








“Professional and educational activity of youth in the digital economy”

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PROFESSIONAL AND EDUCATIONAL ACTIVITY OF YOUTH IN THE DIGITAL ECONOMY

Abstract

The paper is aimed to rank countries similar in terms of selected diagnostic variables: in terms of digital competencies held and variables related to the youth professional activity. The method of descriptive and statistical analysis, including comparative analysis, is used in the study. The paper also uses cluster analysis. The conducted analysis included the empirical material referring to the youth at the age of 15-29 taken from the Eurostat database. The research period is 2011–2019. The analysis by type of educational and professional activity of young people conducted in the EU member countries allowed the identification of four groups of countries, differing in the levels of both the NEET rate (Neither in employment nor in education or training) and the digital skills. The digital skills have been additionally grouped into competences in the field of information, communication, problem-solving and programming skills. The group of countries with the lowest NEET rate proved to include those where young people presented high levels of digital skills in all the dimensions analyzed. The study shows that acquiring digital competencies enables young people to participate in communities and gives them a better chance for professional activity.

Keywords

digital competences, education, youth, NEET, e-skills,
human capital

JEL Classification

E24, J24, M54

INTRODUCTION

Nowadays, the labor market sets the new challenges for the youth. Youth is the most versatile and active segment of an economy and is a vital source of creativity and innovation (Singh & Panackal, 2017). Not only the theoretical knowledge, education and practical skills count, but also digital skills are of great importance. Digital competencies involve critical and responsible use of the digital technology. There is a great interest in them in the context of studies, occupation and being a part of the communities (European Union, 2006). In the near future poor digital skills can result in the social exclusion and low-value work. Whereas, strong digital competencies may guarantee competitiveness, safety of the employment and highly paid positions. These are significant factors considered by the young people who are the new members of the labor market seeking their chances in the digital economy.

The European Commission (2020) has published the Education and Training Monitor, which analyzes the progress in education and training in the EU. As a result, it has been revealed that more than 15% of the young people in all the surveyed countries do not possess sufficient level of digital skills (European Commission, 2020). This Monitor shows that digital competence is linked to socio-economic background. Characteristics reflecting higher socioeconomic status as



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measured, for example, by parents' educational attainment, their occupational status and the number of books at home are positively linked to young people achievements. The consistent and statistically significant relationship between socio-economic status and young people achievements across the Member States of the EU offers evidence of a digital divide, in which young people from lower socioeconomic backgrounds on average perform poorly in computer and information literacy than their peers from more privileged backgrounds (European Commission, 2020).

A strong digital economy powered by Europeans with digital skills is vital for innovation, jobs, growth and European competitiveness. The spread of digital technologies massively affects the labor market and the type of skills needed in the economy and society (European Commission, 2021). Over 70% of businesses have said that lack of staff with adequate digital skills is an obstacle to investment (European Commission, 2021).

The research by the Learning and Work Institute in partnership with Enginuity and WorldSkills UK claimed 88% of young people think digital skills will be important for their future careers, and 62% said they have the basic digital skills employers might need, such as the ability to communicate digitally or use common software (McDonald, 2021). However, when it comes to more complex digital skills, such as coding or using specialist software, only 18% of young people said they thought they had these more advanced skills employers might need (McDonald, 2021).

1. LITERATURE REVIEW

The source literature comprises several terms describing the present economy, such as "new economy", "digital economy", "knowledge-based economy", "electronic economy", "web economy" or "information economy". The pluralism of the concept results from some features of the new economy, which were emphasized by Tapscott (1996). The features include globalization, virtualization, digitization, innovativeness, the strategic role of knowledge and working within the network. Tapscott (1996) also explicitly emphasized the advantages of the new reality, in which the information networking influence on the economy, community, work, education and possibility of communicating prevail.

The information and knowledge (know-why) became the most important factors in the digital economy, particularly significant for the intellectual (Kowalczyk, 2017) and technological development (Chojnicki, 2001). The acquired knowledge and competencies along with their quality and updating guarantee the ability of being a part of the community and increase the prospect of employment (Arms & Bercik, 2013; World Economic Forum, 2014). It is also legitimately pointed out by Prokurat (2016) that technology has updated work to the 2.0 version, in which the activities is based on knowledge, creation and processing the information through digi-

tal devices. A great number of digital devices is used in many fields such as education, administration, banking, agriculture, trade and industry, which is interlinked with the growing need for the employees with digital skills (Brynjolfsson & McAfee, 2014).

In the conditions of digital economy, people must face the widespread transfer of information, which imposes constant learning in order to meet dynamic requirements of the labor market. The results of the WEF "The Future of Jobs 2018" (World Economic Forum, 2018) shows that over 50% of the total number of jobholders will be obliged to improve their qualification or be retrained to prevent the loss of employment. The lack of digital skills will pose the main threat of discrimination, inadequacy, and labor market exclusion. Nowadays, acquisition of the digital competencies by the youth is not only useful, but also essential.

Young people should acquire knowledge and improve their individual abilities at different stages of their career in order to exist in the computer-operated world, and work with Internet network and advanced technologies. The whole process leads to the education system (at the very elementary stage) and learning regardless of its form of realization. It is worth mentioning the great significance of the retrain institutions, which enable increased investments in the human capital qualifications. Human

Capital Theory thus lays considerable stress on the education of individuals as the key means by which both the individual accrues material advantage and by which the economy as a whole progresses (Gillies, 2015). In a simple equation, the more and better education individuals possess, the better their returns in financial rewards and the better the national economy is (Gillies, 2015). Reducing the percentage of young people in formal and non-formal education by contrast causes negative impact on the overall intellectual potential of the country (Mishchuk et al., 2019).

It is concluded that digital literacy is one of the skills which remains critical for work seekers (especially for young people belonging to NEET) to increase their chances of achieving continuous work opportunities, and eventually obtain employment (Matli & Ngoepe, 2020; Luka et al., 2019). There is a positive association between population skills and economic growth (OECD, 2015; Hawkes & Ugur, 2012; Hulten, 2017). Education is a critical force that generates technological progress in an economy (Kefela, 2010).

2. AIMS AND HYPOTHESIS

The aim of this study is to assess the educational and professional activity of young people in selected European countries and to identify the similarities between the countries in terms of selected diagnostic features.

The hypothesis is as follows:

H0: Staying outside the sphere of youth employment and education depends on the level of digital skills.

3. METHODOLOGY

3.1. Research period

The empirical studies included in this paper were chosen from the international database Eurostat (European Statistical Office). Empirical material of data concerns the young people at the age of 15-29 from 28 EU countries. The research period is 2011–2019.

3.2. Research methods

The statistic method analysis including comparative analysis, as well as cluster analysis, were applied to accomplish the above-mentioned aim of the study. The cluster analysis is a tool used for exploratory database analysis, which aim is to group objects in such a way that the degree of the objects connection with other objects of the same group would be the largest and the connection with the remaining objects would be the smallest (StatSoft, 2019). The cluster analysis procedure (Table 1) was performed in the R program (Walesiak, 2008). The research variables selection includes the youth situation in the labor market, shown in the Table 2. There were five variables selected from the Eurostat database related to digital competence, namely: information skills (job search or sending an application; looking for information about education, training or course offers), communication skills (sending/receiving e-mails), problem-solving skills (Internet banking), software skills (creating websites or blogs). All variables were selected using HINoV method (Table 1). The goal of this method is to select a smaller number of variables from the original set of variables by eliminating those that interfere with the existing class structure in the examined population of objects. As a

Table 1. The procedure of the cluster analysis application with using the R program

Source: Authors' elaboration.

Nr	The cluster analysis stages	The functions and packets of the R program applied
1	The choice of variable	Packet clusterSim [functionHINoV.Mod (method applied = k – medoidów – PAM*)]
2	The choice of the variable values standardization formula	Packet clusterSim [function_data.Normalization (type applied = "n1")]
3	The choice of distance measure	Packet clusterSim [function dis.GDM (determined distance measure = GDM1)]
4	The choice of classification method	Packet clusterSim – PAM method applied
5	The number of the classes determination	Packet clusterSim [applied: index.Gap]
6	The evaluation of the classification results	PacketclusterSim [function replication.Mod (method applied = PAM), adjusted Randa Index value determined]

Note: *PAM – Source: Kauffman and Rousseeuw (2005).

result, each variable receives its contribution to the existing class structure. A common age range was used for the variables on digital competences and the variables on educational and professional activity (age of 15-29)

Table 2. The characteristics of the selected variables describing the conditions of the youth at the age of 15-29 in the labor market

Source: Authors' elaboration.

Variable	Name
X1	Youth employment rate
X2	Youth unemployment rate
X3	NEET rates
X4	Internet use: looking for information about education, training or course offers
X5	Internet use: sending/receiving e-mails
X6	Internet use: creating websites or blogs
X7	Internet use: job search or sending an application
X8	NEET rates – tertiary education (levels 5-8)
X9	Internet use: Internet banking

4. RESULTS

The analysis of the educational and professional activity paths of the young people in the labor market was performed according to Eurostat four-element typology, which distinguishes the following categories (Eurostat, 2017):

- Exclusively in education.
- Exclusively in employment.
- Both in education and in employment.
- Neither in employment nor in education or training (NEET).

4.1. Exclusively in education and combining education with employment

The youth education can be realized in a formal (compulsory institutional education) as well as in a non-formal way (facultative participation in the training, apprenticeships or postgraduate studies). The youth have possibilities to acquire skills through self-education (trial and error method) or combining work and education. Entering into the labor or apprenticeship market not connected with the studying field may indicate ambition and self-reliance to the potential employer.

In 2011, 36.3% of the youth in the EU at the age of 15-29 were undergoing only formal education while the informal education was 16.6%. In the case of combining formal education with employment, the indicator level reached 9.8%, while the indicator referring to combination of employment with non-formal education reached the level of 37.3%. In 2019, 36% of the Europeans at the age of 15-29 remained in the formal education system exclusively, the value of non-formal education was 13.7%. In the case of individuals who took up employment and remained in the formal education system, in 2019 in the EU the value was 11.2%, and in the case of employment and non-formal education the value level was 39.1%. The analysis of the given values in the research period shows a slight growth of the proportion of young people who combine employment with formal education (increase of 1.4 pp.) The upward tendency can be noted among people who combine employment with non-formal education (increase of 1.8 pp.).

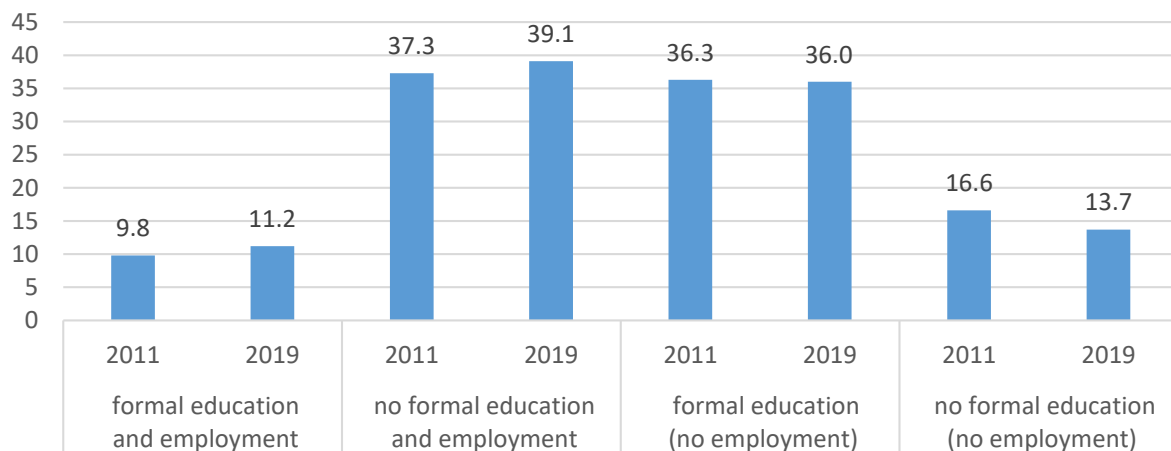


Figure 1. Young people by education and employment status, EU (% share)

According to the Eurostat data (2020a) the greatest number of young people at the age of 15-29 in 2019 who linked employment with formal education was noted in the Netherlands, Denmark and Germany where the value reached equivalent to 36%, 26.5% and 21.9%. In the case of combining employment with non-formal education, the highest proportion of young people at the age of 15-29 who used this form of professional activity was noted in Malta (57.4%), the United Kingdom (50.6%) and Cyprus (48.5%) (Eurostat, 2020a). The largest number of young people at the age of 15-29 in 2019 who remained only in the system of formal education was noticed in Greece (50.1%), Italy (45.2%) and Portugal (43.8%) (Eurostat, 2020a). Whereas in the case of the ones remaining exclusively in the system of non-formal education, the greatest number of young people using this system was in Italy (23.1%), Greece (18.6%) and Spain (18.1%) (Eurostat, 2020a).

4.2. Exclusively in employment

The youth employment indicator comparing the years 2011 and 2019 shows an increasing tendency referring to both, the whole population of young people analyzed in a study case group and with a gender division study. The highest growth of employment which occurred in the research period was noticed among European females (increase of 3.4%). According to the Eurostat database (2020b) the highest proportion of males employed in 2019 was noticed in the Netherlands (72.9%), Malta (68.7%) and Austria (68%). The highest growth values applied to females appeared also in the Netherlands (74.3%), Malta (64.5%) and the United Kingdom (62.8%) (Eurostat, 2020b).

4.3. Neither in employment nor in education or training (NEET)

The age in which a young person decides to start a career depends on social background (e.g., parents' education degree) and general background (e.g., the size of the place of inhabitancy) (Kutwa, 2018). The quality of this career start strongly relies on the quality of education and competency. Young people are, in particular, subject to the barrier, which impedes the fluent transformation from the education to the employment system. In the source literature, the following barriers, which can be applied to youth entering the labor market, can be distinguished:

- Lack of work experience.
- Lack of matching the competencies and skills to the employers' needs.
- Lack of developed community network supporting the process of finding the satisfactory employment possibilities.
- Discouragement or lack of motivation.
- Health restrictions.
- Early parenthood.
- Family and close relatives (unemployment and/or low education level of the parents, poverty, crime, addiction to psychoactive substances, alcohol etc.)

It is a common phenomenon that the first job of youth diverges from their dreams and ideas. Low

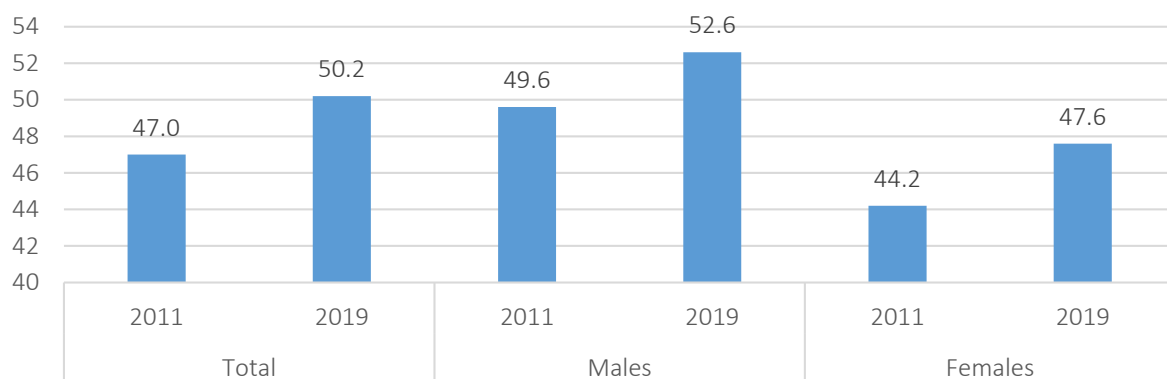


Figure 2. Youth employment rate, EU (% share)

payment or completing simply tasks required at certain work positions can lead to discouragement. The attractive working conditions appear after some work experience gaining. Nevertheless, the later a young person enters the professional activity, the smaller opportunity of finding a suitable employment or any employment at all appear.

The NEET population occurs among the youth. The term “NEET population” was used for the first time in 1999 in the British government report ‘Bridging the Gap’, in the context of the teens between 16 and 18, who was neither in employment nor in education or training during the period of 6 months (Rogozińska & Pawełczyk, 2014). The NEET population is defined as a three times null generation, which means the youth who are not in education, employment, or training. The NEET population is not a homogeneous group of people; this is a very diverse group. The following subgroups can be distinguished among the NEET population:

- Conventionally unemployed (short and long-term unemployed).
- Unavailable (include young people who are unavailable due to family responsibilities and those young who are unavailable due to illness or disability).
- Disengaged (this category includes discouraged workers and young people who are pursuing dangerous and asocial lifestyles).
- Opportunity seekers (include young people who are seeking work or training but are holding out for the right opportunity).

- Voluntary NEETs (constructively engaged in other activities such as art., music and self-directed learning).

The factors determining the subgroup of NEET population can overlaps with each other, which may result in multiplied strength of the impact on the personal and professional situation of a young person.

Members of NEET population constitute something more than just ‘unemployed youth’; the notion also applies to the occupationally passive graduates (unemployed and not searching for employment), individuals who completed their education and have never entered the labor market (Kurzawa, 2018).

The indicator relevant to NEET population at the age of 15-29, analyzing the period 2011–2019, showed a decreasing tendency in both groups: the whole population of one particular group and the group with a gender division. The Eurostat database (2020c) shows that the highest percentage of males at age of 15-29 in 2019 who are the members of the NEET population was noticed in Italy (20.2%), Greece (16.4%), Spain (14.4%) and Bulgaria (13.2%). In the case of females who are the members of NEET population, the highest percentage was noticed in Italy (24.3%), Romania (22.1%), Bulgaria (20.3%), Slovakia (19.5%), Greece (19.1%) and Hungary (17.9%) (Eurostat, 2020c).

Apart from the above characteristics of the education and profession activity of the youth at age of 15-29 in the European labor market, it must be stated that the crucial factor describing the situation of this group of people is the unemployment indicator. The pro-

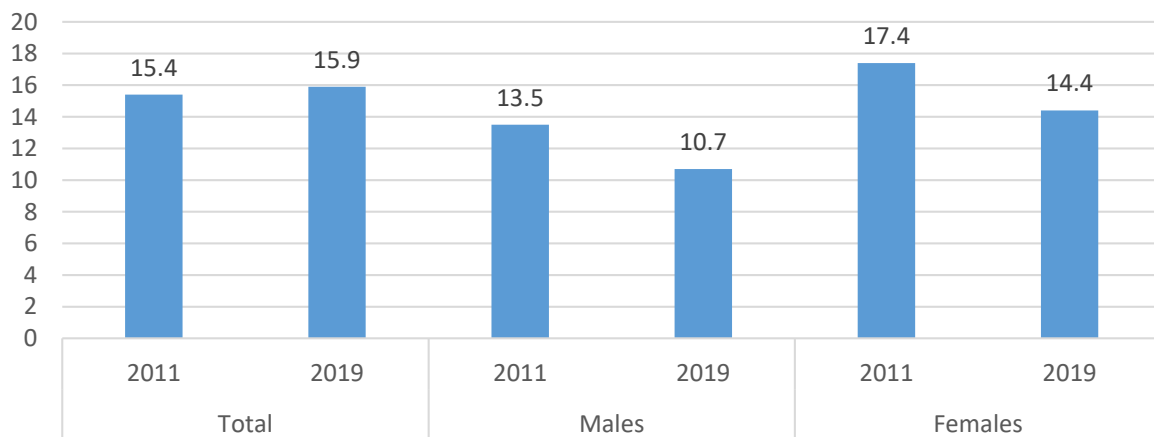


Figure 3. NEET rates, EU (% share)

longing unemployment weakens the motivation to search for employment and leads to low self-esteem and self-confidence.

According to Eurostat (2020d) database, in 2019, 10.7% of the young Europeans between the age of 15-29 remained unemployed. In 2011 the same indicators reached 16.6%. The highest point of unemployment among this group was recorded in 2012–2013, with the indicator of 17.9% and 18.4% (Eurostat, 2020d). In 2019 the highest unemployment rate among people at the age of 15-29 appeared in Greece (28.2%), Spain (24.7%) and Italy (22.4%), while the lowest unemployment rate was noticed in the Czech Republic (3.6%) and Germany (4.3%) (Eurostat, 2020d). In the case of males at the age of 15-29 in 2019, the highest unemployment rate was recorded in Greece (25.3%), Spain (24.2%) and Italy (21.6%), while the lowest rate appeared in the Czech Republic (3.4%) (Eurostat 2019d). In the case of females, the highest unemployment rate in 2019 was noticed in Greece (31.5%), Spain (25.4%), and Italy (23.5%), while the lowest in Germany (3.7%) (Eurostat 2020d).

4.4. The structure of the EU countries in terms of educational and occupational activity

The outcomes of the presented cluster analysis resulted in 4 classes of countries, which are char-

acterized by similar features (Table 3). The first class included 8 countries, which showed poor information and strong communication skills. Moreover, the first class features a medium level of the NEET rate. Poor information, communication and programming competencies of young people dominated in the second class. The third class was dominated by strong competences in information, communication, programming and problem-solving skills. The third-class countries were characterized by the low NEET rate. The last fourth class had a medium level of NEET rate, strong information and communication skills and poor problem-solving skills.

As a result of the conducted procedure based on NEET generation and digital competencies the value of the adjusted Randa Index was obtained at the level of 0.5602057.

5. DISCUSSION

The results obtained confirm that digital skills are the main determinant of professional activity of young people. Brynjolfsson and McAfee (2014) demonstrated a clear increase in the demand for employees with digital skills. The analysis by type of educational and professional activity of young people conducted in the EU member countries

Table 3. The characteristics of the selection of the European Union countries – the results of the cluster analysis

Source: Authors' elaboration.

Class	Country group	Characteristics
1	Belgium, the Czech Republic, Ireland, France, Latvia, Lithuania, Poland, Slovakia	medium NEET rate medium NEET rate among higher education graduates poor digital competencies in searching for education offers, studying and training offers, job offers and applying for them strong digital competencies in sending and receiving e-mail messages
2	Bulgaria, Italy, Romania, Cyprus, Greece	high NEET rate high NEET rate among higher education graduates poor digital competencies in searching for job offers and applying for them, in searching for information about education, studying, training, sending and receiving e-mail messages, creating the websites, blogs and using online banking
3	Denmark, Germany, Estonia, Malta, the Netherlands, Austria, Finland, Sweden, the United Kingdom	low NEET rate low NEET rate among higher education graduates strong digital skills in searching for job offers and applying for them, searching for information about education offers, studying and training, sending and receiving e-mail messages, creating websites and blogs and using online banking
4	Spain, Croatia, Slovenia, Portugal, Hungary, Luxembourg	medium NEET rate medium NEET rate among higher education graduates strong digital competencies in searching for job offers and applying for them, in searching for information about education, studying, training, sending and receiving e-mail messages poor digital skills in using online banking

allowed identification of four groups of countries, differing in the levels of both the NEET rate and the digital skills. The digital skills have been grouped additionally into competences in the field of information, communication, problem-solving and programming skills. The group of countries with the lowest NEET rate proved to include those where young people showed strong digital skills in all the dimensions analyzed. This means that each dimension of digital competences is important for the labor market.

The research results can be used in modeling the educational programs and in modernizing

the labor market instruments and institutions. They will contribute to the improvement of labor market situation (employment of young people), in particular that of young people belonging to NEET generation. European governments should focus on developing digital competences among the NEETs because only then the young will be able to take up interesting and well-paid jobs. In this way, the digital sector will acquire access to a wider pool of talent to meet its human resource needs in a variety of positions. Due to investment in their own digital skills, the NEETs can enjoy a better and more stable working life.

CONCLUSION

The aim of the paper is to rank countries that are similar in terms of the selected diagnostic variables: in terms of digital competencies held and variables related to the youth professional activity.

The study shows that percentage of young people (at the age of 15-29) undergoing formal and non-formal education decreased. The percentage of young people (at the age of 15-29) who gained employment remaining in formal education, as well as in non-formal education, increased. Young people at the age of 15-29 in terms of the EU employment indicator were characterized by the increasing tendency in both groups of the analyzed population and of the gender division. NEET population at the of 15-29 showed a decreasing tendency in both groups of the analyzed population and of the gender division.

As a result of the cluster analysis, the third country class, in which the NEET rate was placed on the low level (also among people with higher education), was characterized by strong skills in all four analyzed dimensions of digital competencies. Whereas the second class of the countries, in which the NEET rate was at the high level (also among people with higher education), was characterized by poor skills in all four analyzed dimensions of digital competencies. It means that gaining the digital competencies enables young people to participate in communities and consequently gives them more opportunity to become professionally active.

AUTHOR CONTRIBUTIONS

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Writing – review & editing: Iwona Madej-Kurzawa, Katarzyna Pieczarka, Grażyna Węgrzyn.

REFERENCES

1. Arms, D., & Bercik, T. (2013). Filling jobs wisely: How companies use talent supply chain management to link human capital to business needs. *Strategic Finance*, 38-45.
2. Bawden, D. (2008). Origins and concepts of digital literacy. In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, policies & practices* (pp. 17-32). New York: Peter Lang.
3. Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York – London: W.W. Norton & Company.
4. Calvani, A., Fini, A., & Ranieri, M. (2010). Digital Competence in K-12. Theoretical Models, Assessment Tools and Empirical Research. *Analisi Nr 40*, 157-171. <https://doi.org/10.7238/A.V0140.1151>
5. Carretero, S., Vuorikari, R., & Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*. Luxembourg: Publication Office of the European Union. Retrieved from <https://publications.jrc.ec.europa.eu/repository/handle/JRC106281>
6. Chojnicki, Z. (2001). Wiedza dla gospodarki w perspektywie OECD. In A. Kukliński (Ed.), *Gospodarka oparta na wiedzy. Wyzwania dla Polski XXI wieku* (p. 82). Warszawa: Wydawnictwo Komitetu Badań Naukowych.
7. European Commission. (2020). *Education and Training Monitor* (Working Paper). Retrieved from <https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/en/chapters/chapter1.html#ch1-1>
8. European Commission. (2021). *Digital skills and jobs* (Working Paper). Retrieved from <https://digital-strategy.ec.europa.eu/en/policies/digital-skills-and-jobs>
9. European Union. (2006). Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning (2006/962/EC). *Official Journal of the European Union L 394/10*. Retrieved from <https://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF>
10. Eurostat. (2017). *Being young in Europe today – labour market – access and participation* (Statistical Article). Retrieved from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Being_young_in_Europe_today_-_labour_market_-_access_and_participation
11. Eurostat. (2020a). *Participation rate of young people in formal education by sex, age and labour status [edat_lfse_19]* (Statistical Article). Retrieved from <https://ec.europa.eu/eurostat/data/database>
12. Eurostat. (2020b). *Youth employment rate by sex, age and country of birth [yth_empl_020]* (Statistical Article). Retrieved from <https://ec.europa.eu/eurostat/data/database>
13. Eurostat. (2020c). *Young people neither in employment nor in education and training by sex, age and labour status (NEET rates) [yth_empl_150]* (Statistical Article). Retrieved from <https://ec.europa.eu/eurostat/data/database>
14. Eurostat. (2020d). *Youth unemployment rate by sex, age and country of birth [yth_empl_100]* (Statistical Article). Retrieved from <https://ec.europa.eu/eurostat/data/database>
15. Ferrari, A. (2013). *DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe* (JRC Scientific and Policy Reports). Luxembourg: Publications Office of the European Union. <https://doi.org/10.2788/52966>
16. Gillies, D. (2015). *Human Capital Theory in Education*. Scotland, UK: University of the West of Scotland, Ayr. Retrieved from https://www.academia.edu/35700794/H_Human_Capital_Theory_in_Education
17. Hulten, C. R. (2017). *The Importance of Education and Skill Development for Economic Growth in the Information Era* (Working Paper No. 24141) (pp. 23-27). National Bureau of Economic Research. Retrieved from <https://www.nber.org/papers/w24141>
18. Hawkes, D., & Ugur, M. (2012). *Evidence on the relationship between education, skills and economic growth in low-income countries: a systematic review*. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London. Retrieved from <https://assets.publishing.service.gov.uk/media/57a08a7de5274a27b200060f/Q2-Education-skills-growth-2012Hawkes-report.pdf>
19. Luca, G., Mazzocchi, P., Quintano, C., & Rocca, A. (2019). Italian NEETs in 2005–2016: have the Recent Labour Market Reforms Produced Any Effect? *CESifo Economic Studies*, 65(2), 154-176. <https://doi.org/10.1093/cesifo/ifz004>
20. Kauffman, L., & Rousseeuw, P. (2005). *Finding Groups in Data. An Introduction to Cluster Analysis*. New Jersey: John Wiley&Sons Inc.
21. Kefela, G. T. (2010). Knowledge-based economy and society has become a vital commodity to countries. *International Journal of Educational Research and Technology*, 5(7), 160-166. Retrieved from https://academicjournals.org/article/article1381828238_Kefela.pdf
22. Kowalczyk, L. (2017). Cyfryzacja w procesie postępu cywilizacyjnego i jej współczesna rola w innowacyjności. *Prace Naukowe Wyższej Szkoły Zarządzania i Przedsiębiorczości z siedzibą w Wałbrzychu*, 43, 10-13. Retrieved from <http://bazekon.icm.edu.pl/bazekon/element/bwmeta1.element.ekon-element-000171502244>
23. Kutwa, K. (2018). *Raport Młodzi 2018. Polski i Europejski rynek pracy. Dla młodych?* (p. 88).

- Warszawa: Grupa EPL. Retrieved from <http://mlodzi2018.pl/files/raport5.pdf>
24. Kurzawa, I. (2018). Generacja NEET w Polsce i wybranych krajach Unii Europejskiej. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 529, 150-161. <https://10.15611/pn.2018.529.13>
 25. Matli, W., & Ngoepe, M. (2020). Capitalizing on digital literacy skills for capacity development of people who are not in education, employment or training in South Africa. *African Journal of Science, Technology, Innovation and Development*, 12(2), 129-139. <https://doi.org/10.1080/20421338.2019.1624008>
 26. Mishchuk, H., Roshchik, I., Sułkowska, J., & Vojtovič, S. (2019). Prospects of assessing the impact of external student migration on restoring country's intellectual potential (the case study of Ukraine). *Economics & Sociology*, 12(3), 209-219. <https://doi.org/10.14254/2071-789X.2019/12-3/14>
 27. McDonald, C. (2021). *Young people don't feel they have advanced digital skills for work*. Computer Weekly.com. Retrieved from <https://www.computerweekly.com/news/252498241/Young-people-dont-feel-they-have-advanced-digital-skills-for-work>
 28. Niankara, I., & Traoret, R. (2019). Formal education and the contemporaneous dynamics of literacy, labour market participation and poverty reduction in Burkina Faso. *International Journal of Education Economics and Development*, 10(2), 148-172. <http://dx.doi.org/10.1504/IJEEED.2019.10018507>
 29. OECD. (2015). *Relationship between skills and economic growth, in Universal Basic Skills: What Countries Stand to Gain*. Paris: OECD Publishing. <https://doi.org/10.1787/9789264234833-5-en>
 30. OECD. (2016). *Skills for a digital world. Policy Brief on the Future of Work*. Paris: OECD Publishing. Retrieved from <https://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf>
 31. Prokurat, S. (2016). *Praca 2.0. Nie ukryjesz się przed rewolucją rynku pracy*. Gliwice: Helion.
 32. Rogozińska-Pawelczyk, A. (2014). Pokolenie NEET czyli młodzież bez pracy, nauki i szkolenia: charakterystyka, koszty i rozwiązania polityczne na przykładzie Europy. In A. Rogozińska-Pawelczyk (Ed.), *Pokolenia na rynku pracy*, (p. 112). Łódź: Wydawnictwo Uniwersytetu Łódzkiego. Retrieved from https://pdf.helion.pl/e_0e79/e_0e79.pdf
 33. Singh, A., & Panackal, N. (2017). Youth and sustainable development – overview, theoretical framework and further research directions. *International Journal of Process Management and Benchmarking*, 7(1), 59-78. <http://dx.doi.org/10.1504/IJPMB.2017.10000813>
 34. StatSoft (2019). *Analiza Skupień* (Electronic Statistics Textbook). Retrieved from https://www.statsoft.pl/textbook/stathome_stat.html?https%3A%2F%2Fwww.statsoft.pl%2Ftextbook%2Fstcluan.html
 35. Tapscott, D. (1996). *The Digital Economy. Promise and Peril in the Age of Networked Intelligence*. New York: McGraw-Hill.
 36. Tehseen, S., & Sajilan, S. (2016). Network competence based on resource-based view and resource dependence theory. *International Journal of Trade and Global Markets*, 9(1), 60-82. <http://dx.doi.org/10.1504/IJTGM.2016.074138>
 37. Walesiak, M. (2008). Procedura analizy skupień z wykorzystaniem programu komputerowego ClusterSim i środowiska R. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 7, 45-46. Retrieved from http://keii.ue.wroc.pl/pracownicy/mw/2008_Walesiak_Taksonomia_15_PN_UE_7_1207.pdf
 38. World Economic Forum. (2014). *Matching Skills and Labour Market Needs: Building Social Partnerships for Better Skills and Better Jobs*. Switzerland: Global Agenda Council on Employment at the World Economic Forum. Retrieved from <https://www.weforum.org/reports/matching-skills-and-labour-market-needs-building-social-partnerships-better-skills-and-better-jobs>
 39. World Economic Forum. (2018). *The Future of Jobs Report*. Geneva: World Economic Forum. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf