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INDEX OF READINESS FOR DIGITAL LIFELONG LEARNING:

CHANGING HOW EUROPEANS UPGRADE THEIR SKILLS

CEPS – Centre for European Policy
Studies in partnership with
Grow with Google

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With contributions
from Leonie Westhoff, Nina Lopez-Uroz, and
country experts



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List of acronyms

| Acronym | Full name |
|-----------------|--|
| DEAP | Digital Education Action Plan |
| DG(s) | Directorates(s)-General |
| EC | European Commission |
| EU | European Union |
| GDP | Gross Domestic Product |
| IRDLL | Index of Readiness for Digital Lifelong Learning |
| Member state(s) | MS(s) |
| MOOC(s) | Mass Open Online Course(s) |

EXECUTIVE SUMMARY

Digitalisation brings about disruptive transformations in society, ranging from access to services, interaction with others, obtaining and sharing information, to metamorphoses in the nature and organisation of work. Learning is no exception.

Digitalisation of learning is the process by which education and training, and generally skills acquisition, development and recognition, are being transformed by the use of digital technologies. Digital technologies have already changed access to information and knowledge in everyday life. Online multimedia tutorials can be downloaded for any daily tasks. Nowadays, online tools and forums are the most effective means to master a statistical computer programme.

To measure the current situation of digital learning in European countries and to draw attention to this very important issue, **the Jobs & Skills Unit at the Centre for European Policy Studies (CEPS) has developed an Index of Readiness for Digital Lifelong Learning (IRDLL) for the European Union (EU)'s 27 countries.**

This Executive Summary presents the results of the research divided into four major chapters. The first deals with digital learning as a topic – what it is, and what it is good for. The second chapter presents the results of the IRDLL overall and of its individual subcomponents. It also contains the main messages that can be distilled for national governments and other stakeholders. The third part of the report looks at what the EU, at supranational level, is currently doing with regard to digitalisation of learning and draws recommendations for the next European Commission (EC). The last chapter contains 27 individual country sheets – just one page long – to present a reader-friendly summary of key findings for each EU member state (MS).

DIGITAL LEARNING – WHAT IT IS AND WHAT IT IS GOOD FOR

In the past, the technological and infrastructural angle of the phenomenon dominated discussions on digital learning. More recently, it has become evident that **digital learning encompasses how digital technologies are integrated in teaching and learning approaches**, within an organisational and institutional context, considering also users' ability to make the best use of such technologies and embrace change.

Digital learning loosens the boundaries of formal and informal learning and creates a continuum of learning opportunities. It changes **where and when one learns** – eliminating or at least reducing barriers to accessibility by creating virtual spaces and the possibility to learn at any time. It increases **the potential actors from and with whom one learns.**

Digital learning changes **knowledge production, assimilation, and ultimately how one learns**. Through enhanced connections, learners can tackle any topic in a much more multidisciplinary manner, more easily synthesising one discipline's approach to that of another. Connections facilitate continuous learning in interaction with peers and stimulate on demand and micro-learning of specific skills, competences and topics that learners choose more easily and more independently.

Lastly, digital learning changes **how to show what one learns**. Formal and non-formal institutions can issue digital certificates to validate competences that result from education and training, either online or in-person. Being digitally available, these certificates are more easily shareable and verifiable. Moreover, digital technologies offer a new means of validation for informal learning.

If approached correctly, digital learning can enhance learning in three main dimensions, which can be summarised by explaining how **digitalisation can deliver more, cheaper, and better learning**.

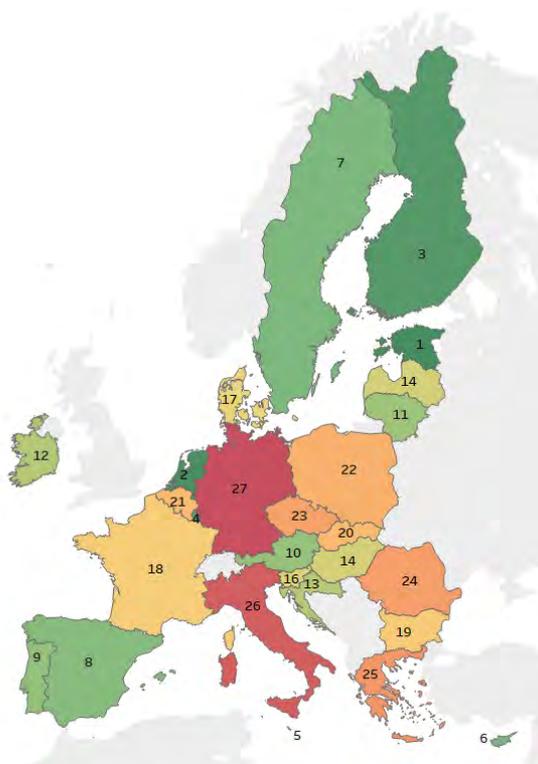
Learning more. Digital learning offers the opportunity to learn “old” subjects with new methods and it paves the way to learn, through a structured and systematic method, new subjects and new skills, which are increasingly important for working and taking part in society. A key example is coding, and more generally digital skills. Opening up and constantly enhancing the possibility to learn remotely, digital technologies also make all sorts of learning opportunities available for people in all locations.

Learning cheaper. Once an initial investment in technology is made, digital learning becomes a highly efficient solution to lower the costs of education and training. It not only provides more opportunities for learning; it can also provide opportunities to more people than was possible before, without significantly increasing costs. This substantially decreases the cost of education and training, allows producers to develop economies of scale and new business models, and to provide cheaper learning opportunities. This lowers entry barriers to education and training.

Learning better. More learning opportunities are available to more people than ever before. Additionally, digital technologies can improve the quality of learning, enhancing its effectiveness in terms of individual outcomes and overall results for society. Teaching methods can be enriched by technological supports to increase participation and interactivity in class, or in virtual learning environments. Digital technologies expand learning opportunities, allowing people (and especially adults) to learn on demand, based on what they need and what they want, personalising their learning process. Personalisation can be further augmented by tracking each learner's performance, making the learning process more adaptable and thus more effective. By better tracking outcomes on a large scale, building big data collected through digital technologies employed in the learning process, we can identify what works best, and what is less successful, for both new and old education and training practices system wide.

INDEX OF READINESS FOR DIGITAL LIFELONG LEARNING IN EUROPE (IRDLL)

Figure 1. Overall results of digital learning index in EU-27



Source: Authors' elaboration based on index calculations.

The countries doing the best overall are Estonia (1st), the Netherlands (2nd), Finland (3rd), Luxembourg (4th), Malta (5th) and Cyprus (6th). The results of most of these countries is not surprising, as north-western countries tend to perform very well in a variety of European rankings considering factors like political institutions and economic performance. As these are likely to impact digital learning readiness, the high performance of these countries is to be expected. Luxembourg is the wealthiest European country per capita, but does not always score well on rankings related to innovation. Surprise comes in 5th and 6th place. Malta and Cyprus – as very small and southern MSs – show that geography is not destiny.

These leaders are followed by countries slightly above and below the European average. Sweden leads in 7th place, followed by Spain (8th) and Portugal (9th), Austria (10th), Lithuania (11th), Ireland (12th), Croatia (13th), with Hungary and Latvia tied for 14th place. Below the EU average are Slovenia (16th), Denmark (17th), France (18th), Bulgaria (19th) and Slovakia (20th).

Countries significantly underperforming the European average are Belgium (21st), Poland (22nd), the Czech Republic (23rd), Romania (24th), Greece (25th), Italy (26th) and Germany (27th). The low ranking of southern and eastern EU MSs at the bottom is not surprising, but Germany's last place highlights an important message discussed further below.

TRENDS AND CONCLUSIONS

Progress is uneven and all countries have room to grow. European countries differ widely in their readiness to utilise digital learning technologies. The gap between the best and the worst EU MS is large across nearly all indicators. Correlation between individual parts of the index is low or even negative, indicating that countries are not uniformly ranked across individual indicators. This also means that all countries, including the top performers, have significant room to grow. At the same time, digital inclusion is not a given, even for wealthier and more successful countries. The latter cannot afford to be complacent; they need to address the risks highlighted in this report to avoid digitalisation hindering rather than fostering better access to learning.

Even the best-performing European country has areas where it should improve. Conversely, even countries with low scores usually have something they can teach others. For example, Romania performs better in terms of institutions and policies (7th in the EU). In neighbouring Bulgaria, new funding opportunities from EU funds are mobilised on a massive scale to drive its development.

Money speaks – up to a point. Wealthier and more economically successful countries generally, but not uniformly, score better than less economically developed MSs. However, there are exceptions – of which Germany and Belgium are most striking.

Neither geography nor history are destiny. A number of central and eastern European MSs seem to be doing quite well in digital learning readiness. Malta, Cyprus, Lithuania, Hungary, and Estonia (accession in 2004), and Croatia (accession in 2013) rank around or above half of all MSs. Notably, Estonia is the absolute winner of this year's index.

Determined action even by a small country can help. Cyprus and Malta are perhaps the most surprising winners of the index. Ranked at the 5th and 6th place, the small Mediterranean island states show the importance of institutions and policies for digital learning, and the potential for less wealthy nations to catch up and even surpass European leaders.

Size matters – negatively, dragging down Europe. Four out of the largest five EU countries by total GDP and population – Germany, France, Italy and Poland - score poorly, with Spain being the only exception. Together, these four countries account for the majority of the EU's population after Brexit, so this is a troubling development. There is no one-size-fits-all solution for this issue. While France has an excellent institutional environment for digital policymaking, it lags behind in investment into the digital skills of educators, which are crucial to digital learning. Italy has recently made strides in creating strong institutions and policies for digitalisation, but this has yet to deliver tangible results.

Europe will not move forward without its biggest economy; that requires changes beyond Germany. Germany's last-place finish is remarkable, but perhaps less so for those closely paying attention to digital trends. Germany has come under scrutiny for under-investment in digital infrastructure. Attitudes are also important, and Germans tend to be sceptical towards digital technologies. However, the salience of this issue goes beyond Germany. If there is one thing that can be observed in several large EU countries, it is a wary attitude towards digitalisation. Unless citizens, students and consumers can trust their privacy and interests will be protected, then the potential of digital learning will never take off.

WHAT SHOULD THE EU DO?

The report describes what the EU has been doing with regard to digitalisation of learning. There is already a flurry of activity, and the incoming EC President von der Leyen clearly stated in her programme that this is a topic of growing importance.

We offer three specific recommendations after analysing current policy and practices at the EU level.

1) The EU needs to be more strategic. It can do that by strengthening a comprehensive vision for concerted and coherent policy action on digital learning, building on the positive experience of the Digital Education Action Plan (DEAP), to serve as framework and orientation for MSs. At the moment, a clear orientation, inspired by a holistic vision, is missing. Too often each Directorate-General (DG) tends to have its own perspective and agenda on the topic of digital learning.

2) The EU should more directly support digital learning by immediately creating a dedicated financial instrument. EU funds for digital learning need to be streamlined, which is best accomplished with a dedicated funding instrument. To ensure the sustainability of digital learning projects funded by the EU, this dedicated financial instrument should have criteria to embed financed projects within national policies for digital learning. This would increase the visibility of the topic, raise awareness and allow for

better tracking of the results of funding. In particular, as a short-term priority, the EU should intensify efforts to foster digital skills, especially for vulnerable groups, to ensure equal access and inclusiveness of digital learning. The current shortage of digital skills by almost half of Europeans is particularly worrying, as the process of digitalisation may leave behind those lacking digital skills. In line with EU objectives, such funding should always aim to drive inclusive progress in digital learning.

3) The EU needs to support Europe-wide understanding and knowledge generation about digital learning. It should increase research efforts for digital learning, including a specific financial stream for digital learning in the next EU Framework Programme for Research and Innovation. As digital learning is still new, further and focused research is needed to explore it, identify what works, what does not, and more clearly assess costs, benefits, and risks.

AN INTRODUCTION TO DIGITAL LEARNING

Digitalisation brings about disruptive transformations in society, ranging from access to services, interaction with others, obtaining and sharing information, to metamorphoses in the nature and organisation of work and the disappearance of certain jobs while new ones emerge. Such transformations impact on all aspects of people's lives. Education and training is no exception. On the contrary, important changes in this field appear imminent, advancing at a pace that has to be kept by those willing to develop a sound understanding of the phenomenon and adequate strategies to navigate it. While it has been argued that digital technologies are likely to have, probably more rapidly, the same impact on the learning process as did the printing press, accompanying social and economic factors are important in shaping such transformation (Warschauer 2007).

Such impact is already visible in the way digital technologies have changed access to information and knowledge in everyday life. Online multimedia tutorials can be downloaded for basically every task that people run in their personal lives as well as at work, from cooking and gardening to preparing presentations and analysing databases, or learning a new language for both pleasure and career objectives.

To learn how to master a statistical computer programme, it is much more effective, nowadays, to search on online blogs,² which are continuously updated by experts and practitioners, than reading a book written by one or two authors to this aim, as one used to do in university courses of statistics in the past. The possibility of obtaining continuous updates on new developments and practices, as well as exchanging common problems to find collaborative solutions, enhances the capacity to keep learning.

But it is not all about computers. The University of Naples has recently launched, through its online platform, the first MOOC on how to make pizza,³ developed by university professors in several disciplines, practitioners, businessmen and businesswomen with significant experience in the field. The course is dedicated to skills development for workers and people willing to work in the food services sector, including cooks, managers, business owners, salespeople, and servers. Yet, it is also open to journalists and food bloggers and, simply, to food lovers. Indeed, the course is open to whomever, because it is for free and it can be accessed online from everywhere, at any time.

The potential of digital learning to open up possibilities in education and training to more people than before is enormous. This applies to new learning opportunities in innovative fields for existing education and training systems, such as computer programming or pizza making, but it is also very relevant for more traditional basic skills. An e-learning platform eBac⁴ in Luxembourg allows adults that dropped out of school before finishing secondary education to achieve their diploma through

² See for example the Stata Blog [Stata Blog: Not Elsewhere Classified](#).

³ See [PizzaMOOC: Pizza Revolution](#).

⁴ See [eCampus Luxembourg Platform](#).

blended distant programmes, with a classical curriculum that prepares for the classical baccalaureate to access to the university, or with a wider range of modules more oriented to vocational training.

Digital learning possibilities are indeed everywhere, so that ‘living’ the phenomenon appears easier than describing, measuring and assessing it. Yet, a sound understanding of the ongoing transformations is necessary to navigate change and make the most out of it.

What is digital learning?

While a well-established overarching definition is hard to find (Williams 2018), digitalisation of learning describes **the process by which education and training, and generally skills acquisition, development and recognition, are being transformed by the use of digital technologies**. To draw a comprehensive picture of digital learning, therefore, it is necessary to consider the phenomenon in its all its complexity, bearing in mind that **it encompasses any type of learning that is undertaken with the support of digital technology**. This includes learning that occurs in formal and non-formal education and training, as well as voluntary informal learning activities in everyday life, such as visiting museums, reading a manual or watching videos. When taking this broad perspective, it appears evident that **digital technologies impact on learning processes at all ages**, whether for children in early education and schools, for students in higher education or for workers in vocational training at the beginning of or throughout their career.

Therefore, by adopting a comprehensive and lifelong perspective, this definition implies that digital learning can occur in very diverse forms, making use of a variety of tools and practices and involving very diverse actors in the process. To give some examples, digital learning can come through completely informal sources on the internet, such as videos, blogs, social media groups and apps, with material often put together through crowdsourcing processes. Alternatively, digital learning resources can be provided online by formal or non-formal institutions on their websites or dedicated apps, being developed by professionals and experts, for instance in the form of e-books or MOOCs. Finally, digital learning can happen through digital tools and sources in a traditional, physical learning environment like the classroom, namely thanks to virtual and augmented reality, gamification of classes and exercises, tablets and computers to study school subjects – and these are only some of many possible examples.

In the past, especially before the 2000s, **the technological and infrastructural component of the phenomenon** used to dominate discussions on digital learning, focusing on the use of computers or connectivity (Conrads et al. 2017). More recently, it has become evident that **digital learning also encompasses how digital technologies are integrated in teaching and learning approaches, within an organisational and institutional context**, also taking users’ skills into consideration so they can make the best use of such technologies and embrace change. Indeed, while technology is acknowledged as the main driver for change in education in the last decade (Vincent-Lancrin et al. 2019), an innovative and functional environment for learning should not undermine the important role of people and their capacity, as well as of organisations and institutions involved in the process. **The skills of both teachers and learners are thus an important component of digital learning**. In particular, digital skills often appear as a closely related topic, being necessary to engage in digital learning activities and, at the same time, improving through digital learning. However, even such skills are only a part of this complex phenomenon that requires and generates a much broader set of cognitive and non-cognitive skills. Enabling infrastructure, technological advancements and digital skills are necessary elements for

digital learning. Yet, these are not sufficient to ensure that it functions properly, which necessitates a **conducive institutional context as well as sound pedagogy and methods in adult education.**

As defined above, digital learning, on the one hand, creates **new channels for learning independently, outside the traditional institutional environments** that modern societies have developed for education and training, namely schools, universities, laboratories and classrooms in general. On the other hand, **it enables forms of blended learning taking place in these traditional learning environments.** Such forms consist of complementing traditional learning methods with digital material and tools, often online, deeply changing even traditional forms of education and training in several aspects. Overall, digital technologies define a new, broader ecosystem for learning, where learning takes place in both physical and virtual environments, through both formal and informal processes (Brown, Conole, and Beblavý 2019).

What does digital learning change?

Digital learning loosens the boundaries of formal and informal learning

When it comes to conceptualising learning, a longstanding distinction has been made between formal and informal learning. Rather than being completely clear cut, this distinction has emphasised the different degree of structure, organisation and intention of the learning process throughout these different types of learning, observing when this happens within or outside education and training institutions (Cedefop 2014). Digital learning, as described above, further blurs such a distinction by establishing an enhanced *continuum* between formal and informal learning. Digital technologies make it possible to access learning opportunities in more contexts and ways than in the past, enhancing both formal and informal learning and mixing some aspects of the two. Such technologies extend the formal learning process far beyond formal or non-formal institutions for education and training, complementing a structured learning process with informal sources of learning; for instance, digital technologies in classrooms are used to access digital material from social media (Dabbagh and Kitsantas 2012). On the other hand, thanks to digital technologies, learning can take place completely outside these institutions, yet still in a very structured way and with a strong motivation, for example when learning a new language through mobile apps or when learning to type faster through games on a computer.

Digital learning changes where and when one learns

Along with conceptual boundaries, digital technologies considerably lower physical barriers in the learning process. Thanks to connectivity, which through the internet eases transfers of digital learning material, physical spaces are not strictly necessary anymore to access learning opportunities. Often, such spaces are replaced by virtual spaces that are accessible remotely with the aid of digital devices. Even if a physical space may still exist where, for example, classes take place, individuals can join virtually from different locations. As such, virtual spaces make it possible to overcome physical distance in accessing learning opportunities, and thereby strengthen the transnational dimension of learning and involve actors across different countries. Happening in virtual environments, learning is often not constrained by a specific schedule and timing, and can be undertaken basically at any moment, according to learners' needs and availability in their daily life. Moreover, digital learning also changes when individuals learn throughout their lifespan. Importantly, allowing for more opportunities to access learning, with higher flexibility in time and space, it facilitates continuous learning during adulthood, when time for learning is limited by other duties (Brien and Hamburg 2014).

Digital learning changes the actors from and with whom one learns

Digital technologies, thanks to connectivity, do not only facilitate access to learning material. These technologies also make it easier to share such material, easily produced and provided by a multitude of actors and by learners themselves. The means for this sharing are notably, but not exclusively, websites, social media and mobile apps. This creates virtual communities of practices, where all those involved in the learning process establish mutual relationships that allow them to share information as well as experience, learning and receiving feedback from each other (Lave and Wenger 1991), not necessarily limited to schooling or professional development. In this way, the process of learning becomes more participatory and characterised by a bottom-up approach that discards to some extent the hierarchies that have historically developed around knowledge. This is not limited to the virtual world. Through the introduction of digital technologies, participation and sharing increase also within traditional learning environments. For example, universities put in place spaces where students and teachers can share resources and their own work, or schoolteachers create mechanisms to take on board student inputs and give more feedback during classes, with the aid of tablets or computers, through instantaneous communications.

Digital learning changes how one learns

As described above, when engaging in digital learning, one learns from more sides and in a relationship often more characterised by parity and active participation than in the past. This deeply affects how knowledge is produced and assimilated. Indeed, changing how to access and share material, as well as the relationships around learning, digital technologies have the potential to transform thinking and information processing overall. Those considered digital natives, born and grown up surrounded by digital devices, are believed to have already developed a new cognitive functioning, while others can gradually shift their approach as they engage with digital learning (Prensky 2001). To explain this process, the theory of connectivism stresses the role of digital technologies in facilitating different types of connections: between different sources or communities, between humans and non-human appliances, between fields, ideas and concepts (Siemens 2005). Through enhanced connections learners can tackle any topic in a much more multidisciplinary approach, crossing the barriers from one discipline to the other more easily. Connections facilitate continuous learning in interaction with peers and stimulate on demand and micro-learning of specific skills, competences and topics that learners choose more easily and, in some cases, independently, creating personalised learning environments (Dabbagh and Kitsantas 2012) and thus increasing motivation. This opens the way to developing new pedagogical approaches and reinforcing adult education methods.

Digital learning changes how to show what one learns

In addition to the learning process *per se*, digital technologies have an impact on how to certify and show skills, competences and subject mastery acquired through learning. Formal and non-formal institutions can use such technologies to issue digital certificates to validate competences that result from education and training, either online or in-person. These certificates are more easily shareable and verifiable because they can be made available digitally and often online. Moreover, digital technologies offer a new means of validation for informal learning, happening both online or in real life. This form of learning has been traditionally overlooked precisely for the lack of visibility and measurability of its outcomes (Björnaváld 2001). With digitalisation, barriers to certification of skills are lowered because anyone can engage in verification of skills, even micro-skills, through digital

online tools. As in the example of open badges, these certifications are then easy to embed in social network profiles and thus highly portable (IMS Global Learning Consortium 2016). In these regards, with digital learning means, skills development and validation become more and more decoupled from the formal institutions traditionally dedicated to these functions.

What are the benefits of digital learning?

Through all these channels of transformation, learning can improve considerably thanks to digital technologies, benefitting individuals, education and training stakeholders and society as whole. Such benefits include a greater accessibility to education and training, with expanded opportunities for learning, as well as a better quality of these more accessible and expanded opportunities.

Learning more

Digital learning offers the opportunity to learn 'old' subjects in new ways. For example, teaching in mathematics, science or literature can benefit from additional tools and methods provided with the support of computers or mobile apps, to do exercises, support rote studying or allowing learners more creativity and interactivity when they approach a subject. Moreover, digital learning paves the way to learn, through a structured and systematic method, new subjects and new skills, which are increasingly important for work and taking part in society. A key example is coding, and more generally digital skills, which is to become a new subject in schools, or for which vocational training courses can be offered more often, with the aid of digital technologies, even remotely. Indeed, opening up and constantly enhancing possibilities to learn remotely, digital technologies also make all sorts of learning opportunities available for more people. Potentially, everyone could take educational and training courses that are provided anywhere, thus no longer being constrained to those subjects offered in their proximity or by institutions they can access physically. Often these learning opportunities are made available with significant flexibility in terms of time schedule, which is a key aspect to pursue learning throughout life, even beyond the period of life dedicated exclusively to learning, traditionally childhood and youth. As a result, access to learning opportunities is facilitated by digital technologies that allow remote access to education and training for all and in particular for those people facing higher barriers, such as people with disabilities. Indeed, as long as an internet connection is available and online learning material is provided in accessible forms (e.g. text captions for deaf or hard-of-hearing people, *ad hoc* screens or audio files for blind or visually-impaired people), people with disabilities can benefit from the removal of barriers to education and training and this will foster inclusive learning opportunities in society as a whole (Kilhoffer and Baiocco 2019). Finally, in addition to facilitated access to formal learning material and opportunities, digital learning, by enabling communities of practices, enhances capacity to access non-codified knowledge on a given subject and expands informal learning opportunities.

National Project for Autonomy and Curriculum Flexibility – PACF (Portugal)

Since 2017, Portuguese schools can join, on a voluntary basis, the “Project for Autonomy and Curriculum Flexibility – PACF” (Projeto de Autonomia e Flexibilidade Curricular). It provides schools with the necessary conditions to manage the curriculum while also integrating practices that promote better learning. Beginning in 2016 with a pilot testing in 10 schools, the project was extended up to September 2017, to over 200 schools. The project relies on the idea that schools must be able to define part of the curriculum, as a way to promote curricular innovation. The PACF pilot not only allowed schools to experiment with new curricular subjects, it also allowed them to implement new pedagogical approaches, as well as to develop new assessment practices, including with the aid of digital technologies. This was developed in order to support a coherent implementation of the “Students’ skills profile by the end of compulsory schooling”, as this new profile for students required the development of a new curricular approach. The PACF works alongside another national initiative to promote digital skills, including through digital education: the “Essential Core Curriculum” for elementary and secondary education (Aprendizagens Essenciais). It was launched in August 2017 to address the need for a process to update curricula. The aim was to ensure a mastery of core disciplinary subjects, while at the same time allowing space for interdisciplinary learning. Through it, ICT became curricular content across all 12 years of mandatory education. At primary schools, ICT is addressed mainly by the national project “Introduction to Coding in Primary Schools- INCoDe.2030” (Iniciação à Programação no 1º ciclo). These projects are aimed at fostering:

- Development of digital educational resources for different levels of education and subjects;
- Training of pre-school, primary and secondary education teachers, with participation of teachers in training centres and higher education;
- Extension and further development of the ICT curriculum;
- Design and implementation of the subject Information and Communication Technologies (ICT) in compulsory education;
- Design of an ICT reference framework for 1st-cycle students.

Impact

The pilot phase was quite positive, with an evaluation study being developed with 130 out of 226 schools that took part in this project. In 2018/19, the PACF project was extended to all schools/school clusters; though the project remains voluntary nature, 85% of schools/school clusters decided to be part of the initiative. In the coming years, PACF will be applicable to all schools in the country by legislation. This means that more than 7,000 Portuguese primary and secondary schools will have the opportunity to experience the PACF.

Useful Resources: [OECD report, 2018](#); [INCoDe2030](#); [Cosme, A., 2018](#); [Palma, C., 2019](#).

Learning cheaper

Once an initial investment on technology is undertaken, digital learning appears as a highly efficient solution for lowering the costs of education and training. It does not only provide more opportunities for learning. It can also provide these opportunities to more people than was ever possible before, without significantly increasing the costs of production. Considering the simple example of classes or books that are produced and then published online, it is possible to claim that these resources become non-rival goods once they are provided online. In fact, once the producers incur the cost of producing one unit of these resources, costs do not increase for additional individuals accessing the

class or book. These can then be provided more cheaply than before, when the producer incurred printing costs or infrastructural costs to allow in-person participation, thereby limiting the quantity on offer. Most digital learning resources can be accessed by individuals without preventing other individuals benefitting from such resources. In some cases, these resources can even be provided for free online, thereby also becoming non-excludable, so that a potentially infinite number of individuals can access these classes or books without incurring any cost. This considerably lowers the cost of education and training, allowing producers to develop economies of scale, create new business models and provide learning opportunities more cheaply than before, lowering in turn the barriers to entry into education and training.

Global Libraries Initiative “Father's third son” (Latvia)

Driven by the observation that public libraries in Latvia play an important role in reducing the digital divide ensuring no one is left behind, reducing social exclusion, especially in rural areas, the project “Father’s Third Son” (Trešā Tēva Dēls) has been financed by the Bill & Melinda Gates Foundation and the Latvian government to develop free access to information technology and digital online resources – through computer and internet – and to receive advice on how to use it. Another activity of the project is the development of a joint access point to the local content of public libraries by digitising local history and other content of local importance and making it available through the joint library portal. Overall, the project aims to connect all Latvian public libraries to the internet with broadband connections, to build a wi-fi network for library users, to provide approximately 3 computers and a scanner per library to meet the anticipated high demand for digital online resources, and to provide training to librarians. Once trained, librarians provide both individual consultations and organise training for different groups. This includes various e-services training to improve users’ computer skills and competencies, in particular seniors, the unemployed and children. As such, since 2006, Father’s Third Son has been contributing to fostering digitisation initiatives in the country.

Impact

The project has contributed to the development of basic IT skills training programmes for social risk groups and methodological materials for librarians to work with these target audiences. An interactive e-learning course with game elements for children up to grade 4 and methodology has also been developed to adapt to different target audiences. Overall, studies conducted in 2007, 2011 and 2015 show an increasing number of internet users in the country with the use of the free public internet access in public libraries having almost tripled. Library internet usage has doubled in all age groups except among children and teenagers, which can be explained by this generation’s greater access to the internet through mobile devices. 874 Latvian libraries (including library branches and book distribution points) installed a total of 4,000 new computers and multifunctional devices for copying, scanning and printing.

Useful Resources: [Bibliotekam](#)

Learning better

More learning opportunities are provided to more people than before. Yet, additionally, digital technologies can improve the quality of learning, to enhance its effectiveness in terms of individual outcomes and overall results for the society. First of all, as mentioned above, teaching methods can be enriched to make the best use of technological supports, to increase participation and interactivity in class or in virtual learning environments. A proactive approach is enhanced also when choosing what to learn. Digital technologies expanding learning opportunities, allow people, especially in adult age, to

learn on demand, based on what they need and what they want, personalising their learning process, which is then characterised by higher motivation and therefore likely to be more effective. Moreover, a better tracking of each learner's performance, through the data collected by the digital devices used while learning, can result in personalised learning modules and programmes, to respond to individual characteristics, making the learning process more adaptable and thus more effective for each one. In fact, tracking of outcomes can account for what works best for whom and for unique individual strengths and weaknesses. In addition to effectiveness at individual level, a better tracking of outcomes on a large scale, for example relying on big data collected through digital technologies employed in the learning process, can help identify what works best and what is less successful in terms of both new and old education and training practices in the entire system. Big data can also be very useful in detecting skills that are increasingly demanded, contributing to develop adequate supply of education and training in response.

[Mathema-TIC Personalised Learning in Mathematics for every learner \(Luxembourg\)](#)

To enhance teaching and learning and to transform maths education at schools, the Ministry of National Education, Children and Youth of the Grand Duchy of Luxembourg (MENJE), in collaboration with Vretta, a leader in learning technology solutions, designed and developed the MathemaTIC Personalised Learning Environment for primary and secondary school students. The purpose of MathemaTIC is to enhance student achievement by building a sustainable solution tailored to meet the specific needs of the mathematics curriculum of schools and to engage students in innovative ways to raise their level of numeracy and prepare them for success in mathematics. MathemaTIC is a personalised learning platform that is designed to make the experience of learning mathematics engaging and enjoyable for every learner irrespective of their social origin or level of access to quality information and pedagogical resources. This is beneficial because it is an example of adapting traditional content via digitisation and media preference of the new generation. Students interact with research-backed, engaging resources that are tailored to their needs and aligned to learning outcomes as in the traditional curriculum for primary school students from Grade 3 to 8. MathemaTIC provides teachers and students with real-time academic progress through actionable data. The dashboards let them view feedback that directly aligns students' needs with learning outcomes, pointing out areas of strengths and weaknesses. MathemaTIC contains game-based and problem-solving items throughout its modules. These goal-oriented items let students apply the knowledge they learned in a fun and engaging environment. The mathematical items have been developed in four languages: German, French, Portuguese and English, enabling students to understand and work through problems in the language in which they are most comfortable. The platform can be switched between languages to enable students to understand the problem in a language other than the language of instruction. It also helps parents assist their children throughout the learning process.

Impact

The successful launch and implementation of MathemaTIC, the personalised learning platform in mathematics, for primary school students in Luxembourg led to the development of about 300 new technology-enhanced items over the past three years for students in lower secondary schools, of which the launch began in autumn 2019 across Luxembourg.

Useful Link: [Mathema-TIC](#)

INDEX OF READINESS FOR DIGITAL LIFELONG LEARNING (IRDLL)

Figure 2. Overall results of digital learning index in EU-27



Source: Authors' elaboration based on index calculations.

This chapter presents the newly constructed **Index of Readiness for Digital Lifelong Learning (IRDLL)**. First, the results of 27 EU MSs are presented for the overall index. Then, the analysis digs into the individual components of the index and related results for each MS.

Indices are a good way to reach policymakers and the public on complex subjects such as this one. However, **the final objective is not only to rank countries and compare their standing. The index presents a combined qualitative and quantitative assessment of each MS' current situation to help policymakers, social partners, media and the public understand what needs to be done.** All these stakeholders may benefit from the present study by considering national gaps and potential areas for improvement, and learning from innovation and best practices elsewhere in Europe.

The index has been constructed with existing data and new data generated from surveys with national experts from the EU-27. In developing the index, other indices⁵ served as a source of inspiration, but we also sought guidance from literature on creating composite indicators.⁶

Moving on to results – **the countries doing the best overall are Estonia (1st), the Netherlands (2nd), Finland (3rd), Luxembourg (4th), Malta (5th) and Cyprus (6th).** The second through fourth countries are not surprising, as north-western countries tend to perform very well in a variety of European rankings considering factors such as political institutions and economic performance. As these are likely to impact digital learning readiness, high performance is to be expected. Surprise comes in the 5th and 6th place. Malta and Cyprus – as very small and southern MSs – show that geography is not destiny.

These leaders are followed by countries slightly above and below the European average. This group is very geographically diverse, but mostly consists of smaller MSs. Sweden leads in 7th place, followed by

⁵ For example, the Regional Innovation Scoreboard, Euler Hermes: Enabling Digitalization Index, International Digital Economy and Society Index, Digital Transformation Scoreboard, the European Lifelong Learning Indicators (ELLI).

⁶ The most authoritative is the OECD's Handbook on Constructing Composite Indicators (Methodology and User Guide) (2008).

Spain (8th) and Portugal (9th), Austria (10th), Lithuania (11th), Ireland (12th), Croatia (13th), with Hungary and Latvia tied for 14th place. Below the EU average are Slovenia (16th), Denmark (17th), France (18th), Bulgaria (19th) and Slovakia (20th).

Countries significantly underperforming European average are Belgium (21st), Poland (22nd), the Czech Republic (23rd), Romania (24th), Greece (25th), Italy (26th) and Germany (27th). The place of southern and eastern MSs at the bottom are not surprising, but Germany's last place certainly is. This result is discussed further below.

Leaders

Figure 3. EU-27 leaders in digital learning



Source: Authors' elaboration based on index calculations.

Estonia is a country that, depending on context, can be grouped with the Baltic or Scandinavian states. Estonia's income per capita is well below half that in Sweden, but the country nevertheless has very strong digital performance across the board. Its government, for example, has launched a number of ambitious programmes to ease administrative burdens, and make everything from tax registration to voting possible via digital means. Its ranking reflects its ambitious and innovative digital programmes, particularly as they relate to its educational system and digital infrastructure. Estonia's leadership shows that even a small country with a chequered history can lead Europe.

Looking to other leaders, the Netherlands places well owing to its excellent institutions and policies on digital learning, and high availability and use of digital learning. Finland is well known for its world-class education system from primary school to lifelong education and training, which is reflected in its high rankings across the board in digital learning indicators. Luxembourg scores quite high generally, but it is not as uniformly successful as other top countries. For example, Luxembourg places 24th in learning outcomes, which is a notably poor result considering the country has the highest GDP per capita in the EU.

Also of note, several countries scored higher than expected and certainly above their typical performance in other European rankings. Malta (5th) and Cyprus (6th) are often grouped with other southern European countries, but this index finds they outperform many larger and higher income countries. This could be a reflection of the Maltese and Cypriot governments taking advantage of EU funding opportunities, which contributed to infrastructure and education system upgrades.

Stragglers

Figure 4. EU-27 stragglers in digital learning



Source: Authors' elaboration based on index calculations.

The worst performers in readiness for digital lifelong learning show some expected results mixed with a few surprises.

Overall, southern and eastern Europe performs poorly. This is particularly reflected by the lower rankings of Romania, Greece and Italy, which often score low on European rankings related to economic performance, innovation, and digitalisation. Italy is interesting in that its education simultaneously performs so well and so badly. In learning outcomes, Italy places 8th, while in educational attainment and participation, it is 26th. Greece is nearly the opposite, placing 27th in learning outcomes, but more moderately in learning attainment and participation (16th).

Romania performs poorly overall, but it seems to be improving its digital infrastructure. In 2017 it ranked second in the EU (behind Sweden) by percentage of households with very high speed internet connections. This figure more than tripled compared to 2013. Still, Romania continues to score very poorly in regards to

quality of governance and policy implementation, which dramatically decreases its overall rankings.

The low rankings of the Czech Republic (23rd) and Poland (22nd) are more surprising. The Czech Republic leads new MSs in terms of economic performance, but also performs strongly in innovation. Poland has had one of the most dynamic performances across Europe during the last 30 years both in terms of economic development and improvements in education. This is a warning against complacency given the pace of technological and economic change.

Most strikingly, Germany comes in last. While Germany is not known for its investments in digital infrastructure and education, few indices of EU MS place Germany so poorly. Germany's performance cannot be explained by a single indicator, but it performs relatively weakly on a range of indicators, providing robust evidence of underperformance.

Detailed information on IRDLL and its results

Digging into the individual components that lead to the overall results presented above, the IRDLL index is composed of 9 indicators in three categories that are assigned weights according to their relevance for the deployment of digital learning (see Table 1). The construction of the IRDLL stems from the premise that **three broad categories are most relevant to understand digital learning readiness: learning outcomes and participation, institutions and policies, and the availability of digital learning**. The literature suggests that each of these provides insight into a particular aspect of digital learning readiness.

Table 1. Composition of IRDLL

| Index section | Weight |
|---|------------|
| A - Learning participation and outcomes | 30% |
| Learning outcomes | 15% |
| Educational attainment and participation | 7.5% |
| Participation in lifelong learning | 7.5% |
| B - Institutions and policies for digital learning | 40% |
| Institutions and policies | 10% |
| Regulation and funding | 15% |
| Educators and schools | 10% |
| Governance and implementation | 5% |
| C - Availability of digital learning | 30% |
| Attitudes towards digitalisation | 15% |
| Accessibility of digital learning | 15% |

Source: Authors' elaboration.

The research team identified existing data suitable for constructing the index through desk research. Such data needed to cover the EU-27, be as recent as possible, and come from reputable sources. As detailed below, main data sources include Eurostat, Eurobarometer, OECD, and the Bertelsmann Stiftung. The United Kingdom has been excluded from the calculation of the index, given its earlier decision to exit the EU by the time this report is published.⁷

It became clear that no existing data sufficiently addressed certain points of interest, particularly the quality of educational institutions, educators, and policy frameworks. For this reason, the research team developed a questionnaire⁸ for completion by national experts⁹ for each MS in the EU-27. The report now presents results for each of the three top categories.

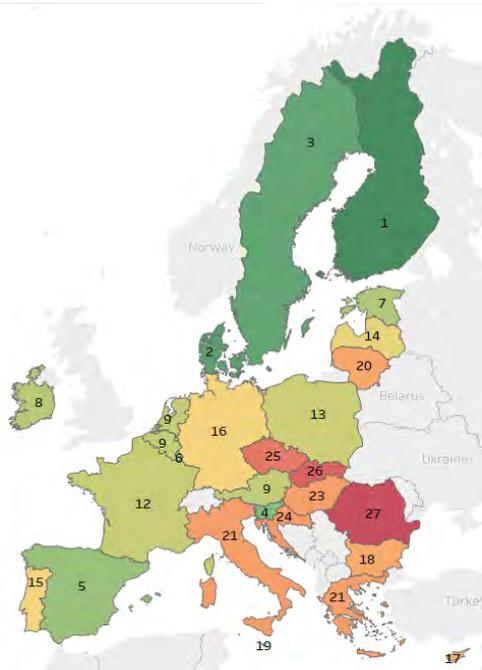
⁷ Should this change, the UK will be included in future editions of the Index.

⁸ See the report's [website](#).

⁹ Several countries were handled in house by the authors of this report. National experts were found through literature and informal stakeholder consultations. For a few countries where CEPS was unable to identify suitable and available experts, Google's team assisted with suggestions for national experts and their contact information.

Section A – Learning participation and outcomes

Figure 5. Learning outcomes performance among EU-27



Source: Authors' elaboration based on index calculations.

This portion of the index measures how much of the population participates in learning, how successful the country is in terms of learning outcomes, and how educated the populace is. More participation, better outcomes, and higher levels of educational attainment correspond to people and infrastructure better suited for digital learning. Of course, this pillar does not measure the effects of digital learning directly, but rather various aspects of learning in general that appear conducive for digital learning. That is why it is only one of three elements in the index.

For learning outcomes, the index focuses on measures most relevant to digital skills. Learning outcomes are measured with mean standardised test scores – a well-established and frequently used indicator – as well as educational outcomes measured by reputable surveys. Test scores for both children and adults are considered. Together, they cover proficiency in mathematics, reading and science, literacy, numeracy, and problem solving in a tech-rich environment. The standardised tests used are from the PISA and PIAAC surveys, TIMSS, and PIRLS.

Educational attainment and participation measures refer to the share of the population with tertiary education. These data come from Eurostat for the most recent year (2018).¹⁰

Participation in lifelong learning is essential given the pace of technological change – the skills and proficiencies in highest demand shift at a faster pace than before. Therefore, continuous up- and re-skilling is an important measure. To this end, the share of the adult population (25-64 years) in education and training in the past four weeks is considered. These data come from Eurostat (2018).¹¹

It is also useful to measure the intensity of lifelong learning, and not simply the proportion of people taking part. For this, the index also considers the mean instruction hours spent by participant in education and training. These data are also from Eurostat (2016).¹²

After combining the data on learning outcomes and participation, Scandinavia rules the roost. Finland leads, with Denmark (2nd) and Sweden (3rd) just behind. Thereafter the picture becomes more diverse, with Slovenia (4th), Spain (5th), Luxembourg (6th) and Estonia (7th).

¹⁰ According to data from the Eurostat Labour Force Survey – Population by educational attainment level, sex and age (%) - main indicators, available [here](#).

¹¹ According to data from the Eurostat Labour Force Survey – Participation rate in education and training (last 4 weeks) by sex and age, available [here](#).

¹² According to data from the Eurostat Labour Force Survey – Mean instruction hours spent by participant in education and training by age, available [here](#).

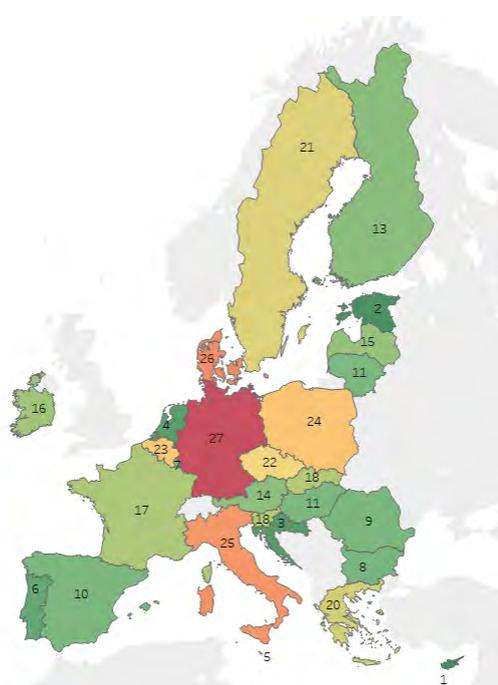
A large group of countries from all over Europe sit in the middle of the ranking – Ireland (8th), then Austria, Belgium, and Netherlands tied for 9th place, followed by France (12th), Poland (13th) and Latvia (14th). Below-average results are achieved by Portugal (15th), Germany (16th), Cyprus (17th), Bulgaria (18th), Malta (19th), Lithuania (20th), with Greece and Italy together occupying 21st place. At the bottom, Hungary (23rd), Croatia (24th), Czech Republic (25th), Slovakia (26th) and Romania (27th) perform the worst.

Section B – Institutions and policies for digital learning

Because quality institutions and policies are important for digital learning outcomes, expert surveys generated new data to measure this element specifically related to digital learning. The ‘governance and implementation’ indicator, however, relies on existing measures. For the other indicators, national experts filled in a detailed standardised questionnaire about the situation in their country with regard to policies and institutions for digital learning. This introduces a measure of subjectivity, but this is minimised by using many detailed and fact-based questions. Overall, the questionnaire captures aspects of the learning environment that no existing measures can.

For institutions and policies, national experts were asked a number of questions to assess the quality of institutions and policies relevant for digital learning. These included questions on the awareness of policymakers on digital learning, the existence of policies and priorities on digital learning, and clear delegation of responsibilities in this area.

Figure 6. Institutions and policies performance among EU-27



Source: Authors' elaboration based on index calculations.

For regulation and funding, national experts were asked a number of questions to better understand if regulatory and funding frameworks were harmful, neutral, or beneficial towards digital learning. Questions focused on curricula, funding, use of digital technology in the classroom, use of digital technology beyond the classroom, personnel rules, and outcome requirements. These questions were specifically asked for primary and secondary level, university and higher education level, and in adult/ongoing-learning institutions.

To assess the situation regarding educators and schools, national experts answered a number of questions on the skills of educators and availability of resources to educators. These questions were specifically asked for primary and secondary level, university and higher education level, and in adult learning institutions. This section also considers the presence (or absence) of programmes supporting system-wide or school-wide change in digital learning.

Finally, World Bank (2017) and Bertelsmann Stiftung (2018) data are used to measure the overall quality of governance and policy implementation.

With regard to policies and institutions for digital learning, Cyprus leads the European Union, followed by Estonia (2nd), Croatia (3rd) and Netherlands (4th). Malta and Portugal are in 5th and 6th place, with Luxembourg, Bulgaria Romania and Spain ranked from 7th to 10th place. Altogether, Southern countries have a much stronger position in this category, reflecting strong push many of them are making to succeed in the digital arena.

The middle group is occupied by Hungary and Lithuania in 11th place, followed by Finland (13th), Austria (14th) and Latvia (15th). Performance slightly below European average in this category is evidenced by Ireland in the 16th place, followed by France (17th), and Slovakia and Slovenia sharing 18th place. Greece is 20th, followed by Sweden. The biggest underachievers in this category are the Czech Republic (22rd), Belgium Poland (24th), Italy (25th), Denmark (26th) and Germany (27th).

Section C – Availability of digital learning

This part of the index measures the availability and attitudes towards digital learning tools. These give insights into people’s possibilities, behaviour and feelings regarding digital technology.

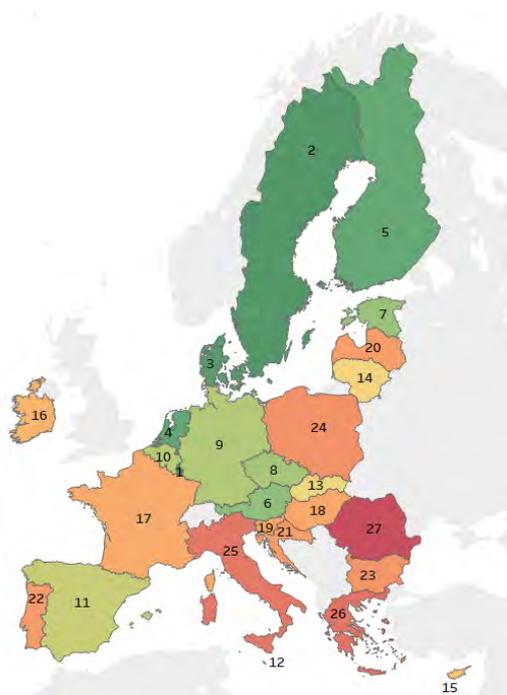
Attitudes towards digitalisation are presumed to be important, as sceptical or negative attitudes may translate to behaviours and policies harmful to digital learning. To measure attitudes, a number of questions from a Eurobarometer study (2017)¹³ were selected. These ask participants questions such as: How do you think new digital technologies affect society? How do you think new digital technologies affect the economy? How do you think new digital technologies affect quality of life? How do you feel about robots and artificial intelligence?

For availability and usage of digital means of learning, the index considers several factors from OECD (PISA) data (2015) and Eurostat (2015-2018). This includes:

- Level of internet access (percentage of households);
- Individuals using mobile devices to access the internet on the move (percentage of individuals aged 16 to 74);
- Individuals using the internet for consulting wiki (percentage of individuals aged 16 to 74);
- Individuals using the internet for doing an online course (percentage of individuals aged 16 to 74);
- Individuals using the internet for looking for information about education, training or course offers (percentage of individuals aged 16 to 74);
- Individuals who have basic or above basic overall digital skills by sex (percentage of individuals aged 16-74).

¹³ Special Eurobarometer 460: Attitudes towards the impact of digitalisation and automation on daily life, available [here](#).

Figure 7. Availability of digital learning performance across EU-27



Source: Authors' elaboration based on index calculations

In this category, Luxembourg (1st), Sweden (2nd), Denmark (3rd), the Netherlands (4th), Finland (5th), Austria (6th) and Estonia (7th) lead the European Union, giving it a clear Nordic tinge. The Czech Republic is in 8th place, followed by Germany (9th), Belgium (10th), Spain (11th), Malta (12th), Slovakia (13th) and Lithuania (14th). Cyprus is 15th, Ireland 16th, France is in 17th place, followed by Hungary (18th), Slovenia (19th) and Latvia (20th). This middle group is followed by stragglers, namely Croatia (21st), Portugal (22nd), Bulgaria (23rd), Poland (24th), Italy (25th), Greece (26th) and Romania (27th).

Trends and conclusions

Progress is uneven and everyone has a room to grow

European countries differ widely in their readiness for digital learning. The gap between the best and the worst EU MSs is large across nearly all indicators. Since historical time series are not available, it is impossible to assess whether there is convergence or divergence

within the Union. Given the importance of digital learning, the current large gap between EU countries cannot be considered an acceptable outcome. For this reason, a separate chapter below is dedicated to the role of the EU and its policies in this area.

Correlation between individual parts of the index is low or even negative, indicating that countries are not uniformly ranked across individual indicators. This also means that all countries, including the top performers, have significant room to grow. For example, Luxembourg places 4th overall, but among the worst in terms of learning outcomes. Even the Netherlands scores in the bottom half of MSs in terms of lifelong learning. These results illustrate that even the highest ranking countries should not become complacent. Given the high pace of change associated with digitalisation, today's winners could very easily fall behind.

At the same time, digital inclusion is not a given even for successful countries. People lacking adequate digital skills and technology, including connectivity, to access emerging opportunities are likely to lag behind in the process of digitalisation of learning. This process could then turn out to be rather exclusive, failing to deliver benefits to the society as whole. This risk exists especially when looking at vulnerable socio-economic groups and elderly, who are often short of such skills or technology. In addition, when designing technological supports for digital learning, accessibility is to be considered in its broader meaning, making sure that all standards are respected for people with disability to access all possible opportunities that digital learning can deliver. When all these preconditions are not met, accessibility of learning could conversely be hindered by digitalisation rather than fostered.

To conclude, even the best-performing European country has areas where it should improve. Conversely, even countries with low scores usually have something they can teach others. For example, Romania performs better in terms of institutions and policies (7th in the EU). Policymakers that are aware of the importance of digitalisation of education and, in cooperation with the European Commission, have developed a national strategy in this regard. In neighbouring Bulgaria, new funding opportunities in development and EU funds are also mobilised on a massive scale to help with the matter.

Money speaks – up to a point

Wealthier and more economically successful countries generally, but not uniformly, score better than less economically developed MSs. This correlation is not surprising and causality is likely in both directions – more developed economies have more resources (both financial and human) to invest, but they are also more developed because they are further along the innovation frontier of which digitalisation is an important element.

However, there are exceptions. Belgium is in the bottom third of MSs despite being one of the wealthiest. The country is around the average in terms of availability and use of the digital learning but among the worst European performers when it comes to institutions and policies (21st). Education is a competence of Belgium's language communities as a result of the division of competences across the federal and regional levels. As such, the country's ranking suffers from the non-alignment between policies set at different levels. Lifelong learning is also underdeveloped, and public attitudes towards digitalisation are rather sceptical. Evidently, the means to finance digital learning does not always translate into success on the ground.

Neither geography, nor history are destiny

A number of central and eastern European MSs seem to be doing quite well in digital learning readiness. Estonia, Malta, Cyprus, Lithuania, Latvia, Hungary (accession in 2004), and Croatia (accession in 2013) rank around or above half of all MSs. Estonia is the winner of the overall index. In the national surveys used to construct the index, several experts noted these countries benefited from EU assistance in improving their digital policies. This provides anecdotal evidence of success for EU programmes and funding targeted at digital learning.

Determined action even by a small country can yield results. Cyprus and Malta are perhaps the most surprising “winners” of the index. Ranked 5th and 6th, the small Mediterranean island states show that importance of institutions and policies for digital learning. For example, Cyprus is ranked 1st in terms of regulatory environment and funding. Digitalisation of learning is one of the main policies of the government and is part of the government's Digital Agenda – with full integration of ICT in teaching and learning as a key objective. This involves developing modern infrastructure in schools to provide adequate equipment and software to make effective use of ICT in teaching, but also focus on training educators.

Size matters – negatively, dragging down Europe

Out of five largest EU countries – Germany, France, Italy, Poland and Spain – four score in the bottom half, and mostly in the bottom third. The only exception is Spain, which delivers good performance especially in learning outcomes and accessibility of digital learning. What sets Spain apart from its peers is that it does not score especially poorly on any single dimension.

The underwhelming performance of large countries does not have a single obvious explanation. One could hypothesise that ensuring successful digital education, both in terms of physical infrastructure and programme quality, is more difficult across large and diverse countries. For example, Germany, France, and Italy all place in the bottom ten MSs by percentage of households with very high speed internet connections.¹⁴ However, one could just as easily argue the inverse – given the lower marginal costs of digital learning compared to the traditional kind, one could expect larger countries to both invest more and reap more benefits, as it makes more economic sense compared to smaller states. Overall, we observe that larger nations struggle to achieve successful digital learning infrastructure and programmes.

Together, these four countries account for majority of the EU’s population after Brexit, so this is a troubling development. There is no one-size-fits-all solution for this issue. While France has an excellent institutional environment for digital policymaking, it lags behind in investment into digital skills of educators, which are crucial. Italy has recently made strides in creating strong institutions and policies for digitalisation, but this has yet to deliver performance.

Europe will not move forward without its biggest economy; that requires changes beyond Germany

Germany’s last-place finish is remarkable, but perhaps less so for those closely paying attention to digital trends. A Reuters special report from 2018 reads:¹⁵

Germany, at the forefront of industrial innovation for decades, is struggling to adapt to the digital age. Creaking broadband, government bureaucracy and resistance to change share the blame.

Germany has come under scrutiny for under-investment in digital infrastructure, low internet connection speeds, and a lack of broadband access throughout its territory. A 2017 OECD study on high-speed internet connections found Germany ranked 29th out of 34 industrialised countries. German mobile data subscriptions remain very expensive, and broadband access is lacking in many rural areas.¹⁶

Attitudes are also important, and Germans are known for their sceptical and negative attitudes towards digital technologies. This impacts private economic behaviour, as well as the government’s policy choices. Some 80% of transactions in Germany still take place in cash,¹⁷ and cash is even preferred for large (over €100) payments.¹⁸ Our index uses surveys which asked participants if they believe recent digital technologies have a very positive impact on their quality of life.¹⁹ Germans ranked second lowest in the EU (with France in last place). Germany’s aversion to digitalisation is likely related to the high value Germans place on privacy; Germany ranks highest among OECD countries for concerns over online privacy, and Germans are sceptical on data sharing and uploading their data to the cloud.²⁰ In spite of its strong economy, Germany has a lot of ground to make up in digital learning.

¹⁴ See European Court of Auditors Special Report No. 12 (2018), Figure 5, available [here](#).

¹⁵ Reuters (2018), “[Where Europe’s most powerful economy is falling behind](#)”, 25 June.

¹⁶ The Local (2019), “[Germany’s disconnectivity](#)”, 29 August.

¹⁷ By comparison, the same figure is 45% in the Netherlands.

¹⁸ Own analysis using data from ECB, Deutsche Bundesbank and De Nederlandsche Bank. This analysis contributed to De Groen, Kilhoffer and Musmeci (2018) “[The Future of EU ATM Markets](#)”, available [here](#).

¹⁹ Eurobarometer data, used in index calculation.

²⁰ See [here](#).

However, the salience of this issue goes beyond Germany. If there is one thing that can be observed in several large EU countries, it is a wary attitude towards digitalisation. For example, while the use of data gathered using digital technologies for teaching and learning can give important insights on how to improve education and training, general concerns persist regarding how and by whom such data are owned and used.

Personal data protection represents a key policy issue in developments of digital learning, especially considering that private sector companies are involved in the process of digitalisation, and thus likely to pursue private interests with the use of such data, while citizens' privacy is at stake. In other words, if citizens, students and consumers cannot trust that their privacy and interests will be protected, then the whole premise of digital learning is unlikely to take off. Governments need to reassure a sceptical public that digital learning and privacy need not be a zero-sum game.

THE EU AND DIGITAL LEARNING

The EU level policy analysis

The research team scanned EU policy documents with reference to digital learning and related topics, which helped identify relevant EU level stakeholders. Then, the research team undertook 15 semi-structured interviews with EU level stakeholders, including representatives of the European Commission (EC), as policymakers and experts, social partners, business-sector and other stakeholder associations that are relevant in the field. The table below summarises the organisations involved in the interviews, held during July and August 2019.

| List of organisations involved |
|---|
| European Commission – Employment, Social Affairs & Inclusion (EC – DG EMPL) |
| European Commission – Education, Youth, Sport and Culture (EC – DG EAC) |
| European Commission – Communications Networks, Content and Technology (EC – DG CONNECT) |
| European Commission – Internal Market, Industry, Entrepreneurship and SMEs (EC – DG GROW) |
| European Commission – Joint Research Centre (EC – JRC) |
| European Trade Union Committee for Education (ETUCE) |
| European Trade Union Institute (ETUI) |
| European Federation of Education Employers (EFEE) |
| European University Association (EUA) |
| European Students Union (ESU) |
| Firm involved in EU projects on digital learning |
| Firm involved in digital learning in several MSs |

The very varied situation in the EU shows that all EU countries can learn from each other, in general and regarding the specific dimensions of digital learning analysed by the index. To support this, the EU provides an appropriate setting and puts in place policy actions to enable a smooth process of digitalisation of learning across countries with different background conditions. Why does the EU care about digital learning?

On the one hand, digital learning can contribute to EU objectives and targets as set out in the Europe2020 Strategy.²¹ Some of these refer to education and training specifically, while others involve a broader perspective, where digital learning is nonetheless relevant, such as the Digital Single Market priorities in the Digital Agenda for Europe.²² Improvements of education and training through digital learning are useful in reaching EU social and economic objectives, especially considering emerging trends and the needs resulting from digitalisation. The need for up- and re-skilling of the workforce leads to **the strategic importance of lifelong learning** for the achievement of EU objectives for jobs and growth. As adult learning remains insufficiently below the set target in the

EU,²³ digital learning, and any EU action to foster its development, can contribute to overcoming financial, organisational and methodological barriers that prevent the roll-out of lifelong learning opportunities, in particular regarding higher education and continuous Vocational Education and Training (VET). Moreover, digital learning represents a key method, at all ages, for **the acquisition of digital skills**, which 43% of Europeans still lack in their basic form,²⁴ while being necessary for 90% of

²¹ COM(2010) 2020: EUROPE 2020. A Strategy for Smart, Sustainable and Inclusive Growth

²² COM(2010) 245 final: A Digital Agenda for Europe

²³ According to data from the Eurostat Labour Force Survey, available [here](#)

²⁴ Data drawn from the Digital Economy and Society Index (DESI) 2019, available [here](#).

future jobs.²⁵ By lowering barriers to access for learning opportunities, such as distance, costs and supply constraints, digital learning is potentially a key driver for **the universal “right to quality and inclusive education, training and lifelong learning” set forth in the European Pillar of Social Rights.**

On the other hand, EU policy action in several domains that pertain to digital learning can generate significant added value for MSs in taking advantage of this opportunity. Coordinated efforts at EU level provide support and synergies for progress in MSs, considering the transnational nature of both the phenomenon of digital learning and the challenges that it can address, such as disruptive change in the labour market and the transformation of industry. **The EU, with the authority and legitimacy of a supranational organisation, can set the agenda for digital learning,** to guide, lead and raise awareness on the issue and create a common vision across MSs. It can play a key role in providing guidelines and frameworks to create common terminology, indicators, regulatory and quality standards for digital learning. For instance, the EU already provides standards for data protection of digital learning users through the General Data Protection Regulation (GDPR). Its action also develops the frameworks to enable issuing and sharing digital certifications and ensure the interoperability of these systems across MSs. In addition, EU-level **cooperation, mutual learning and exchange** make it possible to track successes and failures in different contexts, smoothing and speeding up the process of digitalisation of education and training in a heterogeneous landscape. Last, but not least, developing a European industry for digital learning, through setting common standards and fostering collaboration, can generate **a competitive advantage on the global market for European companies in this sector.**

What does the EU do for digital learning?

EU action for digital learning is framed in the system of competences between MS and the EU, with education and training being primarily a policy area under the competence of MSs. Thus, such action consists in **structuring cooperation through several initiatives at different levels of governance, in providing funding and in monitoring policy developments and outcomes in MSs,**²⁶ according to the Open Method of Coordination (OMC), or ‘soft law’.²⁷ Yet, what the EU does for digital learning is developing into providing an important framework for cooperation and exchange, as well as supporting and influencing policy developments at national level.

The ET2020 Strategic Framework

EU policies on digital learning have been developed mainly under the umbrella of the strategic framework for European cooperation in education and training (ET2020),²⁸ through exchange of information and experience among MSs with peer learning, monitoring and reporting and development of common reference tools. Its four key strategic objectives point to the instrumental role of digital learning in strengthening the capacity of education and training systems to meet economic and societal challenges. Such objectives, in fact, aim to make European education and training systems more responsive to change, as well as to increase the quality and efficiency of education and training so as to raise both basic and advanced skills, including those related to innovation and entrepreneurship, such as digital skills. For this reason, digital learning is tackled in different ways by all seven working groups under ET2020, though more by some than in others.

²⁵ This is a widely cited figure at EU level, in addition, detailed estimation of digital skills required at workplace are presented in a recent study for the EC (Curtarelli et al. 2016).

²⁶ See Title XII of the TFEU.

²⁷ The functioning of the OMC is described extensively [here](#).

²⁸ [Council Conclusion 2009/C119/02](#).

In particular, **the working group “Digital Education: Learning, Teaching and Assessment” (DELTA)** aims at discussing the use of digital technologies and the development of digital competences for teachers and learners. Its members, including representatives of the EC, national ministries of education, experts, social partners and stakeholder organisations, engage in online or in-person meetings and study visits, to explore how education systems can best respond to changes driven by the digital transformation, share and promote best practices as well as new ideas. The DELTA working group is very important for capacity building and to exchange lessons learnt between those countries that are more active in digital learning and those that are progressing more slowly, while also taking into consideration that the phenomenon has different aspects and countries can be a frontrunner in one aspect while learning on another from other countries. Moreover, fostering of digital learning policy in MSs can be facilitated with formal and informal recommendations that emerge out of the working group. Similarly, **the working group on VET** focuses its work on digitalisation, as means to enhance the flexibility and quality of VET, as well as taking into account the changes that digitalisation brings about in the labour market.

The Digital Education Action Plan

In 2010-2020, through the ET2020 working groups, the EC has developed many policy documents involving digital learning.²⁹ However, the turning point for a comprehensive approach and strong focus on the topic is marked by **the Digital Education Action Plan (DEAP)**,³⁰ a key reference for EU policy on digital learning. The DEAP sets out three priorities, which in turn inspire eleven actions, to support technology use and development of digital competences in education. These priorities and actions regard education at all stages in life, covering schools, higher education and VET. Given its extensive and transversal scope, the implementation and monitoring of the DEAP involves several DGs within the EC, more prominently DG EAC, DG EMPL and DG CONNECT, as well as other EC bodies, such as the JRC.

THE DEAP: A best practice for policy development

In previous years, the EU action on digital learning had been relatively fragmented, with several DGs working alongside each other but lacking a common vision and often focusing mainly on the technological aspect of the phenomenon. Resulting from the DELTA working group, the DEAP represents the first effort to develop a coordinated, coherent and comprehensive policy on digital education, and as such, can be considered a best practice of policy development at EU level. Several DGs, including EAC, EMPL and CONNECT, worked together in a concerted manner to obtain a holistic and transversal policy, encompassing all relevant dimensions of digital learning, such as technology and infrastructure, organisational and institutional aspects and the ‘human factor’, such as adequate competences to make the best use of technology in education and training, in a lifelong learning perspective. In the future, the DEAP could and should serve as the basis for improved coordination of EU Policy on digital learning, and for strengthening and streamlining EU action in this field, as well as providing an example for policies at national level. Its success has already been demonstrated by the fact that the EC President-elect Ursula von der Leyen explicitly mentioned the DEAP and recommended further focus on it in her priorities for the new Commission.

²⁹ See for example [COM\(2013\) 654 Final: Opening up Education](#), [COM\(2017\) 248 Final: School development and excellent teaching for a great start in life](#), [COM\(2017\) 247 Final](#), [COM\(2017\) 673 Final: Strengthening European Identity through Education and Culture](#).

³⁰ [COM\(2018\) 22 Final](#).

The three DEAP priorities highlight different aspects of digitalisation and its impact on education and training systems, thus showing a very advanced and comprehensive approach to digital learning. The first priority “**making better use of digital technology for teaching and learning**” focuses on digital technology contributes to improve education and training. The second, “**developing relevant digital competences and skills for the digital transformation**”, insists on using digital technology in education for the acquisition of skills required in the changing economy and society. The third, “**improving education through better data analysis and foresight**”, stresses the importance of understanding the learning process better thanks to digital technologies, so as to improve and adapt education and training systems to change. Under these priorities, eleven actions are designed to support MSs in the digitalisation of education and training.³¹

Under the first priority, **Action 2: SELFIE - self-reflection tool & mentoring scheme for schools** supports the digital capacity of primary, secondary and vocational schools. The action makes available a free online self-reflection tool, SELFIE, for schools to assess through a series of questions to teachers, students and school leaders their capacity in digital teaching and learning. Such assessments reflect a holistic approach to digitalisation in schools, which is not limited to infrastructure, but duly takes into account pedagogy and the school context. Schools can customise the tool by adding or changing questions for their particular situation. As a result, these schools receive a tailor-made report outlining strengths and areas for improvement, as a basis for an action plan for the school. The SELFIE tool is available in all twenty-four official EU languages, and in six additional languages, to extend its use beyond the EU. In addition to the tool, the action provides a mentoring scheme, to be operative by 2020, to scale up ICT-based innovative practices, to build capacity in an inclusive and sustainable network and to mainstream digital learning.

Regarding the use of digital technology for accreditation and recognition, **Action 3: Digitally-signed qualifications**, again under the first priority, focuses on facilitating storage and sharing of qualifications online. Digitally-signed qualifications are electronic documents that education and training institutions issue to confirm the awarding of a qualification. This document can be trusted by employers, education providers or other parties. A common technical approach for issuing digitally-signed qualifications is currently under development, to provide for a shared understanding and interpretation across MSs. Indeed, digitally-signed qualifications aim to make the best use of digital technology to respond to the heterogeneity of national education and training systems, providing the means for ensuring comparability and verification of qualifications across countries, so as to support the mobility of workers and students in the Union. The action will be integrated in the new Europass platform,³² to be launched in early 2020, which will allow everyone to store and share digitally-signed qualifications.³³ Current developments are exploring the possibility to use blockchain technology for the digitally-signed qualifications, overcoming privacy issues to a certain extent (Grech and Camilleri 2017).

³¹ The full list of the eleven actions is available [here](#).

³² [Decision \(EU\) 2018/646](#).

³³ In the new Europass, digitally-signed qualifications are referred to as digitally-signed credentials.

SELFIE: A best practice for policy tools

Discussing within the DELTA working group, MS representatives expressed a demand for practical tools to assess competency in digital education and develop concrete recommendations for educational stakeholders. SELFIE is the EC's response to these requests. A self-assessment tool for schools, SELFIE is an innovative development in EU-level policymaking, which has traditionally been less focused on the development of practical tools, focusing rather on guidelines and recommendations. It can be considered a best practice because it offers concrete advice to stakeholders and establishes a close connection with the end-users of digital learning, the schools and students. The fact that each school can build up its own questionnaire leads to tailored, context-specific recommendations. The response from MSs has been overwhelmingly positive in the piloting, and scaled-up efforts beyond the EU are underway. While SELFIE is already applicable to vocational schools, possibilities are being explored to enlarge the use of SELFIE for assessing worked-based learning in companies, enhancing its role for lifelong learning. This success is arguably a result of close cooperation between MS representatives, practitioners and other institutions in developing the tool, and of the way the resulting application is flexible to the needs of users and incorporates the view of all involved, including students. The development of SELFIE can be seen as an example of a coherent process of policy development from start to finish, beginning with a process of mutual exchange and co-design and culminating in the development and implementation of a practical and user-friendly tool, including effective communication to involve stakeholders and practitioners in the field. In future, SELFIE could serve as an example to EU and national policymakers on how to develop accessible and practical policy tools, in the field of digital education and beyond.

Responding to the second priority of the DEAP, **Action 6: EU Code Week in schools** focuses on acquiring digital skills. The EU Code Week is a pre-existing initiative, started in 2013 through a markedly bottom-up approach, promoted by the young advisers for the Digital Agenda for Europe and supported by the EC in the framework of the Digital Single Market and the Digital Skills and Jobs Coalition. It was later incorporated in the DEAP, with the specific aim of involving more schools, up to 50% of all schools in Europe by 2020. The EU code week aims at stimulating creativity, problem solving and collaboration through programming and other activities involving digital technology. It takes place for two weeks every year, normally in October, and it is coordinated at national level by code week ambassadors, although anyone can organise their own activity and add it to the code week map available on the platform developed by the EU for the initiative. The aim of this action consists, by its nature, in raising awareness about the field, making programming more visible to the young, adults and the elderly, with a view to demystifying digitalisation and related skills.

The Digital Competences Frameworks

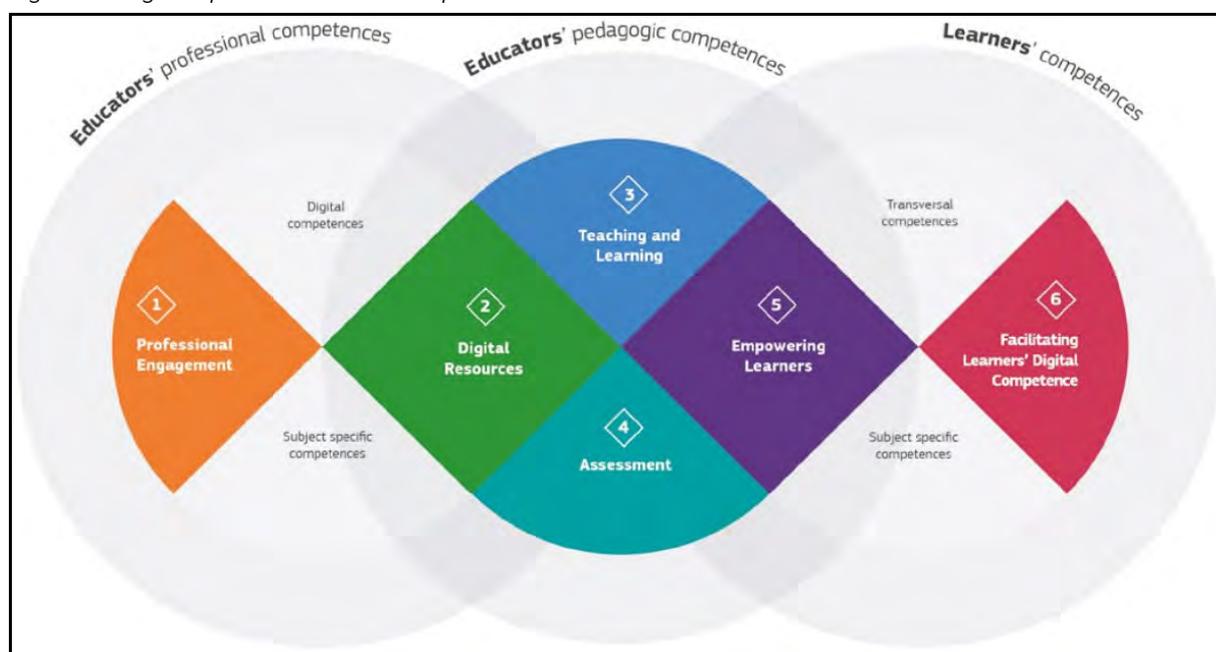
The DEAP and its actions build on the Digital Competences Frameworks, developed by the JRC to smoothen the process of digitalisation in education and training and its effects in the labour market. The Frameworks provide a conceptual understanding of digital skills, needed to harness the potential of digitalisation. In addition, they offer a tool for assessment and improvement of such skills. Three of

these frameworks are specifically relevant for digital learning, providing for the common language for exchange and cooperation (Carretero, Vuorikari, and Punie 2017).

The Digital Competence Framework for Citizens, **DigComp**, represents the most general framework. Its latest version, DigComp 2.1, contains a fine-grained **description of eight proficiency levels, which supports the development of adequate learning material and helps in the design of instruments for assessing competence, career guidance and promotion at work.** The proficiency levels apply to five competence areas, namely information and data literacy, communication and collaboration, digital content creation, safety, problem solving, which together constitute the capacity to interact with digital technology. Examples of specific situations are provided in the Framework to illustrate to what each level of each competence corresponds in real life, facilitating understanding and implementation by users (Carretero, Vuorikari, and Punie 2017). DigComp is a reference for the development and strategic planning of digital competence initiatives at both EU and national level, being **also integrated in the Europass CV as an important instrument for (self) assessment, validation and recognition of digital skills.**

The Digital Competence Framework for Educators, **DigCompEdu**, provides a more specific reference, **merging digital skills with skills that are key for educators, to support MSs in fostering educators' digital competence, as a prerequisite for digital learning** (Redecker 2017). It has been developed as a response to the acknowledgement of educators' need to master a set of digital competences specific to their job in order to harness the potential of digital technologies in education and training. Such competences **are organised in six areas, reflecting all aspects of the profession of educator (Figure 8), and have different levels of proficiency.**

Figure 8. DigCompEdu Areas and Scope

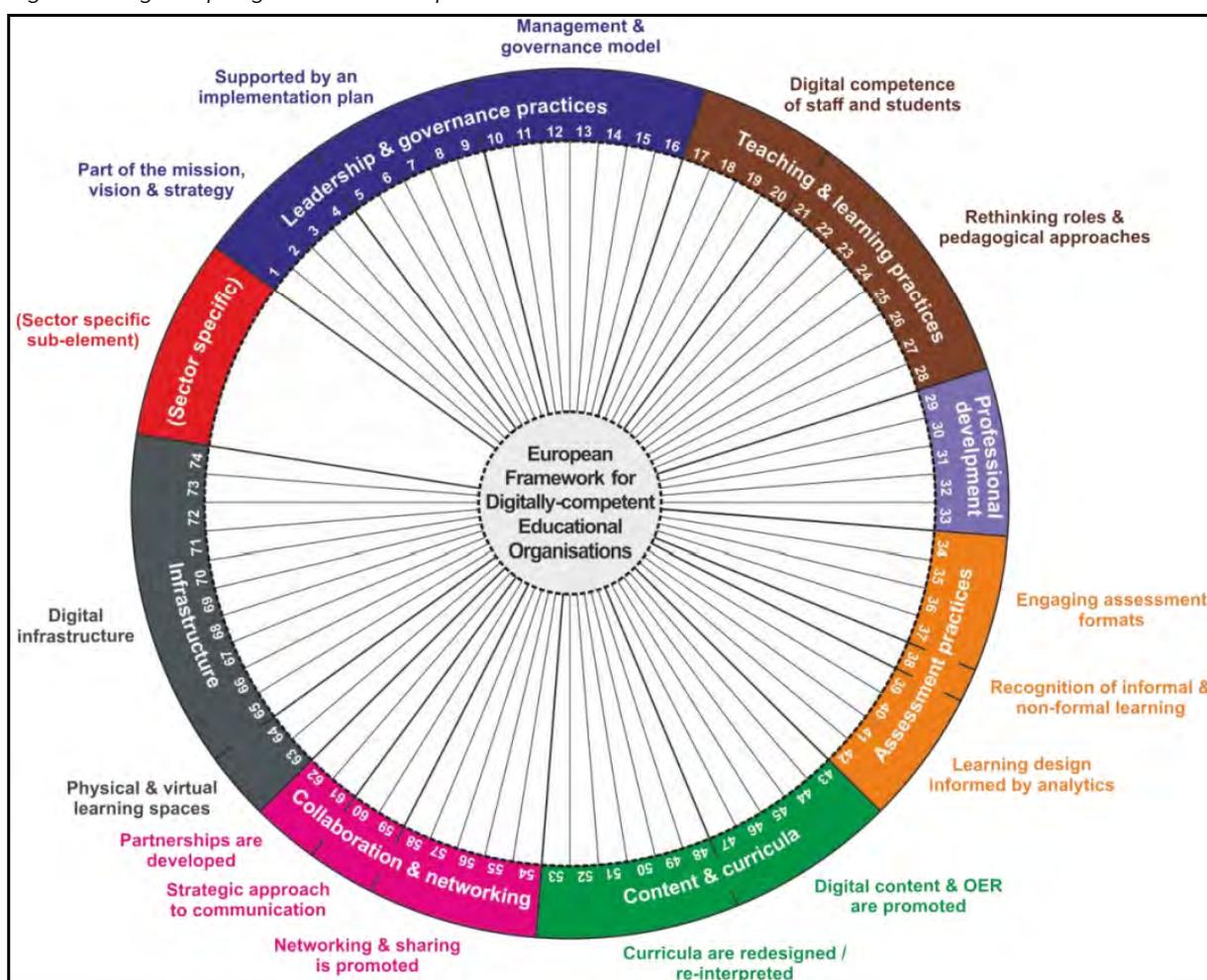


Source: Redecker 2017.

The Framework for Digitally-Competent Educational Organisations, **DigCompOrg**, offers a comprehensive conceptualisation taking into account all aspects of digitalisation for learning in educational organisations (Panagiotis, Punie, and Devine 2015). It helps educational organisations in

self-reflection and self-assessment in their process of digitalisation and it enables policymakers to develop policies for digital learning. DigCompOrg is developed to reflect three fundamental dimensions in the process of digitalisation of education, namely the pedagogical, technological and organisational dimensions. In fact, it defines seven key elements in these three dimensions: infrastructure, collaboration and networking, content and curricula, teaching and learning practices, assessment practices, professional development, leadership and governance practices – all represented in a circle to highlight their interconnectedness (Figure 9). The Framework also leaves room open to additional sector-specific elements, resulting in it being highly adaptable to different contexts. SELFIE, mentioned above, represents the practical implementation of DigCompOrg, operationalising and assessing the digital readiness of schools, providing initial evidence on how the Framework can be used in reality.

Figure 9. DigCompOrg Areas and Scope



Source: Panagiotis, Punie, and Devine 2015.

EU funds for digital learning

Through its financial instruments, the EU provides additional resources at national level for the deployment of programmes and initiatives, as well as research, related to digital learning. Whereas it does not have a dedicated financial instrument, digital learning is a cross-cutting topic in several EU funding programmes.

The Erasmus+ Programme (co-)funds several initiatives that make use of digital technology to foster cooperation for improving education and training and to boost digital learning in particular, such as online platforms like **the Electronic Platform for Adult Learning in Europe (EPALE)**³⁴ or **the OpenupEd portal**,³⁵ which hosts a pan-European MOOCs initiative.³⁶ Erasmus+ acknowledges digital learning as horizontal priority for open education and innovative practices in the digital era, indicating that priority for funding is given to initiatives that encourage the use of digital technologies for innovative practices in teaching, learning and assessment, as well as to those initiatives that support educators and educational institutions in integrating digital technologies and resources in education and training. DigCompEdu, DigCompOrg and SELFIE are mentioned as important tools for implementation of digital learning strategies and their integration in the initiative awards priority for funding.³⁷

For 2014-2020, **the Horizon2020 Framework Programme for Research and Innovation (H2020)** has provided funds to support digital learning. Depending on the type of action, the projects funded are oriented towards research, exploring drivers, challenges and outcomes of the integration of digital technologies in education and training, or focused on the development and piloting of technological solutions for digital learning. When mainly focusing on technology, projects are funded in particular under H2020 Leadership in Enabling and Industrial Technologies, while other aspects of digital learning are in the scope of funding in the H2020 Societal Challenges. Private actors in the industry sector can access these funds when partnering with public and private research organisations, non-governmental organisations (NGOs) and public bodies. Before H2020, in 2007-2013, the Seventh Framework Programme for Research and Innovation of the EU (FP7) invested more than €185 million in supporting Technology-Enhanced Learning and the Competitiveness and Innovation Framework Programme (CIP) financed projects worth €5.7 million, covering e-learning for science, technology, engineering and math, and showcasing excellence in digital learning.³⁸

The **European Structural and Investment Funds (ESIF)**,³⁹ which channel over half of EU funding, co-finance MS initiatives in deploying digital learning, within the streams dedicated to infrastructure, skills enhancement, education and training. One ESIF focus is digital technology, including for research and innovation. Part of the ESIF, the European Social Fund (ESF) has funded many projects to reinforce the infrastructure and provide devices for digital learning in educational institutions; additional funds have been devoted to strengthening broadband in general and in educational institutions (European Court of Auditors 2018). As the topic of digital learning cuts across several themes of the ESF, tracking all projects and the amount of funds is problematic.⁴⁰

³⁴ Further information is available [here](#).

³⁵ Further information is available [here](#).

³⁶ Similarly, the [School Education Gateway](#) is an online platform for professionals in schools to share teaching material as well as European and international research and projects, and the [e-Twinning Platform](#) connects school staff in Europe to collaborate and exchange ideas, also offering resources to build their own projects, facilitate self-assessment and professional development and showcase best practices.

³⁷ [Erasmus+ Programme Guide](#).

³⁸ Detailed information about research and innovation for ICT in education are available [here](#).

³⁹ More information on the ESIF can be found [here](#).

⁴⁰ Data on ESIF funding can be explored [here](#).

What should the EU do better for digital learning?

The topic of digital learning will grow in importance in EU policy, accompanying the digitalisation trend. EC President-elect von der Leyen has stated this in her programme, referring in particular to the DEAP (von der Leyen 2019). There is *momentum* behind reflection on how to better structure EU action and to increase its effectiveness in supporting MSs in harnessing the potential of digital learning. As the DEAP is likely to evolve, it could represent an umbrella for all policy initiatives and funds for digital learning in a lifelong perspective. Similarly, the ET2020 will soon evolve into the ET2030, where digitalisation of education and training is expected to be given prominence. In addition, EU financial instruments that are relevant for digital learning are undergoing an important reorganisation. The ESIF are restructured in the new Multiannual Financial Framework, to limit dispersion of resources and duplication. Erasmus+ will grow significantly in importance. H2020 will come to an end and the new Framework Programme is expected to be solution-oriented, financing highly transdisciplinary research with the aim of accomplishing key ‘missions’ for the EU. Based on progress so far and considering current challenges at EU level in this area, the EU policy for digital learning could significantly benefit from some adjustments and improvements.

The EU needs to strengthen a comprehensive vision for concerted and coherent policy action on digital learning, building on the positive experience of the DEAP, to serve as framework and orientation for MSs. By its nature, digital learning is a complex and cross-cutting topic, touching upon diverse policy areas and involving many stakeholders and actors at EU level, including different DGs. In spite of many examples of cooperation, each DG still too often tends to look at digital learning from their own perspective and within their own competences and mission. As a result, a clear orientation, inspired by a holistic vision, is missing. In several cases, digital learning comes out only in its partial representations related to digital skills or digital technologies. By contrast, technology in education and training must be always seen as supporting a sound enhanced pedagogic and teaching approach, which should remain the focus of any policy actions in this field. A comprehensive approach must also look at all types of learning, from early childhood to continuous professional development. This is to be developed jointly, to avoid fragmentation of actions across different levels of education by different DGs, which might lead to some important parts of lifelong learning being overlooked, such as vocational training.

EU policy on digital learning has necessarily to be developed through a bottom-up approach, involving MSs and key stakeholders in education and training in continuous dialogue and consultations, to take the diversity in background conditions and interests sufficiently into account. First, MSs are in the best position to consider cultural and contextual specificities in the actual deployment of digital learning, avoiding one-size-fits-all types of policy measures and technical solutions. So far, the engagement of MSs in EU action in this field is reckoned to be very good. However, large disparities in digital infrastructure and the heterogeneity of educational and training systems pose a challenge that could lead to divergence in both efforts and outcomes. By contrast, differences should be treated as a stimulus for further cooperation and a greater scope for exchanging best practices. As the process of innovation, and particularly digitalisation, is not linear and is characterised by a high degree of uncertainty, diversity represents a precious resource for differentiating strategies and learning from each other’s successes and failures. Moreover, given its enormous potential impact on the economy and society, there are multiple interests at stake around digital learning developments. Rather than becoming a matter of *impasse*, such interests have to come together in the definition of policies, to make sure that each actor has clear incentives to play its role in the deployment of digital learning. For

instance, industry can be an important actor in developing and testing solutions, leading innovation for digital learning, providing informed insights for policy design and regulations. At the same time, the involvement of national and local stakeholders in the education sector is crucial for ensuring that what is developed fits the purpose in the field. Engaging local organisations and taking on board the experience of individuals is critical for developing successful policies, as well as for the smooth running of initiatives and taking into consideration the contextual specificities, heterogeneity and uncertainty that characterise the process of digitalisation of education and training systems. In this, social partners should play a key role, being the actors that are best connected to the individuals implementing and affected by change. While consultations of social partners in education are well established, these could be further developed specifically in the new area of digital learning.

As a short-term priority, the EU should intensify efforts to foster digital skills, to ensure equal access and inclusiveness of digital learning. The EU has already put in place significant initiatives, measures and funds that have indeed made significant progress in this field possible, as shown by the improvement of specific components in the DESI index. However, the current remaining lack of basic digital skills among almost half of Europeans is particularly worrying when it comes to ensuring that the process of digitalisation of learning does not leave them behind. While digital skills are not sufficient to ensure that the process of digital learning works well, they are certainly a necessary condition to become involved and potentially benefit from it, so efforts must be continued and strengthened where necessary, with specific attention to vulnerable groups.

EU funds for digital learning need to be streamlined, creating a dedicated funding instrument. This would make it possible to track digital learning projects and programmes better, as it is necessary to avoid duplication and isolation of funded initiatives, as well as to allow an overall evaluation of the results achieved by EU funds in digital learning. Although the nature of the phenomenon makes it relevant for different financial streams, having a dedicated funding mechanism to finance, track, monitor and evaluate what is financed for digital learning can facilitate the identification of what works best. Such a mechanism, possibly linked directly to the DEAP, could encourage further exchange and cooperation among DGs. It could also reduce the number of different procedures to apply and increase clarity on what funds are relevant for digital learning, fostering access to such funding. To ensure the sustainability of digital learning projects funded by the EU, this dedicated financial instrument should have criteria to embed financed projects within national policies for digital learning.

The EU needs to increase research efforts for digital learning, including a specific financial stream for digital learning in the next EU Framework Programme for Research and Innovation. As digital learning is still a largely unknown phenomenon, further and focused research is needed to explore its outcomes, to identify what works and what does not and to gain a clearer assessment of risks. Being a complex phenomenon, such research should be highly transdisciplinary, including technical sciences – to develop technologies – as well as social sciences – to look at the impact of such technologies. Scientists in these fields and practitioners should work together in solution-oriented research that considers digital learning in both its theoretical and implementation aspects. These research efforts should aim at the definition of adequate indicators, linked to the development of a sound and coherent theoretical framework and terminology to study the phenomenon. As such, research results would inform policy and help in addressing a still high level of scepticism and controversial opinions about technology in learning, especially for children. Evidence about solutions and practices in place should be systematised and disseminated, to increase visibility, benchmarking and scaling up of experiences. By identifying initiatives that work especially well, a culture of excellence would foster investment and policy developments in digital learning.

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AUSTRIA

RANK IN EU-27

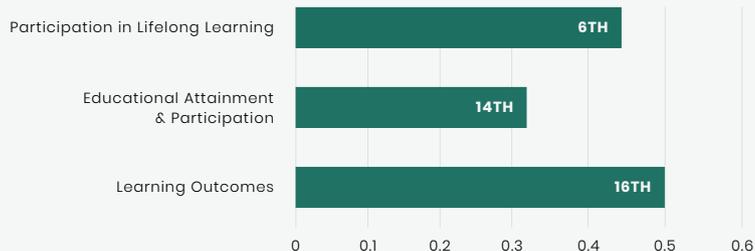
10TH

OVERALL SCORE

0.626

LEARNING PARTICIPATION AND OUTCOMES

RANK
9TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
14TH



AVAILABILITY OF DIGITAL LEARNING

RANK
6TH



MAIN OBSERVATIONS

- Austria scores above the EU-27 average for digital learning readiness.
- Part of the reason is that Austria's federal government has taken a proactive stance on digitalisation generally, and made specific efforts to ensure Austrians from childhood to adulthood can access digital learning and skills development.
- Still, Austria's scores and implementation of digital learning suggest mixed success and substantial room for improvement. In 'Institutions & Policies' it places 1st, while it scores as low as 22nd in other measures.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Austrian stakeholders coordinate on a variety of promising pilot projects and initiatives, reflecting widespread awareness of digital learning. From this we see a number of promising and innovative pilot projects concluded or ongoing throughout the country.
- Even so, attitudes towards digitalisation seem rather ambivalent or even negative among both educators and the general public. A sizable portion of schools lack even the basic infrastructure required for digital learning, such as high-speed internet access.
- Overlapping competencies between various federal ministries, state governments, and other actors make it more difficult to coordinate programme funding and implementation.

RECOMMENDATIONS

- We recommend focusing on empowering educators to teach digital skills with training modules, and ensuring that the necessary hardware and software is available.
- Austrians score rather poorly on learning outcomes, so schools should focus on building proficiencies essential to new technologies, such as maths, science, and problem-solving.
- Austria should ensure that its 'Masterplan for digitalisation in education' is implemented and monitored, as it contains a number of practical and sensible recommendations.

KEY REFERENCES

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The Federal Minister of Education, Science and Research, "Digitale Kompetenzen Informatische Bildung. Warum digi.check?" [Digital Competencies Informatics Education. Why digi.check?].

PHOTOGRAPHY: Jacek Dylag on Unsplash.com

BELGIUM

RANK IN EU-27

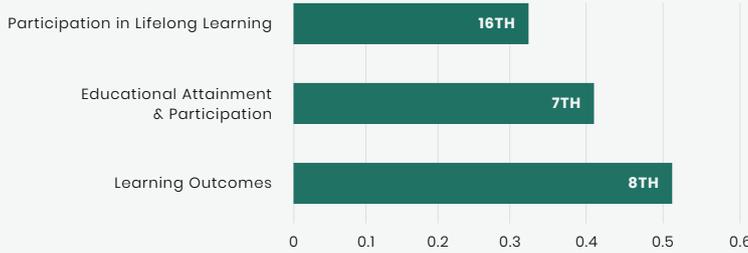
21ST

OVERALL SCORE

0.575

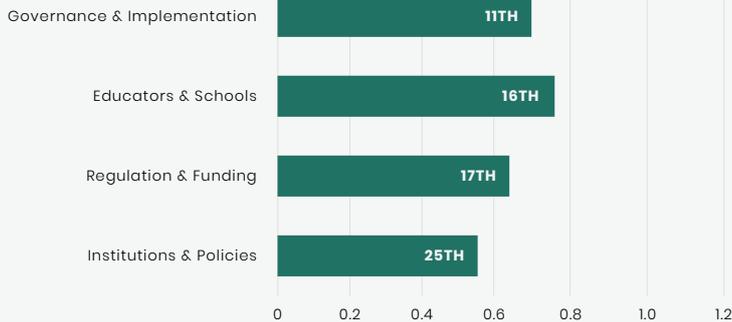
LEARNING PARTICIPATION AND OUTCOMES

RANK
9TH



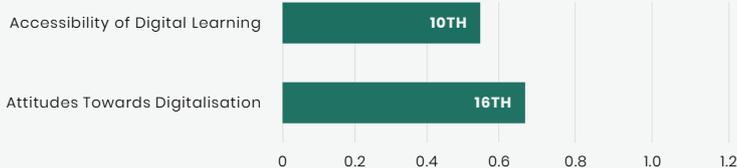
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
23RD



AVAILABILITY OF DIGITAL LEARNING

RANK
10TH



MAIN OBSERVATIONS

- Belgium ranks 21st in Europe on the overall index. The country is around the average in terms of availability of digital learning but among the worst European performers when it comes to institutions and policies (23rd).
- Belgium policymakers are aware of the importance of digital learning even though it has not been set as an explicit priority at the time of this study. It is also worth mentioning that education is a competence of the language communities under the division of competences across the federal and regional levels. As such, the country's ranking suffers from the non-alignment between the policies set at different levels.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Overall, Belgium is still ranked among EU countries as one with the highest exposure to digitalisation and whose populations are best equipped with adequate skills and lifelong learning that enable them to benefit from digitalisation.
- This can be partially explained by the fact that digital skills are explicitly part of the curriculum.
- Still, digitalisation not being a priority, the country also suffers from not always sufficient means to invest in innovation/experimentation and skills development.

RECOMMENDATIONS

- Even though the regulatory framework is not harmful to digital learning, the lack of coordination between the different institutions and the absence of a unique policy clarifying responsibilities can be damaging in the long run and lead to further inequalities among the regions.
- Specifically, digital learning should be further developed at the lower level through support to schools on media literacy topics, accessibility and ICT-based special needs provisions, and ICT-curriculum reform, including by supporting teachers and trainers' pilot practices.

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Vlaamse Overheid (2014), "Beleidsnota Onderwijs" [Policy Paper Education], Available at: <https://www.vlaanderen.be/publicaties/beleidsnota-2014-2019-onderwijs>

Digital Belgium (n.d.), Available at: <http://digitalbelgium.be/en/> Alexander De Croo (2018), "Digital Belgium Skills Fund trekt 5,6 miljoen euro uit voor 37 nieuwe projecten" [Digital Belgium Skills Fund makes available 5,6 million euros for 37 new projects], Available at: <https://www.decroo.belgium.be/nl/digital-belgium-skills-fund-trekt-56miljoen-euro-uit-voor-37-nieuwe-projecten>

PHOTOGRAPHY: Marius Badstuber on Unsplash.com

BULGARIA

RANK IN EU-27

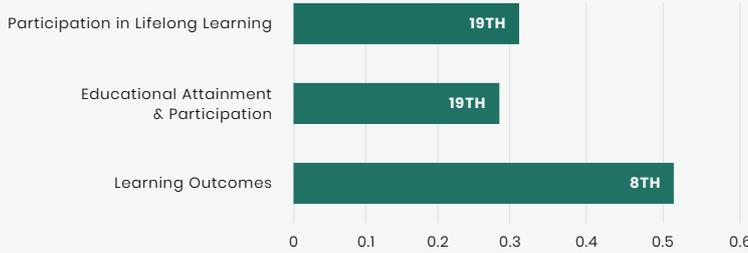
19TH

OVERALL SCORE

0.585

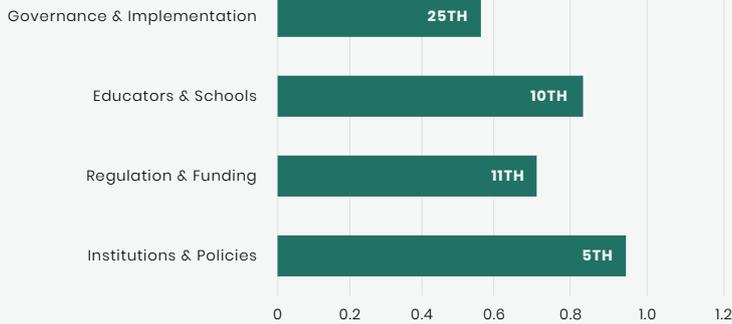
LEARNING PARTICIPATION AND OUTCOMES

RANK
18TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
8TH



AVAILABILITY OF DIGITAL LEARNING

RANK
23RD



MAIN OBSERVATIONS

- Bulgaria is part of the European middle achievers in terms of readiness for digital learning as it ranks 19th on the index. It has a low score on availability of digital learning (23rd) but scores better on institutions and policies (8th).
- This reflects the relatively high level of awareness among policymakers on this issue. Improving digital skills is one focus of the recent reform of the education system.
- Bulgaria still lags behind in terms of digital human capital as the share of the population with at least basic digital skills is one of the EU's lowest. It has made some progress, but overall most schools lack the proper IT infrastructure.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- The regulatory framework does not prevent innovation and experimentation, as exemplified by the "Innovative schools" programme. However, a lot depends on certain schools' ambitions and on their teaching staff. Most teachers still do not feel confident enough to fully use digital education practices.
- Vocational training is also updated in partnership with the IT business sector. Digital up-skilling through lifelong learning is also tackled via public libraries or private projects.
- New funding opportunities in development and EU funds are used to a considerable extent. Resources tend to be concentrated in schools participating in Erasmus + projects and at central level backed by EU ESF funding.

RECOMMENDATIONS

- Bulgaria should pursue its investment in ICT equipment, basic digital skills for all of the population and tackling shortages in ICT specialists.
- Attitudes toward digitalisation are fairly positive and the government has very recently launched several new initiatives to improve digital skills among teachers and learners. However, significant progress still needs to be achieved and it is still to be seen whether the government will deliver on its promises of financial support for digitalisation of education.

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PHOTOGRAPHY: Alexandr Bormotin on Unsplash.com



CROATIA

RANK IN EU-27

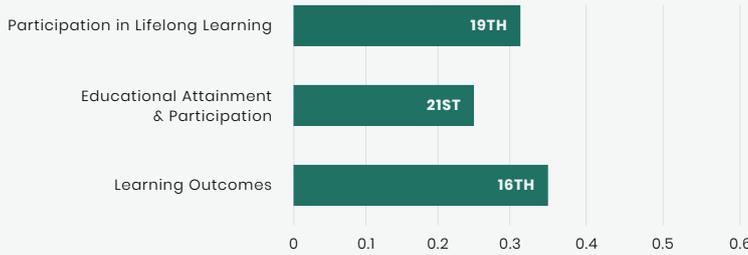
13TH

OVERALL SCORE

0.612

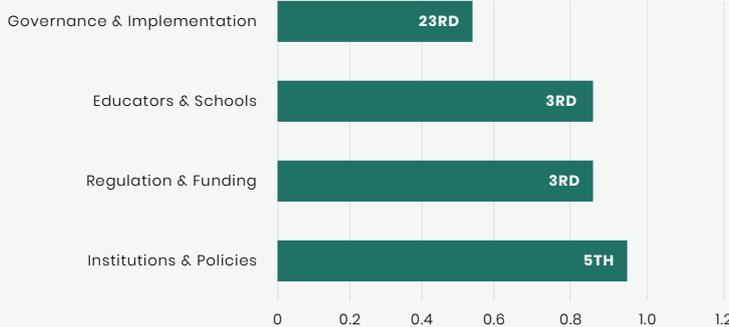
LEARNING PARTICIPATION AND OUTCOMES

RANK
24TH



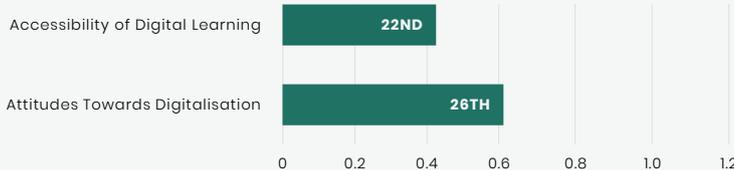
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
3RD



AVAILABILITY OF DIGITAL LEARNING

RANK
21ST



MAIN OBSERVATIONS

- Croatia is in the European average in terms of the digital learning readiness index in Europe. Its main strength comes from the available institutions and policies for digital learning (rank 3rd).
- However, the country scores poorly in availability of digital learning as well as in participation in lifelong learning.
- Attitudes towards digital innovation in Croatia are highly sceptical and some of the most negative in Europe.
- There seems to be a lack of quality of governance and policy implementation of digitalisation reforms in the education system.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Digitalisation of learning in elementary and secondary schools is being carried out through the e-Schools Programme, which is funded by European Structural Funds and European Regional Development Funds.
- The specific goals of the e-Schools Programme include the provision of a reliable ICT environment tailored to the needs of schools and improving the efficiency of the education system to enhance digital competences contributing to the digital maturity of schools.
- In digitally mature schools, teachers use various types of technology to enhance teaching, develop their own digital content and support self-taught learning.

RECOMMENDATIONS

- Croatia is not performing well on international tests (e.g. PISA) and there is considerable dropout from tertiary education. This led to reforms in the education system pushing for the digitalisation of learning, strengthening the capacity of education to better prepare students for the labour market and lifelong learning. This needs to continue.
- Schools need a more powerful digital infrastructure to comply with the ambitious objective of digitally mature schools; policies should also aim to decrease regional disparities in school infrastructure.
- It is also recommended that educators are empowered and better trained for raising new generations of digitally competent citizens.

KEY REFERENCES

Croatian Government (2014), "Strategija obrazovanja, znanosti i tehnologije" [Strategy for Education, Science and Technology], Zagreb.

CARNet (2015), "eSchools Program", Zagreb.

PHOTOGRAPHY: John Weinhardt on Unsplash.com



CYPRUS

RANK IN EU-27

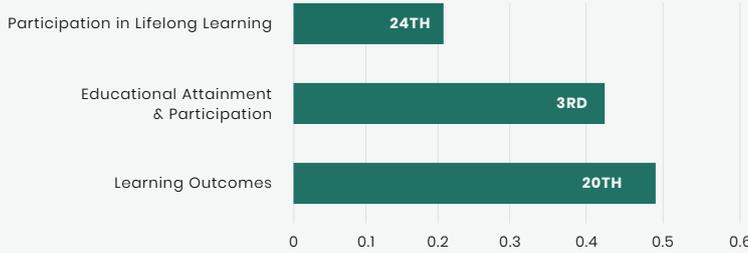
6TH

OVERALL SCORE

0.641

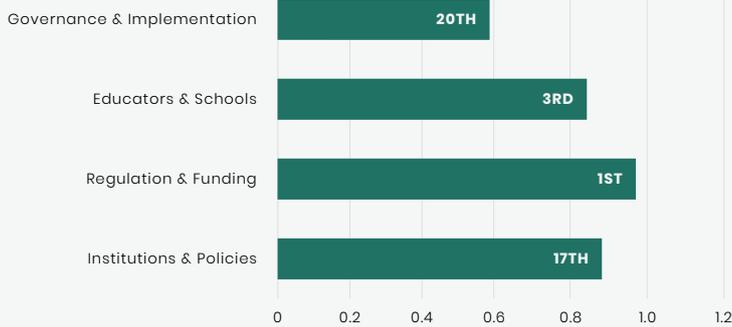
LEARNING PARTICIPATION AND OUTCOMES

RANK
17TH



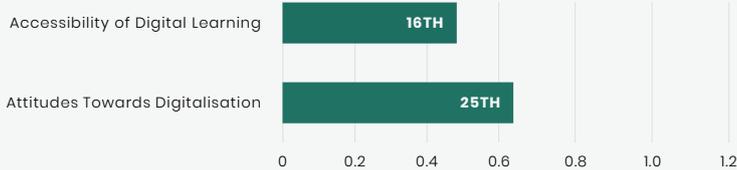
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
1ST



AVAILABILITY OF DIGITAL LEARNING

RANK
15TH



MAIN OBSERVATIONS

- Cyprus has a relatively good ranking in digital learning readiness, which is well above the EU-27 average. The main reason is the extensive emphasis put on institutions and policies for digital learning (Cyprus is ranked 1st in terms of regulation and funding).
- Digitalisation of learning is one of the main policies of the government and is part of the Government Digital Agenda. Several ministries are involved in managing and implementing the digital agenda.
- Despite the high ranks in institutional environment in digital learning readiness, the country scores low in Participation in lifelong learning (24th) or Attitudes towards digitalisation (25th).

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- One of the strategic objectives within the Strategic Plan of the Ministry of Education and Culture is the full integration of ICT in teaching and learning. This involves developing modern infrastructure in schools to provide adequate equipment and software to make effective use of ICT in teaching.
- There is also a strong emphasis placed on continuous training of teachers in ICT skills for personal use and for use in the educational process.
- Even though the regulatory setting and proactive digital strategies are in place, most of the efforts still remain on a voluntary basis.

RECOMMENDATIONS

- Given the relatively low score in learning outcomes (20th), the quality of digital learning should be reconsidered.
- The positive developments in digital learning policies in place should be accompanied by oversight bodies ensuring the quality of governance and policy implementation.
- Further efforts need to be made in order to enhance digitalisation of learning in the adult education sector, in terms of curriculum development, infrastructure, in-service training of adult educators, and other means of support.

KEY REFERENCES

Ministry of Transport, Communication and Works (2012), "Digital Strategy for Cyprus", Nicosia.

Ministry of Education and Culture (2018), "Strategic Plan MOEC – 2019-21", Nicosia.

PHOTOGRAPHY: LSD for Society on Unsplash.com



CZECH REPUBLIC

RANK IN EU-27

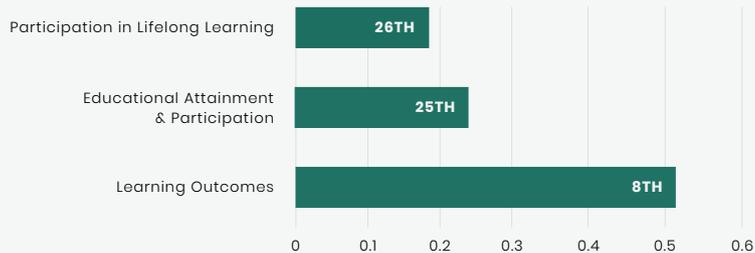
23RD

OVERALL SCORE

0.56

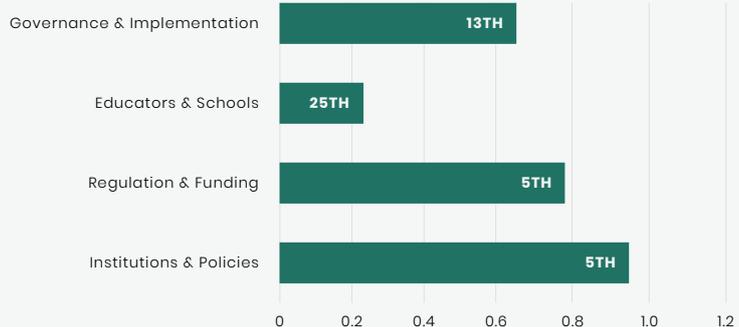
LEARNING PARTICIPATION AND OUTCOMES

RANK
25TH



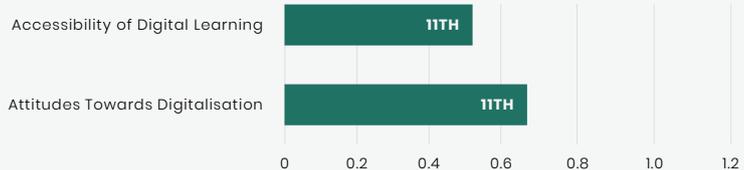
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
22ND



AVAILABILITY OF DIGITAL LEARNING

RANK
8TH



MAIN OBSERVATIONS

- There is lack of public financing for life-long learning in general. Costs are borne by companies or are financed through EU funds which leads to a very uncertain and unsystematic mode of financing.
- Even though the share of the adults in education or training is average, the number of instruction hours per person is the second lowest in the EU after Slovakia.
- Awareness of the importance of digital learning among senior policy makers is high, which influences strategic documents though they primarily focus on the availability of programmes.
- Even though learning outcomes are one of the highest in the EU, the digital skills of the educators are among the lowest in the EU. Programmes for educators focus mainly on primary and secondary educators.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Even though universities often lack funding and incentives, they possess considerable autonomy in the deployment of new technologies in education.
- The Czech Republic achieves promising results in NGO activities aimed at educating primary and secondary school teachers.
- Czech universities are successful at implementing e-learning techniques (such as Moodle).
- In general, primary and secondary schools' national curricula are open to the implementation of new technologies.

RECOMMENDATIONS

- The Czech Republic should focus more on lifelong learning and not only on primary and secondary education.
- Programmes are available but proper incentives and funding are necessary in order to motivate primary and secondary educators to implement digital learning. There is no scheme for teachers that would remunerate their efforts in introducing innovations.
- In lifelong learning, policymakers should focus on overcoming the following obstacles: lack of financial resources, but also missing incentives for adults to enter life-long learning and missing tools to identify appropriate programmes for adults.

KEY REFERENCES

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-Ministerstvo školství, mládeže a tělovýchovy (2014) "Strategie Digitálního Vzdělávání do Roku 2020" [Digital Education Strategy until 2020], available at: <http://www.msmt.cz/vzdelavani/skolstvi-v-cr/strategie-digitalniho-vzdelavani-do-roku-2020>

PHOTOGRAPHY: Dmitry Goykolov on Unsplash.com

DENMARK

RANK IN EU-27

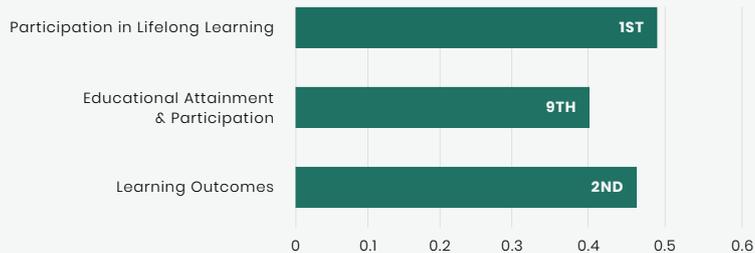
17TH

OVERALL SCORE

0.592

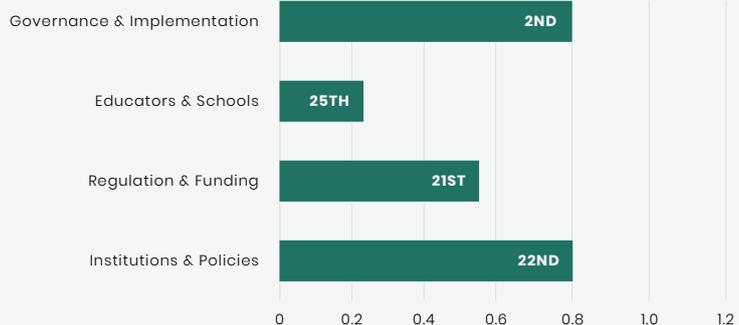
LEARNING PARTICIPATION AND OUTCOMES

RANK
2ND



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
26TH



AVAILABILITY OF DIGITAL LEARNING

RANK
3RD



MAIN OBSERVATIONS

- Despite its strong education system and high accessibility of digital learning, Denmark is a middle achiever in Europe regarding readiness for digital learning. It ranks 17th on the overall index.
- Digitalisation has been an important strategic priority for the Danish government, though digital changes in the education system have been slow to take root owing to regulatory barriers and other factors.
- The Danish government aimed to improve students' and teachers' digital competencies through well-funded initiatives.
- Denmark's digital infrastructure and attitudes towards digitalisation are some of the best in Europe.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Denmark's performance is driven by the quality of its education system and proactive attitude towards digitalisation.
- Many Danish actors share responsibility for progress in digitalisation.
- Substantial regulatory barriers contribute to Denmark's very poor rankings in 'institutions and policies for digital learning'.
- Most educators' training is provided internally at local or university level. This is an example of where comprehensive national programmes for system-wide change could drive digitalisation of learning further.

RECOMMENDATIONS

- Certain regulatory barriers ought to be rethought, as they seem to be slowing progress in Denmark's education system.
- Denmark should clarify governmental responsibility for driving progress in digital learning.
- Online and distance-learning courses could be promoted through improved accreditation and enhanced organisational support.
- Denmark should continue pushing classrooms at all levels to embrace digitalisation.

KEY REFERENCES

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PHOTOGRAPHY: Ava Coploff on Unsplash.com

ESTONIA

RANK IN EU-27

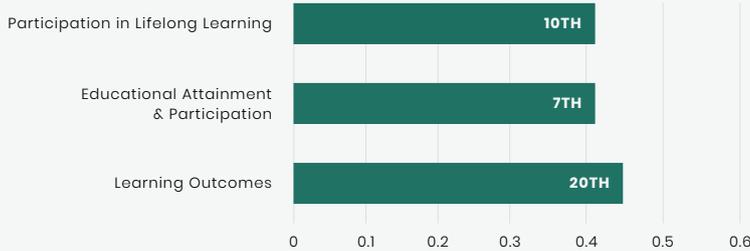
1ST

OVERALL SCORE

0.685

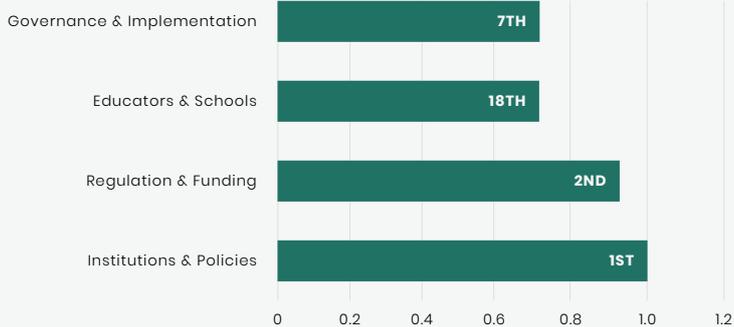
LEARNING PARTICIPATION AND OUTCOMES

RANK
7TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
2ND



AVAILABILITY OF DIGITAL LEARNING

RANK
7TH



MAIN OBSERVATIONS

- Estonia is a frontrunner in all things digital in the EU, including digital learning.
- Estonia is remarkable for its comprehensive policy framework (Programme for Digital Focus in the Estonian Lifelong Learning Strategy 2020) incorporating digital learning tools into primary, secondary, higher and continuing education programmes.
- Estonia stimulates autonomous and highly innovative digital learning practices both in schools and universities.
- Since the TigerLeap programme began in 1997, innovation and experimentation in digital learning have been strongly encouraged.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Estonia supports access to digital resources and modern digital infrastructure for learning at all levels.
- Estonia takes a comprehensive approach to Digitalisation; 95% of teachers use digital technology daily in their courses and the use of digital technology beyond the classroom is encouraged through homework as well as in adult education.
- Online courses benefit from equal recognition and educational technologists regularly support teachers and university professors in introducing digital culture into learning and teaching.
- Teachers benefit from digital training, and programmes such as INNOVE support inter-school cooperation.

RECOMMENDATIONS

- Estonia has some room for improvement in stimulating teachers' readiness to use digital materials as they sometimes still prefer traditional teaching methods. Estonia did not score as highly on access to means of digital learning, internet use for learning and problem-solving in a technology-rich environment.
- Efforts to improve the use of digital technology within adult education should also be further developed as this has been pointed out as one of the most important training needs.

KEY REFERENCES

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Ministry of Education and Research (2019), "Ministry of Education and Research annual report 2018", Tartu, available at https://www.hm.ee/sites/default/files/htm_aruanne_2018.pdf.

PHOTOGRAPHY: Ilya Orehov on Unsplash.com

FINLAND

RANK IN EU-27

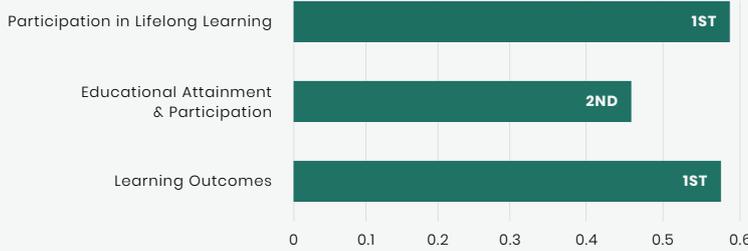
3RD

OVERALL SCORE

0.672

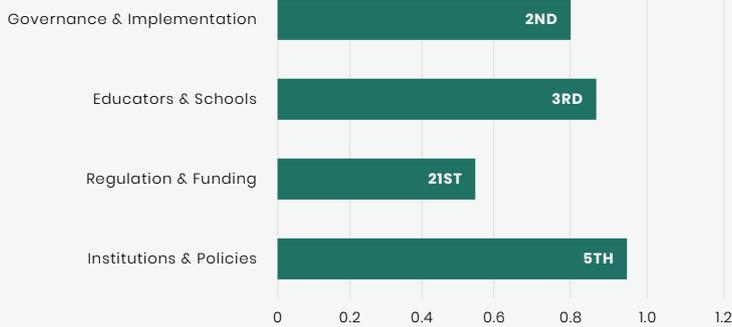
LEARNING PARTICIPATION AND OUTCOMES

RANK
1ST



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
13TH



AVAILABILITY OF DIGITAL LEARNING

RANK
5TH



MAIN OBSERVATIONS

- Finland is considered as one of the most advanced countries in Europe in digitalisation and digital learning, both in terms of policy and practice. This is reflected in the country's placement in 3rd place in digital learning readiness across the EU-27.
- Learning outcomes, educational attainment and participation as well as lifelong learning are ranked as one of the best among the EU-27.
- While overall regulatory frameworks are mainly beneficial for digitalisation of learning in primary and secondary schools (comprehensive education), digital learning formats – particularly open online learning provisions such as MOOCs – are not widely accredited by universities. This explains a relatively lower score (13th) for institutions in digital learning.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Several ministries are coordinating together to ensure that Finland is a leading country in future learning and inspiring education. In addition to national policies (e.g. Digital Finland Framework), there are also many regional policies and projects to promote digitalisation at the municipal level.
- One of the main priorities in the public sector is to develop the digital-based curriculum, new learning environments and digital materials at comprehensive schools as well as an expansion in digitising public services.
- There are also various assessment tools to evaluate digital skills or other skills using digital assessment tools. These tools are also used for teachers and schools to measure and analyse their usage of ICT.

RECOMMENDATIONS

- There appears to be some evidence that the digital competence of teachers in higher education needs to be further developed.
- We recommend that the digital teaching competency and integration of digital technologies by adult educators should be further improved.
- Despite development of digital materials and online training in adult and vocational education, there is not enough evidence of how widely these trainings are accredited and this remains an obstacle for higher education, hence requiring further attention.

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Ministry of Education and Culture. Digital Learning Environments in Higher Education Institutions, Helsinki.

Vahtivuori-Hänninen, S., Halinen, I., Niemi, H., Lavonen, J., & Lipponen, L. (2014). A new Finnish national core curriculum for basic education and technology as an integrated tool for learning. In Finnish innovations and technologies in schools. Sense Publishers, Rotterdam.

PHOTOGRAPHY: Jaakko Kempainen on Unsplash.com

FRANCE

RANK IN EU-27

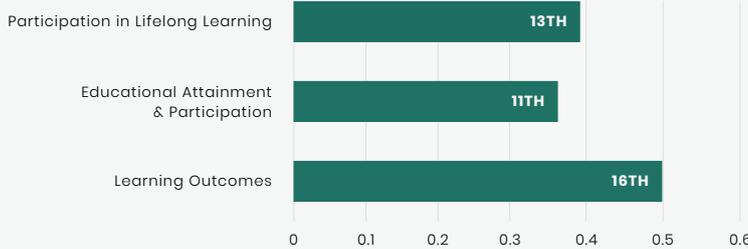
18TH

OVERALL SCORE

0.586

LEARNING PARTICIPATION AND OUTCOMES

RANK
12TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
17TH



AVAILABILITY OF DIGITAL LEARNING

RANK
17TH



MAIN OBSERVATIONS

- France scores in the EU-27 average overall, but its rankings vary from the top to the bottom quartile.
- A few noteworthy outliers are 'learning outcomes' and 'attitudes towards Digitalisation', where France scores significantly below average. On the contrary, France performs exceptionally well in 'Institutions & Policies', where it ranks in the top 5.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- The French government has taken a fairly proactive stance in fostering digital learning and helping the country catch up with its peers.
- Given overlapping competencies due to the decentralised management of education, coordination as well as inclusive and equitable implementation of an ambitious agenda has been challenging.
- Stakeholders coordinate on a variety of promising pilot projects and assessment initiatives to foster recognition of a French digital competence, including by fostering the training of trainers in digital skills development techniques.

RECOMMENDATIONS

- Rather than investing in equipment, focusing on educators and sharing good practices seems more effective in reducing social and educational inequality.
- One particular gap seems to be in programmes providing training and skills for educators and the creation of digital work spaces at school/work.
- France can build on its most successful pilot projects, and recent gap assessments studies to plan its next steps.

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GERMANY

RANK IN EU-27

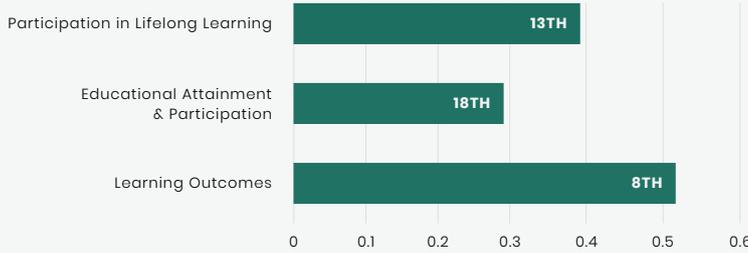
27TH

OVERALL SCORE

0.495

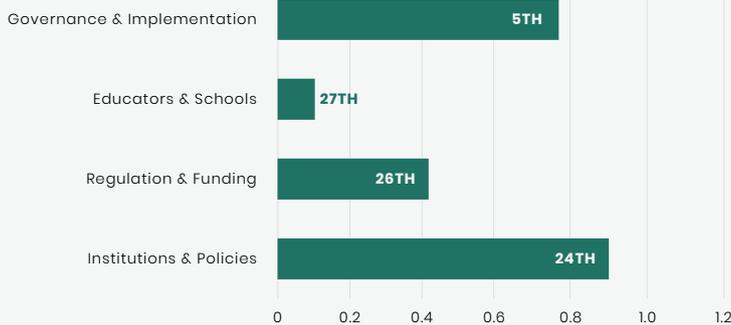
LEARNING PARTICIPATION AND OUTCOMES

RANK
16TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
27TH



AVAILABILITY OF DIGITAL LEARNING

RANK
9TH



MAIN OBSERVATIONS

- While Germany has a strong economy and a fairly good education system, investment in digital infrastructure and programmes is sorely lacking.
- Germany ranks lowest in the EU overall, and also for institutions and policies for digital learning.
- Germans attitudes towards digital innovation are highly sceptical and some of the most negative in Europe.
- German schools and educators are not ready to prepare students with the necessary digital skills and competencies.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Digitalisation is associated with rapid change; even industrial leaders can quickly fall behind without political focus and ambitious investments.
- Germany has problems at basic levels of digital infrastructure. For example, Germans pay more for their internet and mobile data than most Europeans, while receiving worse quality.
- German policymakers are aware of the importance of digitalisation, but efforts to date lack ambition. Modest efforts are insufficient, and political will is necessary for the next steps.

RECOMMENDATIONS

- The attitudes of German policymakers and citizens must adjust to the new economic realities.
- To have any chance of success, policymakers must ensure that programmes and investments in digitalisation respect the high expectations of Germans regarding data privacy. This should be explicitly communicated.
- The educators themselves require better digital education.
- Strict rules governing curricula in primary and secondary schools may be stifling new strategies for digital learning. Generally, outcome requirements remain inflexible.

KEY REFERENCES

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Bertelsman Stiftung (2017), Monitor Digitale Bildung* [Digital Education Monitor], Gütersloh.

PHOTOGRAPHY: Markus Spiske on Unsplash.com

GREECE

RANK IN EU-27

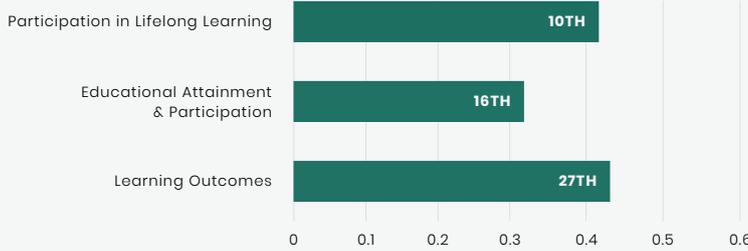
25TH

OVERALL SCORE

0.55

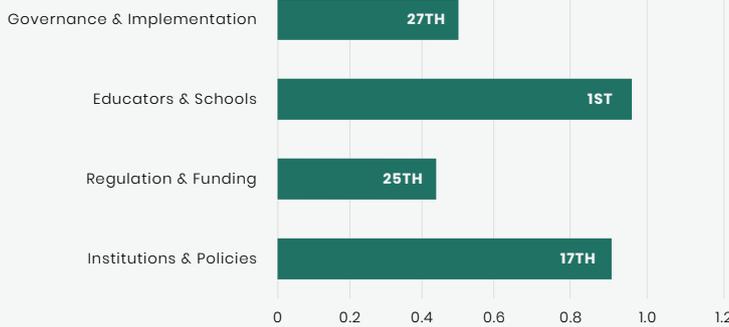
LEARNING PARTICIPATION AND OUTCOMES

RANK
21ST



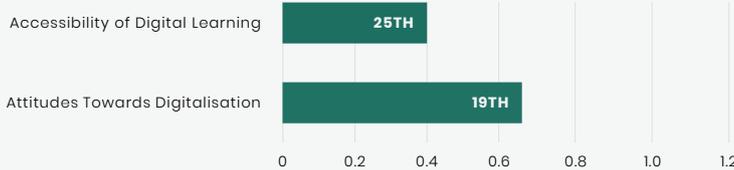
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
20TH



AVAILABILITY OF DIGITAL LEARNING

RANK
26TH



MAIN OBSERVATIONS

- Digitalisation of learning has not been among the top priorities of policymakers. This is reflected by the overall ranking of the country, which comes almost last among EU member states (25th). Greece is specifically performing badly regarding institutions and policies as well as availability of digital learning (bottom quartile).
- Greece has a general national strategy on life-long learning with digital learning policy being an integral part of it, but has not been investing sufficiently in education and digital learning tools in recent years.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Greece has no specific national operational plan focusing exclusively on digitalisation of learning. In contrast, there are national plans on ICT strategy, covering e-Government, infrastructure and broadband connectivity, ICT security and e-Skills development but not focusing on the school system.
- This lack of regulatory framework, combined with strong state control of primary and higher education has prevented the country from performing well on numerous indicators.

RECOMMENDATIONS

- Further financial investment and policy development towards the use of ICT at school level would be beneficial to the country as a whole.
- Some tools or actions could further promote digital literacy, such as the introduction of both access to digital learning material in classrooms and at home via web portals with, possibly, incentives to purchase notebooks.
- Specifically, for lower school levels, continuing professional development of teachers and trainers, which is optional in Greece towards digital learning, should be further encouraged.

KEY REFERENCES

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EU (2018), "Education and Training Monitor 2018: Greece". Brussels.

Available at: https://ec.europa.eu/education/resources-andtools/document-library/education-and-training-monitor-2018-greece-factsheet_en

GSL (2012), "Lifelong Learning in Greece 2012, Executive Summary National Report", Athens.

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PHOTOGRAPHY: Kylie Docherty on Unsplash.com

HUNGARY

RANK IN EU-27

14TH

OVERALL SCORE

0.599

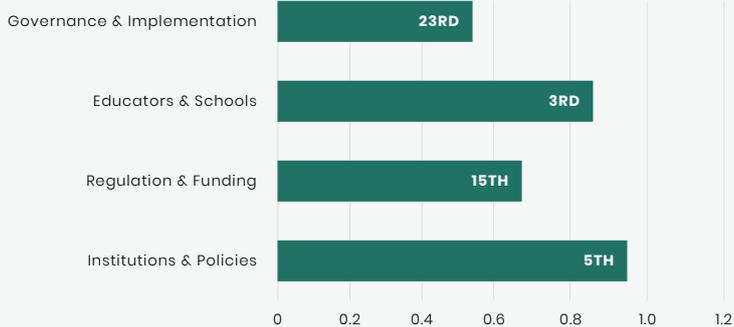
LEARNING PARTICIPATION AND OUTCOMES

RANK
23RD



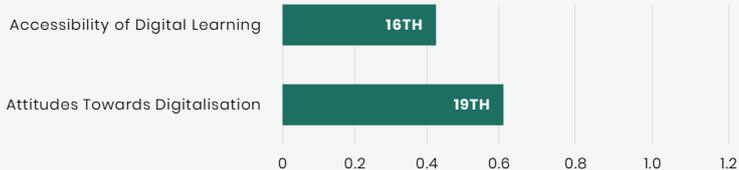
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
11TH



AVAILABILITY OF DIGITAL LEARNING

RANK
18TH



MAIN OBSERVATIONS

- The Hungarian government is very active in integrating digital learning into the educational system via training programmes for educators at all levels and extensive funding from EU funds.
- As the official draft of the new National Curriculum is still under development, Digital Education Strategy alone will be not able to provide the necessary innovation and the spirit of experimentation for the Hungarian educational sector.
- Higher education institutions have high levels of autonomy in choosing the teaching methods, which creates a significant opportunity to thoroughly implement digital learning, but also to follow traditional, paper-based methods.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Overall, Hungarian primary and secondary education has a beneficial regulatory framework that allows flexibility in introducing digital learning.
- Even when funding schemes are available and training programmes for all educators are provided, it is necessary to focus on educators motivation to adopt new teaching methods. Generally, new digital tools are not perceived as a first choice among educators.
- The strategies were developed in broad consultation. Hungary placed particular emphasis on professional consultations with advocacy organisations and representatives of business, the non-governmental sector and research communities.

RECOMMENDATIONS

- The Hungarian Government has approved the Digital Workforce Programme, as part of the Digital Success Programme, which aims to implement a new legal environment regarding the Hungarian adult learning system. Implementation of this programme should be a priority.
- Based on the objectives of this programme, the presently restrictive legal environment must be changed in many aspects for it to be success. For instance, according to the present Act on Adult Learning, all the administration must be on paper.

KEY REFERENCES

The Digital Education Strategy of Hungary (2016). Available at: kormany.hu/download/0/4b/21000/The%20Digital%20Education%20Strategy%20of%20Hungary.pdf

PHOTOGRAPHY: Seth Fogelman on Unsplash.com

IRELAND

RANK IN EU-27

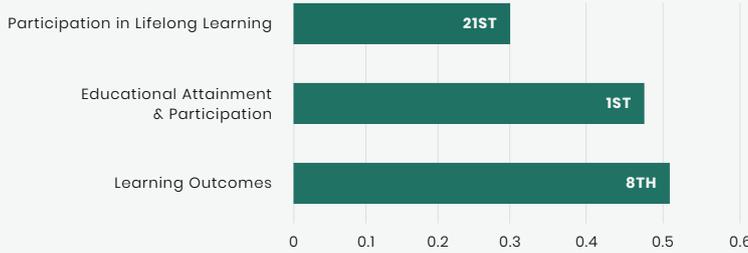
12TH

OVERALL SCORE

0.613

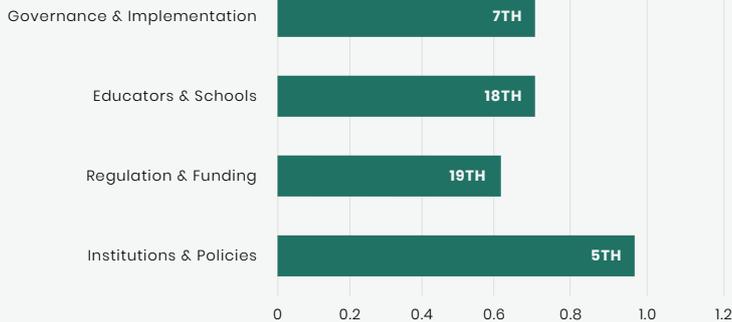
LEARNING PARTICIPATION AND OUTCOMES

RANK
8TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
16TH



AVAILABILITY OF DIGITAL LEARNING

RANK
16TH



MAIN OBSERVATIONS

- Ireland scores 12th in overall digital learning and averagely regarding the different index indicators.
- Its main strengths lie in the accessibility of digital learning with a national skills architecture that has been evolving in the past years to respond to the increased challenges of digitalisation at all levels.
- Despite a high awareness reflected by institutions and policies, and participation by society overall, the country's performance is undermined by a lack of up-skilling initiatives to respond to digital transformation and the absence of a sustainable, long-term vision.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Digitalisation of learning has been considered by the government since 2013, with initially a focus on infrastructure in primary and post-primary schools and it set out practical actions to encourage and assist more citizens and small businesses to get on line.
- Yet, if Ireland performs above the EU average in high-level digital skills, the average digital skills of its people remains low.
- This can be explained by the lack of sufficient support to accompany the shift in pedagogical practices of teachers, too much independence for education institutions combined with a lack of long-term sustainability in funding for pilot initiatives.

RECOMMENDATIONS

- There is a continuous effort to highlight the deficiencies and challenges of the current system and this should be pursued, as well as the current work on the regulatory framework, towards establishment of equal technology enhanced learning environments to facilitate achievement of the national skills strategy through further funding and coordinating responsibilities.
- Targeted investments towards a specific audience when it comes to digital skills education in schools, universities and work, should also be considered further.

KEY REFERENCES

Doing more with digital. National Digital Strategy for Ireland Phase 1 – Digital Engagement (2013). Dublin: Department of Communications, Energy and Natural Resources. <https://www.dccae.gov.ie/enie/communications/publications/Documents/63/National%20Digital%20Strategy%20July%202013%20compressed.pdf>

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PHOTOGRAPHY: Saturday Sun on Unsplash.com

ITALY

RANK IN EU-27

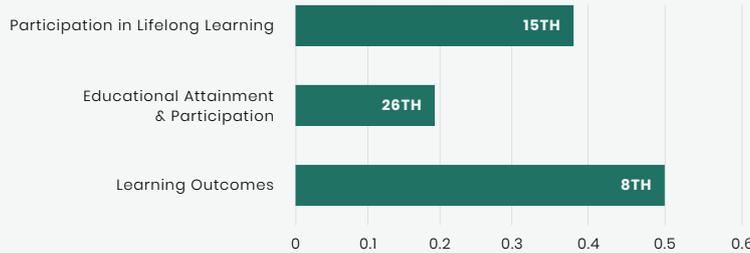
26TH

OVERALL SCORE

0.507

LEARNING PARTICIPATION AND OUTCOMES

RANK
21ST



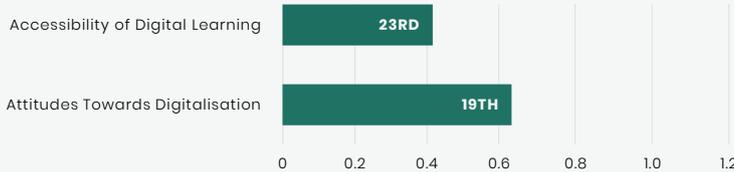
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
25TH



AVAILABILITY OF DIGITAL LEARNING

RANK
25TH



MAIN OBSERVATIONS

- Italy's score ranks it towards the bottom of the overall index, ranking 26th out of the EU-27.
- It scores very poorly in all the dimensions of the index, but its worst performance is in Institutions and Policies for digital learning and Availability of digital learning (25th).
- Indeed, despite having set up a national plan for digital learning in schools, a dedicated ministry for innovation has been created only very recently and responsibilities for digitalisation of learning are not clearly allocated.
- Funding has not been consistently ensured across changes in government.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- The National Plan for Digital Schools (Piano Nazionale Scuola Digitale) and its co-funding mechanism with the European Social Fund have triggered several innovative and promising initiatives in digital learning, which could be scaled up through more regular funding at national level. Some universities also appear to be frontrunners in the development of MOOC platforms.
- The enhancement of digital infrastructure in schools has been a priority in recent years, with introduction of digital technologies in classrooms and improvement of internet connections, as a basic step for digital learning.
- Incentives to firms for continuous vocational training clearly applies to digital learning opportunities, which encourage the uptake of online courses for adult learning.

RECOMMENDATIONS

- Funding should be ensured consistently over time and through changes in government so as to stay focused on the priorities set by the National Plan on Digital Schools.
- A comprehensive strategy for digital learning in Italy should also include higher education and adult learning. At the moment there is no approved comprehensive policy for universities, for example. Only guidelines for development of MOOCs have been developed.
- Developing the digital skills of educators, especially, but not only in universities, is a key step to see digital learning happening throughout the country.

KEY REFERENCES

- Ministero dell'Istruzione, Università e Ricerca (2015), "Piano Nazionale Scuola Digitale" [National Plan for digital school].
- Istituto Nazionale Documentazione Innovazione Ricerca Educativa (2019), INDIRE - Ricerca per l'Innovazione della Scuola Italiana.
- Cedefop (2017) "Italy: Digital school year one evaluation".

PHOTOGRAPHY: Dan Novac on Unsplash.com

LATVIA

RANK IN EU-27

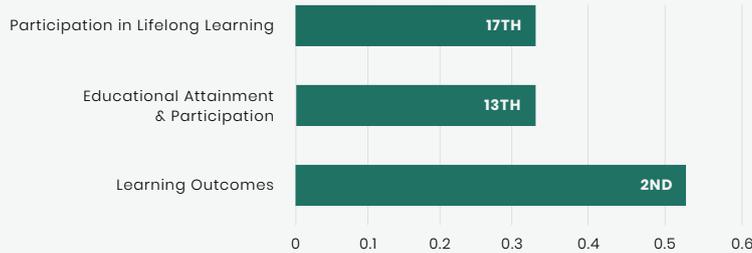
14TH

OVERALL SCORE

0.599

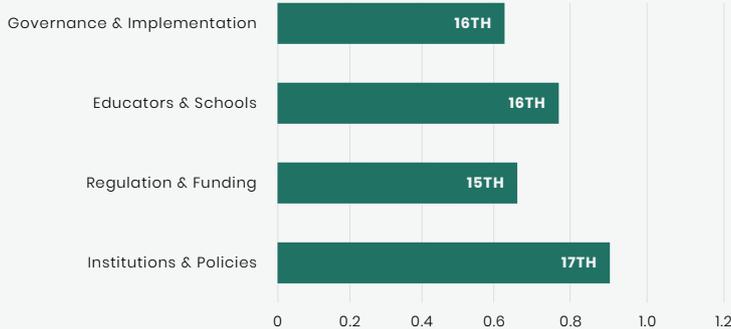
LEARNING PARTICIPATION AND OUTCOMES

RANK
14TH



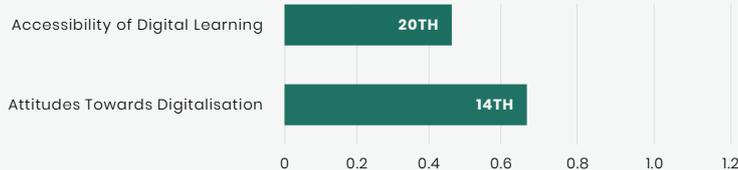
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
15TH



AVAILABILITY OF DIGITAL LEARNING

RANK
20TH



MAIN OBSERVATIONS

- Latvia lies in the European average on the overall index for digital learning readiness.
- The main weaknesses are related to the lack of availability of digital learning tools (rank 17th).
- The institutions and policies as well as regulation of digital learning appear slightly below the EU-27 average.
- The main strength in digital learning in Latvia comes from the country's high learning outcomes summarised by the mean standardised test scores.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Ministry of Education and Science is the primary organisation responsible for implementation of digital learning in Latvia. The most recent achievements are development of digital tools and expansion of digital methods in general and in vocational education.
- There has been an important expansion in digital equipment in schools: powerful internet connections (free of charge), interactive whiteboards, projectors, science rooms, etc. These allow schools to include elements of digital technology in the learning process.
- One of the main shortcomings is the lack of teachers' digital skills as well as the inability to synthesise traditional teaching methods with digital learning opportunities.

RECOMMENDATIONS

- While there is an overall considerable awareness and actions in the regulatory framework towards digital learning, most of the policies or projects have only been introduced recently and, therefore, there is no systematic assessment on the effect of these actions.
- Funding is an important element in investing in digital infrastructure and implementing the policies. European Social Funds support these programmes and continuity is important.
- While digital learning skills have been acknowledged as one of the key competences in adult education, this is progressing relatively slowly and there is still room for overall development of adult education.

KEY REFERENCES

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PHOTOGRAPHY: Gilly on Unsplash.com

LITHUANIA

RANK IN EU-27

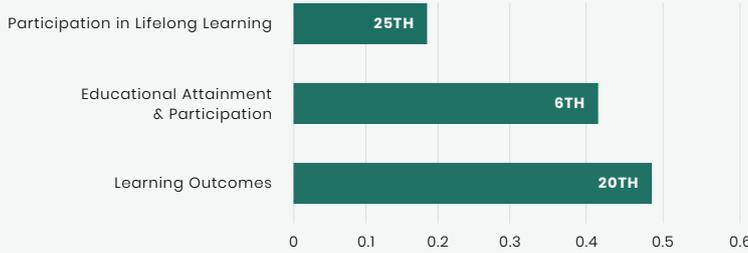
11TH

OVERALL SCORE

0.623

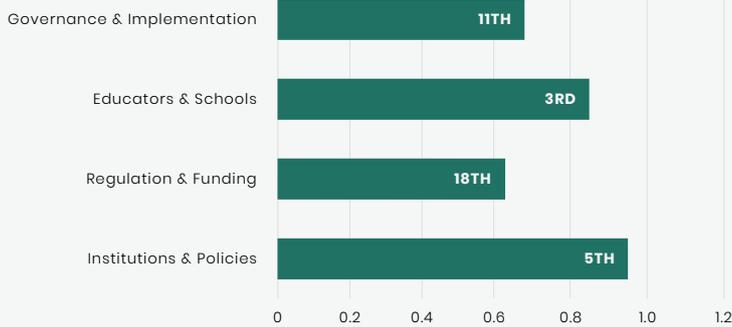
LEARNING PARTICIPATION AND OUTCOMES

RANK
20TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
11TH



AVAILABILITY OF DIGITAL LEARNING

RANK
14TH



MAIN OBSERVATIONS

- Lithuania ranks 11th on the overall index with an average to low performance on the main indicators. It performs better on institutions and policies for digital learning (11th) than on learning participation and outcomes (20th).
- Policymakers are aware of the importance and potential of digitalisation of learning. Development of digital technologies and infrastructure to boost the knowledge economy is set as a key priority in the high level strategic documents (National Progress Programme, 2012).

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- The Lithuanian Digital Agenda prioritises the reduction of the digital divide. The target group includes people with low digital literacy as well as potential future ICT-specialists to fill the gap in this profession.
- Digitally supportive schools are more numerous in Lithuania compared to the European average (EU, 2019). In higher education, most of the lecturers are able to integrate IT into the study process although they occasionally need support from IT specialists.
- EU funds are used to develop broadband connections and high-speed networks. Plus, teacher qualification improvement activities in ICT, including VET, adult and higher education teachers, are usually funded by EU funds (mostly ESF).

RECOMMENDATIONS

- Despite very positive general attitudes towards digitalisation and good scores on accessibility of digital learning, a lack of modern teaching methods has been noticed in the expert survey.
- Digitalisation of education is very reliant on EU funds in Lithuania. The long-term financial sustainability of digital learning investment should be ensured beyond EU support.
- The Lithuanian innovation system as a whole suffers from a lack of synergy between institutions providing innovation support and financial incentives.

KEY REFERENCES

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European Union (2019) 2nd Survey of Schools: ICT in Education. Country Report on Lithuania.

PHOTOGRAPHY: Jisoo Kim on Unsplash.com



LUXEMBOURG

RANK IN EU-27

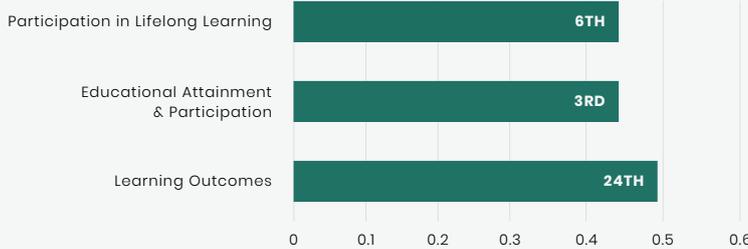
4TH

OVERALL SCORE

0.668

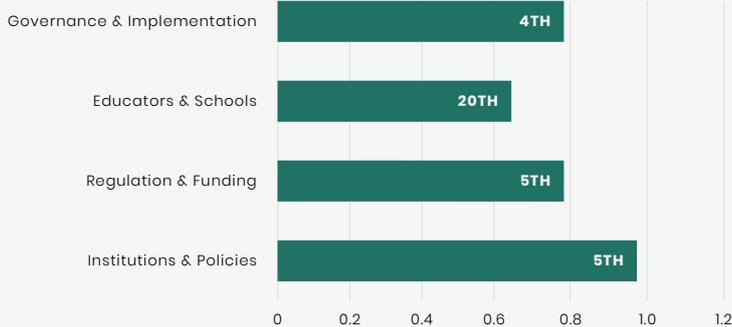
LEARNING PARTICIPATION AND OUTCOMES

RANK
6TH



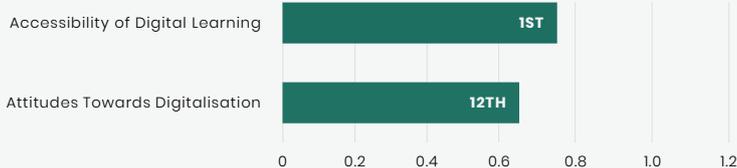
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
7TH



AVAILABILITY OF DIGITAL LEARNING

RANK
1ST



MAIN OBSERVATIONS

- Luxembourg scores as the 4th best performing country in the overall digital learning readiness index in Europe.
- Its main strengths lie in availability of digital learning and educational attainment and participation.
- The institutions and policies as well as regulatory environment in digital learning in Luxembourg are assessed to be among the top group of EU-27 countries.
- The main weakness relates to the digital skills and competences of educators, which need further development in Luxembourg.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Digitalisation of learning is part of the current government coalition agreement. As regards digital learning in education, it is reflected notably in the use of digital technology and the development of e-skills.
- Priorities are set on innovation and modernisation of vocational training offers (lifelong learning), development of a national e-learning platform, generalisation of the computer science school section and access to digital devices in secondary education.
- There is a centralised effort to develop digital skills and competences under the eduSphere project and at the National Teachers' Training Centre.

RECOMMENDATIONS

- The digital skills and teaching competency of educators in adult learning is fragmented across different service providers and also less developed. This requires further attention and development.
- There is continuous effort to enrich the adult education with digital options; this should continue.
- Learning outcomes based on existing data are rather poor for Luxembourg. We recommend a systematic evaluation and improvement of the quality of the education to address this issue.

KEY REFERENCES

Luxembourg (2016), "Carrefour pédagogique pour l'enseignement et l'apprentissage à l'ère numérique" [Pedagogical Crossroad for Teaching and Learning in the Digital Age], Luxembourg.

Luxembourg (2018), "Accord de coalition 2018-2023" [Coalition Agreement 2018-2023], Luxembourg.

PHOTOGRAPHY: Jean Carlo Emer on Unsplash.com

MALTA

RANK IN EU-27

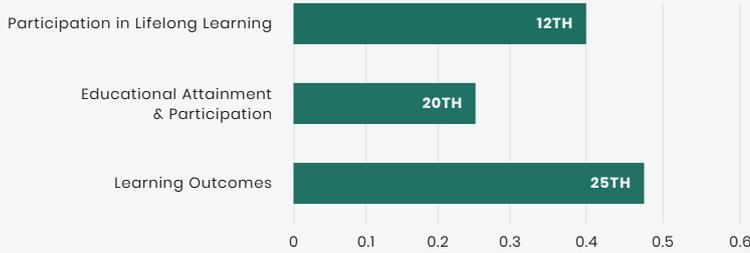
5TH

OVERALL SCORE

0.642

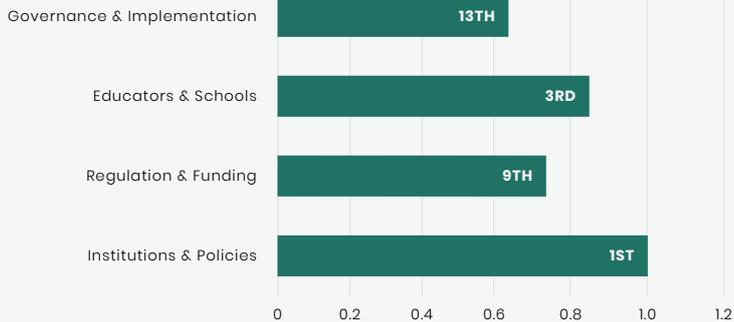
LEARNING PARTICIPATION AND OUTCOMES

RANK
19TH



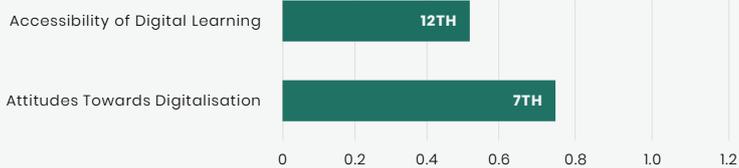
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
5TH



AVAILABILITY OF DIGITAL LEARNING

RANK
12TH



MAIN OBSERVATIONS

- Malta ranks 5th on the overall index for readiness of digital learning. Despite its low score on learning participation and outcomes (19th), it ranks high on institutions and policies for digital learning (5th).
- This is partly due to a long-standing awareness of the importance of ICT in education among policymakers. Digital literacy was set as a policy priority early on. Synergies between government, education and industry are created to sustain a strong digital economy in Malta.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Higher education institutions have made substantial investments in digital education. Professors are offered training opportunities to develop blended learning material. Also primary and secondary education teachers' training includes the design of technology-enhanced learning. They have fairly good access to IT equipment and open education resources.
- Malta is the first European country to use blockchain for certification purposes.
- Malta's policies in digital adult learning or digital up-skilling have been noticeably influenced by EU policy documents.

RECOMMENDATIONS

- Progress could be made regarding the equal recognition and accreditation of MOOCs or other open education courses both at higher and adult education levels.
- A lack of funding and training for lifelong educators remains a concern. This aspect should be taken into due account by policy to ensure digital lifelong learning opportunities.
- Educational methods in Malta remain rather traditional and digital resources are used mainly to support traditional models of education. A more comprehensive modernisation could be implemented relying on digital technologies.

KEY REFERENCES

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- Ministry for Education and Employment (2014), "Framework for the Education Strategy for Malta 2014-2024".
- Ministry for Education and Employment (2015), "Digital Literacy, 21st Century Competences of our Age".

PHOTOGRAPHY: Micaela Parente on Unsplash.com

NETHERLANDS

RANK IN EU-27

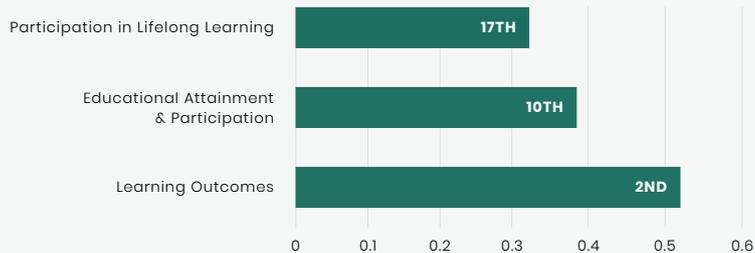
2ND

OVERALL SCORE

0.681

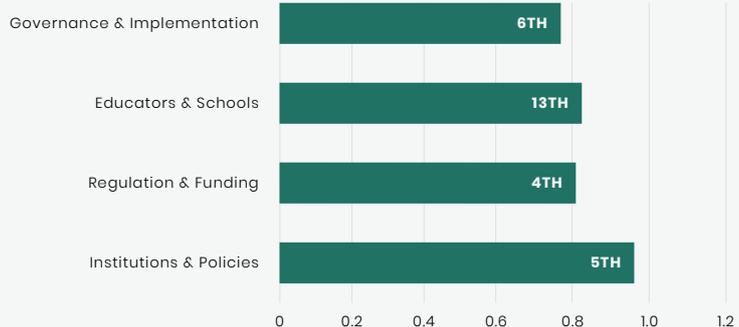
LEARNING PARTICIPATION AND OUTCOMES

RANK
9TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
4TH



AVAILABILITY OF DIGITAL LEARNING

RANK
4TH



MAIN OBSERVATIONS

- The Netherlands is at the forefront of digital learning in Europe. It scores 2nd on the overall index given its excellent institutions and policies on digital learning, high availability of digital learning and positive learning outcomes.
- Digital learning is fully embedded in the national "Digitalisation Strategy" laid out recently by the government.
- Investment in digital infrastructure in more remote areas and in the digital skills of primary and secondary education teachers is still needed.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- The Netherlands has successfully updated the curriculum to increase digital literacy in primary and secondary education. A key priority has been the provision of digital learning materials and IT infrastructure via funding opportunities or joint purchasing of ICT equipment.
- Blended learning and innovative practices are explicitly encouraged in higher education.
- Enhancing the digital skills of the general population has also been a policy goal via courses at public libraries or self-assessment tools.

RECOMMENDATIONS

- Room for improvement remains regarding lifelong learning and the basic digital infrastructure in more remote areas in terms of hardware and fibre-optic connections.
- Policy efforts targeted at the professionalisation of ICT instructors and teachers more generally should be sustained. In the meantime, ICT coordinators or e-coaches should be more widely at the disposal of educational institutions.
- The Netherlands should sustain its implementation efforts on its digitalisation strategies regarding adult learning and higher education. National strategies are very recent, so a comprehensive assessment is not yet possible.

KEY REFERENCES

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PHOTOGRAPHY: Javier M on Unsplash.com

POLAND

RANK IN EU-27

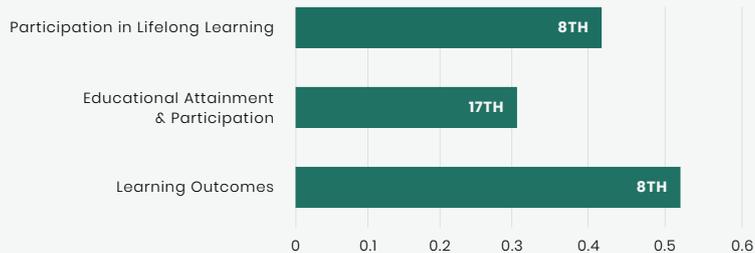
22ND

OVERALL SCORE

0.569

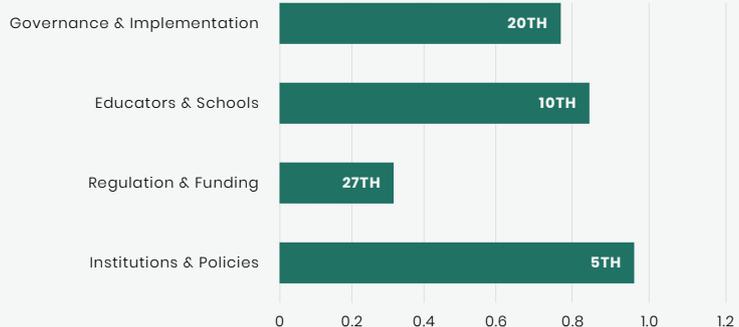
LEARNING PARTICIPATION AND OUTCOMES

RANK
13TH



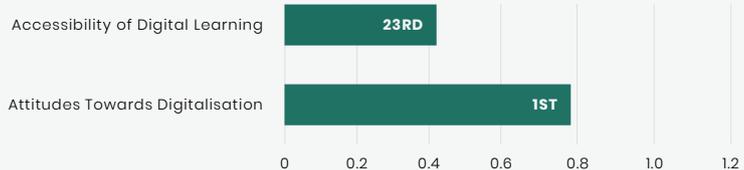
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
24TH



AVAILABILITY OF DIGITAL LEARNING

RANK
24TH



MAIN OBSERVATIONS

- Despite widespread awareness of the urgent need for digitalisation, there is currently low performance in digitalisation of education - for example, Poland only reached one of the lowest places in DESI.
- One of the main challenges is the digital skills of educators in primary and secondary education. University educators also only apply digital educational tools to a limited extent, usually transferring materials into a digital format (e.g. Power Point). The use of ICT by adult educators seems to depend on their individual digital skills, even though little research has been conducted on this topic.
- Digital skills are also a problem among pupils. In response, the government has introduced programmes increasing the number of information technology and programming courses for primary schools willing to participate.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- There is a growing use of digital technology for adult education. Adult educators have most often graduated from pedagogical or psychological studies, which helps to develop adequate attitudes towards learning and so-called thinking habits. However there are no specific programmes for digital skills teaching among adult educators.
- Poland has many innovative projects. For example, due to the low use of the internet among adults over 50, Poland has a tool, "Lighthouse Keeper", which is designed to train and familiarise persons with ICT skills who further train older, digitally excluded adults.
- In traditional schools, there is a government programme, "Scholaris - an internet knowledge portal for teachers", which makes available a range of textbooks and other teaching aids via the internet.

RECOMMENDATIONS

- There is a need for a better regulation framework for nearly all issues relevant to digital education - personnel rules, outcome requirements, digital technology use beyond the classroom, etc.
- Digital competence trainings for primary and secondary teachers are available, but the supply and customisation of such trainings should be significantly improved.
- At the university level, more attention should be devoted to more sophisticated digital skills of educators, especially with regard to course design and innovation in teaching methods.
- More training for adult educators to enhance digital skills is also needed.

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PORTUGAL

RANK IN EU-27

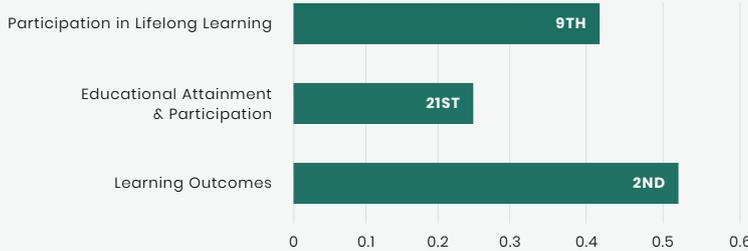
9TH

OVERALL SCORE

0.628

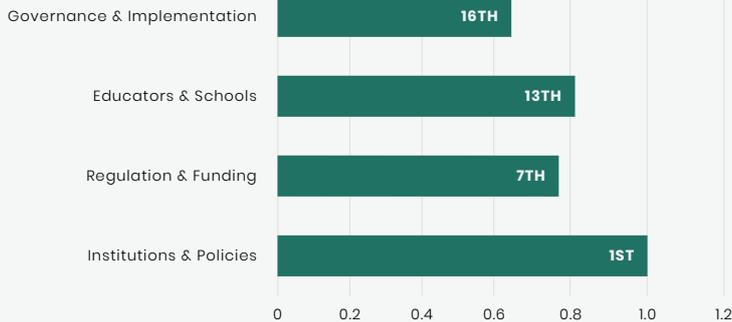
LEARNING PARTICIPATION AND OUTCOMES

RANK
15TH



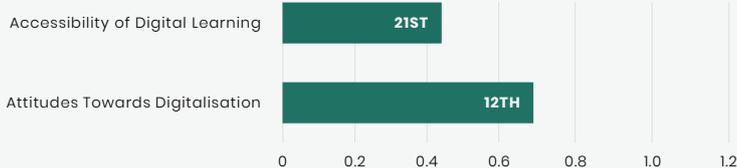
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
6TH



AVAILABILITY OF DIGITAL LEARNING

RANK
22ND



MAIN OBSERVATIONS

- Portugal is the 9th best performing country in Europe on the overall index. It is a high-achiever in terms of institutions and policies for digital learning (6th) but lags behind regarding the availability of digital learning (22nd).
- Portuguese policymakers are highly aware of the importance of digital learning for improving Portugal's competitiveness and turning it into higher value-added economy. The inter-ministerial policy framework on digital skills (INCoDe.2030) defines clearly responsibilities and funding, setting quantitative policy targets for 2030.
- The inclusion of ICT in teaching and learning is at a more advanced stage in primary and secondary education than in higher education.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Full integration of ICT in the national curriculum in primary and secondary education as well as in training for teachers have been a priority. Experimentation in pedagogical and assessment practices is encouraged. Universities share good digital learning practices among them.
- Updating the skills of the general population is also a priority. Digital literacy is framed as a key dimension of citizenship and inclusion. Hence, digital lifelong learning is also included in the national strategy, for example via Technological Specialization Courses.
- The influence of the EU and the OECD in defining the Portuguese strategy has been significant.

RECOMMENDATIONS

- Even though the regulatory framework is beneficial overall for digital learning in primary and secondary education, the lack of access to fast internet connections and new IT equipment, as well as the difficulty of introducing innovative assessment practices remain significant barriers to be removed.
- Open educational resources should also be better organised.
- Digital learning and teaching in higher education should be further developed. This is linked to a lack of adequate training for professors that needs to be addressed.
- Low-skilled adults should be better supported in managing their continuing education, especially with regard to digital skills.

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ROMANIA

RANK IN EU-27

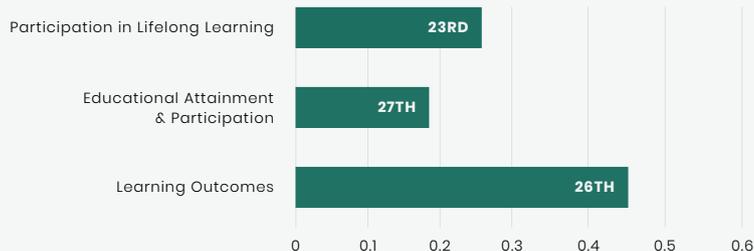
24TH

OVERALL SCORE

0.557

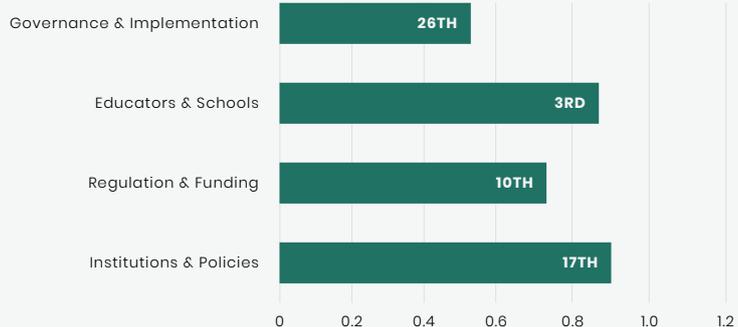
LEARNING PARTICIPATION AND OUTCOMES

RANK
27TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
9TH



AVAILABILITY OF DIGITAL LEARNING

RANK
27TH



MAIN OBSERVATIONS

- Romania is part of the European laggards in terms of readiness for digital learning. It ranks 24th on the overall index, with very poor scores on learning participation and outcomes (27th) and availability of digital learning (27th).
- It performs better in terms of institutions and policies (9th). Policymakers are aware of the importance of digitalisation of education and, in cooperation with the European Commission, have developed a national strategy in this regard.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- The Ministry of Education has started to create learning materials and open educational resources. ICT is increasingly important in the curriculum, in students' assessments and teachers' training.
- In higher education, investments in digital learning depend significantly on EU funds. Universities are increasingly using open technologies, online educational platforms and e-learning methods.
- However, lack of substantial support for innovation or experimentation hinders further developments.

RECOMMENDATIONS

- A main priority for Romania is to improve access to digital learning at all educational levels, including on the infrastructure aspect. Indeed, a major obstacle remains the lack of basic IT infrastructure in schools.
- There are still significant barriers in terms of recognition and accreditation of digital learning methods. MOOCs do not give the right to obtain ECTS as traditional courses do. To encourage digital learning these barriers should be removed.
- Enhancing primary teachers' digital skills, especially those active in primary and secondary schools, should be a priority, to trigger changes in pedagogy and uptake of digital learning from a young age.

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SLOVAKIA

RANK IN EU-27

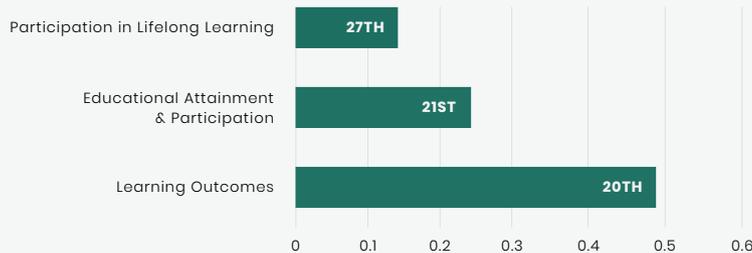
20TH

OVERALL SCORE

0.576

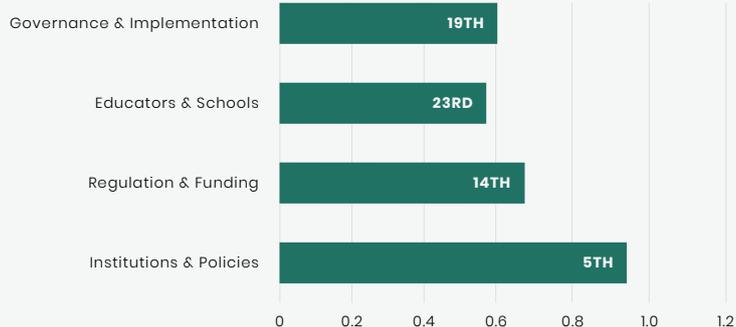
LEARNING PARTICIPATION AND OUTCOMES

RANK
26TH



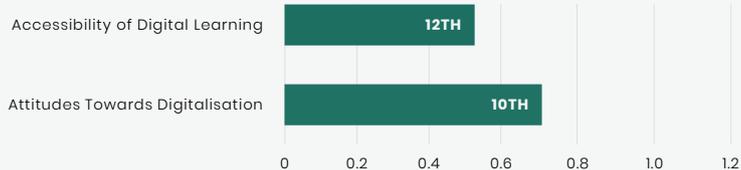
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
18TH



AVAILABILITY OF DIGITAL LEARNING

RANK
13TH



MAIN OBSERVATIONS

- Slovakia performs very badly in terms of individual learning outcomes, participation and attainment. This ranges from declining PISA scores to the fact that adult persons who participated in training or education in the last 12 months spent the fewest hours in the course compared to the rest of the EU countries.
- System-wide projects are usually focused on building basic infrastructure (internet connection, tablets, computers, etc.) but there are also projects aimed at bringing digital content into the learning process and educating mainly primary/secondary educators.
- Even though programmes for digital competencies are solely focused on the primary and secondary educators, they have low ICT skills and mostly they are not required to use digital tools. Even the well-developed pedagogical approaches and materials utilising digitalisation in learning are mostly available only in elite schooling.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Structural Funds were used to foster significant innovation in digital content and to fund hardware for schools. This has been done both through centrally-driven and demand-driven projects and the total investment runs into hundreds of millions. However, the quality of content and its use are highly variable with a lot of waste, even fraud. Consequently, the digital education projects have been subject to vigorous public discussion of their quality, which helped to remedy some of the problems, but also undermined trust. Slovakia demonstrates a number of very cost-effective, bottom-up projects in specific areas either by specific teachers, schools or NGOs.
- Adult education is lightly regulated, the possibilities for digitalisation are significant and frequently utilised. Again, the challenge is more with regard to quality control.

RECOMMENDATIONS

- Primary and secondary educators need to be motivated to participate in programmes focused on improvement of their digital competencies in order to implement digital techniques.
- The regulatory framework of primary and secondary education does not impede the process of digitalisation. However, it does not foster it. The regulatory framework should be revised to stimulate digitalisation of learning.
- The availability of training programmes for university and adult learning educators should be improved.

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SLOVENIA

RANK IN EU-27

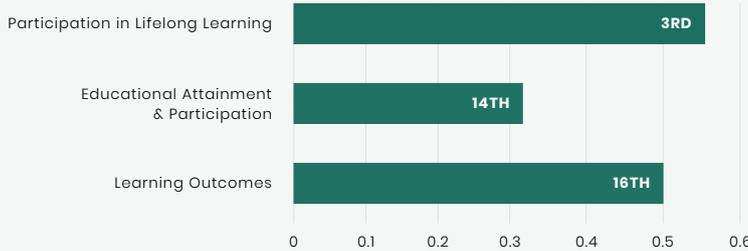
16TH

OVERALL SCORE

0.597

LEARNING PARTICIPATION AND OUTCOMES

RANK
4TH



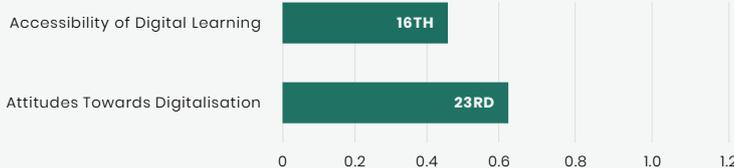
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
18TH



AVAILABILITY OF DIGITAL LEARNING

RANK
19TH



MAIN OBSERVATIONS

- There is awareness among policy makers about the topic and its importance, but also reluctance to push for systemic change. This is due to perceived risks of disruption of the existing educational system by requiring new skills and changing the process (i.e., the majority of teachers are not digitally enabled and skilled and requirements for too rapid change represents a risk).
- The lack of forceful proactive government action means that most of the efforts depend on individual and school initiatives. Digital learning implementation relies heavily on NGO, community and private initiatives.
- Since higher education and university educators are required to use digital tools daily, they are more digitally competent than primary and secondary educators who are not pushed or motivated to use digital tools. As a result, there are significant gaps in digital capacities between primary and secondary educators on one hand and university and adult educators on the other.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Slovenia's strength lies in bottom-up action. For example, the situation in lifelong learning is satisfactory only because of grass-root initiatives. Adult education is typically left to private schools and NGOs which are often equipped with digital infrastructure. Competition between schools also leads to quick adoption of some innovations. A good example of grassroots action is NGO Simbioza where skilled young volunteers are teaching seniors and elderly people.
- The government financially supports digital learning start-ups and pilot programmes using blockchain, machine learning, or AI. For instance, there is a blockchain solution to maintain track records of students.

RECOMMENDATIONS

- Slovenia needs to work on the digital competencies of older educators and motivate primary and secondary educators in general to use digital methods more. Even at the university level, the situation warrants some improvement.
- Curricula and exams are designed without regard to digital learning and infrastructure. Regulatory actions in these areas are needed to unleash the potential.
- There is a lack of digital self-assessment tools for citizens to assess, evaluate and compare their knowledge and skills. This is a cost-efficient way to stimulate awareness and participation.

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PHOTOGRAPHY: Febiyan on Unsplash.com

SPAIN

RANK IN EU-27

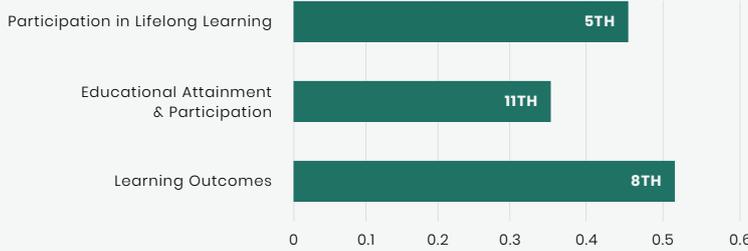
8TH

OVERALL SCORE

0.634

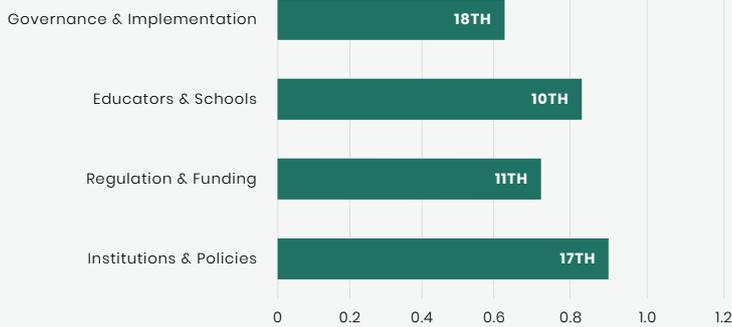
LEARNING PARTICIPATION AND OUTCOMES

RANK
5TH



INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
10TH



AVAILABILITY OF DIGITAL LEARNING

RANK
11TH



MAIN OBSERVATIONS

- Spain ranks 8th among EU countries on readiness for digital learning. It scores above the European average on all indicators.
- Digitalisation has permeated the economy and industry more than education and learning. While a comprehensive national strategy on digital learning at all educational levels is still lacking, specific governmental organisations have developed consistent actions to integrate ICT into primary, secondary and adult education.
- People's attitudes towards digitalisation are still quite negative.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Awareness is high regarding the need to integrate ICT into the curriculum, to invest in fast internet access in schools and to encourage digital learning beyond the classroom.
- Even though adult education regulation is not significantly developed in Spain, online learning for adults is promoted through initiatives such as courses via the government platform Aula Mentor.
- In higher education, blended learning and virtual campuses are more and more widespread. There are no significant regulatory barriers, even though the law has not been changed since 2001.

RECOMMENDATIONS

- The regulatory framework in primary and secondary education could be more conducive for digital learning.
- Funds should increase. So far, the deployment of digital learning has relied on voluntary efforts by teachers, which caused extra workloads and suffered from insufficient support.
- As for other countries, the autonomy of universities prevents the development of a comprehensive national digitalisation strategy in higher education. Each university decides on the resources and strategy dedicated to digital learning. This should be fixed to avoid fragmentation of efforts and outcomes.

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SWEDEN

RANK IN EU-27

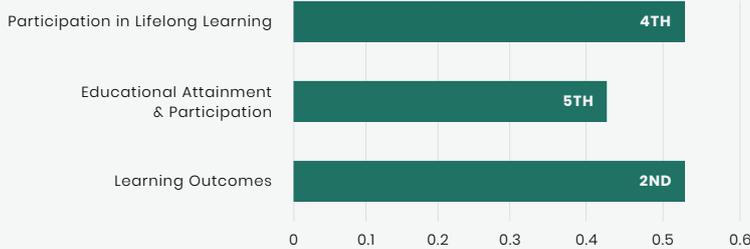
7TH

OVERALL SCORE

0.64

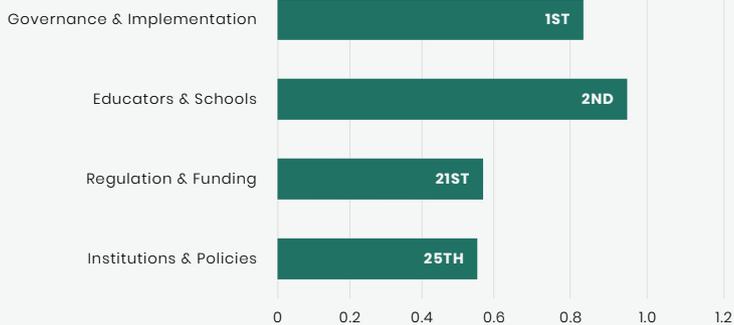
LEARNING PARTICIPATION AND OUTCOMES

RANK
3RD



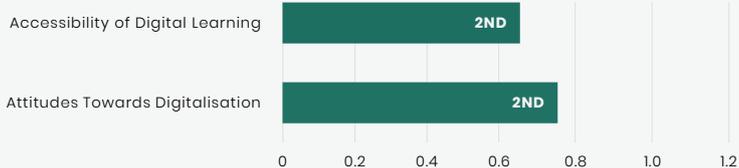
INSTITUTIONS AND POLICIES FOR DIGITAL LEARNING

RANK
21ST



AVAILABILITY OF DIGITAL LEARNING

RANK
2ND



MAIN OBSERVATIONS

- Sweden is a European leader in education and digitalisation, which contribute to its high performance.
- Sweden's government is very active in driving research and innovation in digitalisation generally.
- While digitalisation is an explicit part of primary school curricula, schools and teachers have significant autonomy in funding and running courses. This means schools have uneven implementation of digital tools.

TAKEAWAYS:

WHAT CAN WE LEARN FROM THIS COUNTRY?

- Sweden's government is well aware of the importance of remaining a digital leader, which translates into proactive policy and a solid investment strategy.
- Sweden's schools are quite autonomous, so implementation of digital learning varies across the country and between classrooms. This means that some students benefit more than others.
- However, the high autonomy of teachers and schools means that experimentation is encouraged, and innovative practices have a chance to develop.

RECOMMENDATIONS

- Sweden should closely monitor the diverse strategies used for digital learning. This will help central authorities identify what is and isn't working.
- Educators should be encouraged to use digital tools for learning, not just administration and management. The plan to gradually introduce nationwide digital testing in 2022 is promising.
- Distance learning in adult education (Komvux) is promising, but has significant room to improve.

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INDEX OF READINESS FOR DIGITAL LIFELONG LEARNING:

CHANGING HOW EUROPEANS UPGRADE THEIR SKILLS

Digitalisation of learning is the process by which education, training and skills are being transformed by the use of digital technologies. With the Index of Readiness for Digital Lifelong Learning (IRDLL), CEPS assesses and ranks 27 EU Member States' performance, offering policy guidance at national and EU levels.

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