E-learning Platforms and European Digital Society

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Abstract

The current paper emphasizes the role that e-learning platforms play in upskilling and reskilling of the European workforce, thus improving the competitiveness and contributing to a stronger digital landscape. By using a mixed-method approach, combining literature review, document and trend analysis with descriptive statistical analysis, the auhors have examined the relationship between e-learning platforms and the European digital society.

The research revealed substantial disparities in digital skill proficiency and online learning adoption among European citizens, emphasizing the need for targeted strategies to boost digital literacy and fully harness the potential of e-learning platforms in improving digital skills. European countries should capitalize on the progress made in the last two years and work towards creating digital educational tools and methods that are of higher quality, more readily available and more inclusive. Although a number of programs and target objectives are in place to support the digitalization of education in Europe, the e-learning platforms still represent an underutilized tool that can help to increase digital skills among European citizens. The potential to improve the digital skills is still high and an extra focus should be granted to the programs that improve these on a national or cross border level.

The originality of the article consists of a review of relevant statistics regarding the most recent evolution of online learning and digital skills, along with an examination of the existing frameworks at the European level that have an aim to improve digital education and skills.

This research contributes to a better understanding of the complex and expansive nature of e-learning platforms and the European Digital Society and can offer valuable insights to policymakers and other stakeholders such as decision-makers from various organizations, educators and technologists.

Keywords

E-learning, Digital Skills, European Digital Society, MOOC.

Introduction

With the expansion of the internet, e-learning platforms in general and Massive Open Online Courses (MOOC) platforms in particular are regarded as a promising solution for democratizing the access to education, workforce upskilling and for improving the European digital ecosystem.

Despite a growing corpus of research on the evolution and impact of e-learning, such as the exhaustive bibliometric analysis conducted by Djeki et al. (2022), there is a lack of knowledge regarding the broader implications of e-learning within the European digital society context. This research seeks to address this gap.

This study seeks to highlight the significant role that e-learning platforms can play in the process of upskilling and reskilling the European workforce, thus contributing to a more robust digital landscape across the European Union.

The specific objectives of this research are to: 1) Examine the relationship between e-learning platforms and the European digital society in order to determine the current status and potential of e-learning in improving the digital skills of European citizens. 2) Examine the disparities in digital skills proficiency and adoption of e-learning across European regions, emphasizing the need for targeted strategies to improve digital literacy and leverage the potential of e-learning platforms.

We have used a mixed-method approach, widely utilized in e-learning research. Our research methodology includes a comprehensive literature review, document analysis, keyword trend analysis, and descriptive statistical analysis.

The benefits of digitalization are correlated with innovations in the digital sphere, with a direct impact on the field of education. In OECD countries, educational strategies are established by designing and implementing specific technologies (van der Vlies, R., 2020). Through e-learning platforms, clear benefits in the academic environment are observed as a result of improved communication relationships between students and teachers, the development of harmonious group relationships, and quick access to materials posted by interested parties (Benta, D., Bologa, G., & Dzitac, I, 2014). This research is of interest because the context in which MOOC strategies are implemented must be coherently and objectively evaluated. As a result of studies conducted by specialists in the field, significant disparities specific to different geographic areas are observed (Jansen et al., 2015). Using digital technology in education can significantly streamline time-consuming tasks for teachers, such as monitoring attendance and student performance. Also, educational technologies offer students a virtual realm, allowing them to access digital information tailored to their learning styles (Haleem et.al, 2022).

Our findings indicate that e-learning platforms are still an underutilized mechanism that can assist in enhancing the digital skills of EU citizens. The potential to improve the digital skills is still high and an extra focus should be granted to the programs that improve these on a national or cross border level.

This paper is organized as follows. The next section includes a literature review of the existing research on e-learning and digital society. This is succeeded by the research methodology section. Next, we present our results and discuss their implications. The study continues with the conclusions section and it concludes with the study limitations and further research.

1. Literature review

The digitalization and the digital society are abstract concepts, sometimes difficult to understand by the general public. Digital technologies have already transformed our lives. Such technologies seem to redefine the times, the spaces and the ways of our daily living. Some authors proposed the concept of *digi-grasping*, a theoretical construct to analyze the awareness and the involvement in a digital society (Duvfa & Duvfa, 2019).

Djeki et al. (2022) have conducted a bibliometric analysis of 12,272 publications between 2015 and 2020 from the Web of Science database on the e-learning topic as a search term, by using the VosViewer tool. The authors of the above study have found that Spain, the USA, England, China and Romania have produced the highest number of papers. Also, in e-learning domain, among the most influential European countries are Spain, England (UK), Germany, Italy, Portugal, Belgium and Romania (ranked by citations).

Figure no. 1. Network visualisation map of e-learning keywords' co-occurrence.
Source: Djeki et al., 2022

As illustrated in Figure 1 above, Djeki et al. (2022) identified several clusters of keywords, with the red cluster being the largest (208 keywords), the green cluster (166 keywords) , blue (163 keywords) and yellow (118 keyword) ones also had significant keywords related to e-learning. The findings of the previously referenced study, illustrated above, suggest the major role that e-learning plays in the education context and the necessity to integrate the collaboration tools and technology with an aim to enhance the digital learning experience. Digital technologies provide the educational institutions with the potential to disseminate knowledge to more people than ever before. During COVID-19 pandemic, the use of technologies for e-learning have gained in popularity in a compressed period. The impact of digitalization on education started long before the COVID-19 pandemic. The digital world has given massive advantages, but the rate at which digital technology progresses is far faster than the ability of individuals to adapt in terms of education, regulations and culture (Jackman et. al. 2021). However, the discussions regarding adopting e-learning to develop institutional collaborations are not new. For quite some time, e-learning has represented a significant topic on the discussions regarding education in the European Union (Hodgson, 2002). The literature on this topic (Salajan and Roumell, 2016) has highlighted a steady unification of e-learning policies at EU level, which points to the need for a more consistent and structured way to member state level.

A research study on institutional MOOC strategies in Europe (Jansen and Schuwer, 2015) has revealed a growing implication in the MOOC movement by European higher education institutions however, from a business perspective the MOOC movement seems to be dominated by the United States players. Furthermore, in a comparative study of institutional MOOC strategies in Europe and U.S has been conducted by Jansen et. al. (2015) and concluded that "MOOC provision is set to become a mainstream trend in Europe in the next years". In fact, the role of digital education is recognized by an important number of OECD countries, as revealed by van der Vlies, R. (2020). In an earlier research study, some authors have concluded that the influence of digital technologies in the Czech Republic will result in a significant transformation of the environment in which future generations of students are educated. (Jelinek, 2015). A quantitative study on the utilization of digital learning technologies among educators from Malta, exploring the costs and benefits of using digital learning resources in schools, has revealed that educators were committed to using digital technologies and younger teachers were increasingly engaging in digital learning resources (Camilleri and Camilleri, 2017). Other authors have highlighted the differences that e-learning providers should consider on how Z generation students gather and gain information and knowledge from the web compared with earlier generations, who used mostly professional literature and libraries (Tick, 2018). According to van Dijck (2020), integrating core societal values into the development and operation of digital societies has emerged as a critical European challenge that should not be the sole responsibility of companies. Ensuring that the internet continues to be a democratic and accessible platform calls for the collaborative efforts of (supra-) national and local authorities, businesses, civil society groups and individuals.

2. Research Methodology

The objective of this research is to examine the effectiveness of e-learning platforms in improving the digital skills across EU member states. The authors have adopted a mixed-method approach, combining the literature review, document analysis, keyword trend analysis and descriptive statistical analysis. According to Creswell & Creswell (2018), mixed methods research is "an approach to inquiry that combines or associates both qualitative and quantitative forms. It involves philosophical assumptions, the use of qualitative and quantitative approaches, and the mixing of both approaches in a study". Using a mixed-method research is a commonly used practice in e-learning studies (Lan and Hew, 2020; Gentile et al., 2020). Our research aligns with these approaches, combining a review of scientific literature, document analysis, and trend analysis with descriptive statistical analysis. Also, quantitative analysis of existing datasets is frequently utilized in researches related to e-learning (Pejić Bach et al., 2023).

Literature review: We have conducted an analysis of scientific literature published in journal entries indexed in Web of Science, Scopus and Google Scholar, reviewing academic studies, relevant journal articles and research reports published in the last 15 years. We have used relevant keywords and phrases such as "e-learning", "e-learning platforms", "digital society" and "European Union" to identify relevant works addressing these topics in an international context.

Document analysis: We reviewed Organization for Economic Co-operation and Development (OECD) and EU official publications related to digital education and digital society, such as Digital Education Action Plan 2021-2027, Declaration on Digital Rights and Principles, Recovery and Resilience Facility (RRF)

and The Digital Europe Programme, Digital Economy and Society Index, Digital Skills Indicator, European Investment Bank's Investment Report; and The Digital Europe Programme.

Keyword trend analysis: The Google Ngram Viewer, a digital tool used in the literature for trend analysis, has been used for tracking the prevalence of key terms related to e-learning and digital skills over time, providing a historical perspective on the evolution of these fields.

Descriptive statistical analysis: We have used the EU official datasets isoc_sk_dskl_i21 and isoc_ci_ac_i (data code: TIN00103), graphically illustrating the top five, the EU average, and the bottom five values.

Data Analysis Procedures: The Eurostat datasets were primarily used for data extraction. These datasets already provide population-level figures for various indicators across EU countries, reducing the need for inferential statistics. Instead, we focused on descriptive statistics to illustrate the top five, EU average, and bottom five values for various indicators.

3. Results and Discussions

According to a recent EIB's Investment Report 2021/2022 edition, the success of e-learning effectiveness is likely to have been impacted by variables such as parents' educational backgrounds, family affluence and immigrant status. These variables have an impact on the standard of working circumstances, the learning environment at home and the level of digitalization in the schools the student attends (European Investment Bank, 2022).

The e-learning and digitalization have been interesting topics for the global research community and the frequency of these terms within the recent literature has increased. We have analyzed the terms "e-learning", "MOOC", "digital skills", "digital society" and "digital education" with Google Books Ngram Viewer based on the following search criteria: Years range: 1990 – 2019; Corpus: English(2019); Mode: Case insensitive; Smoothing = 3, in order to get historical perspective on the usage of these terms over time.
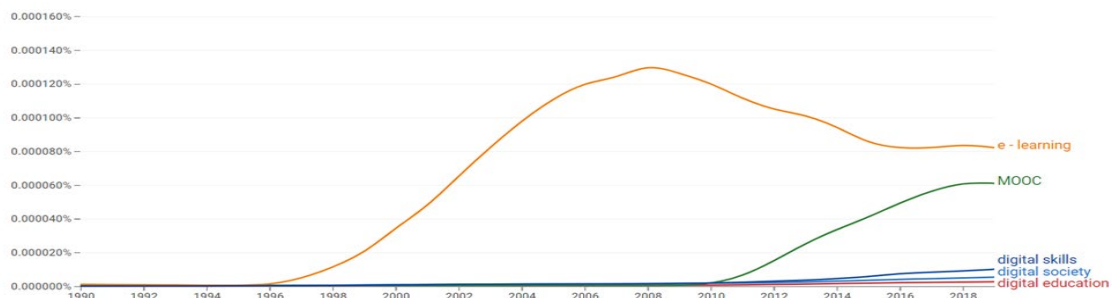
Figure no. 2. The frequency of the e-learning, MOOC, digital skills, digital society, digital education concepts in Google Books from 1990 to 2019
Source: Google Books Ngram Viewer, 2023

Based on the output displayed, it seems that the e-learning and the MOOC concepts have the highest popularity while digital society, digital skills, digital society and digital education concepts are less popular. Per Ngram viewer data, e-learning has gained momentum starting with 1996, reaching a peak in 2008, while MOOC has gained in popularity starting with 2010 until 2018 and has leveled off since then, as illustrated in Figure 2.

Advantages of using e-learning platforms:

E-learning platforms seem be adaptable and accessible, allowing students to access educational content whenever and wherever they choose. The option to replay lectures, quizzes and mini-games enables the students to better comprehend the topic. Also, content can be quickly changed to reflect evolving technological and commercial developments. Another significant advantage is that online education is more cost-effective than traditional classroom instruction. E-learning systems offer uniformity in terms of quality and content, guaranteeing that all students have the same learning experience. The course information and materials can be updated in real-time. E-learning has less of an effect on the environment if electronic resources are used more often comparing with printed textbooks because it reduces the need to print textbooks on paper and there is less waste of resources.

Based on the centralization provided by ClassCentral.org, an independent aggregator of online courses, the highest number of the online courses are provided by US based e-learning platforms. These US based

platforms are leading as well when it comes to the number of learners recorded on their platforms. For example, Coursera has 17.4 million learners in Europe, with an average age of 33. A percentage of 40% of learners are using their mobile devices to access their courses (Coursera Global Skills Report, 2022). Although no European country is among the top five countries with the highest number of registered learners, the UK and Spain have the highest number of Coursera learners in Europe (Coursera, 2023).

Table no. 1. Comparison of e-learning platforms from US and Europe

E-learning platforms from United States	Number of courses	E-learning platforms from Europe	Number of courses
Udemy	22223	Alison	4000*
Coursera	13952	FutureLearn	3463
Linkedin Learning	11802	OpenLearn	822
EdX	5597	MiriadaX	687
Pluralsight	5506	FUN	675
Domestika	2349	OpenSAP	220
Udacity	352	iversity	119

Source: ClassCentral.com, 2023;
Note: Alison.com, nd*

Besides the above-mentioned platforms, in Europe there are multiple initiatives to develop e-learning platforms such as:

Unow (https://www.unow.fr/): Unow is a French e-learning platform that offers online courses in management, personal development, marketing and technology. Unow contributes to the development of digital skills and increasing accessibility to high-quality education in Europe.

Leuphana Digital School (https://www.leuphana.de/digital-school.html): This German platform offers free online courses and learning programs in collaboration with universities and higher education institutions in Europe. The courses offered include topics such as management, science and technology.

OpenClassrooms (https://openclassrooms.com/): OpenClassrooms is a French e-learning platform that offers courses and learning in areas such as web development, design, marketing and project management. The platform contributes to developing digital skills and increasing accessibility to education in Europe.

European Schoolnet Academy (http://www.europeanschoolnetacademy.eu/): This platform, supported by European Schoolnet (a network based in Brussels of over 30 ministries of education), offers free online courses for teachers and education professionals.

OpenupEd (https://www.openuped.eu/): OpenupEd is a European initiative, a service of European Association of Distance Teaching Universities (EADTU) bringing together universities and higher education organizations to provide accessible and free MOOC (Massive Open Online Courses) courses.

The Lifelong Learning Platform (https://lllplatform.eu/) is a community of 42 European organizations that operate in the fields of education, training and youth and are based in various parts of Europe and beyond. These networks currently comprise over 50,000 educational institutions and associations that offer formal, non-formal and informal learning opportunities across all sectors.

In 2022, the European Commission (EC) launched an updated version of Digital Skills Indicator (DSI 2.0) that was based on its Digital Competence Framework 2.0. The DSI 2.0 measures the internet activities of European citizens in the last three months for the following areas: communication and collaboration; digital content creation; information and data literacy; safety and problem solving. These activities over the internet may be able to indicate the level of digital skills of the individuals (EC, 2022a).

According to recent data from Eurostat (dataset isoc_sk_dskl_i21), the average share of individuals aged 16 to 74 with at least basic overall digital skills across the EU was 53.92%. The digital skills with the levels "basic" and "above basic" have been defined based on Digital Competence Framework for Citizens (DigComp) and measure the internet activities of European citizens in regard to the following dimensions: a) digital content creation; b) safety; c) information and data literacy; d) communication and collaboration and e) problem solving (EC, 2022b).

The EU countries with the highest percentage of individuals with basic and above basic digital skills were Finland (79.18%) and the Netherlands (78.94%), followed by Ireland at 70.49%. In contrast, Romania had the lowest percentage of individuals with basic and above basic digital skills at 27.82%, followed by Bulgaria (31.18%) and Poland (42.93%). This has been illustrated in Figure no. 3 below that shows top five and bottom five countries.

These findings highlight the varying degrees of digital skill proficiency across different EU Member States and the need for targeted efforts to improve digital literacy. As digital technology continues to play an increasingly significant role in various aspects of daily life, including digital education and training, it is essential for the individuals to possess at least basic digital skills to maximize their participation and benefits in the European digital society.
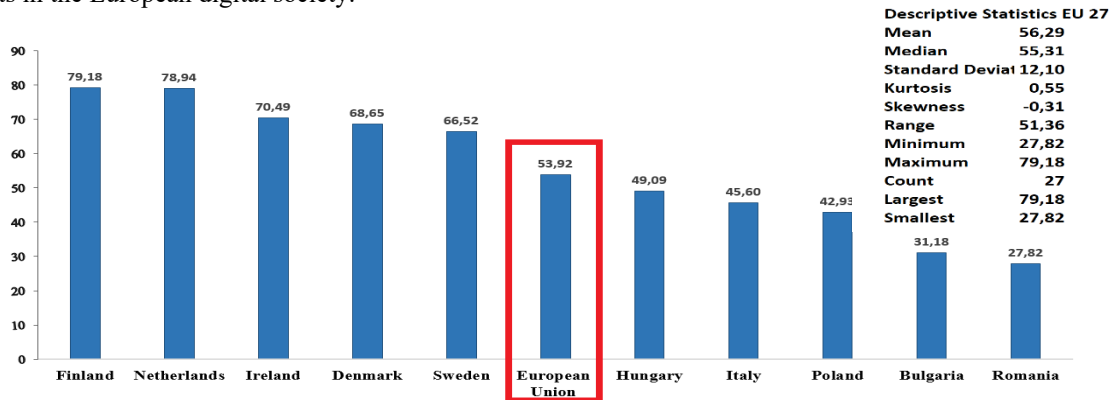

Figure no. 3. The percentage of individuals with at least basic digital skills in 2021 in EU
Source: Adapted by authors, based on dataset: isoc_sk_dskl_i21 (Eurostat, 2023a)

The EU Digital Compass is a strategic plan designed to direct the European Union (EU) toward realizing its digital transformation objectives by 2030. One of the key goals of this plan is to ensure that a minimum of 80% of all adults possess basic digital skills (EC, nd). This goal is very important if EU citizens are going to be able to fully participate in the digital economy. It will also help promote digital inclusion and decrease the risk of digital divide.

Digital infrastructure and fast connectivity, together with consistent cross-country institutional support, create the conditions for the significant development of e-learning platforms and open educational resources (OER). Also, by offering courses that are made for both current and future needs, these platforms can help European citizens improve their digital skills.

The Organization for Economic Co-operation and Development (OECD) conducted research on online learning in 2020, which suggests that unless there is a sense of community support and improvements in literacy and socio-economic equality, online educational opportunities are only completed successfully by privileged individuals (OECD, 2020).

Furthermore, the official European statistics (Eurostat, nd- available at https://ec.europa.eu/eurostat/databrowser/view/TIN00103/default/table?lang=en&category=isoc.isoc_i.isoc_iiu) reveal significant discrepancies among EU Member states regarding the percentages of individuals that have been used the internet to do an online course (Figure no.4).
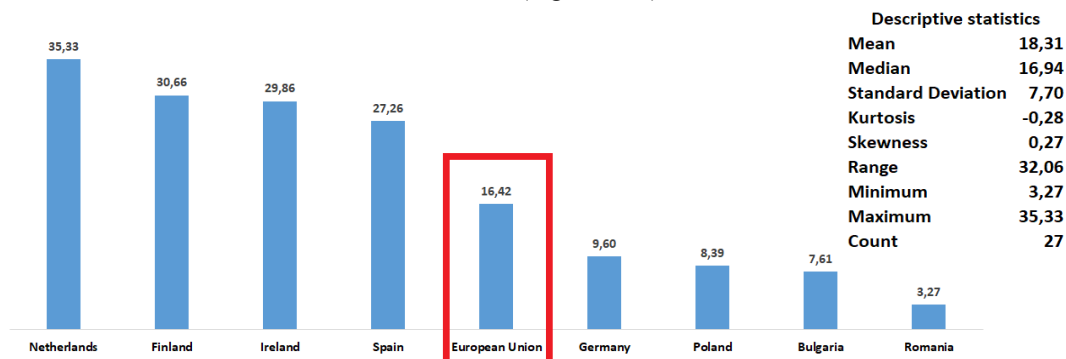

Figure no. 4. The percentage of individuals in EU, in 2022, using internet for doing an online course
Source: Adapted by authors, based on dataset isoc_ci_ac_i (Eurostat, 2023b)

Among EU Member States, Netherlands (35.33%), Finland (30.66%), Ireland (29.86%) and Spain (27.26%) are the countries with the highest percentages of individuals doing an online course while Germany (9.60%), Poland (8.39%), Bulgaria (7.61%) and Romania (3.27%) have the lowest percentages. These reveals significant disparities related to the prevalence of the online learning among European citizens. With an average of 16.42% of individuals at EU level doing an online course in the last three months from the applied survey in 2022, the potential to increase the online education in EU seems very high.

As part of the RRF, each EU member state is expected to allocate 20% of the funds towards the digital transition (EC, nd). Large-scale initiatives, often known as multi-country projects, are essential to fulfilling Europe's digital transformation objectives by 2030, as no one Member State is able to achieve such tasks alone. These initiatives allow Member States to collaborate and combine resources in order to create digital capabilities in important sectors that are crucial for enhancing Europe's digital independence and supporting its economic recovery. The European Commission has identified an initial list of multi-country projects. This list includes areas for investment, such as data infrastructure, digital innovation hubs and digital skills (EC, nd).

Conclusions

A stronger EU engagement in digital education and upskilling is crucial not only for the European Union's labor market but also for its overall competitiveness.

Digital competencies contribute decisively to states' economic development, as they generate an increase in labor productivity, operational efficiency in diverse and complex actions, increased access to international markets and global competitiveness, as well as the identification of new business ideas. As highlighted in this work, countries where intensive online courses are conducted are countries with a high level of economic development. Through improved and continuously updated digital competencies, a series of areas can be revolutionized, namely: research and development, e-commerce, financial-banking services, tourism services, as well as the productive sector.

Digital infrastructure and fast connectivity, together with consistent cross-country institutional support, create the conditions for the significant development of e-learning platforms and OERs. Also, by offering courses that are made for both current and future needs, these platforms can help European citizens improve their digital skills.

EU countries should capitalize on the progress made in the last two years and work towards creating digital educational tools and methods that are of higher quality, more readily available and more inclusive.

Although a number of programs and target objectives are in place to support the digitalization of education in Europe, the e-learning platforms still represent an underutilized tool that can help to increase digital skills among EU citizens. The potential to improve the digital skills is still high and an extra focus should be granted to the programs that improve these on a national or cross border level.

Limitations of the study and future research

Due to the extensive scope of e-learning platforms and the European Digital Society, as well as the page limitation, this paper could only provide a high-level overview as opposed to a thorough investigation. Consequently, some topics may not be investigated as exhaustively as they may merit, indicating the need for more in-depth studies in future researches.

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