Enabling digital education: from official statistics to public policy

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Abstract: *This study adopts a theoretical and empirical approach to digital education structured on three levels: the definition of digital education, the statistical analysis of data on digital education, and the evaluation of public policies in digitization. The study aims to provide a comprehensive view of the benchmarks and trends regarding digital education in the post-COVID-19 period, as reflected in official statistics and policies at the European and national levels. The evaluation of digital education in Romania, within EU member countries, is based on a series of statistical indicators provided by Eurostat and the National Institute of Statistics. These indicators include the early school leaving rate, the share of NEETs, the share of people with higher education in the total population, the participation of adults in lifelong learning, the DESI index, the level of digital skills, and computer skills. The research methodology comprises descriptive analysis, boxplot analysis, and regression analysis, ensuring a comprehensive and robust evaluation. The study's results can be used to evaluate progress in achieving the targets proposed by public policies for the digitization of the economy and society in Romania in a European context, providing reassurance of the thoroughness and reliability of the research.*

Keywords: digital, education, learning, skills, technology, statistics, public policy.

1. Introduction

There is more and more talk lately about the future of work in the context of the Fourth Industrial Revolution (4IR), which stands for automation, robotization, accelerated digitization of the production of goods and services, and the expansion of communications through the Internet and smart devices. At this stage of the development of human society, socioeconomic transformations are based on the latest socio-technological phenomenon – digitalization. Through digital technologies, new products and services have been launched that have dramatically changed jobs, professions, personal life, and leisure time. All these aspects of private and public life depend highly on the quality and quantity of human-technology interactions. Today, without a smart devices and an Internet connection, everyday life is hard to imagine (Sima et. al, 2020).

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At the forefront of this global change process are high tech companies that collect, store and process vast amounts of data using artificial intelligence, machine learning, algorithms, the Internet of Things (IoT), blockchain, and applications based on immersive technologies. These technological resources provide quick and practical solutions to problems faced by companies and their customers, assisting or even replacing human decision-making.

Nowadays, not only execution/production activities but also managers' tasks are likely to be automated. The implementation of digitized solutions comprises public and private systems, service providers (social, educational, health, urban planning, land planning), individuals and companies as users or beneficiaries. Smart cities where citizens interact with local authorities through digital platforms and intelligent applications have long been a reality. Many countries have implemented "the smart city" concept to improve local communities' quality of life and to enable sustainable development.

Many jobs based on manual, repetitive tasks that require intense effort will disappear, while others that require digital skills will multiply (Bădoi & Preoteasa, 2024). Robots and intelligent machines will replace workers who perform manual and repetitive activities involving physical force. Even repetitive intellectual activities will be replaced by machine learning and algorithms. For a transition as friendly as possible to the digital economy, the opportunity to introduce a guaranteed minimum income for those employees who are to be made redundant or for people who do not yet have the digital skills corresponding to the new jobs requirements is being discussed. For a certain period and specific socio-professional groups, the situation in the labour market can become dramatic.

Digitization has been integrated into agriculture, forestry, fishing, rural development, and environmental protection. Farm machines are equipped with computers and satellite communication systems that can only be operated by workers with at least basic digital skills. In this context, a rethinking of young people's and adults' education and professional training is required in a globalized, dynamic and increasingly demanding labour market with people looking for well-paid jobs. So that no one is left behind, there is a need for the digital literacy of some people and groups at risk of marginalization or social exclusion through the use of ITC systems, communication facilitated by online platforms, the creation of digital content, knowledge of online applications and measures of cyber security (Ilie, 2021).

Children and young people, so-called "digital natives", are familiar with digital technologies and online communication infrastructure so that they become resilient to the demands of the digital society. However, digital education and digital skills training must also be extended to children from disadvantaged social groups, the elderly, and people with disabilities so that they are not marginalized or socially excluded. Reducing digital gaps between individuals, groups,

communities, and regions involves concerted efforts by central and local governments to ensure a truly inclusive digital education (Steriu & Stănescu 2023).

Access to the Internet, possession of smart devices (computers, electronic tablets, smartphones), and a basic level of digital skills are necessary for all persons who wish to access online public or private services, purchase goods provided through digital platforms or simply that they communicate quickly in situations of physical distancing, as was the case with the COVID-19 pandemic (Badawi & Ciupercă, 2023). The pandemic crisis of 2020-2022 has fundamentally changed our way of life. Regardless of our concerns, preferences, and hobbies, we must admit that we have become addicted to digital technologies. Digital education and professional training cannot be exempted from this process of accelerated change (Cathy, Lalani, 2020; Alakrash, Norizan, 2022).

2. The role of digital education in a demanding labour market

A report by the European Investment Bank (2019) showed that at the European Union (EU) level, 58% of companies that wanted to hire ICT specialists had difficulties recruiting, and 78% indicated a lack of digital skills to fill vacant jobs and expand activities through additional investments in emerging technologies. Undoubtedly, digital skills make a difference in the labour market.

The European Commission's document, *A Europe prepared for the digital age*, highlights digitization as one of its six key policy priorities for 2019-2024. The Commission's initiatives, particularly creating a single digital market, are shaping a future where citizens can use digital technologies to address societal challenges (European Commission, 2019).

By financing National Recovery and Resilience Programs (NRRPs/ PNRR), the European Commission recommended that EU member countries allocate at least 20% of funds for Europe's digital transformation so that 80% of European adults have basic digital skills by 2030. According to the *Digital Education Action Plan 2021-2027*, digitization is approached from two perspectives: the use of a variety of digital technologies and the training of digital skills necessary to be able to live, work and learn in an increasingly technological world (European Commission, 2020).

2.1 Increasing employability through digital education

Digital education is that component of the education system that integrates digital technologies into the teaching-learning process, professional training, and assessment to facilitate lifelong learning experiences. The development of digital education involves an interactive collaboration between the providers of digital learning platforms and applications, the administrators of these tools and, last but not least, the direct and indirect beneficiaries: students, teachers, educational staff, the family, and the local community.

Digital education means not only digital platforms and applications (e.g. Google Classroom, Microsoft Teams, Webex, Zoom) that facilitate communication and collaboration between teachers and students in real-time but also the development of learning content (e-courses, online tutorials, quises, feedback, data analysis, capitalizing on personal skills) with a view to the socio-professional integration of graduates. In this context, a new discipline has been developed, *Digital Pedagogy*, which studies the impact of digital technologies in the design, implementation and evaluation of teaching-learning activities, synchronous and asynchronous interactions between teachers and students in virtual or mixed reality, digital educational resources, the role of virtual assistants in didactic activities, the impact of public policies that aim to digitize educational content (Istrate, 2022).

Recently, the virtual dimension of learning has registered a considerable advance. This form of learning takes place exclusively online, facilitated by access to the Internet and digital platforms that offer flexible learning resources and that are adapted to the learning needs of the people interested: Moodle, Khan Academy, Coursera, Canvas, Blackboard, and MOOCs. Immersive technologies as Virtual Reality (VR) and Augmented Reality (AR) are also used in the e-learning process to provide interactive and engaging educational experiences.

Immersive technologies refer to equipment and programs that allow a transition from physical reality to virtual reality, where the students have new experiences (sensations, emotions, knowledge) and new perspectives on things. Through immersive technologies, we can, for example, experience teaching a history lesson by walking among the artefacts of ancient Rome. Students will be able to explore 3D physical processes or molecular structures that, until recently, were taught in a theoretical manner in the natural sciences. Likewise, medical students can practice surgery without any consequences or risks (Carmigniani et al., 2011).

From a sustainable development perspective, we must ensure that all these emerging technologies are accessible to all who want to learn and train professionally, including people from vulnerable, marginalized or socially excluded groups and communities. Digital and assistive technologies can contribute to the socio-professional inclusion of people and groups with support needs. By integrating these technologies into formal education and continuing professional training, people with disabilities who are available to work and looking for a job but still do not have access to working conditions adapted to their needs can be brought into the labour market. Digital technologies, assistive technologies, and reasonable accommodations are essenssial tools for increasing the employment of people with disabilities (Iftimoaei & Achiței, 2023).

2.2 Virtual education as a response to the fast-changing labour market

Virtual learning has the following advantages compared to traditional learning: creative and interactive ways of learning, flexibility and adaptability,

reduction of expenses with the transport of teachers and students to schools, and the costs of maintaining physical spaces. Online learning also has several disadvantages (negative effects) which arise from the interaction of the humans with the technology. Prolonged exposure to electronic devices and working in the virtual environment can lead to physical isolation, anxiety or depression, physical problems related to computer posture, interruption of the Internet connection and others (Gautam, 2020).

Online learning meets the needs of employees who want to learn or improve to advance in the workplace or apply for another job. Online study courses are flexible and can be accessed by pupils and students without being conditioned by their presence in the classrooms at certain time intervals. Virtual learning takes place according to everyone's work pace or the configuration of their work and free schedule. However, teachers or trainers no longer have control over students as in the classic learning environment, in the classroom, with greater freedom of didactic interaction (Franklin, 2022).

Courses provided by virtual learning platforms offer the possibility of certifying knowledge and skills without high costs compared to classical learning. At the same time, virtual learning ensures international recognition of acquired skills and employment opportunities in a global labour market. Compared with classical learning, a competitive advantage of virtual learning is the adaptation of educational content (courses, seminars, tests, learning games) by integrating know-how, innovations and recent developments. Interactive simulations, virtual laboratories, multimedia presentations and gamified learning modules with intuitive and interactive interfaces stimulate the curiosity and enthusiasm of those who want to train or learn more taking into account the labour market demands (Hongsuchon et al., 2022).

Participation in e-learning modules implies basic digital skills, which can be improved during learning so that participants can access a higher level of digital skills. Digital knowledge and skills are essential in a job market where employment depends on medium to advanced technology use. Virtual learning is inclusive in that it gives people from vulnerable groups or socioeconomically disadvantaged communities the opportunity to access quality and personalized educational content at reasonable costs compared to traditional learning in school and university classrooms.

3. A statistical assessment of digital education

The state of digital education in Romania is quite different from other European member countries that allocated considerable resources to digitization before the outbreak of the COVID-19 pandemic, a period of crisis that indisputably accelerated this process. Estonia is a successful example of digital education by effectively integrating information and communication technology (ICT) into the educational process. This EU member country has promoted programs to inform,

raise awareness and empower the population about the importance of digital skills. Similarly, since the first two decades of 2000, Norway has recognized the importance of digitization in improving the education system and research efficiency. An innovative Norwegian initiative consisted of updating the curriculum in primary and secondary education by integrating digital learning and digital skills development platforms.

3.1 A statistical approach on digital education in European Union

The European Skills Agenda 2020 in digital education envisages that by 2025, 230 million adults aged between 16 and 74 will acquire at least basic digital skills, representing 70% of the EU population. In this context, it is essential to integrate digital education into lifelong learning by including vulnerable categories and adults in the 50-74 age group at risk of being excluded from the labour market in training programs (Pettersen & Fugletveit 2015).

The European Commission has designed the *European Digital Competence Framework for Citizens* (DigComp), structured in five areas: digital and information literacy, communication and collaboration, digital content creation, safety, and problem-solving. The five areas count as 21 skills. Citizens must have competencies in each of these areas to actively participate in formal education, employment, continuing professional education, online interacting with government, problem-solving, leisure.

Since 2014, the European Commission has been monitoring the digital progress of member states through the Digital Economy and Society Index (DESI) reports. According to DESI 2022, Romania was last at the European level (27). The low level of the DESI index in Romania, compared to the other EU member countries, is due to the low values obtained for the indicators that describe human capital (the people's level of digital skills) and the indicators that show the level of integration of digital technologies in the public administration and the private sector.

Figure 1 describes the structure of the composite DESI index based on a weighted sum of its five components. Romania has good results in terms of internet connectivity, second place at the European level (EU-27), in terms of the share of women employed in the ICT field in the total number of female employees, and fourth place in terms of the number of graduates in the ICT field of study.

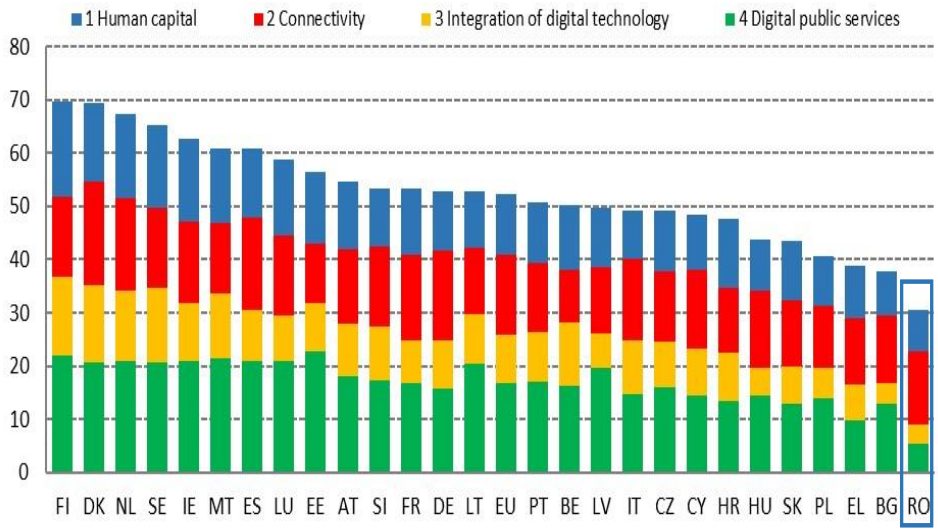

Figure 1. Digital Economy and Society Index (DESI) 2022
(Eurostat, https://ec.europa.eu/eurostat**)**

The boxplot analysis (figure 2) graphically reflects the distribution of scores obtained by EU member countries on the DESI index in the period 2018-2022: the minimum value – Romania, the first quartile – Cyprus, the median – Latvia, the third quartile – Luxembourg, and the maximum value – Finland.

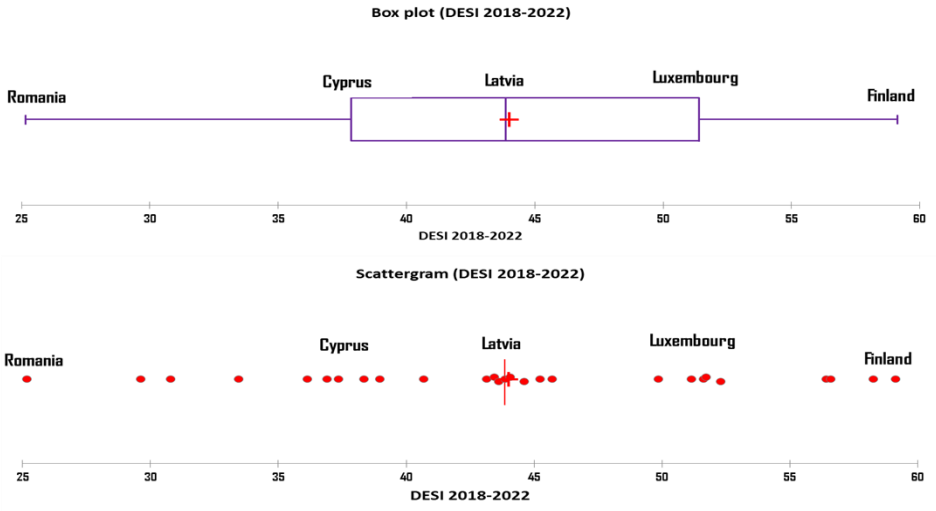

Figure 2. Boxplot Analysis of DESI Index 2018-2022 (*own processing*)

European statistics also show that the level of formal education plays a vital role in acquiring digital skills. Thus, 80% of people with higher education in the EU-27 have basic digital skills, while only 34% of people with low education have such skills. Dropping out of school or being an early leaver from school are

phenomena that have a negative impact on the education, vocational training and employment prospects of children and young people.

The simple linear regression analysis in Figure 3 (R^2 coefficient = 0.699) indicates a strong causal link between the variables: the higher the level of participation in formal education has an impact on the higher the DESI index level of the countries.

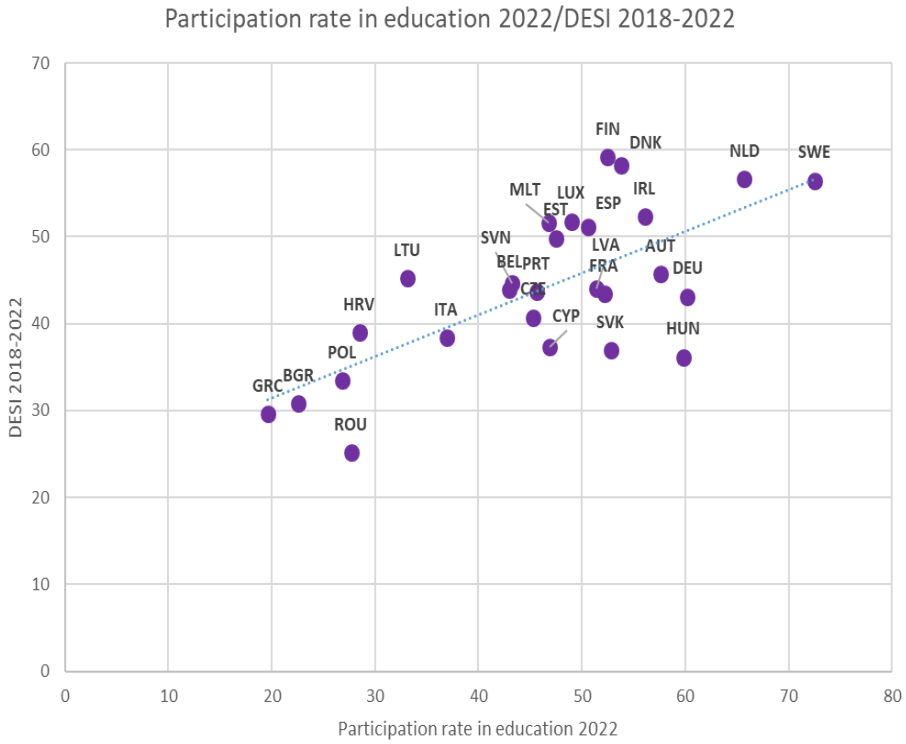

Figure 3. The impact of formal education on digital skills (*simple linear regression, own processing based on Eurostat data*)

Eurostat data (2022) shows that older people have lower basic digital skills than young people. For example, only 34% of 65-74 year olds have basic digital skills, compared to 69% of 25-34 year olds. The contrast between women of different age groups is somewhat more evidend: 25% of women aged 65-74 had at least basic digital skills, compared to 71% of women aged 25-34.

People aged 55 and over (elderly workforce), children, and young people from rural areas who come from disadvantaged families or communities are the most exposed to inequalities in the labour market. The elderly workforce (55-64 years old) faces difficulties in hiring or maintaining jobs in the conditions of the reduction of jobs involving routine operations and their replacement with digitalized jobs.

3.2 Statistical coordinates regarding digital education in Romania

A country's economic development impacts the education of children and young people and continuous professional training. The economic potential of a country is also reflected in the budget expenditures for education and research. Figure 4 shows a simple linear regression model in which the dependent variable "DESI index 2018-2022" is explained by the independent variable "Real GDP per capita 2018-2022". The coefficient of $R^2 = 0.640$ indicates a strong link between the variables: the more a country increases its allocation for education, the higher the level of the DESI index.

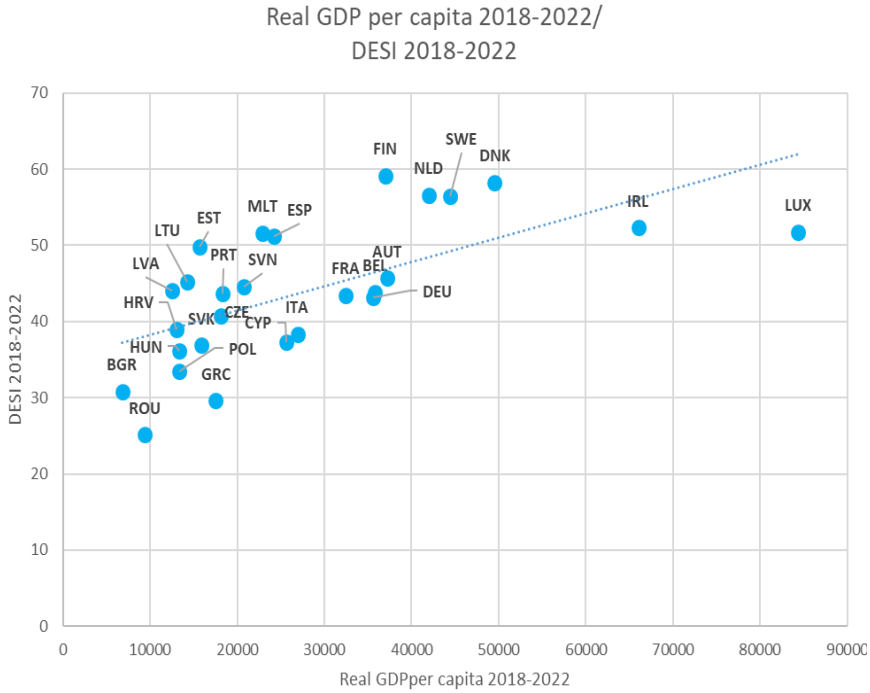

Figure 4. The impact of economic development on digital skills (*simple linear regression, own processing based on Eurostat data*)

Until it solves the problems related to the level of digital skills of the population, the Government of Romania has to solve the problem of poverty among children and young people. According to Eurostat, in 2022, the risk of poverty or social exclusion of people up to 18 was 41.5%, the highest level among EU member countries (EU average = 24.7%). At the opposite pole, Slovenia (10.3%), the Czech Republic (13.4%) and Denmark (13.8%) recorded the lowest shares.

According to Eurostat, in 2022, the proportion of NEETs in the EU varied from 4.2% in the Netherlands to an almost 5 times higher share in Romania (19.8%). The EU statistical office also shows that 43% of the European Union population aged between 25 and 34 was a graduate of higher education. Romania

ranks last among the member states, with a share of only 23% of the population of this age group who have graduated from a university. In 2022 the early school leaving rate was 15.6%, the highest level in the EU-27. Romania still needs to register progress regarding the participation of adults (25-64 years) in lifelong learning. The values of the indicator were in the range of 1-2% in the period 2011-2020; for 2022, there is an increase in the value of the indicator up to 5.4%, but the value is lower than the European target (15%), as well as the EU-27 average (11.9%).

The National Institute of Statistics (INS, 2023) conducts an annual survey on the population's access to information and communication technology (ICT). From the 2022 edition of the research (the data were collected in 2021), we find that 80.8% of households with dependent children have a much higher frequency of connecting to the Internet: 98.8% of households with children access the Internet at home, compared to only 70.8% of all households without dependent children. Pupils and students in Romania access the Internet mainly to participate in social networks and access online platforms with games, music, and movies. Although they have access to the Internet and smart devices for online navigation, children and young people are not trained to use these resources for educational activities or learning.

According to Eurostat, in 2023, 56% of EU citizens aged between 16 and 74 had at least basic digital skills; the lowest level was reported in Romania (27.7%), as represented in Figure 5.

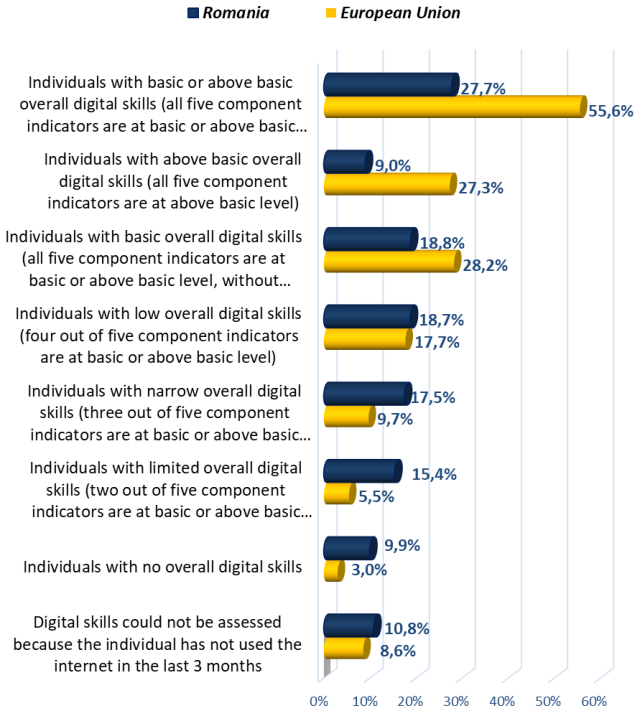

Figure 5. Individuals' level of digital skills (*from Eurostat 2023 onwards, own processing*)

The social, economic and education system problems also affect the level of digital skills of the population and, implicitly, the level of skills in using the computer (figure 6).

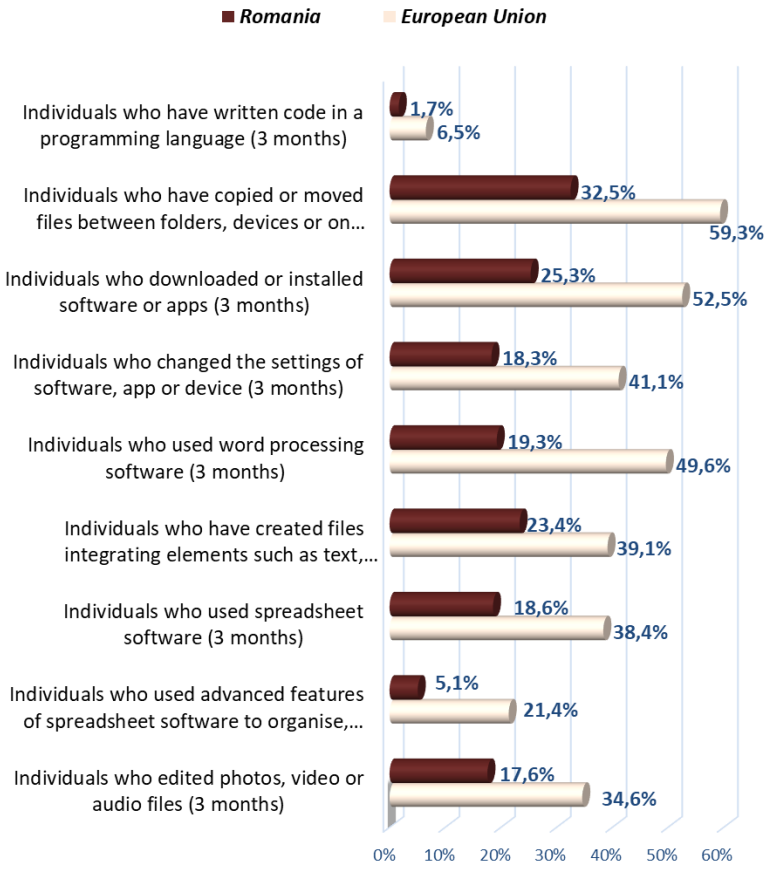

Figure 6. Individuals' level of computer skills
(*from Eurostat 2023 onwards, own processing*)

We are all familiar with the discussions about the impact of digitization on the labour market, the expansion of information and communication technology, where job offers are increasing, and the attractive salary packages in this leading area of the economy. According to National Institute of Statistics's data, at the end of December 2022, the average gross salary in the ICT sector was 14,593 lei, specialists in this sector being the best paid in Romania, to which are also added the tax facilities (exemption from income tax on salaries).

Although in Romania, the demand for labour in the ICT field is increasing, the universities still cannot provide the specialists required by employers in the high-tech sector. Professional reconversion of the elderly labour force (55-64 years) in this economic sector is extremely difficult. In the context of the digital society, active ageing and an inclusive labour market for people aged 55 and over

is quite problematic in Romania. There is a pressing need for ICT specialists, but they are unlikely to be recruited from the active 55-64 age group. A big challenge for Romania is how to bring NEETs into the workforce through digital skills training.

4. From official statistics to public policy for enabling digital education

Action Plan for digital education, "Resetting education and training for the digital age (2021-2027)." The new action plan complements and continues the first Digital Education Action Plan, which was adopted in January 2018. The revised plan forms part of the vision for the European Education Area.

The European policy program regarding the Digital Decade 2030 (Digital Decade Policy Programme), established by Decision (EU) 2022/24811, guides the digital transformation of all the member states of the European Union along four main directions of action, with concrete and measurable objectives: digitization of public services, digital skills, the digital transformation of enterprises, as well as secure and sustainable infrastructures.

4.1 European policies for the development of digital education

The EU Digital Strategy "Shaping Europe's Digital Future" sets out the following public policies: the Data Governance Act, the Digital Services Act, the Digital Markets Act, and the Cyber Security Strategy. Several Union budgetary instruments, including cohesion programmes, the Technical Support Instrument, and the Digital Europe programme, will support the investments needed for the digital transition. The agreement that at least 20% of the Recovery and Resilience Mechanism should support the digital transition will contribute to achieving the proposed digitalization targets.

The European Commission has proposed that by 2030, 80% of citizens between 16 and 74 should have at least basic digital skills. General digital skills refer to five areas: information and data literacy skills, communication and collaboration skills, digital content creation skills, safety skills and problem-solving skills. To have at least basic general digital skills, people need to know how to do at least one activity related to each domain.

4.2 Regulations on digital education in Romanian public policies

The pandemic crisis period (2020-2022) showed how important it is for citizens to have digital skills. Approximately 62% of respondents to a sociological survey considered that they improved their digital skills during the COVID-19 pandemic, this percentage being higher for staff involved in education and training. More than 50% of respondents intend to take steps to further improve their digital skills in the future, according to the research above (Digital Education Plan 2021-2027).

The Educated Romania Report of the Romanian Presidency proposes the following measures for digital education: digital literacy, the development of pupils' and students' digital skills and their certification; teacher training for digital education; the development of digital skills among auxiliary teaching and non-teaching staff in the education system; ensuring cyber security programs, personal data protection (Educated Romania, 2018).

With investment support of almost EUR 6 billion (20.5% for digitization), Romania's National Recovery and Resilience Plan (NRRP/ PNRR) includes measures to fully integrate digitization in all DESI index dimensions: digital skills, connectivity, support awarded to businesses and digital public services. While most of these measures are managed by the Ministry of Research, Innovation and Digitization (2024), other ministries (Ministry of Education, Ministry of Labour) and public entities (e.g. Authority for Digitization of Romania) are responsible for implementing the measures in the strategies and plans that include objectives related to the digitalization of society and the economy.

On December 18, 2020, the *Education Digitalization Strategy* (SMART.Edu) was launched for public consultation, which provides the following targets: developing the digital skills of pupils and students, adapting the school curriculum to the new emerging professions, promoting lifelong digital education, training teachers for digital education, ensuring digital infrastructure, improving connectivity, creating open educational resources, and addressing issues related to cyber security, data protection, online safety and ITC ethics (Ministry of Education, 2021).

The National Employment Strategy 2021-2027 emphasizes that the workforce should acquire the necessary skills to cope with global digital technological developments and trends. Some measures have been taken to respond to these needs, including through the "Relevant Curriculum, Open Education for All - CRED" Project and measures within the PNRR, which are expected to respond to training needs, including digital skills (Ministry of Labour, 2021).

In 2022, a new legislative framework for digitising education was established. Thus, by order of the Minister of National Education, the profile of digital skills for professionals in the field of education was established, as well as the mechanism for validating teachers' digital skills at school exams according to the *European Framework of Digital Skills for Educators*. The optional discipline "Digital education and media skills" was introduced for high school students, starting with the academic year 2022/2023. These measures were adopted in order to improve the continuous training of teachers in elementary and secondary education and to ensure the quality of teacher development programs.

Another project launched in 2022 aims to integrate digital technologies into education by transforming libraries into centres for developing digital skills in local communities. The project also provides for the purchase of computer equipment for libraries, as well as the training of librarians in accessing the online platforms

(online library catalogues) and the guidance of all those interested. Another goal of the project is to provide digital equipment for high schools and create smart laboratories for the development of advanced digital skills.

The private sector's involvement in policies to develop digital skills is still in its infancy. Statistics show that only 9% of businesses offer ICT training to their employees, below the EU average of 22%. (Ministry of Research, Innovation and Development, 2024). The Authority for the Digitization of Romania, through the project "Skills in advanced technologies for SMEs" financed by PNRR, offers access to employees from the private sector to training courses in the following fields: Internet of Things, Cloud Technologies, Big Data, Machine Learning, Artificial Intelligence, Robotic Process Automation, Blockchain, Cyber-Physical Systems and Additive Manufacturing. It is expected that through these courses, employees from small and medium-sized enterprises in Romania will use advanced technologies and, in turn, contribute to innovation in the areas targeted by digitization.

5. Conclusions

Digital skills are crucial for economic development and social well-being. The lack of these skills and ICT accessibility has meant that many disadvantaged groups, students, teachers, and families cannot continue working and learning during the restrictions imposed by the management of the COVID-19 pandemic. This situation has amplified the risk of poverty and marginalization, exacerbating inequalities in education and vocational training.

A high-quality and inclusive digital education that respects personal data protection and ICT ethical principles must be a strategic objective for public authorities, the business environment, and non-governmental organizations. Through public and private investment in digital education and research, goals related to economic growth and social development can be achieved.

Digital technologies must be integrated into formal and non-formal education provided by all public and private education systems. Basic digital skills should become essential to the transferable skills that people need to participate actively in society, use digitized public services, and access well-paid jobs.

Digital skills development influences professional life, work productivity, job satisfaction and personal life. Digital technologies can reduce time spent at work in favour of family activities, groups of friends, participation in socio-cultural life and sustainable development of communities**.** Investments in digital infrastructure must go hand in hand with investments in upskilling or reskilling programs to ensure workforce resilience in an increasingly digitized future economy and society.

REFERENCES

Alakrash, H. M. & Norizan, A. R. (2022) Education and the Fourth Industrial Revolution: Lessons from COVID-19. *Computers, Materials & Continua*. CMC, 2022. 70(1), 951-962. doi:10.32604/cmc.2022.014288.

Badawi, S. & Ciupercă, E. M. (2023) Empowering education: learning from crises to achieve resilient education in Romania. *International Conference on Virtual Learning*, vol. 18, pp. 104-112. doi:10.58503/icvl-v18y202308.

Bădoi, D. & Preoteasa, A. M. (2024) Răspunsuri la criza ocupării. Transformări digitale ale pieței muncii din România. *Sociologie Românească*. 22(1), 51-68. doi:10.33788/sr.22.1.3 .

Carmigniani, J., Furht, B., Anisetti, M., Ceravolo, P., Damiani, E. & Ivkovic, M., (2011) Augmented Reality Technologies, Systems and Applications. *Multimedia Tools and Applications*. 51(1), 341-377. doi:10.1007/s11042-010-0660-6 .

Cathy, L. & Lalani, F. (2020). *The COVID-19 pandemic has changed education forever. This is how*. https://www.weforum.org/agenda/2020/04/coronaviruseducation-global-covid19-online-digital-learning [Accessed August, 2024].

European Commision (2019) *Shaping Europe's digital future*. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/shaping-europes-digital-future_en. [Accessed August, 2024].

European Commision (2020) *Digital education action plan (2021–2027).* September 30, 2020. https://eur-lex.europa.eu/EN/legal-content/summary/digital-education-action-plan-2021-2027.html. [Accessed August, 2024].

European Commision (2024) DESI dashboard for the Digital Decade (2023 onwards). https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/charts. [Accessed August, 2024].

European Commission, Directorate-General for Education, Youth, Sport and Culture (2023) Education and training monitor 2023 – Comparative report. *Publications Office of the European Union*. doi:10.2766/936303 .

Franklin, J. (2022) *Is Online Learning As Good As Classroom Learning In 2022?* https://elearningindustry.com/is-online-learning-as-good-as-classroom-learning-in-2022. [Accessed August, 2024].

Gautam, P. (2020) *Advantages and Disadvantages of Online Learning.* https://elearningindustry.com/advantages-and-disadvantages-online-learning. [Accessed August, 2024].

Hongsuchon, T., Emary, I., Hariguna, T. & Qhal, E. (2022) Assessing the Impact of Online-Learning Effectiveness and Benefits. Knowledge Management, the Antecedent of Online-Learning Strategies and Motivations: An Empirical Study. *Sustainability*. 14(5). doi:10.3390/su14052570.

Iftimoaei, C. & Achiței, A. (2023) The Employment of People with Disabilities: public policies, assistive technologies, reasonable accommodations. *Scientific Annals of "Alexandru Ioan Cuza" University of Iasi. (New Series) Sociology and Social Work Section* – XVI Volume, No.1. doi:10.47743/asas-2023-1-719 .

Ilie, D.-G. (2021) *Tehnologiile digitale și stratificarea socială. Spre o societate post-materială?* Editura Tritonic: București.

Institutul Național de Statistică – INS. (2023) *Accesul populației la tehnologia informației și comunicațiilor în anul 2023*. https://insse.ro. [Accessed August, 2024].

Istrate, O. (2022) Pedagogia digitală: Definiție și arie conceptuală. *Revista de Pedagogie Digitală*. 1(1), 3-10. doi:10.61071/RPD.2290 .

Ministerul Cercetării, Inovării și Digitalizării – MCID. (2024) *Planul național de acțiune privind deceniul digital pentru România*. https://www.mcid.gov.ro. [Accessed August, 2024].

Ministerul Educației. (2021) *Strategia pentru digitalizarea educației din România - 2021-2027*. https://www.edu.ro. [Accessed August, 2024].

Ministerul Muncii. (2021) *Strategia națională pentru ocuparea forței de muncă 2021 - 2027 și a Planului de acțiuni pe perioada 2021–2027*. https://mmuncii.ro. [Accessed August, 2024].

România Educată. (2018) *Proiectul „România Educată”*. www.romaniaeducata.eu. [Accessed August, 2024].

Sima, V., Gheorghe, I.G, Subić, J. & Nancu, D. (2020). Influences of the Industry 4.0 Revolution on the Human Capital Development and Consumer Behavior: A Systematic Review. *Sustainability.* 12(10), 4035. doi:10.3390/su12104035 .

Steriu, I. & Stănescu, A. (2023) Digitalization in education: navigating the future of learning. *International Conference on Virtual Learning*. 18, 171-182. doi:10.58503/icvl-v18y202314. [Accessed August, 2024].