve problems. In 2015, Polish students were assessed on the basis of their reasoning in the field of natural sciences, mathematical skills and text comprehension. In turn, TIMSS studies school achievements in mathematics and natural science. The 2015 study focused on Polish primary school students (5th and 4th year of education). The topic of the PIAAC survey conducted in Poland in 2011 and 2012 was assessing the skills such as text comprehension, mathematical reasoning and the use of information and communication technologies among adults aged 16-65. However, a decrease in the results of Polish students between PISA 2012 and PISA 2015 in terms of coping with a computer test as well as their peers in the OECD countries is worrying. It indicates a significant lack of digital competences among Polish 15-year-olds. In Polish schools, the traditional approach to teaching prevails, even though modern computer rooms and portable devices are available in almost every educational facility (Penszko et al., 2013). Students acquire digital competences mainly outside school (Jakubowski, 2014), and not all young Poles are “digital natives”, as evidenced by the refusal of 20% of young Poles to participate in a computer version of the study (PIAAC study - OECD, 2013).

The authors of the quoted report point to the lack in competence of Polish students in the field of developing skills necessary to navigate in cyberspace:

- understanding the principles of computers and software operation as well as the basics of coding;
- the ability to analyze the reliability of content posted on the Internet;

- conducting simple computer simulations useful in the analysis of natural phenomena.

Deficiencies in digital competences of Polish students translate into their low interest in working in the IT industry (*ibid.*). Only 1.4% of Polish 15-year-olds plans to have their future careers in the ICT industry. This result is below the average of the OECD (2.6%) and the EU (3.4%) and is much lower than for some EU countries such as Estonia (8.1%) or Bulgaria (8.3%). Moreover, a lack (0%) of female students in the group of people who see their future working in ICT was reported only in Poland and the Netherlands. However, as the authors of the quoted report stress, the results of the study are not of a normative nature. They present the position of Polish students in relation to the other 19 countries. The results of international research indicate the progress made by Polish students in reading and interpreting electronic text and information management, processing it and posting text and audiovisual materials on the Internet. However, Polish students achieve much lower scores in relation to advanced activities.

In view of this situation, the Ministry of National Education, in cooperation with the Ministry of Digitisation, decided to introduce the basics of programming as part of the IT core curriculum project (September 2016 — pilot phase, September 2017 — systemic implementation phase). The aim of this is to compensate for the gaps between Poland and West European countries (e.g. Germany, England) as well as between those within Poland.

As the results of a survey conducted in 2016 by the Central Statistical Office indicate (GUS, 2016), children use the Internet most often at home, but also at the place of study (49.3%) and in other people's flats (27.1%). Considering the activities performed by children when using the Internet, the highest percentage (85.0%) was recorded among households where parents allow their children to have their own profile on a social networking site. In every second family, children can use instant messaging (e.g. WhatsApp, Messenger) and upload photos, music or videos to the Internet. The percentage of children who encounter content online which they find disturbing has also increased (1.0% more than in 2013).

5. Summary and Conclusion

In light of the above, the use of modern technologies in the process of education should include, *inter alia*: strengthening traditional education with electronic tools, creating an alternative (media-based) teaching and learning environment as well as disseminating indirect education (on-line) (Dylak, 2013). One of the initiatives included in the above areas of activity is the Ministry of National Education programme entitled: "Digital School". Its aim is to raise the level of digital competences of students and to improve teachers' skills in the effective use of modern technologies during lessons (e.g. computer simulation or using a multimedia whiteboard). In turn, activities related to the organization of an alternative teaching and learning environment can be found in the phenomenon of "cyborgization" of education, i.e. expanding cognitive functions to increase the efficiency of the learning process. Cyborgization means integration of people with technology (e.g. learning foreign languages in Second Life) and the idea of e-textbook introduced to Polish schools. Elements of indirect education are also increasingly implemented, where teaching takes place without the direct presence of a teacher, e.g. in the MOOC (massive open online courses) methodology, where whole courses are posted online and are completed by a student. However, these activities are not a grounded educational practice in the Polish school. Only a small group of teachers decide on such wide application of modern technologies in the organization of the education process (*ibid.*). Even if the school has a good IT infrastructure, teachers make use of it to a low extent (e.g. watching films, displaying multimedia presentations, electronic textbooks on a multimedia board).

PISA results from 2013 and 2015 show that neither Polish students nor Polish schools are able to use IT technology in a strictly educational context. The low level of digital competence of Polish teachers is particularly worrying. The situation highlighted above sets the framework for the education of students in the field of digital teaching competences, aimed at mastering the skills of transferring knowledge from the above-mentioned deficient area of skills.

The idea is to construct IT education curricula at the higher education level in such a way that teachers are prepared to fill in the gaps in their students' knowledge. This concerns the mastery of specific skills in the scope of: critical analysis of information; creation of content and its presentation on the Internet; diagnosis of the scope of students' knowledge of copyright on the Internet; use of a computer to solve unusual tasks and mathematical tasks. This suggests that in order to use computers and the Internet in the education of the young generation effectively, the paradigm of working with students needs to be changed. The idea is that the teacher should not be only be a lecturer who uses information technologies for teaching, but their students' guide into the digital world. Another priority is to conduct research aimed at identifying the level of digital competence of Polish pupils at the first stage of education and their predisposition to develop these competences. Therefore, there is a growing need for rapid changes in the existing

teacher education, as the vast majority of young people acquire information mainly on the Internet, which significantly reduces the constitutional importance of the school as an educational institution.

In conclusion, digital competences do not form a specific catalogue of skills today, which is necessary for the use of computers, mobile devices and the Internet. They are competences that help people function in contemporary society, help them be conscious recipients of content and creative creators in online communities, and enable a more efficient implementation of individual paths of educational and professional development. However, rapid technological progress makes it difficult to determine the direction of further changes. In order not to be digitally excluded, one has to adapt successively to these changes. This is why it is particularly important to educate and train teachers not only in the use of information technologies in the education of students but also in relation to safe navigation in cyberspace, obtaining reliable information and skillfully selecting and gathering it.

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