

## Digital Transformation and Digital Competences of Urban and Rural Polish Youths

Łukasz Tomczyk 

Institute of Education, Jagiellonian University, Poland

**Correspondence:** Łukasz Tomczyk ([lukasz.tomczyk@uj.edu.pl](mailto:lukasz.tomczyk@uj.edu.pl))

**Submitted:** 28 July 2023 **Accepted:** 8 September 2023 **Published:** 31 January 2024

**Issue:** This article is part of the issue “Active Labour Market Policies and Youth Employment in European Peripheries” edited by Francisco Simões (ISCTE—University Institute of Lisbon) and Jale Tosun (Heidelberg University), fully open access at <https://doi.org/10.17645/pag.i378>

### Abstract

This article explores the level of digital competence of young people in Poland, with the indirect aim being to show the differences in the level of digital competence for adolescents living in rural and urban areas. The research covered a sample of 985 respondents, from 11–18 years old, from Poland. The research was carried out within the EU Kids Online network. The survey tool related to the assessment of digital competences covered issues of installation of software on mobile devices, configuration of internet access as pertains to confidential information, information security awareness, management of information downloaded from the internet, configuration of social networks, e-shopping, verification of costs related to the use of additional software, advanced information search, checking the reliability of information, and editing online content. Descriptive statistics, k-means cluster analysis, one-way analysis of variance (non-parametric test), and correlations were used to show the differences between rural and urban adolescents in the indicated areas. The collected data offer several postulates for education and education policy, being not only diagnostic but also implementational. Based on the analysis of the data, it was noted that: (a) Eleven areas related to basic digital competence strongly differentiate between urban and rural young people; (b) rural young people rate their own digital competence lower than urban young people do; (c) a small percentage of young people from both rural and urban areas have low digital competence; (d) one well-developed area of key competence does not always co-occur with another well-developed area; and (e) the style of using new media among rural and urban young people is similar.

### Keywords

digital competences; digital skills; Poland; rural; urban; youth

## 1. Introduction

The development of young people's digital competences is an area that media educators and social and educational policy makers are particularly interested in. The ability to use information and communication technologies (ICT) efficiently is not only important in everyday life (for learning, entertainment, and leisure activities, to name but a few), but is the basis for the formation of professional competences—a critical element for an increasingly digital world. Basic digital competences (as one of the key skills) shaped in the formal, non-formal, and informal education system constitute a set of knowledge, skills, and attitudes that allow the use of elementary e-services typical of e-citizens and provide a basis for building professional digital competences (Hämäläinen et al., 2021; Pettersson, 2018). Only with the possession of basic digital competences can more advanced skills, like those of use in the contemporary labour market, be acquired (Bejaković & Mrnjavac, 2020). Any person lacking basic digital competences will be unable to participate to the full degree in the information society that has grown up around us in recent decades. For the problem of underdeveloped or undeveloped digital competences to be solved, it is important to first analyse the level of ICT proficiency, so that differences between members of the population can be understood and stereotypes associated with the lack of digital competences can be removed.

This article focuses on basic digital competences and the style of use of new media by young people from rural and urban areas. This is an area that is changing dynamically with the development of the information society, the emergence of new e-services, and the digital transformation of young people's selected life activities. This article is an attempt to fill the empirical gap related to the diagnosis of the level of digital competences, which are differentiated by the place of residence. This empirical gap is particularly visible in diagnoses representing the Visegrad countries (with particular emphasis on Poland).

## 2. Theoretical Framework

Digital competences in this study are more than the simple skills related to processing information and operating software, as they also refer to digital security (e.g., checking the authenticity of information or securing one's own data online). Given the dynamic development of e-services and the emergence of new e-threats, it is important to be aware that the basic theoretical framework of digital competences is constantly evolving (Eger et al., 2020; Ziemba, 2019). When analysing digital competences, it is also important to be aware that ICT literacy belongs to a group of key competences that further include mother tongue and foreign language skills, mathematical skills, entrepreneurship, and cultural and civic participation, among others (Halász & Michel, 2011; Van Laar et al., 2017). Given this fact, it appears that the lack of digital competences may be one of the factors leading to selected groups becoming disadvantaged and, in the case of young people (Haddon et al., 2020; Mascheroni et al., 2020), preventing them from taking full advantage of the opportunities offered by the modern information society and the increasingly digitalised labour market.

In this study, digital competences are measured and defined according to the EU Kids Online European research network (Pyżalski et al., 2019). The theoretical framework of the variable digital competence adopted the following indicators: saving pictures from the internet, changing privacy settings, checking whether information is true, selecting keywords for searching, knowing how to select information to share, deleting people from contact lists, creating and publishing music and video on the web, editing content

downloaded from the internet, installing applications on a mobile device, checking the cost of using software, and shopping with a mobile device. When analysing the set of indicators, the different purposes of young people's use of ICT emerge, such as information retrieval and processing, e-safety, creative use of the capabilities of ICT, entertainment, and participation in the e-commerce sector. The theoretical framework of EU Kids thus covers a set of typical internet-mediated activities. The theoretical framework relating to digital competences is treated here in a utilitarian way—oriented towards practical activities and linked to activities that are not only undertaken by young people but also by other age groups (hence, leading to the possibility of comparing data between different generations of ICT users).

It should also be noted that the concept of digital competence has multiple definitions that depend on the purpose of the research (Leahy & Wilson, 2014), the group studied (Cirilli & Nicolini, 2019), the location of the research (Richardson & Bissell, 2019), or the educational policy needs (Helsper & Van Deursen, 2015). The multiplicity of models defining the concept of digital competences is, on the one hand, a richness (Iordache et al., 2017), while, on the other hand, it can lead to problems in choosing the right set of indicators to define the concept under analysis. In this article, the EU Kids model has been chosen for several reasons. Firstly, it is a set of indicators that is relevant to the current stage of development of the information society. Secondly, the model is used across almost all of Europe. Of course, the model is not exhaustive in its definition of digital competence indicators, so it is important to be aware that there are also other indicators beyond the EU Kids diagnostic tools.

In seeking to understand not only the changing theoretical framework of the concept of digital competence but also the indicators of this concept as they relate to young people, it is necessary to outline the broader social context related to the use of new media in this age group. Firstly, digital competence is now one of the primary educational and socialisation environments for the generation of digital natives (Anderson & McCabe, 2012; Shin & Lwin, 2017). New media, with a particular focus on social networks and instant messaging, are some of the primary “places” of activity for young people. In the space of new media, communication skills are shaped, behavioural patterns are acquired, and the learning process takes place (Schmeichel et al., 2018). Of course, this process has both positive and negative sides (with the latter taking the form of e-risks; Tomczyk & Potyrała, 2021). The second element of why handling new media, and thus having digital competences, is important for adolescents is the aspect related to achieving the educational goals set out in the core curriculum of formal education, as well as other important skills for a given developmental stage (e.g., social skills). In this case, it should be clearly emphasised that relevant digital skills are the starting point for the process of self-education, as well as the construction of knowledge that might also come from the offline world. The validity of such an assumption has been confirmed not only by the experiences and events of recent years, in which the e-learning crisis proved to be a time of verification of digital competences of both students and adults (teachers and parents) but also by the requirements of the labour market, in which digital competences for many professions are leading or are a skill supporting the performance of other “analogue activities.”

When analysing young people's style of new media use, many studies claim that ICTs are mainly used for communication and entertainment purposes (Mascheroni & Ólafsson, 2018; Ponte & Simões, 2008; Velicu & Marinescu, 2019). The leading activity of young people is therefore related to contact with peers and the obtaining of information prepared by peers or the business sector. In the analyzed reports, it is clear that regardless of the country, young people are predominantly consumers of digital content rather than creators. Such a state of affairs results in this group being perceived, on the one hand, as very active users of online

services, while, on the other hand, the level of advanced digital competences relating to the creative use of ICT is less developed than they are for the straightforward consumption of digital content. The presented research results make it necessary to discuss the real level of digital competences among young people, which goes beyond simple consumption of digital content and communication via social network sites and instant messaging. In addition, there is a need to consider the real level of preparation of young people for the increasingly digital labour market.

Considering the close relationship between the labour market and digital competences, it should be made clear that the ability to use ICT proficiently and the issue of preparation for a profession exist in a close relationship. The research that has been conducted shows that adolescents' basic digital competences are the foundation for building other more advanced skills needed in the labour market (e.g., programming, operation of mechatronic devices, operation of specialised software, and e-business skills, etc.; Eynon & Geniets, 2016; Fernández-de-Castro et al., 2023; Pawluczuk et al., 2019). This means that without properly formed basic digital skills there is great difficulty in preparing professionals for digitally-mediated work. Therefore, when developing a didactic framework of operational objectives for digital competences, special attention should be paid to activities that are beyond the typical communication skills of young people and the ludic use of new media.

The assumptions presented previously, which are related to the importance of digital competences (in the context of formal and non-formal education), are evident in the strategic documents of the European Commission. Important documents include:

- (a) A Digital Education Action Plan 2021–2027: sets out to promote a high-performance digital education system (priority 1) and the enhancement of digital skills and competences for digital transformation (priority 2). In both areas, digital competences in society are the starting point for other activities related to the broader quality of life. The concept to be implemented places particular emphasis on the digital competences of school-centred stakeholders (European Commission, 2020a);
- (b) Bridge to Jobs—Reinforcing the Youth Guarantee: pays particular attention to the digital transition, which requires the formation of basic digital competences among adolescents, as well as the adaptation of training and formal education in line with the directions of the information society and the need for education that takes into account IT trends (European Commission, 2020b);
- (c) A Europe Fit for the Digital Age: emphasises that digital skills are key to achieving sound civilisational development. It points out that digital skills should become a priority for the education of highly skilled digital professionals supporting business transformation (Alberti et al., 2022).

These strategy documents clearly show that digital skills are becoming one of the priorities of the EU. Poland, as with other countries in the EU structure, uses strategic documents to define the directions of changes related to shaping digital competences. Taking into account the documents mentioned above, to which programmes financing the development of proficiency in the use of ICT are connected, several key national documents should also be mentioned. The first of these are the *core curricula* (prepared by the Ministry in charge of education) for formal education. For example, documents such as the core curriculum for education set out in the decree of the Minister of National Education of 30 January 2018, as well as the core curriculum for general education set out in the decree of the Polish Minister of National Education of 14 February 2017, provide detailed guidelines related to the development of digital competences, with

these being implemented in compulsory IT classes (also referred to as computer classes at earlier stages). These documents set out the set of skills and knowledge that a student completing a given educational threshold should possess. Taking into consideration the data presented in the empirical part, it should be emphasised that the *core curricula* are much broader and thus define the notion of digital competence among adolescents much more precisely than, for example, the EU Kids Online theoretical framework used in this study. In addition to formal education, attention should also be paid to some documents prepared by the Polish Ministry of Digitalisation, which establishes the directions for the development of the information society, including documents such as the Act on Supporting the Development of Digital Competences of Students and Teachers of 7 July 2023 and the Project of the Polish Educational Network.

The strategic documents previously listed consider the digital competences of young people to be a driving force for the modernisation of enterprises and the creation of innovations in the economic sector. Therefore, a diagnosis of digital competences is an indispensable starting point for mapping the level of change for this key competence and allows for the subsequent creation of intervention programmes and pedagogical innovations aimed at increasing knowledge, skills, and attitudes related to basic and advanced forms of ICT use.

The remainder of this article seeks to fill the gap in the differentiation of digital competences among rural and urban youth in Poland. In addition, the article shows the style of ICT use among young people from the perspective of differentiation due to place of residence. The article is part of the research attributed to the opportunity paradigm of media pedagogy (Pyżalski, 2017), in which new digital technologies are a pro-development factor, and is consistent with the aforementioned EU development directions.

A review of the research relating to young people's digital competences yields a great deal of information about the specifics of how young people function in an increasingly digitalised world in comparison to other groups (e.g., those in middle or late adulthood). Differences in ICT proficiency and usage style are often analysed in the context of sociodemographic variables such as gender, age, or place of residence (Cabello-Hutt et al., 2018; De Coninck & d'Haenens, 2023). The issue of the place of residence also resounds in some studies as a variable that differentiates significantly the level of digital competence of young people (Foong, 2018; Oyedemi & Mogano, 2018). However, studies showing differences in ICT proficiency and style of use by place of residence are not conducted in all countries, thus preventing a full diagnosis of patterns in this area from taking on a global perspective. Therefore, there is a need to include in research models a variable identifying similarities and differences by place of residence. It should be added that in many countries (e.g., Poland) there is an empirical gap in this area, which does not allow us to fully understand whether the place of residence in an increasingly global and homogenous information society differentiates the level of digital competences of young people in a real (including statistically significant) way.

### 3. Methodology

#### 3.1. Purpose and Scope of the Study

The research aims to diagnose the level of digital competence and style of new media use among young people in Poland. This is connected with a secondary analysis of data from the EU Kids Online project enabling the presentation of differences and similarities in the style of ICT use by place of residence. The subject of the research is the responses provided by the young people who were surveyed. The research was defined by the

following questions:

RQ1: To what extent does place of residence differentiate basic digital competences among young people?

RQ2: What percentage of young people have low levels of digital competence in rural and urban areas?

RQ3: What is the correlation between the rates of basic digital competence among young people in rural and urban areas?

RQ4: What are the similarities and differences in styles of internet use among young people living in urban and rural areas?

### 3.2. Research Tool

This article uses data from the EU Kids Online tool 2018 edition (Pyżalski et al., 2019.) This research used an extensive battery of tests covering both behaviours assigned to the risk paradigm and the opportunity paradigm of media pedagogy. Due to the research questions posed regarding digital competence and volume constraints, the following set of variables was selected:

- (a) *Basic digital competences*: consisting of 11 items (c\_QE1\_oy) covering typical activities performed by current e-service users. These items form an elementary set of indicators for contemporary e-citizens. The response scale for this variable took the form of 1 (*none of a given skill*) to 5 (*a very high level of skill in a given area*). Responses for this variable could also take the form of *hard to say* and *prefer not to answer*. The internal consistency of the variable basic digital competence was Cronbach's alpha = 0.892;
- (b) *Internet activity in the last month*: made up of 15 items (c\_QC3) describing the frequency of typical activities related to functioning in the information society. The items cover issues related to searching for information, learning, chatting, using social networks, entertainment, and shopping. Responses for this variable ranged from 1 (*never*) to 6 (*almost all the time*). Higher values indicated a higher frequency of use of e-services. The internal consistency for the online activity variable was Cronbach's alpha = 0.795;
- (c) *Frequency of ICT use at school* (op\_QC5): consisted of 9 items relating to activities such as preparing presentations, creating text, creating graphics, learning with specialised software, doing group work using new media, communicating via the internet, communicating with teachers using the internet, and posting material on the internet. The internal consistency of the variable was Cronbach's alpha = 0.806.

### 3.3. Research Procedure

The research was conducted in 2018 by a team led by professor Jacek Pyżalski from the Adam Mickiewicz University in Poznań (Poland). The author of the present study was a member of the Polish team responsible for data collection and the development of analytical reports (Pyżalski et al., 2019). The research was collected from a random sample across Poland using a Polish-language survey instrument that was equivalent to the English-language version (Smahel et al., 2020). The data refer to results from the

pre-pandemic period. The study refers to a secondary analysis of foundational data. Due to the research objectives set, only three variables related to the key competence of ICT literacy were included in the analysis. The secondary analysis goes beyond the descriptive statistics included in the main report (Pyżalski et al., 2019). The in-depth analysis makes it possible to see correlations that have not been sufficiently highlighted so far (e.g., differences in digital competence by place of residence). The secondary analysis of the data included 857 records, these being the responses of young people in the age range of 11–18 years old ( $Mean = 14.39$ ,  $SD = 2.06$ ). The collated data includes 46% of boys and 54% of girls. The selection of the age sample between 11 and 18 is due to developmental thresholds. The indicated age range is the time of adolescence, which is characterised by increased socialisation, and the formation of key competences both online and offline. The selection of the sample was also motivated by the issue of having access to data from the EU Kids Online research network.

## 4. Results

The one-way analysis of variance that was conducted clearly shows that place of residence is a significant factor in differentiating the level of self-assessed digital competences in the 11 areas that were extracted from the EU Kids Online research model in Poland. For all activities related to basic ICT activities, i.e., saving pictures from the internet, changing privacy settings, checking if the information is true, choosing keywords for searches, selecting information to share, deleting people from a contact list, creating and publishing music and videos on the internet, editing content downloaded from the internet, installing applications on a mobile device, checking the cost of using software, and shopping via mobile devices, young people living in rural areas declare themselves to be less competent. The answers in the diagram below are on a scale from 1 (*no skill in the indicated area*) to 5 (*very high skill*).

Using the non-parametric Mann-Whitney test, it was noted that all 11 elements of basic digital competences identified in the research model are statistically significantly differentiated by place of residence. In addition, it should be stressed that issues related to searching for and downloading information from the internet, in both groups, are at a higher level of self-assessment than activities related to, for example, editing materials downloaded from the internet or creating and sharing multimedia materials on the internet. Thus, the consumption of digital content in both groups is an activity rated higher in terms of self-rated digital competence than activities requiring more advanced skills. For a detailed overview, see Table 1.

During the analysis of the data, attention was also drawn to the issue of the relationship between the metric age of the respondents and the self-evaluation of their own digital competences. For the data analysed, a linear increase in the level of digital competences was noted in most cases. This is due to the natural process associated with formal as well as non-formal education, in which ICT proficiency increases with metric age. The detailed relationship is illustrated in Figure 1.

Using cluster analysis with the k-means method, it was noted that the low level of self-assessment of digital competence in rural areas (Cluster 1—blue) concerns 14.28% of the respondents, while in urban areas it concerns 15.66% (Cluster 3—green). In both groups, similar patterns emerge in relation to low levels of digital competence, which only apply to a selected (non-rural) number of young people. In the case of young people from urban areas, the cluster is slightly more diverse in terms of passive use of new media than among their peers from rural areas. This means that Cluster 3 (urban area), despite its own low rating of

**Table 1.** Basic digital competences and place of residence.

	Group	Mean	SD	SE	W	p
CQE1a_oy: Saving pictures from the internet	Rural	3.701	1.548	0.176	22,306.000	<0.001
	Urban	4.396	1.145	0.041		
CQE1b_oy: Changing privacy settings	Rural	3.605	1.558	0.179	21,269.500	<0.001
	Urban	4.347	1.170	0.042		
CQE1c_oy: Checking whether the information is true	Rural	3.105	1.475	0.169	20,745.000	<0.001
	Urban	3.805	1.243	0.045		
CQE1d_oy: Selecting keywords for searching	Rural	3.178	1.456	0.170	18,133.000	<0.001
	Urban	3.997	1.183	0.043		
CQE1e_oy: Knowing how to select information to share	Rural	4.096	1.345	0.157	22,879.500	0.002
	Urban	4.565	0.907	0.033		
CQE1f_oy: Deleting people from contact lists	Rural	4.284	1.380	0.160	24,894.000	0.026
	Urban	4.692	0.821	0.030		
CQE1g_oy: Creating and publishing music and films on the web	Rural	3.162	1.526	0.177	20,994.000	<0.001
	Urban	3.798	1.377	0.050		
CQE1h_oy: Editing content downloaded from the internet	Rural	2.352	1.559	0.185	18,798.000	<0.001
	Urban	3.131	1.552	0.057		
CQE1i_oy: Installing applications on a mobile device	Rural	4.329	1.258	0.144	24,387.000	0.001
	Urban	4.696	0.839	0.031		
CQE1j_oy: Checking the cost of using software	Rural	3.403	1.580	0.186	20,257.500	<0.001
	Urban	4.102	1.260	0.046		
CQE1k_oy: Shopping with a mobile device	Rural	3.500	1.553	0.178	22,086.500	<0.001
	Urban	4.103	1.305	0.048		

digital skills in terms of editing and creating digital content, is slightly better at assessing its own skills in terms of activities, such as the ability to share digital information, operating selected social media functions, or installing software on smartphones. The group of young people from rural areas (Cluster 1) is more homogeneous. Within both groups, there is also an intermediate group (Cluster 2—red), which is characterised by varying levels of digital competence. This is the dominant group in both urban and rural areas. What is common is that in both rural and urban areas, self-evaluation in terms of “editing content downloaded from the internet” is rated very low in Cluster 2. This means that this group is a consumer of digital content rather than a group focused on actively processing available data. A detailed depiction of the three elementary clusters is shown in Figure 2.

Young people from rural and urban areas are similar in terms of the co-occurrence of self-reported digital competence. Convergence is evident in all aspects as evidenced by the Spearman’s Rho correlation coefficient results (presented in Figure 3). A high self-assessment of skills in one area is not the same as a high assessment of ICT handling in another area. This means that young people who actively retrieve information from the internet will not necessarily be active creators at the same time. This relationship is analogous in both groups and confirms that the notion of digital competence is a complex construct that needs to be analysed in detail in the context of very precisely distinguished indicators (both skills and knowledge). The data collected also clearly suggest that when using the term digital competences, it is necessary to clearly define which skills or knowledge are being referred to.



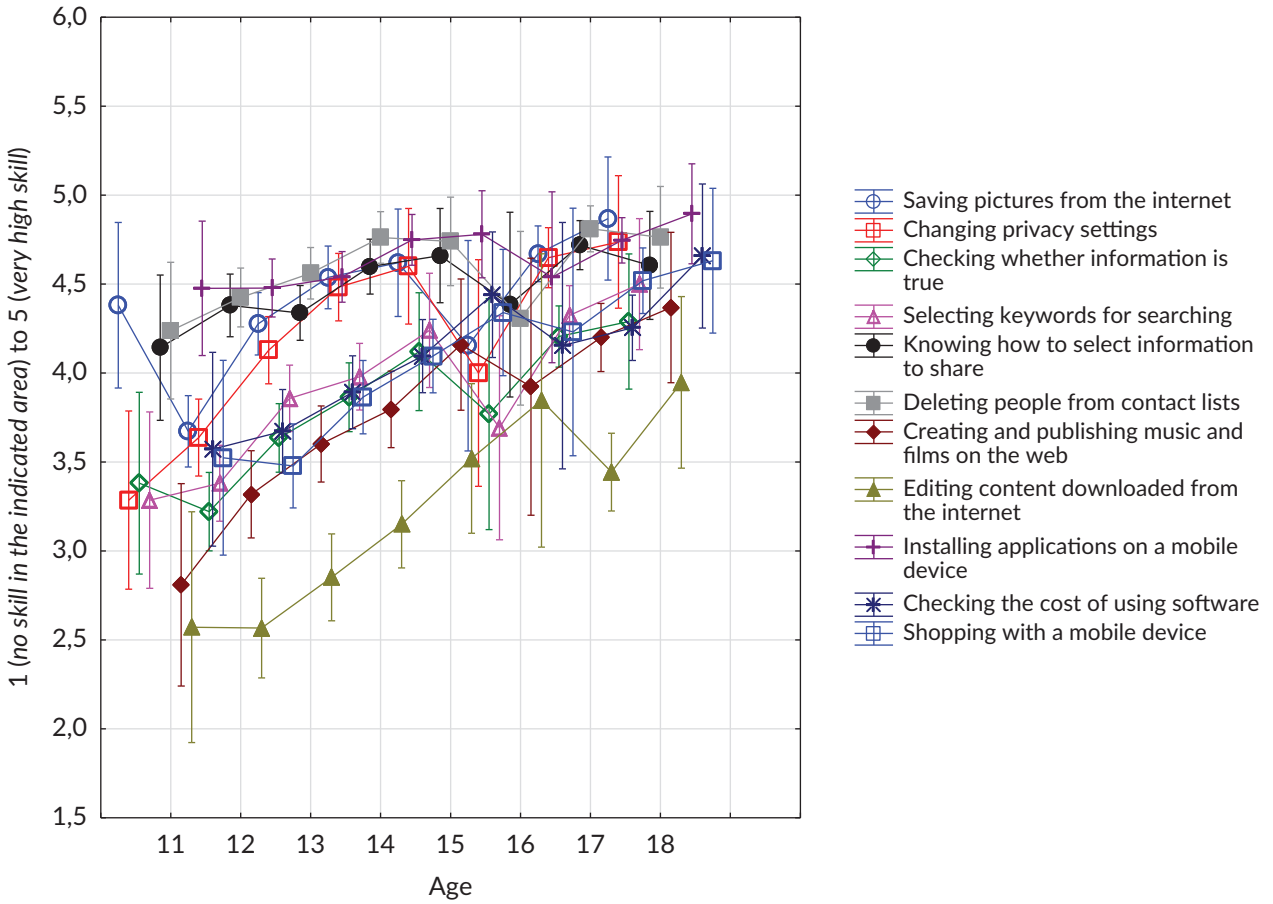


Figure 1. Level of digital competences and metric age.

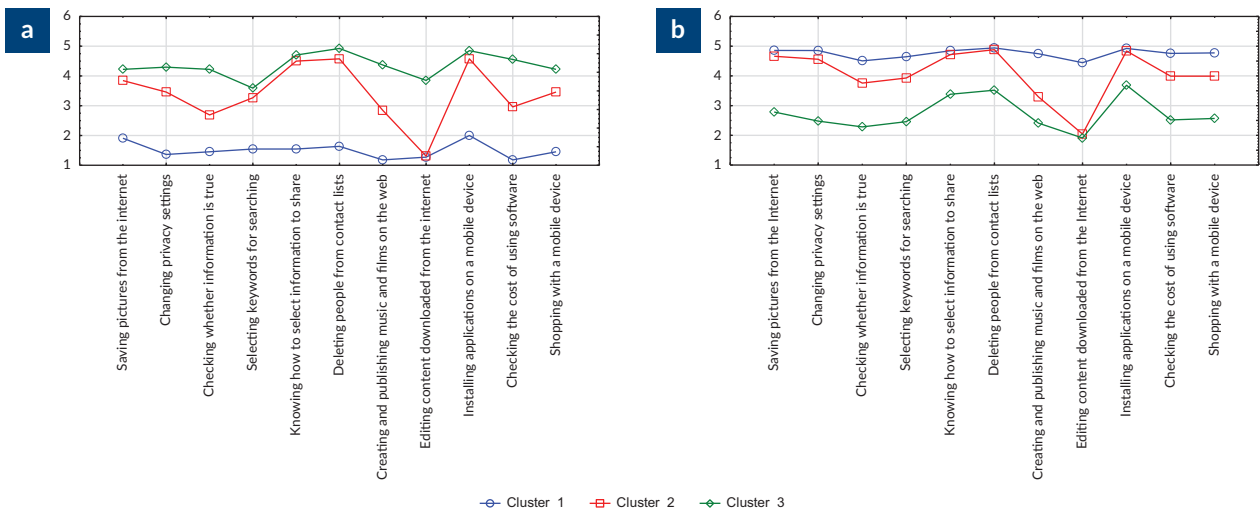
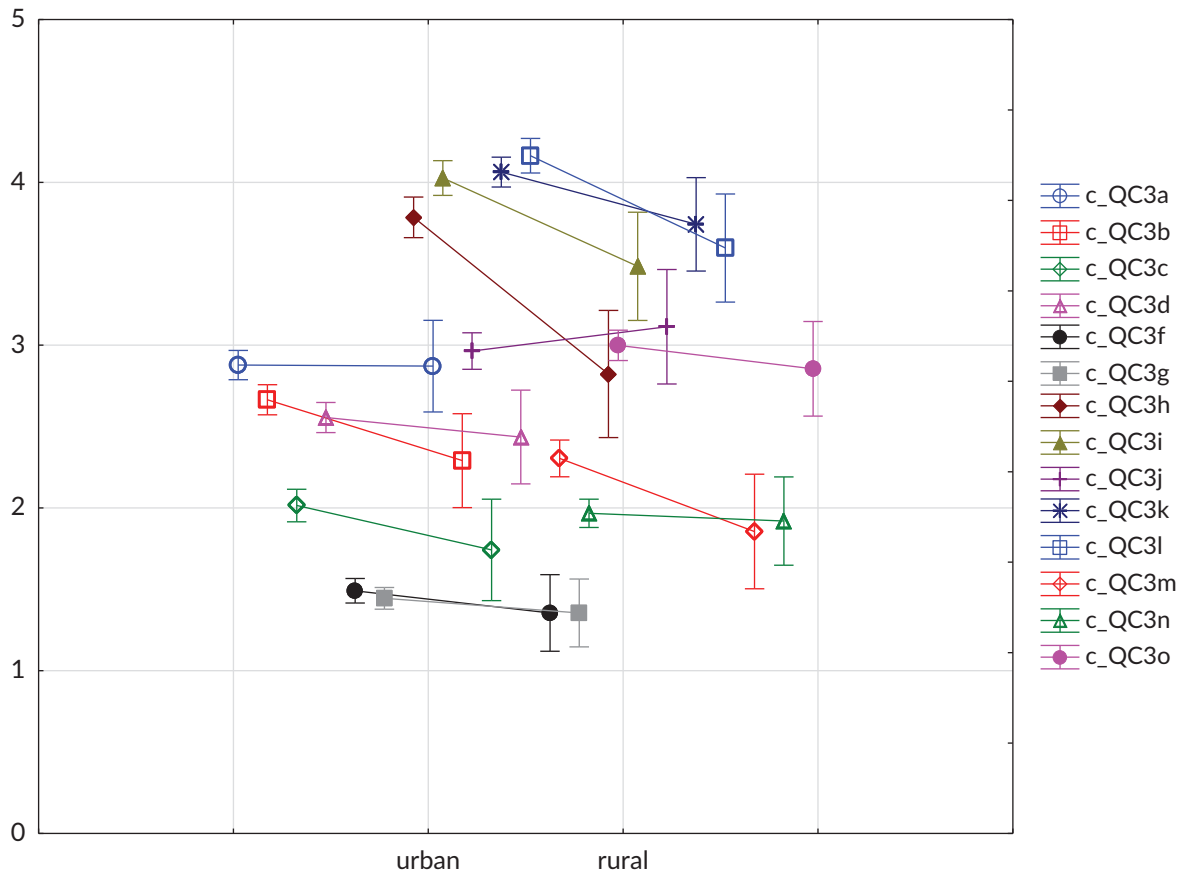


Figure 2. Cluster analysis by k-means: (a) levels of digital competence among rural students; (b) levels of digital competence among urban students.



**Figure 3.** Co-occurrence of self-assessment of digital competence: (a) young people rural and (b) young people urban. Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ .

In terms of the frequency of internet use for different purposes over the last month, differences were also observed between young people living in urban and rural areas. In most cases, young people from rural areas use some of the e-services less frequently. In one case (C\_QC3j), it was noted that young people from rural areas were more active, though this item concerned playing computer games alone. However, the difference was not statistically significant. A graphical summary of differences and similarities is shown in Figure 4, while detailed statistical characteristics can be found in Table 2.



**Figure 4.** Internet use style and place of residence.

The frequency of use of typical e-services, in contrast to the assessment of one's own digital competence, does not differentiate between young people living in rural and urban areas in each range. Only in a few cases is there a statistically significant difference. For example, young people living in urban areas are much more likely to use the internet for learning at school, use social networks more intensively, communicate with family or friends via online services, watch films (though here there is only a small degree of difference), and listen to music online. Differences therefore only exist in a few areas that can be characterised as communication and entertainment. Details of the analysis using the Mann-Whitney non-parametric test can be found in Table 2.

**Table 2.** E-service use style and place of residence.

	Group	Mean	SD	SE	W	p
c_QC3a: I have been looking for information on job/learning opportunities	Rural	2.960	1.202	0.139	27,621.500	0.636
	Urban	2.933	1.149	0.043		
c_QC3b: I used the internet to study at school	Rural	2.395	1.255	0.144	23,155.000	0.009
	Urban	2.693	1.175	0.043		
c_QC3c: I used the internet to talk to people from other countries	Rural	1.811	1.279	0.149	24,864.000	0.093
	Urban	2.019	1.277	0.046		
c_QC3d: Looked up national and international information on the internet	Rural	2.532	1.294	0.147	27,829.000	0.684
	Urban	2.577	1.162	0.043		
c_QC3e: Joined a campaign/protest or signed an online petition	Rural	1.351	0.985	0.115	27,873.500	0.940
	Urban	1.249	0.646	0.024		
c_QC3f: Discussed social or political issues online with others	Rural	1.468	1.021	0.116	28,268.000	0.644
	Urban	1.475	0.932	0.034		
c_QC3g: Made my own video or music and shared it online	Rural	1.419	0.907	0.105	26,484.000	0.325
	Urban	1.475	0.885	0.032		
c_QC3h: I visited a social networking site	Rural	2.892	1.610	0.187	19,318.500	<0.001
	Urban	3.807	1.581	0.057		
c_QC3i: I communicated with family or friends	Rural	3.587	1.367	0.158	23,018.500	0.006
	Urban	4.044	1.337	0.049		
c_QC3j: Played/played online games (alone)	Rural	3.213	1.417	0.164	31,276.500	0.161
	Urban	2.955	1.422	0.052		
c_QC3k: I have watched/listened to videos	Rural	3.816	1.208	0.139	25,059.500	0.048
	Urban	4.096	1.139	0.041		
c_QC3l: Listened to music online	Rural	3.747	1.453	0.168	23,691.000	0.016
	Urban	4.179	1.323	0.048		
c_QC3m: I have participated in an online group where people share their interests/hobbies	Rural	2.053	1.451	0.168	24,859.500	0.067
	Urban	2.313	1.453	0.053		
c_QC3n: I have searched for health information that I or someone I know needs	Rural	1.933	1.189	0.137	26,282.500	0.434
	Urban	1.968	1.090	0.040		
c_QC3o: I was looking for something to buy or information on how much something costs	Rural	2.761	1.325	0.157	23,286.500	0.061
	Urban	2.996	1.188	0.043		

## 5. Discussion

The data collected suggest that the level of basic digital competences of young people from rural areas is slightly lower than that of their peers from urban areas. This situation may be conditioned by several factors, including those relating to the quality of education in rural areas, real-life needs that are met by new media, or attitudes towards new media. The assessment of basic digital competences may also result from a general difference in self-assessment of all key competences among young people differentiated by place of residence (Irvin et al., 2012; Rychen & Salganik, 2003).

Variation in self-assessment of ICT skills is evident in all the areas mentioned. However, when conducting research into the assessment of digital competence of rural and urban young people, it is important to look for areas where there may be an opposite trend to that shown in the study. It would also be worthwhile to measure this competence closely, taking into account mediating variables such as the profile of the institutions

where students study, the quality of the equipment in computer labs, and the type of education directed at teachers. Arguably, the level of digital competence is, as research from other countries and continents shows (Tomczyk & Sunday Oyelere, 2019), not only variable by place of residence but according by other variables. The issue of differences in the level of digital competence by place of residence may also arise from offline lifestyles that differentiate ICT proficiency. Thus, the characteristics of peer relationships, not to mention the level of digital competence of those in the home environment, may have a significant impact on the issues analysed in RQ1 (Uzuegbunam, 2022). Existing differences are also explained by the level of digitisation of the living environment and the level of parental wealth, which influences the purchase of IT equipment (Tran et al., 2020).

Interesting data emerge from the cluster analysis. There is a cluster of young people in both groups who require support in basic digital competences. The data collected, based on self-assessment, clearly show that this is a collective of up to several percent. Such data should not come as a surprise, as even among the younger generations there is a group of people who do not always feel confident in using ICT. Their digital competence is limited to typical communication and information retrieval activities, while slightly more advanced activities are beyond their skill level. These data support the finding that respondents are not a homogeneous collective and not all of them are highly effective when using ICT (Judd, 2018; Koutropoulos, 2011). The grouping of respondents clearly suggests that young people are a non-homogeneous collective when we consider indicators characterising their level of digital competence and their style of new media use by place of residence. Therefore, the present results confirm that both digital competence and other key competences differentiate this group (Pagani et al., 2016). In analysing the level of any of the key skills, it is important to be aware that there are groups with varying levels of proficiency in ICT use. Treating all young people as individuals with a high level of digital literacy can lead to the generation of so-called positive stereotypes that are not supported by reality.

Analysing the results from RQ3, there is a convergence with other studies related to the co-occurrence of digital competence indicators. As Polish reports (Tomczyk, 2019, 2020) show, a high level of digital competence in one area does not automatically mean that a person will have a high level in other areas. When defining digital competence, it should be borne in mind that the concept of digital skills is strongly internally heterogeneous. The concept of digital competence is a rich set of indicators that characterise the performance of many activities and the operation of a large range of software and hardware.

Referring to RQ4, only in a few areas is the style of ICT use differentiated by place of residence (e.g., listening to music, communicating with friends, frequency of ICT use at school). It appears that the typical digital-global teenager has more similarities than differences. Nevertheless, there are minor differences that require the integration of sociological theories (e.g., modernisation, socio-cultural activities, etc.) with media pedagogy knowledge to understand why certain areas of ICT use in daily life among urban and rural adolescents differ. Analysis of the data in Table 2 also makes it clear that society is homogeneous between the two groups analysed. For example, senior citizens tend to be less active in the new media space and their activity is limited to typical e-services (e.g., e-mail, reading news, etc.). Younger age groups, on the other hand, also have many converging characteristics in terms of the style of use of new technologies. For example, the homogeneity of this group is expressed in the use of the same e-services (e.g., Instagram), increasing screen time, and preferring communication and entertainment services over creative use of the possibilities of cyberspace.

## 6. Methodological Limitations and New Research Directions

The presented results are an attempt to diagnose digital competences among young people. The methodology used allows for a quick evaluation of one of the key competences necessary to function in today's society, which has become highly computerised. However, the adopted research strategy, used in more than 30 European countries as part of EU Kids Online (Smahel et al., 2020), has some limitations. The first is the diagnosis of digital competences using self-assessment. The lack of use of standardised tests, e.g., European Computer Skills Certificate, may lead to under- or over-estimation of ICT proficiency. Such a condition may result in the Dunning-Kruger effect (Dunning, 2011). Therefore, the use of real-world measurement of digital competences in the form of knowledge and skills tests is advocated in future studies. A methodology based on real-life task solving is much more time-consuming and requires access to ICT software and hardware, which may increase the cost of the survey, but, nevertheless, would show digital competences in a more relevant way.

The data presented are from 2018. Over the last few years, the information society, including the level of digital competence, has been transformed. In the context of young people (though not only young people), the time of the Covid-19 pandemic was of great importance, with the crisis of e-learning (Toto & Limone, 2021; Walter & Pyzalski, 2022) changing the style of use of new media, thus strengthening the digital competences of young people in many areas. Therefore, the present data should only be considered through the prism of historical data.

Nevertheless, the presented research results represent one of the few samples in Poland to show the digital competences of young people differentiated according to their place of residence. This means that there is an empirical gap (especially referring to post-Covid changes, which are a milestone in digitisation) related to the area of real measurement of digital competences in rural and urban areas. In addition, new research directions should take into account the rapidly changing space of school, family, and working life, which is increasingly digitised through, for example, new e-services based on AI (Donoso et al., 2020; Omer, 2023; Su & Yang, 2023). Digital transformation therefore forces a redefinition of the theoretical framework of digital competences and how they are measured.

## 7. Conclusions

Research on the level of digital competence among adolescents in a rapidly changing socio-technical reality has become a necessity (Guillén-Gámez et al., 2020; Linde-Valenzuela et al., 2022). In recent years, there has been an exponential development of various e-services favouring communication, entertainment, and shopping. Undoubtedly, the Covid-19 pandemic was also a milestone, one which highlighted the weaknesses and strengths of digitisation (Tomczyk, 2021). The rapid development of the information society, the increasing digitisation of school spaces, be they educational or professional, and free-time spaces all force a reflection on the real and effective use of the opportunities offered by ICT. Such a reflection is realised both through the modification of formal and non-formal education programmes and, above all, the diagnosis of digital competences. The collected data clearly show that the diagnosis makes it possible to detect differences between the level of digital competences among young people from rural and urban areas.

The diagnosis of the real level of digital competences becomes an indispensable element not only for learning about the specific functioning of selected groups in the information society, but to draw attention to the preparation of appropriate support programmes. This article becomes another voice in the discussion on the need to diagnose digital competences, which are the key at the macro level to increasing the innovativeness of the economy, while at the micro level to enabling young people to develop effectively.

### Acknowledgement

This article was supported by the TRACK-IN–Public Employment Services Tracking Effectiveness in Supporting Rural NEETs. This project is funded by Iceland, Liechtenstein, and Norway through the EEA and Norway Grants Fund for Youth Employment.

### Conflict of Interests

The author declares no conflict of interests.

### References

- Alberti, V., Caperna, G., & Colagrossi, G. (2022). *A Europe fit for the digital age: Tracking Europeans' interest in EC priorities using online search data*. Publications Office of the European Union.
- Anderson, L., & McCabe, D. B. (2012). A coconstructed world: Adolescent self-socialization on the internet. *Journal of Public Policy & Marketing*, 31(2), 240–253.
- Bejaković, P., & Mrnjavac, Ž. (2020). The importance of digital literacy on the labour market. *Employee Relations: The International Journal*, 42(4), 921–932.
- Cabello-Hutt, T., Cabello, P., & Claro, M. (2018). Online opportunities and risks for children and adolescents: The role of digital skills, age, gender and parental mediation in Brazil. *New Media & Society*, 20(7), 2411–2431.
- Cirilli, E., & Nicolini, P. (2019). Digital skills and profile of each generation: A review. *International Journal of Developmental and Educational Psychology*, 3(1), 487–496.
- De Coninck, D., & d'Haenens, L. (2023). Gendered perspectives on digital skills and digital activities: Comparing non-binary and binary youth. *Comunicar*, 31(75), 35–45.
- Donoso, V., Pyżalski, J., Walter, N., Retzmann, N., Iwanicka, A., d'Haenens, L., & Bartkowiak, K. (2020). *Report on interviews with experts on digital skills in schools and on the labour market*. Zenodo. <https://doi.org/10.5281/zenodo.5226910>
- Dunning, D. (2011). The Dunning–Kruger effect: On being ignorant of one's own ignorance. In J. M. Olson & M. P. Zanna (Eds.), *Advances in experimental social psychology* (Vol. 44, pp. 247–296). Academic Press.
- Eger, L., Egerová, D., Mičík, M., Varga, E., Czeglédi, C., Tomczyk, L., & Sládkayová, M. (2020). Trust building and fake news on social media from the perspective of university students from four Visegrad countries. *Communication Today*, 11(1), 70–81.
- European Commission. (2020a). *Communication from the Commission to the European Parliament, the Council, the European Economic And Social Committee and the Committee of the Regions Digital Education Action Plan 2021–2027. Resetting education and training for the digital age* (COM(2020) 624 final). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0624>
- European Commission. (2020b). *Proposal for a Council recommendation on a bridge to jobs—Reinforcing the youth guarantee and replacling Council recommendation of 22 April 2013 on establishing a youth guarantee* (COM(2020) 277 final). <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0277>

- Eynon, R., & Geniets, A. (2016). The digital skills paradox: How do digitally excluded youth develop skills to use the internet? *Learning, Media and Technology*, 41(3), 463–479.
- Fernández-de-Castro, P., Aranda, D., Moyano, S., & Sampedro, V. (2023). Digital youth work: A systematic review with a proposal. *Social Work Education*, 42(3), 318–336.
- Foong, L. M. (2018). Digital skills measurement: A study on the Malaysian youth. In IEEE (Ed.), *2018 IEEE Conference on e-Learning, e-Management and e-Services (IC3e)* (pp. 52–55). IEEE.
- Guillén-Gámez, F. D., Romero Martínez, S. J., & Ordóñez Camacho, X. G. (2020). Diagnosis of the attitudes towards ICT of education students according to gender and educational modality. *Apertura (Guadalajara, Jal.)*, 12(1), 56–71.
- Haddon, L., Cino, D., Doyle, M. A., Livingstone, S., Mascheroni, G., & Stoilova, M. (2020). *Children's and young people's digital skills: A systematic evidence review*. Zenodo. <https://doi.org/10.5281/zenodo.4160176>
- Halász, G., & Michel, A. (2011). Key competences in Europe: Interpretation, policy formulation and implementation. *European journal of education*, 46(3), 289–306.
- Hämäläinen, R., Nissinen, K., Mannonen, J., Lämsä, J., Leino, K., & Taajamo, M. (2021). Understanding teaching professionals' digital competence: What do PIAAC and TALIS reveal about technology-related skills, attitudes, and knowledge? *Computers in Human Behavior*, 117, Article 106672.
- Helsper, E. J., & Van Deursen, A. J. A. M. (2015). Digital skills in Europe: Research and policy. In K. Andreasson, *Digital divides: The new challenges and opportunities of e-inclusion* (pp. 125–148). CRC Press.
- lordache, C., Mariën, I., & Baelden, D. (2017). Developing digital skills and competences: A quick-scan analysis of 13 digital literacy models. *Italian Journal of Sociology of Education*, 9(1), 6–30.
- Irvin, M. J., Byun, S. Y., Meece, J. L., Farmer, T. W., & Hutchins, B. C. (2012). Educational barriers of rural youth: Relation of individual and contextual difference variables. *Journal of career assessment*, 20(1), 71–87.
- Judd, T. (2018). The rise and fall (?) of the digital natives. *Australasian Journal of Educational Technology*, 34(5), 99–119.
- Koutropoulos, A. (2011). Digital natives: Ten years after. *MERLOT Journal of Online Learning and Teaching*, 7(4), 525–538.
- Leahy, D., & Wilson, D. (2014). Digital skills for employment. In D. Passey & A. Tatnall (Eds.), *Key competencies in ICT and informatics. Implications and issues for educational professionals and management* (pp. 178–189). Springer Berlin Heidelberg.
- Linde-Valenzuela, T., Guillén-Gámez, F. D., & Devitt, A. (2022). Digital literacy of teachers, families, and students for virtual participation in school: A multiple comparison analysis. *IEEE Revista Iberoamericana de Tecnologías del Aprendizaje*, 17(1), 1–8.
- Mascheroni, G., Cino, D., Jakub, M., David, L., & David, S. (2020). *Digital skills, risks and wellbeing among European children: Report on (f) actors that explain online acquisition, cognitive, physical, psychological and social wellbeing, and the online resilience of children and young people*. Zenodo. <https://doi.org/10.5281/zenodo.4313274>
- Mascheroni, G., & Ólafsson, K. (2018). *Accesso, usi, rischi e opportunità di internet per i ragazzi italiani. I risultati di EU Kids Online 2017* [Access, uses, risks and opportunities of the internet for Italian children. The results of EU Kids Online 2017]. EU Kids Online; OssCom. <https://www.lse.ac.uk/media-and-communications/assets/documents/research/eu-kids-online/reports/EU-Kids-Online-Italy-report-06-2018.pdf>
- Omer, D. S. (2023). Egyptian youth acceptance of using Chat GPT technology as an application of artificial intelligence—A field study. *Journal of Mass Communication Research*, 66(1), 9–74.
- Oyedemi, T., & Mogano, S. (2018). The digitally disadvantaged: Access to digital communication technologies among first year students at a rural South African university. *Africa Education Review*, 15(1), 175–191.



- Pagani, L., Argentin, G., Gui, M., & Stanca, L. (2016). The impact of digital skills on educational outcomes: Evidence from performance tests. *Educational studies*, 42(2), 137–162.
- Pawluczuk, A., Webster, G., Smith, C., & Hall, H. (2019). The social impact of digital youth work: What are we looking for? *Media and Communication*, 7(2), 59–68.
- Petterson, F. (2018). On the issues of digital competence in educational contexts—A review of literature. *Education and Information Technologies*, 23(3), 1005–1021.
- Ponte, C., & Simões, J. A. (2008). Crianças e jovens online: Comparando os usos da internet e dos novos media na Europa. Algumas pistas de reflexão a partir do projecto EU Kids Online [Children and young people online: Comparing the use of internet and new media in Europe. Some clues for reflexion from the project EU Kids Online]. In *Atas do Congresso Português de Sociologia* [Records of the Portuguese Congress of Sociology] (pp. 2–13). Universidade Nova de Lisboa.
- Pyżalski, J. (2017). Jasna strona-partycypacja i zaangażowanie dzieci i młodzieży w korzystne rozwojowo i prospołeczne działania [Bright side-participation and involvement of children and young people in developmentally beneficial and pro-social activities]. *Dziecko Krzywdzone Teoria, Badania, Praktyka*, 16(1), 288–303.
- Pyżalski, J., Zdrodowska, A., Tomczyk, Ł., & Abramczuk, K. (2019). *Polskie badanie EU Kids Online 2018. Najważniejsze wyniki i wnioski* [Polish EU Kids Online survey 2018. Key findings and conclusions]. UAM.
- Richardson, L., & Bissell, D. (2019). Geographies of digital skill. *Geoforum*, 99, 278–286.
- Rychen, D. S., & Salganik, L. H. (Eds.). (2003). *Key competencies for a successful life and well-functioning society*. Hogrefe Publishing GmbH.
- Schmeichel, M., Hughes, H. E., & Kutner, M. (2018). Qualitative research on youths' social media use: A review of the literature. *Middle Grades Review*, 4(2), Article 4.
- Shin, W., & Lwin, M. O. (2017). How does “talking about the Internet with others” affect teenagers' experience of online risks? The role of active mediation by parents, peers, and school teachers. *New Media & Society*, 19(7), 1109–1126.
- Smahel, D., Machackova, H., Mascheroni, G., Dedkova, L., Staksrud, E., Ólafsson, K., Livingstone, S., & Hasebrink, U. (2020). *EU Kids Online 2020: Survey results from 19 countries*. EU Kids Online. <http://hdl.handle.net/20.500.12162/5299>
- Su, J., & Yang, W. (2023). Unlocking the power of ChatGPT: A framework for applying generative AI in education. *ECNU Review of Education*, 6(3), 355–366.
- Tomczyk, Ł. (2019). What do teachers know about digital safety? *Computers in the Schools*, 36(3), 167–187.
- Tomczyk, Ł. (2020). Skills in the area of digital safety as a key component of digital literacy among teachers. *Education and Information Technologies*, 25(1), 471–486.
- Tomczyk, Ł. (2021). E-learning in Poland: Challenges, opportunities and prospects for remote learning during the Covid-19 pandemic. *Higher Education in Russia and Beyond*, 2(27), 10–12.
- Tomczyk, Ł., & Potyrała, K. (2021). Parents' knowledge and skills about the risks of the digital world. *South African Journal of Education*, 41(1), Article 1833.
- Tomczyk, Ł., & Sunday Oyelere, S. (2019). *ICT for learning and inclusion in Latin America and Europe. Case study from countries: Bolivia, Brazil, Cuba, Dominican Republic, Ecuador, Finland, Poland, Turkey, Uruguay*. Pedagogical University of Krakow.
- Toto, G. A., & Limone, P. (2021). From resistance to digital technologies in the context of the reaction to distance learning in the school context during Covid-19. *Education Sciences*, 11(4), 163.

- Tran, T., Ho, M.-T., Pham, T.-H., Nguyen, M.-H., Nguyen, K.-L. P., Vuong, T.-T., Nguyen, T.-H. T., Nguyen, T.-D., Nguyen, T.-L., Khuc, Q., La, V.-P., & Vuong, Q.-H. (2020). How digital natives learn and thrive in the digital age: Evidence from an emerging economy. *Sustainability*, 12(9), Article 3819.
- Uzuegbunam, C. E. (2022). Assessing rural and urban teenagers' domestication of technology: The role of digital literacy. *International Journal of Mobile and Blended Learning*, 14(3), 1–15.
- Van Laar, E., Van Deursen, A. J., Van Dijk, J. A., & De Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, 72, 577–588.
- Velicu, A., & Marinescu, V. (2019). Usage of social media by children and teenagers: Results of EU KIDS online II. In *Internet and technology addiction: Breakthroughs in research and practice* (pp. 115–151). IGI Global.
- Walter, N., & Pyżalski, J. (2022). Lessons learned from Covid-19 emergency remote education. Adaptation to crisis distance education of teachers by developing new or modified digital competences. In *Digital literacy for teachers* (pp. 7–23). Springer Nature.
- Ziemba, E. (2019). The contribution of ICT adoption to the sustainable information society. *Journal of Computer Information Systems*, 59(2), 116–126.

### About the Author



**Łukasz Tomczyk** is an associate professor at the Institute of Pedagogy (Jagiellonian University, Poland). He received his doctorate (PhD) in philosophy from Charles University in Prague, Czech Republic, and his doctorate in pedagogy (media education and social pedagogy). His research interests are in media and information education, information society, and lifelong learning. He is a fellow of the Ministry of Science and Higher Education (outstanding young researchers). Currently, he is also an associate editor in the journal *Education and Information Technologies* and works as a reviewer for several research agencies, including the European Commission.