Correlations between Individuals' level of digital skills and the ways of obtaining ICT skills

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Abstract

Our paper aims to identify the correlations between Individuals' level of digital skills and the ways of obtaining ICT skills to fill the digital gap. Pearson correlation and Kendall's tau-b correlation were run to determine the relationship between individuals' level of digital skills in 2019 (14 variables, 11 with normal distribution) and the ways of obtaining ICT skills in 2018 (6 variables, only one with normal distribution) amongst 34 European countries. In the case of access to the new digital technologies, the digital skills for individuals with digital skills above the basic level in a) Communication, information, or problem-solving could be obtained at the demand formulated by external factors, i.e., employers or public entities; b) Software could as it is the case of the ICT professionals could be obtained at the demand formulated by internal factors, i.e., the individual themselves. The study's originality is the need for analysis to diversify the ways to acquire basic digital skills for persons without or with a low level. Our main contribution is to better understand the priorities to fill the digital gap for adults. The way individuals learn through free online training or self-study is not strongly correlated with the lack of digital skills.

Keywords

Basic Digital skills, level of digital skills, way to obtain ICT skills, digital gap, learning

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Introduction

Digital transformation is a profound and holistic cohesive process focused on the desiderate to "leave no one behind" (Lincaru, 2020). Beyond global competitiveness, boosting jobs and growth are the digital skills for all as a criterion to build a cohesive society sustainably, according to Agenda 2030 (Rosa, 2017). Given the pervasive role of digital technology in sectors ranging from business to transport to agriculture, there is a growing emphasis on measuring and enhancing digital skills across the EU. Digital skills are becoming increasingly essential for both personal and professional life. More than 90% of European jobs require basic digital knowledge alongside traditional skills like literacy and numeracy. However, approximately 32% of Europeans lack basic digital skills (European Data, 2023). Digital skills deficit is quantifiable in gap skills. The World Economic Forum's Forecasts since 2020 show that employers plan to reskill or upskill 70% of their employees up to 2025 to fill the digital gap (World Economic Forum, 2020; Van Laar et al., 2020) The EU has implemented various policies and initiatives, such as the European Skills Agenda, the Digital Education Action Plan, and the Digital Skills and Jobs Coalition, to address the digital skills gap.

Our work addresses the specific research question of how we can acquire skills in ICT in correlation with the level of digital skills. We explore the relationship between the level of digital skills and how individuals obtain ICT skills (seen as digital skills). In the case of normally distributed variables, we apply Pearson correlation to identify significant linear relationships, and for non-normally distributed variables, we apply Kendall tau b correlation.

1. Review of the scientific literature

Zagada (2019) shows that this situation presents a critical training challenge that leaders must confront. Notably, the Cornerstone report has shown that 73% of Baby Boomers report a lack of investment in their training by employers, compared with 53% of Millennials. This discrepancy is often attributed to the belief that older employees, the silent and alfa generation, may be nearing retirement and require less training (Cirilli et al., 2019). Digital competence encompasses the skillful, critical, and mindful utilization and interaction with digital technologies for educational purposes, professional settings, and societal engagement. It covers a broad range of skills, including literacy in information and data, communication and collaboration abilities, understanding of media, creation of digital content (such as programming), maintaining safety (which encompasses digital well-being and cybersecurity skills), addressing questions of intellectual property, and problem-solving and critical thinking capabilities (Vuorikari et al., 2022a, European Commission, 2018).

Education plays an important role in digital skills development, which is why they are the first that should be trained and updated (Caena and Redecker, 2019; Du et al., 2023; Sanchez-Cruzado et al., 2021) Digital or IT skills are a range of abilities and knowledge to use digital devices and applications (Akaliza, 2022). Digital capabilities extend beyond merely acquiring the skills to operate a particular tool or software; they involve comprehending its application in real-world scenarios. Adopting this perspective is key to fully leveraging your participation in a digital society (Akaliza, 2022).

In 2013, the first DigComp reference framework defined digital competence as a combination of 21 competencies grouped into five main areas (Punie and Brecko, 2013). Since 2016, the five areas are Information and data literacy, Communication and collaboration, Digital content creation, Safety, and Problem-solving. According to the variety or complexity of activities performed, two levels of skills (basic and above basic) are computed for each dimension. Finally, an overall digital skills indicator is calculated as a proxy of individuals' digital competencies and skills: foundation, intermediate, advanced, and highly specialized (Caena and Redecker, 2019).

Ben Youssef et al. (2022) explores the digital divide: the lack of appropriate digital skills is, among the other factors mentioned above, the main driver of the digital divide and requires appropriate training. The findings highlighted the differences in the needs of so-called baby boomers, Gen X, millennials, and Gen Z. They must be addressed with different types of training and digital skilling, upskilling, and reskilling programs. The ways of obtaining digital skills differ in terms of age (Blažič and Blažič, 2020) activity (Van Laar et al., 2020; Van Laar et al., 2018). Bernacki et al. (2020) explore if short digital training modules help the students to improve their learning process. The most studied aspect is the digital skills for young people (De Coninck et al., 2024) or for older (Hargittai et al., 2019) as the extreme of the range 16-74 years and more exposed to exclusion. Less studied are the ways of obtaining the knowledge and skills and the implication of stakeholders to support the proper solutions.

2. Research methodology and data collection

The present study used data from Eurostat according to the European Digital Competence Framework (European Commission, 2022a; European Commission, 2022b): 14 variables for Individuals' level of digital skills typologies for 2019 and 6 variables for the Way of obtaining ICT skills typologies for 2018 for 34 European countries.

a) Individuals' level of digital skills [isoc_sk_dskl_i] This indicator was developed in cooperation with users in the European Commission based on the Digital Competence Framework and in the context of the Digital Single Market strategy, updated methodology for the measurement of digital skills using the Digital Skills Indicator (DSI) is by Vuorikari *et al.* (2022). Digital skills indicators are composite indicators based on selected activities related to internet or software use performed by individuals aged 16-74 in four specific areas (information, communication, problem-solving, software skills) (Table 1). It is assumed that individuals having performed certain activities have the corresponding skills. Therefore, the indicators can be considered as a proxy of the digital competencies and skills of individuals.

Table no. 1. Variables for Individuals' level of digital skills

	Variable code	Variable content
1	I_DSK_I_B	Individuals who have basic information skills
2	I_DSK_I_AB	Individuals who have above basic information skills
3	I_DSK_C_B	Individuals who have basic communication skills
4	I_DSK_C_AB	Individuals who have above basic communication skills
5	I_DSK_PS_B	Individuals who have basic problem-solving skills
6	I_DSK_PS_AB	Individuals who have above basic problem-solving skills
7	I_DSK_S_B	Individuals who have basic software skills
8	I_DSK_S_AB	Individuals who have above basic software skills
9	I_DSK_L	Individuals who have low overall digital skills
10	I_DSK_B	Individuals who have basic overall digital skills
11	I_DSK_AB	Individuals who have above basic overall digital skills
12	I_DSK_BAB	Individuals who have basic or above basic overall digital skills
13	I_DSK_X	Individuals who have no overall digital skills
14	I_DSK_NA	The digital skills could not be assessed because individuals have not used the internet in the last 3 months

Source: Eurostat (2023)

b) Ways of obtaining ICT skills [isoc_sk_how_i__custom_10156680] Eurostat measures the ways to obtain/improve digital skills at individual level relating to the use of computers, software, or applications using the following typologies (Table 2).

Table no. 2. Way of obtaining ICT skills

	Variable code	Variable content
1	I_SKTP_FRE	Individuals carried out **free online training or self-study** to improve skills relating to the use of computers, software, or applications
2	I_SKTP_SLF	Individuals carried out **training paid by themselves** to improve skills relating to the use of computers, software, or applications
3	I_SKTP_PUB	Individuals carried out **free training provided by public programs or organizations** to improve skills relating to the use of computers, software, or applications
4	I_SKTP_EMP	Individuals carried out **training paid or provided by the employer** to improve skills relating to the use of computers, software, or applications
5	I_SKTP_OTJ	Individuals carried out **on-the-job training** to improve skills relating to the use of computers, software, or applications
6	I_SKTP	Individuals carried out **at least one training activity** to improve skills relating to the use of computers, software, or applications

Source: Eurostat (2023)

Methodological steps were Normality checking of variables with the Kolmogorov-Smirnov Test, Visual exploration of the variable's distribution and relationship patterns using scatterplots and histograms, Pearson correlation, Kendall's tau-b (τb) correlation.

We check with NPAR TESTS from SPSS the normality of the 20 analysed variables with the nonparametric test Kolmogorov-Smirnov Test. According to the rule of thumb, we conclude that a variable is not normally distributed if "Sig." < 0.05 for the Null Hypothesis (H_0) that variable is normally distributed.

Visual exploration of the variable's distribution and relationship patterns using scatterplots and histograms was used first.

In view to explore the correlations among pairs of variables from the skill level and way of obtaining ICT skills, we apply the Pearson correlation (Kent State University Libraries., 2017) or Kendall's tau-b (τb) correlation test as a nonparametric alternative to Pearson's (Geert van den Berg, 2022).

3. Results and discussion

The visual exploration is presented in Figure 1 and Figure 2.

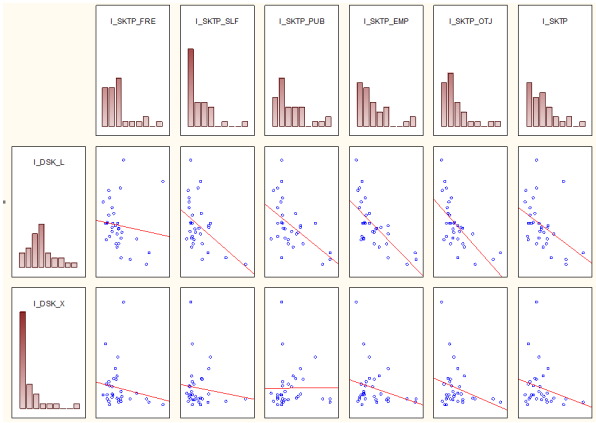

Figure no. 1. Detail for individuals who have low or no overall digital skills and ways of obtaining ICT skills
Source: Calculated by authors

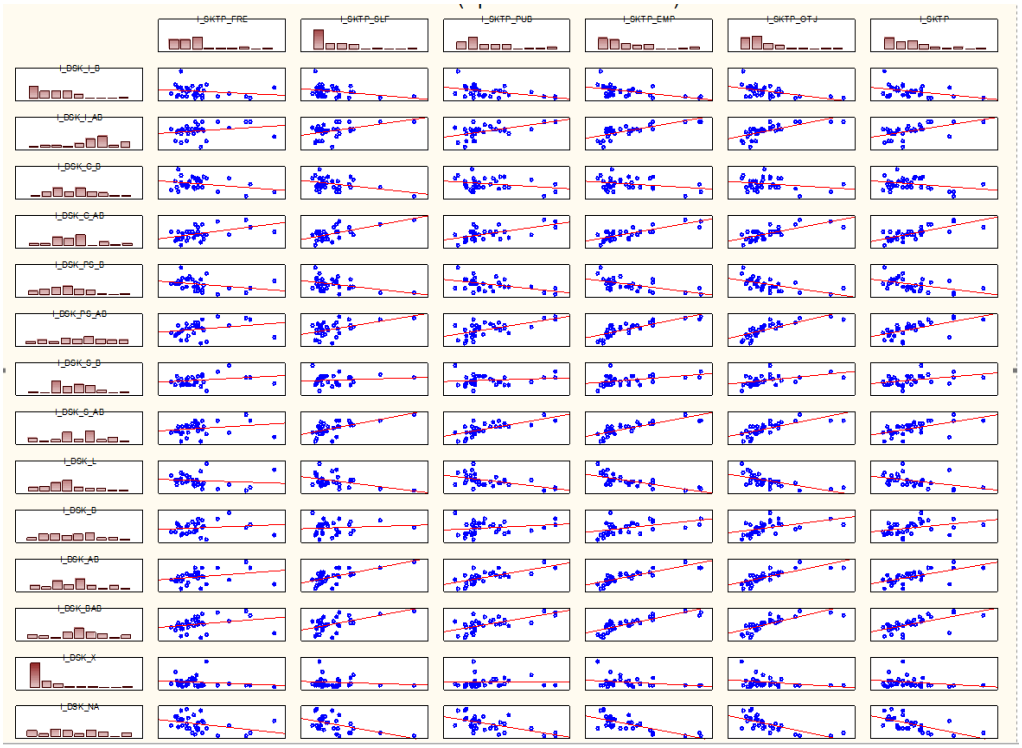

Figure no. 2. The Scatter point and Histogram representation for level of skills and ways of obtaining ICT skill variables packages
Source: Calculated by authors

Looking at the distribution of each variable, it is visible that the variable package "way of obtaining ICT skills" is non-normally distributed across the 34 European countries studied in 2018, except for the variable I_SKTP, which counts "at least one training activity."

Figure 2 clearly shows that the segments with low or no overall digital skills are not correlated with any ways to get the digital skills (Figure 1). We should identify specific intervention programs and training modules to overlap this and not condemn a 1/3 share of the active EU population to professional and social exclusion. Our findings must corroborate with the studies on socio-professional categories to identify the best diversification tools.

In Table 3, we present the normality test. If the "Sig." < 0.05 for the Null Hypothesis (H_0) is not normally distributed. The Pearson Correlation will be applied to the normally distributed variables.

Table no. 3. Descriptive Statistics and the Test One-Sample Kolmogorov-Smirnov Test

Variable name	N	Normal Parameters[a,b]		Most Extreme Differences			Test Statistic	Asymp. Sig. (2-tailed)	Decision
		Mean	Std. Dev.	Absolute	Positive	Negative			
I_SKTP_FRE	34	12.8894	8.32688	.210	.210	-.127	.210	.001[c]	*Reject H0*
I_SKTP_SLF	34	2.7147	2.51377	.188	.188	-.179	.188	.004[c]	*Reject H0*
I_SKTP_PUB	34	3.1465	2.47366	.208	.208	-.142	.208	.001[c]	*Reject H0*
I_SKTP_EMP	34	7.7932	6.97404	.209	.209	-.140	.209	.001[c]	*Reject H0*
I_SKTP_OTJ	34	10.3194	8.89271	.191	.191	-.138	.191	.003[c]	*Reject H0*
I_SKTP	34	23.6168	12.79476	.137	.137	-.118	.137	.104[c]	Retain H0
I_DSK_I_B	34	9.9294	4.58991	.112	.104	-.112	.112	.200[c,d]	Retain H0
I_DSK_I_AB	34	68.1788	14.97412	.150	.113	-.150	.150	.051[c]	Retain H0
I_DSK_C_B	33	13.7018	4.69985	.092	.092	-.068	.092	.200[c,d]	Retain H0
I_DSK_C_AB	33	67.4167	10.95056	.136	.136	-.054	.136	.128[c]	Retain H0
I_DSK_PS_B	34	21.9424	7.46941	.174	.174	-.095	.174	.011[c]	*Reject H0*
I_DSK_PS_AB	34	52.0056	18.84097	.086	.073	-.086	.086	.200[c,d]	Retain H0
I_DSK_S_B	34	18.3362	5.50468	.111	.111	-.099	.111	.200[c,d]	Retain H0
I_DSK_S_AB	34	36.9591	13.24873	.102	.071	-.102	.102	.200[c,d]	Retain H0
I_DSK_L	33	30.9233	10.31598	.172	.172	-.054	.172	.015[c]	*Reject H0*
I_DSK_B	33	23.0276	5.32939	.092	.092	-.068	.092	.200[c,d]	Retain H0
I_DSK_AB	33	30.1988	13.22434	.096	.096	-.069	.096	.200[c,d]	Retain H0
I_DSK_BAB	33	53.2270	16.52736	.087	.087	-.079	.087	.200[c,d]	Retain H0
I_DSK_X	32	.7991	.83639	.228	.228	-.212	.228	.000[c]	*Reject H0*
I_DSK_NA	33	15.0742	8.80398	.090	.090	-.066	.090	.200[c,d]	Retain H0

Note: a-Test distribution is Normal; b-Calculated from data; c-Lilliefors Significance Correction; d-This is a lower bound of the true significance.

Source: calculated by authors

For all the variable pairs, the level of significance for the Chi-Square independence test, the p-value is higher than the standard alpha value of 0.05, so we retain the null hypothesis H0 for the Chi-square test that asserts the two variables are independent of each other. Respectively, he results is not *significant* – the data suggests that the variables I_SKTP and each selected variable for the level of digital skill are NOT associated.

Individuals carried out at least one training activity to improve skills relating to the use of computers, software, or applications seem to have a statistically significant linear relationship with the magnitude, or strength, of the association is approximately large/strong correlation ($0.5 < |r|$) (Cohen, 1988) Correlation is significant at the 0.01 level (2-tailed):

- positively correlated (Kent State University Libraries., 2017) with above basic level of digital skills for all domains and by domains

a) I_DSK_C_AB Pearson Correlation (r=0.741**), communication skills
b) I_DSK_AB Pearson Correlation (r=0.647**), above basic overall digital skills
c) I_DSK_BAB Pearson Correlation (r=0.641**), basic or above basic overall digital skills
d) I_DSK_PS_AB Pearson Correlation (r=0.613**), problem-solving skills
e) I_DSK_S_AB Pearson Correlation (r=0.591**), software skills
f) I_DSK_I_AB Pearson Correlation (r=0.574**), information skills

- negatively correlated (Kent State University Libraries., 2017)

I_DSK_NA Pearson Correlation (r=-.653**), The digital skills could not be assessed because individuals have not used the internet in the last 3 months

4. Discussions

Based on the results, weight and height have a statistically significant linear relationship (r =.513, p < .001). The direction of the relationship is positive (i.e., height and weight are positively correlated), meaning that these variables tend to increase together (i.e., greater height is associated with greater weight). The association's magnitude, or strength, is approximately moderate (.3 < | r | < .5).

In conclusion, individuals with basic or above basic overall digital skills have a statistically significant linear relationship with approximately a large/strong correlation with all four dimensions and each dimension of obtaining ICT skills: communication, problem-solving, software skills, and information skills. also have a statistically strong negative correlation with a lack of internet use. In other words – if a person does not use the internet, it is impossible to assess his/ her level 0 digital skills and if an individual has all or at least one of the 4 dimensions of basic digital skills.

A Kendall's tau-b correlation was run to determine the relationship between the level of skills and ways of obtaining ICT skills among 34 European countries for the variables with a non-normal distribution.

There is a strong, positive monotonous relation between the level of skills and ways of obtaining ICT skills, which was statistically significant, problem-solving (τb = >0.35, p < .01) (Geert van den Berg, 2022) in the specific subcases:

- I_DSK_B Individuals who have basic overall digital skills, positive monotonous with the training paid or provided by the employer (I_SKTP_EMP) and on-the-job training (I_SKTP_OTJ);
- I_DSK_I_AB Individuals who have the above basic information skills. I_DSK_C_AB Individuals who have above basic communication skills, I_DSK_PS_AB Individuals who have above basic problem-solving skills, I_DSK_BAB have basic or above basic overall digital skills has a strong, positive monotonous with the training paid or provided by the employer (I_SKTP_EMP) and on-the-job training (I_SKTP_OTJ); out free training provided by public programs or organizations (I_SKTP_PUB);
- Individuals who have above basic software skills (I_DSK_S_AB) or Individuals who have above basic overall digital skills I_DSK_AB have a strong, positive monotonous with the training paid or provided by the employer (I_SKTP_EMP) and on-the-job training (I_SKTP_OTJ); out free training provided by public programs or organizations (I_SKTP_PUB) and also with the Individuals carried out training paid by themselves to improve skills relating to the use of computers, software, or applications I_SKTP_SLF.

The level of skills increases monotonously (except basic problem-solving) with the diversification of the ways of obtaining ICT skills (except the free online training or self-study) for all individuals with at least one dimension of the digital skill above the basic level. Problem-solving is not enough for ICT skills; it also requires information, communication, and software digital skills development. Also, the ICT professionals drive themselves the carries and, more than that, invest in digital training themselves. Training for digital skills development proves efficient if there is at least one digital skill above the basic level (except basic problem-solving digital skills), which indicates an external driver for digital training: the employer or free public programs.

There is a strong, negative monotonous relation between the level of skills and ways of obtaining ICT skills, which was statistically significant, problem-solving (|τb| = >0.35, p < .01) (Geert van den Berg, 2022) in the specific subcases:

- I_DSK_I_B Individuals who have basic information skills have a strong, negative monotonous with the training paid or provided by the employer (I_SKTP_EMP) and on-the-job training (I_SKTP_OTJ);
- Individuals who have basic problem-solving skills (I_DSK_PS_B), Individuals who have low overall digital skills (I_DSK_L), and The digital skills could not be assessed because individuals have not used the internet in the last 3 months (I_DSK_NA) has a strong, negative monotonous with the training paid or provided by the employer (I_SKTP_EMP) and on-the-job training (I_SKTP_OTJ); out free training provided by public programs or organizations (I_SKTP_PUB);

Only basic information skills or basic problem-solving digital skills present the same relationship with obtaining ICT skills as the individuals with low overall digital skills, which is a strong negative monotonous relationship. That means in the case of individuals with low overall digital skills, with only basic information skills or basic problem-solving digital skills, the statistically registered ways of

obtaining ICT skills prove inefficient, unappropriated, or even useless. Finally, in the case of lack of internet access, it is impossible to obtain ICT skills.

Conclusions

Filling *the digital gap* is a dynamic process affected by various factors like technological cycles, access to digital infrastructure, and the capacity to acquire new digital skills to exploit new digital technologies. In the case of lack of access to digital infrastructure, as it is the case of individuals who have not used the internet in the last three months, there is no case to talk about ways to obtain ICT skills.

The paper's main contribution is the emphasis on the pyramid of the digital skills of an individual relative to the basic level of digital skills in four specific areas (information, communication, problem-solving, and software skills). Access to digital infrastructure is at the base, the prerequisite for any digital skills development. Locations with a lack of digital infrastructure need public infrastructure investment. Immediately above is the need to diversify learning and develop specific ways for obtaining basic digital skills for individuals without or with low levels of digital skills, in short, programs for digital literacy – but in a more effective & accessible way.

For individuals with digital skills above the basic level in communication, information, or problem-solving, training could be obtained at the demand formulated by external factors, i.e., employers or public entities. For software skills, the case of the ICT professionals could be obtained at the demand formulated by internal factors, i.e., the individual themselves.

A new research direction is the decision to select and pay for a specific type of program for digital skills development by a specific area and the correlation between the training costs, benefits, and rate of return. Of course, the study has limits due to the lack of data. Only two years were considered, and they are asynchronous. At the same time, we didn't use modern data scraping to extract more complex and relevant information.

Our work contributes to a better understanding of the "leave no one behind" desiderate in the process of digital transformation, pointing towards the basic digital skills as the reference for digital literacy, on the background that digital literacy is an external process dependent first of all by the access to an appropriate digital infrastructure in the same time with costly specialized support to obtain basic digital skills, knowing that these skills could not be acquired free by any individual. The way of learning "Individuals carried out free online training or self-study" is not strongly correlated with no level of digital skills. So, the digital transformation process is a highly expensive process driven by radical new technologies. Not least, the costly specialized support to obtain basic digital skills means it is time to create new ways of obtaining basic digital skills for everyone.

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References

Akaliza, N., 2022. *Digital skills vs. digital capabilities – Library and IT news*. Available at: < https://blogs.kent.ac.uk/isnews/digital-skills-vs-digital-capabilities/ > [Accessed 2 February 2024].

Ben Youssef, A., Dahmani, M. and Ragni, L., 2022. ICT Use, Digital Skills and Students' Academic Performance: Exploring the Digital Divide. *Information*, [online] 13(3), p.129. https://doi.org/10.3390/info13030129.

Bernacki, M.L., Vosicka, L. and Utz, J.C., 2020. Can a brief, digital skill training intervention help undergraduates "learn to learn" and improve their STEM achievement? *Journal of Educational Psychology*, [online] 112(4), pp.765–781. https://doi.org/10.1037/edu0000405.

Blažič, B.J. and Blažič, A.J., 2020. Overcoming the digital divide with a modern approach to learning digital skills for the elderly adults. *Education and Information Technologies*, [online] 25(1), pp.259–279. https://doi.org/10.1007/s10639-019-09961-9.

Caena, F. and Redecker, C., 2019. Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu). *European Journal of Education,* [online] 54(3), pp.356–369. https://doi.org/10.1111/ejed.12345.

Cirilli, E., Nicolini, P. and Mandolini, L., 2019. Digital skills from silent to alpha generation: An overview. In EDULEARN19 *Proceedings 11th International Conference on Education and New Learning Technologies* (pp. 5134-5142). IATED Academy.

Cohen, J., 1988. Statistical Power Analysis for the Behavioral Sciences (2nd ed.). [online] *Routledge*. https://doi.org/10.4324/9780203771587.

De Coninck, D., Vissenberg, J., Joris, W. and d'Haenens, L., 2024. Perceived discrimination and digital inequalities among children and young people: studying the multidimensional concepts of digital skills and digital knowledge. *Information, Communication & Society*, [online] 27(2), pp.350–367. https://doi.org/10.1080/1369118X.2023.2205508.

Du, R., Grigorescu, A. and Aivaz, K.-A., 2023. Higher Educational Institutions' Digital Transformation and the Roles of Digital Platform Capability and Psychology in Innovation Performance after COVID-19. *Sustainability*, [online] 15(16), p.12646. https://doi.org/10.3390/su151612646.

European Commission, 2018. *Council Recommendation on Key Competences for Lifelong Learning*. [online] Available at: < https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01) > [Accessed 2 February 2024].

European Commission. Joint Research Centre., 2022a. *DigComp 2.2, The Digital Competence framework for citizens: with new examples of knowledge, skills and attitudes.* [online] LU: Publications Office. Available at: <https://data.europa.eu/doi/10.2760/115376> [Accessed 2 January 2024].

European Commission. Joint Research Centre., 2022b. *Measuring digital skills across the EU: digital skills indicator 2.0.* [online] LU: Publications Office. Available at: <https://data.europa.eu/doi/10.2760/897803> [Accessed 2 January 2024].

European Data, 2023. *Digital literacy in the EU: An overview.* [online] Available at: < https://data.europa.eu/en/publications/datastories/digital-literacy-eu-overview > [Accessed 2 February 2024]

Geert van den Berg, R., 2022. *Simple Introduction', SPSS Tutorials.* [online] Available at: < https://www.spss-tutorials.com/kendalls-tau/#:~:text=Kendall's%20Tau%20%2D%20Interpretation,-%CF%84b%20%3D%20%2D1&text=%CF%84b%20%3D%200%20indicates%20no,lower%20score%20on%20variable%20B > [Accessed 1 April 2023].

Hargittai, E., Piper, A.M. and Morris, M.R., 2019. *From internet access to internet skills: digital inequality among older adults. Universal Access in the Information Society*, [online] 18(4), pp.881–890. https://doi.org/10.1007/s10209-018-0617-5.

Kent State University Libraries, 2017. *'SPSS TUTORIALS: PEARSON CORRELATION*. [online] Available at: < https://libguides.library.kent.edu/SPSS/PearsonCorr#cite_cohen> [Accessed 3 May 2023].

Lincaru, C., 2020. *The Social Dimensions of Cohesion Policy.* [online] RSA Main.Available at: <https://www.regionalstudies.org/events/the-social-dimensions-of-cohesion-policy/> [Accessed 8 January 2024].

Punie, Y. and Brecko, B., Ferrari, A., 2013. *DIGCOMP: a framework for developing and understanding digital competence in Europe.* [online] LU: Publications Office. Available at: < https://data.europa.eu/doi/10.2788/52966 > [Accessed 8 January 2024].

Rosa, W. ed., 2017. *Transforming Our World: The 2030 Agenda for Sustainable Development. In: A New Era in Global Health.* [online] New York, NY: Springer Publishing Company. https://doi.org/10.1891/9780826190123.ap02.

Sánchez-Cruzado, C., Santiago Campión, R. and Sánchez-Compaña, M.T., 2021. Teacher Digital Literacy: The Indisputable Challenge after COVID-19. *Sustainability*, [online] 13(4), p.1858. https://doi.org/10.3390/su13041858.

Van Laar, E., Van Deursen, A.J.A.M., Van Dijk, J.A.G.M. and De Haan, J., 2018. 21st-century digital skills instrument aimed at working professionals: Conceptual development and empirical validation. *Telematics and Informatics*, [online] 35(8), pp.2184–2200. https://doi.org/10.1016/j.tele.2018.08.006.

Van Laar, E., Van Deursen, A.J.A.M., Van Dijk, J.A.G.M. and De Haan, J., 2020. Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. *SAGE Open*, [online] 10(1), p.215824401990017. https://doi.org/10.1177/2158244019900176.

World Economic Forum, 2020. *The Future of Jobs Report 2020.* [online] World Economic Forum. Available at: <https://www.weforum.org/publications/the-future-of-jobs-report-2020/digest/> [Accessed 2 April 2024].

Zagada, M., 2019. *Managing L&D for a Multigenerational Workforce.* goFLUENT | United States. Available at: <https://www.gofluent.com/us-en/blog/multigenerational-workforce-ld/> [Accessed 22 October 2023].