COVID-19 Pandemic Vs. Digital Competences of Pupils and Teachers in Poland

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Abstract:

Purpose: *The purpose of this paper is to evaluate the digital competencies of pupils and teachers and analyse the education system in terms of its adaptation to turbulence caused by external factors such as the COVID-19 pandemic.*

Design/Methodology/Approach: *The paper compares the selected research findings gathered by three independent research institutes on pupils' and teachers' levels of digital skills. The methods of desk research and comparative analysis were applied. These methods utilized the surveys' results on pupils' and teachers' digital competencies and statistical data.*

Findings: *The research has shown that, on the one hand, the pandemic has exacerbated social inequalities in terms of digital competencies. On the other hand, it has revealed the need for pupils and teachers to quickly respond and adapt to changing conditions of operation. The pandemic has also exposed inadequacies in the education system. The conducted analysis has shown that acquiring digital competencies is essential for the whole society.*

Practical Implications: *It is necessary to revise education systems and curricula in terms of content, technologies used, fields of study, and education levels. It is essential to monitor teachers' and pupils' digital competencies constantly. As far as access to infrastructure is concerned, monitor groups at risk of exclusion (families with many children and poor and those living outside of urban centers).*

Originality/Value: *The pandemic phenomenon allowed for verification of the level of digital competencies in practice and the resistance of the Polish education system to the pandemic. The research has shown several aspects of problems that have arisen as schools have shifted to remote learning. These aspects include sensu stricto, the teachers', pupils', and parents' competencies, and the problems related to the infrastructure: connection speed, access to equipment, and incompatibility of curricula with the needs of the modern economy.*

Keywords: Pupils, school, digital competences, digital education.

JEL Classification: A22, O33, O52, I21, I24, I28.

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1. Introduction

The first days of lockdown caused anxiety and problems in schools, both on the part of teachers and pupils, who were not prepared to work remotely, but also in terms of digital infrastructure deficiencies. Digital competencies are now considered key in life and the economy. Therefore, it is desirable to conduct research that would assess the level of digital competencies and verify them in shaping an information society. The transition to remote working was a test of digital skills. This article compares the selected findings from surveys on pupils' and teachers' digital competencies conducted by three independent centers between 1 April 2020 and 18 March 2021.

The research was carried out by the Faculty of Education at the University of Warsaw (students and teachers were surveyed twice: in June 2020 and March 2021), by the Centrum Cyfrowe Foundation (teachers were surveyed twice, in April 2020 and between August and October 2020) and by the Libris Platform (parents were surveyed twice: in April and May 2020). The surveys were addressed to primary and secondary schools in Poland.

2. Literature Review

2.1 Digital Education in the 21st Century – Term Definition

The development of information and communication technologies (ICT), which began in Japan in the late 1950s and early 1960s, marked a turning point in the development of civilization and contributed to broadly defined socio-economic transformations around the world. One of them was the emergence of the concept of information society, which has quickly become the subject of discussion among the researchers and practitioners, first in the USA (Bell 1973; Porat and Rubin 1977; Drucker 1993; Toffler 1980; Webster 2002), then in Europe (Castells, 1996; 1998; Mansell, 2009) and after 2000s – the research in Poland has intensified (Cellary, 2002; Doktorowicz, 2002; Bliźniuk and Nowak, 2006; Oleński, 2006; Szewczyk, 2007; Pepińska-Kacperek, 2008; Kisielnicki, 2009; Sienkiewicz and Nowak, 2009; Babis and Hales, 2010; Oleszek and Ziemba, 2010; Czapiewski, 2011; Goliński, 2011; Ziemba, 2017).

Robert Walach first used the term digitalization in 1971 in an essay on the digitalization of society (Pieriegud, 2016). The creation of the foundations of the information society in Poland, which determined the need for digitalization of public and economic life, began in 2000 and was associated with the upcoming accession of Poland to the European Union. At that time, an economy based on such foundations as education, science, and the development of an information society began to be created. An essential feature of this information society is still a high degree of digitalization, based on the full utilization of the opportunities associated with ICT development (Mazurkiewicz, 2020). Digitalization of education includes "the development of digital technologies, the use of digital tools, content and digital educational resources" (Plebańska, 2018).

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The development of a knowledge-based economy and the digitalization of education led to the emergence of the concept of digital education, which is most often considered from two perspectives: the development of pupils' and teachers' digital competencies and the use of digital technologies in teaching to support the teaching and learning process. Different European countries have varying levels of development in digital education, which means that building digital infrastructure is still a priority for some of them. However, its improvement alone does not guarantee better use of digital technologies in teaching since the development of teachers' digital competencies, which affect the quality of teaching, is of paramount importance. Only such a direction of action will allow for optimal utilization of the investments in technology and for the education systems to keep up with the demands of the 21st century (European Commission/EACEA/Eurydice, 2019).

At the European level, digital competencies are recognized as one of the critical competencies for lifelong learning. The European Commission mentioned them for the first time in 2006 in the Recommendations of the European Parliament and of the Council of 18 December 2006 on Key Competences for Lifelong Learning. Moreover, in 2018, the IT competencies were defined as "confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and participation in society." This definition is the same as the one used in Poland (European Commission/EACEA/Eurydice, 2019).

However, it should be noted that there is conceptual confusion in the secondary sources. In addition to the concept of digitalization, terms such as digitization and digital transformation appear, which seem close in meaning (Śledziewska and Włoch, 2020). For this paper, we will assume that education is undergoing a process of digitalization that would not be possible without the development of digital competencies.

2.2 EU Facing the Challenges of Digital Economy

Since the mid-1990s, the knowledge-based economy has been discussed in terms of its impact on economic growth. The universality of communication technologies and devices has made it necessary to create conditions for efficient, safe, and effective use in the economy. There were no specific provisions for ICT provided for in the Treaties. Still, due to the growing importance of these technologies, the European Commission adopted the law about sectoral and horizontal policies. The Digital Agenda for Europe was one of the initiatives under the Europe 2020 strategy, where the role of ICT in the context of achieving the strategy's goals has been identified (European Commission, 2010).

Meeting the purposes of the plan resulted in, among others, more accessible and better access to the Internet with broadband services for citizens and socio-economic development institutions. Moreover, in the development of digital competencies, the Digital Agenda for Europe was focused on maximizing the digital potential through

strengthening digital skills, digitalizing the economy, or developing artificial intelligence, and modernizing public services. The actions taken affected both the economy and society and thus also all levels of education.

To implement the process of incorporation and use of digital technologies through increasing citizens' competencies, it is necessary for the educational institutions at a national level to continuously review their strategies to increase innovation capabilities and use the potential of technologies and digital content. To this end, a report was drawn up in 2015 which presented the European Framework for Digitally Competent Educational Organisations (DigCompOrg). As a result of applying this framework, it is feasible to compare the institutions located in Europe and at the member state level (Kampylis, Punie, and Devine, 2015).

Along with the new perspective, the analysis of trends development, and the emergence of unexpected risks (COVID-19), the decision to continue strengthening digital education was made (Grima *et al.,* 2020). The said decision was presented in the "Digital Education Action Plan (2021-2027). Resetting Education and Training for the Digital Age" (European Commission, 2020). This document adopted two strategic objectives related to education systems, infrastructure, and human resources. It emphasized the importance of strengthening digital skills and soft skills, the so-called competencies of the future. The indicated areas of activity include the role of teachers in the educational process, inclusivity, equality, and labor market needs. What was also emphasized was the importance of infrastructure from the perspective of networks, digital devices, and educational tools.

The challenges that have emerged with the pandemic show that it is necessary to improve the digital competencies of the EU society. Though the digital competencies are steadily improving, there is still a high percentage of households, which do not have access to the Internet in the EU-27. In 2020 this percentage amounted to 9%, which is an improvement of 1% compared to 2019 and 20% compared to 2010. Meanwhile, in Poland, this indicator has improved by 23 percentage points. In the EU-27, the level of digital literacy of people with at least basic digital skills amounted to 56% in 2019, which means that it improved by 6% compared to 2017 (Eurostat, 2021a). The analysis of digital competencies shows disproportions in this area when age, gender, education, or type of these skills are considered.

2.3 Infrastructure

Four hundred sixty-three million children do not have access to remote learning (UNICEF, 2020). COVID-19 made small education necessary, which could only be introduced in places with proper infrastructure, and access to the Internet, equipment, and tools (Khan *et al.,* 2020). In 2019, 90% of households in the EU-27 had Internet access, and 88% used broadband connections. However, despite the high Internet access rates, one can see regional disparities: urban areas had higher rates of Internet access than rural areas, except in Germany, where the indicator values were the same.

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The most significant differences in Internet use among the school-age youth in the last three months were noted in 2018-2020 among 16-24-year-olds with low education. Bulgaria had the lowest percentage of Internet users, wherein 2018, this indicator amounted to 85%, and in the next two years, it dropped to 83%. Internet usage in the EU-27 was approximately 98% (Eurostat, 2021b).

Internet usage levels are certainly affected by the average monthly price of a broadband connection, which amounted to $33.41 in the EU-27 in 2020. The cost was the lowest in countries with low Internet access: Romania $10.59, Bulgaria $12.69, Lithuania $13.35, Poland $16.66, and it was most expensive in Luxembourg $57.80, Belgium $54.53, and the Netherlands $52.47 (cable.co.uk, 2021).

There was also a noticeable drop in data transfer speeds during the lockdown period due to increased network load caused by the shift to remote working and school closures and online learning introduced in many countries. Poland was ranked in the lowest positions in the countries described by the 2020 Digital Economy and Society Index (DESI, 2020). The progressive digitalization has helped Poland move from 25th to 23rd position. The summary indicator consists of 5 main categories: connectivity, human capital, online services, digital technology integration, and digital public services (European Commission, 2021b).

In 2016, only 23% of educational facilities in Poland used an Internet connection with a minimum of 100Mbps, and 40% of educational facilities had an Internet with speeds of up to 10Mbps. In October 2017, the Act on the Nationwide Education Network (OSE) was passed, which aims, among other things, to provide schools with access to a free and secure connection with speeds of 100Mbps (Act, 2017). There were 24,570 schools for children and youth in 2018/2019 (Miszke *et al.,* 2019). Schools could apply to be connected to the Nationwide Education Network (OSE) until 2020.

According to the report prepared by the Supreme Audit Office, as of 31 August 2019, the OSE services had been launched in 2,575 locations (i.e., 20.3%) out of the 12,700 which are planned to be connected in 2019, that is in 13.2% of the locations out of the 19,500 projected to be bound by the end of 2020 (NIK, 2020). These delays were made particularly apparent as recently as in March 2019 and in the 2020/2021 school year, when schools were operating in a hybrid and remote mode. At the same time, it is essential to note that the percentage of households with children with internet access increased by 0.1 percentage points year-on-year in 2019 and by 0.2 percentage points year-on-year in 2020, reaching 99.5% of all households (Gumiński *et al.,* 2020).

3. Research Results

Digital competencies are an integral part of an information society. They include the following competencies:
- ICT skills related to using digital devices.

- Information literacy, which requires the ability to search for data, critically evaluate and analyze it.
- Functional competencies, which reflect the ability to use the previous two in practice.

Digital technologies are pervasive in almost every aspect of modern life. They should also play an essential role in education, preparing young people for a world driven by modern technology. Until March 2020, the use of ICT was limited mainly to extracurricular activities and leisure time, which has changed with remote learning. Teachers' competencies are the primary determinant of the use of digital technologies in teaching (European Commission/EACEA/Eurydice, 2019). Although the teaching profession is a regulated profession in Europe, the scope of teachers' digital competencies is exclusively controlled by the state.

For this reason, the level of these competencies varies widely. In Poland, digital competencies are a part of a much broader competencies framework. Teachers' perceptions of modern solutions, their willingness to integrate them into teaching practice, and the proper use thereof play an essential role in maximizing the opportunities offered by digital education and ensuring that pupils' competencies in this area are improved.

Figure 1. *Individuals' level of digital skills in 2019, 16 to 19 years old (% of individuals)*

Source: *Own work based on Eurostat. 2021a.*

These competences vary among students (Figure 1). In 2019, 49% of pupils in Poland had low and basic levels of digital competences, and this number was significantly higher than the EU-27 average. Also, the proportion of pupils with higher competences was about 6% lower than in the EU-27. This means that despite having compulsory lessons in teaching key competences as a separate subject in Poland at ISCED1 and ISCED2 or ISCD3 levels, the pupils do not sufficiently master and use them.

The closures of schools in March 2020 due to the spread of the COVID-19 pandemic and the sudden need to switch to remote learning have exposed the problem of low

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digital competencies among educators. The survey respondents raised the issue of an inferior staff training system, especially by the teachers with approximately ten years of teaching experience, which means that the oldest generations did not raise this issue. The latter often "created an email account in February and started teaching remotely in April" (Buchner, Wierzbicka, 2020a), and this was mainly due to their initiative.

In the first survey conducted two weeks after remote learning, as many as 46% of parents declared that none of the teachers teaches via video conferencing (Libris, 2020a). Almost two months later, only 19% of parents reported this problem (Libris, 2020b). At the beginning of lockdown, at least 85% of teachers were not familiar with remote learning. The main barrier was the fear of receiving hate comments from 4th – 8th-grade pupils (Buchner and Wierzbicka, 2020a). The increasing use of synchronous teaching tools was also observed by analyzing the results of teacher surveys. Since the introduction of remote learning, it has been confirmed that the use of various platforms enabling online delivery of classes such as MS Teams, Zoom, Google Classroom, etc., was, on average, three times higher (Buchner, Wierzbicka, 2020b). Despite initial problems and the lack of organized support, thanks to their commitment and materials provided by, among others, experts, publishers or organizations, teachers, as far as it was reasonably possible, ensured the continuity of education by moving it to the virtual world (Plebańska *et al.,* 2020).

The teaching staff feels that their digital competencies (computer literacy) have increased. However, methodological support is still needed to transition from in-person classrooms to virtual ones, as in this respect, they "have remained at the same level, have not expanded the repertoire of methods used and have not introduced other digital tools and materials into their working style" (Plebańska *et al.,* 2021).

After a year of remote learning, teachers still implement the expository teaching methods using digital technologies to the same high extent (36.9%) and the activity-based techniques to the same low time (33.7%), which is only more increased by three percentage points. However, many respondents are looking for more attractive, modern ideas to implement the curriculum. They report an urgent need to learn effective methods to activate children and school-age youth (Plebańska *et al.,* 2021). Young people expressed interest in all-new tools that enabled teaching classes in a non-standard way, such as a flipped classroom or discussing problems in groups (Buchner and Wierzbicka, 2020b). However, these practices were not frequent, which reduced pupils' motivation to learn independently and develop their creativity.

It was somewhat surprising that the results of the studies analyzed revealed an abnormally low level of digital competencies among some pupils, who are proficient in using social media or various instant messengers daily. Both children and youth found sending emails, attaching files, using links, or Office package tools difficult. They should have acquired most of these skills during their computer science lessons. Sometimes the situation was quite the opposite. In some cases, the pupils, so-called

gamers, enabled online classes by training the teaching staff on the use of gaming platforms (Buchner and Wierzbicka, 2020b).

In all the reports analyzed, there was a demand for continuous learning, at least partially, in the form of remote learning and, above all, for using modern digital methods, even after the end of the pandemic. Whether students will be interested and motivated to participate actively in the lesson depends on how attractive the resources are to be used during the study. Unfortunately, that is where the barriers start to emerge. One of them is the digital exclusion of schools, as they are not equipped to use digital tools on such a large scale as during remote learning.

In the Centrum Cyfrowe Foundation report, the fact that remote learning was quite efficient thanks to the use of teachers' and pupils' equipment and their private access to the Internet has been viewed as a paradox. Parents' and pupils' bad experiences are the second significant barrier. Some parents would be against remote learning even if such classes were conducted occasionally. On the other hand, many pupils admitted that they had immediately uninstalled the apps used for remote learning from their smartphones as soon as the school year after the first wave of the pandemic ended and that they are planning to do so again soon as they return to in-person learning. Many teachers are against remote education (Buchner and Wierzbicka, 2020b).

From pupils' perspectives, their teachers' digital competencies varied widely (Plebańska *et al.,* 2021). Some teachers were "covering the material so quickly, that they did not make sure their pupils understood it" (FEZiP, 2021).

To a large extent, teachers have realized that schools must teach pupils how to use digital tools skillfully and practically. Such an approach will improve pupils' digital competencies, which is essential for functioning in the professional environment in the future. For this to become possible, a profound reform of the education system will need to be undertaken. The existing education model should be changed to "experiential learning, asking questions, searching, explaining the causes of phenomena, searching for links between facts" (FGiAP, 2020). Moreover, the teachers themselves should immediately undergo an intensive training program to improve their teaching style.

4. Conclusions

Challenges in the ICT area that have arisen in connection with the COVID-19 pandemic in Poland were caused by the transition to an online or hybrid teaching system, which concerned, among others, the area of infrastructure. Our attention should be directed towards access to the Internet and electronic equipment, which should be made available both in schools and in the community, with particular attention paid to low-income families and families with many children. It would be reasonable to implement continuous monitoring of groups at risk of exclusion.

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Despite teachers' efforts, the level of their digital competencies in using ICT in distance education varies widely. Due to technological advances, it is necessary to continuously monitor the status of digital competencies and introduce systemic solutions for in-service training of teachers in the field of ICT competencies. The system of staff training has proven to be very poor. Nonetheless, the teachers feel that their digital competencies have improved, but they still expect to be provided with methodological support.

Despite including courses where digital skills are taught in compulsory education, students do not sufficiently master and use them. The research makes the following recommendations:

- continuous review of strategies for teaching and acquiring digital competences by educational institutions at a national level,
- carrying out a profound reform of the education system and teacher training on the use and application of digital methods,
- adapting curricula to the dynamic processes of change in the field of digital technologies,
- enabling teachers to use the acquired skills and competences after the pandemic by continuing to teach, at least partially remotely, with the use of modern digital methods.

References:

Act. 2017. Act on the Nationwide Education Network (OSE) of 27 October 2013. Dz. U. (Journal of Laws) 2017 item 2184, 1-10.

Buchner, A., Wierzbicka, M. 2020a. Edukacja zdalna w czasie pandemii. Raport z badań. (Remote Education in the Times of the Pandemic. Research Report). Warszawa: Centrum Cyfrowe Foundation.

Buchner, A., Wierzbicka, M. 2020b. Edukacja zdalna w czasie pandemii. Raport z badań. (Remote Education in the Times of the Pandemic. Research Report) 2nd edition. Warszawa: Centrum Cyfrowe Foundation.

cable.co.uk. 2021. Retrieved from: https://www.cable.co.uk/broadband/pricing/worldwide-comparison/.

European Commission. 2010. A Digital Agenda for Europe. COM245. Brussels.

European Commission. 2020. Digital Education Action Plan 2021-2027. Resetting Education and Training for the Digital Age.

European Commission. 2021b. The Digital Economy and Society Index (DESI). Retrieved from: https://digital-strategy.ec.europa.eu/en/policies/desi.

European Commission/EACEA/Eurydice. 2019. Digital Education at School in Europe. Eurydice Report. Luxembourg: Publications Office of the European Union.

Eurostat. 2021a. Individuals' level of digital skills. Retrieved from: https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do.

Eurostat. 2021b. Individuals - Internet Use. Retrieved from: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_ci_ifp_iu&lang=en

FEZiP. 2021. Etat w sieci 2.0. Raport. (Full-time online 2.0. Report). Poznań.

FGiAP. 2020. Między pandemią Covid-19 a edukacją przyszłości. Raport edukacja. (Amidst the COVID-19 pandemic and education of the future. Education Report). Kraków: Fundacja Gospodarki i Administracji Publicznej.

Grima, S., Dalli Gonzi, R., Thalassinos, I.E. 2020. The Impact of COVID-19 in Malta and its Economy and Sustainable Strategies. Available at SSRN: https://ssrn.com/abstract=3644833.

Gumiński, M., Guzowski, W., Huet, M., Kwiatkowska, M., Mordan, P., Orczykowska, M. 2020. Społeczeństwo informacyjne w Polsce w 2020 r. (Information society in Poland in 2020) Statistical analyses. Warszawa: GUS Statistics Poland.

Kampylis, P., Punie, Y., Devine, J. 2015. Promoting Effective Digital-Age Learning. https://doi.org/10.2791/54070. Luxembourg: Publications Office of the European Union.

Khan, S., Rabbani, R.M., Thalassinos, I.E., Atif, M. 2020. Corona Virus Pandemic Paving Ways to Next Generation of Learning and Teaching: Futuristic Cloud Based Educational Model. Available at SSRN: https://ssrn.com/abstract=3669832.

Librus. 2020a. Nauczanie zdalne, jak wygląda w naszych domach? (Distance Learning. What Does it Look Like in Our Homes?). Katowice: Librus.

Librus. 2020b. Nauczanie zdalne, jak zmieniło się na przestrzeni czasu? (Distance learning – how has it changed over time?). Katowice: Librus.

Mazurkiewicz, A. 2020. Digitalisation of schooling in the information society. Łódź: Łódź University Press.

Miszke, T., Pokrywka, K., Raciniewska, M., Rybicka K., Wiktor, M., Zielińska, H., Żochowska, A. 2019. Education in the 2018/2019 school year. Statistical information. Warszawa, Gdańsk, Statistics Poland.

NIK (Supreme Chamber of Control). 2020. Realizacja programu Ogólnopolskiej Sieci Edukacyjnej (OSE) (Implementation of the National Education Network (OSE)). Warszawa: NIK.

Pieriegud, J. 2016. Cyfryzacja gospodarki i społeczeństwa – wymiar globalny, europejski i krajowy. (Digitalization of Economy and Society – Global, European and National Level). Gdańsk: IBnGR - GAB.

Plebańska, M. 2018. Cyfryzacja edukacji w opiniach i doświadczeniach środowiska szkolnego. Wyniki badań jakościowych maj 2017 (Digitisation of Education in Opinions and Experience of the School Environment. Qualitative Research Findings, May 2017). Warszawa: AFiB, Vistula Warszawa.

Plebańska, M., Szyller, A., Sieńczewska, M. 2020. Edukacja zdalna w czasach COVID-19. Raport z badania – czerwiec 2020 (Distance Education in the Times of COVID-19. Research report – June 2020). Warszawa: University of Warsaw.

Plebańska, M., Szyller, A., Sieńczewska, M. 2021. Co zmieniło się w edukacji zdalnej podczas trwania pandemii? Raport z badania – marzec 2021 (What Has Changed in Distance Education During the Pandemic? Research report – June 2020). Warszawa: University of Warsaw.

Śledziewska, K., Włoch, R. 2020. Gospodarka cyfrowa. Jak nowe technologie zmieniają świat. (Digital Economy. How New Technologies Are Changing the World). Warszawa: University of Warsaw Publishing House.

UNICEF. 2020. How Many Children and Young People Have Internet Access at Home? Estimating Digital Connectivity During the COVID-19 Pandemic. New York: UNICEF.

Ziemba, E. 2017. Zrównoważone społeczeństwo informacyjne (Sustainable Information Society). Katowice: University of Economics.