European Commission

Eurydice *Brief*

Digital Education at School in Europe

Education and Training

European Commission

Eurydice Brief

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This executive summary provides a comprehensive overview of the main findings of the Eurydice report on 'Digital Education at School in Europe'.

It firstly clarifies why digital education is important, what we mean by it, and how it fits into the European policy context. Secondly, it summarises the main findings of the report, presenting the main policies and regulations emanating from top-level education authorities across Europe in relation to the four areas under investigation: the development of digital competence through school curricula, teacher-specific digital competences, the assessment of students' digital competences and the use of technology in assessment and testing, and finally, the strategic approaches to digital education across Europe with specific reference to policies supporting schools.

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WHY IS DIGITAL EDUCATION IN SCHOOLS AN IMPORTANT TOPIC?

Digital technologies have revolutionised our society, and children today grow up and live in a world where these are ubiquitous. The 4th industrial revolution, the term originally coined by Schwab (2016) to describe the spread of digital technologies, affects all aspects of life, from health to commerce, from social interactions to the way people work. Education systems are no less affected, not only because technology can impact on the way education is delivered, but also because education has a role to play in preparing young people for a tech-driven world. Moreover, as research shows, growing up in the digital age does not make 'digital natives' (Prensky, 2001) inherently competent and confident with digital technologies (European Commission, 2014). Students still need support in acquiring the right skills, even though surveys indicate that the use of technology is to a great extent restricted to non-school leisure time activities, while engagement with technology for educational purposes in schools lags behind (OECD, 2015).

The challenges posed by digital education in schools, as well as the many potential benefits, are manifold.

The challenges posed by and the potential benefits of digital education in school are manifold. From a labour-market perspective, there is a skills gap to fill – an increasing number of jobs require high levels of proficiency in the use of technology and many new jobs are based on specialised digital skills (Cedefop, 2016). From a social point of view, the challenge is one of inclusiveness: a digital divide between those with no or only basic digital skills, and others with high level skills, could exacerbate existing gaps in society and further exclude some parts of the population (European Commission, 2017b). From an educational point of view, the challenge is not only to ensure that young people develop the digital competences needed, but also to reap the benefits that technology can bring to the teaching and learning process (Cachia et al., 2010). This includes ensuring that young people can use digital technologies effectively and safely. The risks posed to students' personal well-being such as through cyber-bullying and internet addiction, as well as the loss of privacy, have been a major concern to policy-makers for some time and, as a result, safety has become a central issue in digital education policies (European Commission, 2017a).

EUROPEAN POLICY CONTEXT

European and national policies have long acknowledged, as a priority, the need for all citizens to understand that digital competence is a key competence which must continue to be developed throughout life. It has already been among the key competences for lifelong learning since the first European Recommendation on this issue was published in 2006 ([1]). In the latest update of this recommendation (May 2018), digital competence is defined as the confident, critical and responsible use of, and engagement with, digital technologies for learning, work, and participation in society ([2]).

The Communication from the Commission on the Digital Education Action Plan from January 2018 has a similar definition (European Commission, 2018). The Plan focuses on the need to support and scale up the purposeful use of digital and innovative education practices. Its first two priorities are: 1) make better use of digital technology for teaching and learning; 2) develop relevant digital competences and skills for the digital transformation.

WHAT DO WE MEAN BY DIGITAL EDUCATION?

This report uses the expression 'digital education' to highlight two different but complementary perspectives: the development of digital competences relevant to learners and teachers on the one hand, and the pedagogical use of digital technologies to support, improve and transform learning and teaching on the other.

'Digital education' comprises two main strands: the development of digital competences for learners, and the pedagogical use of digital technologies.

The European Digital Competence Framework for Citizens, also known as DigComp (latest version, Carretero, Vuorikari and Punie, 2017), describes digital competence in detail and has been used by many European countries already. It refers to competences that all citizens need in a rapidly evolving digital society. There are 21 digital competences arranged into five areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving.

([1]) Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning, OJ L 394, 30.12.2006, p. 10-18.

([2]) Council recommendation of 22 May 2018 on key competences for lifelong learning, OJ C 189, 4.6.2018, p. 1-13.

Figure 1: The Digital Competence Framework for Citizens (DigComp)

DigComp 2.0

Competence areas	Competences
Information & data literacy	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content
Communication & collaboration	2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies 2.5 Netiquette 2.6 Managing digital identity
Digital content creation	3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licences 3.4 Programming
Safety	4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment
Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps

Source: Adapted from Carretero, Vuorikari and Punie, 2017.

Teacher competence is the prime factor in the pedagogical use of digital technologies.

The prime factor in the pedagogical use of digital technologies is teacher competence. In addition to the digital competences needed for everyday life, teachers need specific digital competences to enable them to use technology effectively in the classroom and for their wider responsibilities in school, as also shown by the latest TALIS data on continuing professional development (CPD) needs of teachers (OECD, 2019). However, it is not only teachers' level of digital competence which is important, but also whether they see digital technology as adding value to their teaching practices and their students' learning experiences. At European level, these competences have been captured in a competence framework for educators, the European Framework for the Digital Competence of Educators (Redecker, 2017). Teachers' digital competences and related teaching and learning practices are also addressed in the European Framework for Digitally Competent Educational Organisations (DigCompOrg). SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies) ([3]), is an online and free self-reflection tool for schools, based on DigCompOrg, that helps schools to identify strengths and weaknesses in their use of digital technologies for teaching and learning.

Those three European frameworks (DigComp, DigCompEdu, DigCompOrg/SELFIE) aim to provide a common language and common ground for discussions and developments at national, regional and local levels. Moreover, they offer a consistent set of self-reflection tools at European level addressing citizens and learners (DigComp), educators (DigCompEdu) as well as schools (DigCompOrg/SELFIE).

([3]) https://ec.europa.eu/education/schools-go-digital_en

MAIN FINDINGS

Digital competence in school curricula

- There is a consistent approach to defining digital competence as a key competence across Europe. Nearly half of the European education systems refer to the European key competence definitions for digital competence: 11 education systems use exclusively their own national definition of digital competence ([4]); eight other countries (Estonia, France, Cyprus, Lithuania, Malta, Austria, Albania and Serbia) use both the European definition and a national one. In general, these definitions originate in curriculum or top-level strategy documents related to digital competence.
- The development of digital competence is included in the vast majority of countries at all three education levels. However, unlike other traditional school subjects, it is not only addressed as a topic in its own right, but also as a transversal key competence. In primary education, in eight education systems (French and German-speaking Communities of Belgium, Croatia, Latvia, Luxembourg, Albania, Bosnia and Herzegovina, and Turkey), digital competence is not explicitly addressed in the national curriculum in the reference year (2018-19), while in secondary education, this is only the case in two systems – the French and German-speaking Communities of Belgium. However, the French-speaking Community of Belgium, Croatia and Latvia are currently reforming the curriculum to introduce digital competences or are in the process of implementing ongoing curriculum changes as from primary education.
- In primary education, more than half of the European education systems include digital competence as a cross-curricular theme. It is addressed as a compulsory separate subject in 11 countries ([5]), and integrated into other compulsory subjects in ten countries ([6]). A quarter of the education systems combine two approaches ([7]), while in Czechia and Liechtenstein all three exist at the same time.
- In lower secondary education, the number of countries teaching digital competences as a compulsory separate subject increases to over half of the education systems. In upper secondary, the number of countries teaching digital competences as a cross-curricular topic decreases slightly in relation to lower secondary and fewer countries offer compulsory separate subjects for all students in this area. It must be borne in mind though that in upper secondary education, students can usually choose more optional subjects and these can include subjects related to digital competence.
- Iceland, Greece and North Macedonia have the highest number of recommended hours for information and communication technologies (ICT) as a compulsory separate subject in primary education (around 150 hours). Lithuania and Cyprus allocate the highest number of hours during lower secondary education, although they do not have any recommended instruction time for primary education. Within the scope of compulsory education, Romania has the highest number of hours related to digital competence as a compulsory separate subject in upper secondary education.

In primary education, the majority of European education systems include digital competence as a cross-curricular theme.

In lower secondary education, over half of the countries teach digital competences as a compulsory separate subject.

([4]) Germany, Croatia, Netherlands, Portugal, Slovakia, Sweden, United Kingdom (WLS and SCT), Iceland, Norway and Turkey

([5]) Bulgaria, Czechia, Greece, Poland, Portugal, United Kingdom (ENG and WLS), Iceland, Liechtenstein, Montenegro and North Macedonia

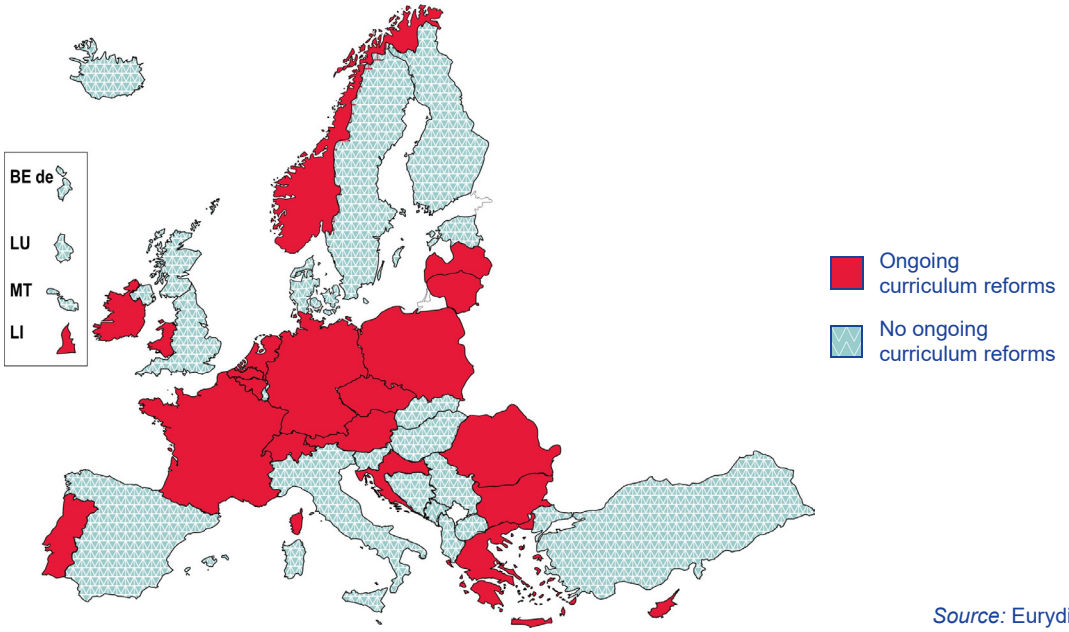
([6]) Czechia, Ireland, Spain, France, Italy, Cyprus, Lithuania, Slovenia, Sweden and Liechtenstein

([7]) Ireland, Greece, Spain, France, Italy, Poland, Portugal, Slovenia, Sweden, United Kingdom (WLS) and Iceland

Half of the European education systems are currently engaged in curriculum reform related to digital competence.

- Half of the European education systems are currently reforming the curriculum related to digital competence (see Figure 2). The revisions aim either at introducing digital competence into the curriculum where it had not previously been addressed, or making the subject area more prominent. Some reforms are also about changing the curriculum approach, updating content or strengthening particular areas such as coding, computational thinking or safety.

Figure 2: Ongoing curriculum reforms related to digital competences in primary and general secondary education (ISCED 1-3), 2018/19



Source: Eurydice.

Explanatory note

This Figure is located in Chapter 1 'Curriculum' (see Figure 1.4).

Competence areas and related learning outcomes

Most countries have included learning outcomes related to all five digital competence areas, mainly in lower secondary education.

- The majority of European education systems have explicitly included learning outcomes related to all five digital competence areas in the DigComp framework. In descending order of prevalence these are: information and data literacy, digital content creation, communication and collaboration, safety, and problem solving.
- Most of the learning outcomes related to digital competences are associated with lower secondary education. For primary education, the number of countries with related learning outcomes is the lowest, but still around 30 education systems cover the first four areas, and 24 education systems ([8]) also cover problem-solving.
- In some countries, depending on the prevalent curriculum approach, these learning outcomes can be distributed across a range of subjects and rather broad. Alternatively, they can be concentrated within a specific separate subject with detailed learning outcomes itemised in subject curricula, often accompanied by a specific amount of instruction time. In several other countries, where the main approach to digital competence is cross-curricular, there is nevertheless a high level of detail in the related learning outcomes (e.g. Estonia, Greece, Malta, Finland and the United Kingdom – Northern Ireland).

([8]) Bulgaria, Czechia, Germany, Estonia, Greece, Spain, France, Italy, Cyprus, Malta, Poland, Portugal, Slovakia, Finland, Sweden, United Kingdom (all four jurisdictions), Switzerland, Iceland, Montenegro, North Macedonia and Serbia

Eight essential competences

For the purpose of this focused analysis, eight ([9]) of the 21 digital competences in DigComp have been selected, taking at least one from each of the five areas.

The most frequently addressed competences in terms of learning outcomes are, in descending order, developing digital content, evaluating data, information and digital content, and programming/coding.

- Evaluating data, information and digital content (information and data literacy area): this competence is explicitly stated as a learning outcome in the curricula of nearly three quarters of the countries studied, mostly at lower secondary level. It is the second most frequently referred to in terms of learning outcomes of the eight selected competences.
- Collaborating through digital technologies (communication and collaboration area): while these learning outcomes are less frequently mentioned in European curricula than the previous competence, they are still covered by 27 education systems ([10]) at lower secondary level, and by more than 20 systems at primary and upper secondary levels.
- Managing digital identity (communication and collaboration area): only one third of European curricula have related learning outcomes in lower secondary education and less than a dozen in primary and upper secondary education.
- Developing digital content (digital content creation area): virtually all European education systems have learning outcomes for this competence at lower secondary level, and around 30 countries at primary and upper secondary levels. It is the most frequently cited of the eight competences analysed.
- Programming/coding (digital content creation area): while less than half of the European education systems explicitly include this competence in terms of learning outcomes in primary education, around 30 countries do so in lower and upper secondary education. It is the third most frequently referred to competence coming after 'digital content creation' and 'evaluating data, information and digital content'.
- Protecting personal data and privacy (safety area): the increasing relevance of this competence is reflected in European curricula, as nearly 30 education systems have explicit related learning outcomes in secondary education, and nearly 20 in primary education.
- Protecting health and well-being (safety area): this competence has explicit learning outcomes in more than half of the European education systems in lower secondary education, in more than 20 education systems in primary education, and in slightly less in general upper secondary education. Some common topics are: the prevention of risks linked to the length/overuse of digital technologies, including addiction and physical health and ergonomics.
- Identifying digital competence gaps (problem solving area): this is the competence least referred to in national curricula of the eight selected (fewer than ten countries). In four education systems, it features at all three education levels (Estonia, Greece, the United Kingdom – Wales and Northern Ireland), in two at primary and lower secondary level (Germany and Malta), in one only at primary level (Lithuania) and in one other at upper secondary level (Bulgaria).

([9]) Evaluating data, information and digital content; collaborating through digital technologies; managing digital identity; developing digital content; programming/coding; protecting personal data and privacy; protecting health and well-being; identifying digital competence gaps

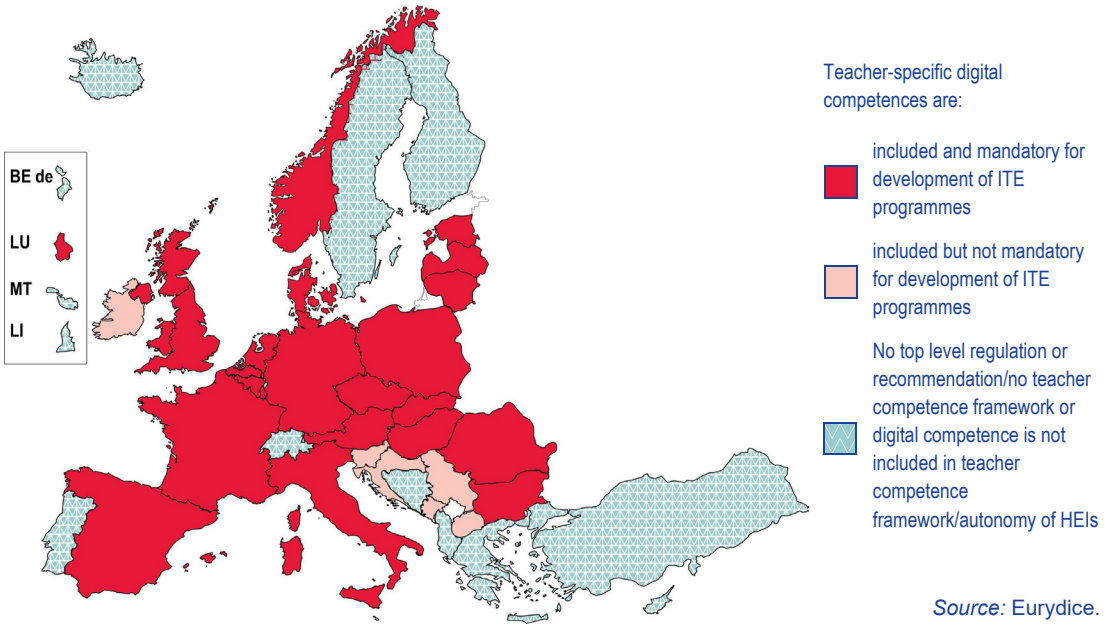
([10]) Flemish Community of Belgium, Bulgaria, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Lithuania, Malta, Austria, Poland, Portugal, Romania, Slovakia, Finland, United Kingdom (WLS, NIR and SCT), Bosnia and Herzegovina, Switzerland, Iceland and Norway

Development of teacher-specific digital competences before entry to the profession

While in most education systems, teacher-specific digital competences are recognised among the essential competences for prospective teachers, less than a quarter of the education systems require these competences to be assessed.

- In about two thirds of European education systems, teacher-specific digital competences are recognised in competence frameworks as some of the essential competences teachers are expected to have (see Figure 3). The definition of what constitutes digital competence for a teacher varies. In some competence frameworks, it is a very broad definition, in others there is a detailed description of areas and skills. All of them, however, emphasise that teachers have to know how to integrate digital technologies into their teaching and learning and be able to use them effectively.
- Estonia, Spain, Croatia, Lithuania, Austria, Norway and Serbia have even developed distinct digital competence frameworks for teachers, which provide a complete mapping of the essential competences, including those related to the pedagogical use of technologies. In Ireland, the Digital Learning Frameworks refer to the standards described in terms of 'effective' and 'highly effective' school practices. The Spanish, Croatian, Austrian and Serbian frameworks propose a progression model to help teachers evaluate their skills and move forward. Moreover, in Spain and Austria, self-assessment tools have been developed alongside teacher digital competence frameworks and together represent a comprehensive system for teacher self-evaluation.

Figure 3: Inclusion of teacher-specific digital competences in top-level regulations/recommendations on ITE or teacher competence frameworks, primary and general secondary education (ISCED 1-3), 2018/19



Source: Eurydice.

Explanatory note

This Figure is based on Figures 2.1 and 2.2 located in Chapter 2 'Digital competences for teachers: professionalisation and support'.

- In about half of the European education systems, top-level regulations or recommendations promote the inclusion of teacher-specific digital competences in initial teacher education (ITE) (see Figure 3). Education providers, however, are usually free to decide on the subject content and how this should be delivered. It is

also worth noting that in almost all education systems where ITE is subject to top-level regulations or recommendations, they are published in the same official documents as the teacher competence frameworks.

- Top-level regulations or recommendations on the assessment of prospective teachers' digital competences exist in less than a quarter of education systems. In most, they are assessed during ITE.

Support measures for the continued development of teacher-specific digital competences

- In almost all education systems, top-level authorities are involved in the provision of continuing professional development (CPD) in the area of digital education. In Bulgaria, Croatia, Italy, Hungary, Poland, the United Kingdom (England) and Montenegro, CPD is a part of national initiatives focusing on different aspects of digitalisation in society. To define CPD needs, 21 education systems ([11]) may use teacher competence frameworks. In nine (France, Lithuania, Austria, Romania, Slovenia, the United Kingdom – Wales and Scotland, Montenegro and North Macedonia), their use is mandatory.

In-service training is the most widespread type of professional development supported by top-level education authorities.

- To help teachers evaluate their level of digital competence and thereby define their development needs, 15 education systems ([12]) promote the use of self-assessment tools. Six countries (Czechia, Estonia, Spain, Cyprus, Portugal and Slovenia) have adopted the European self-assessment tool (TET-SAT) ([13]), the others have developed their own models.
- In almost two-thirds of education systems, top-level education authorities have helped establish teacher networks. In France, Croatia, Austria, Slovenia and the United Kingdom (England and Wales), they have set up networks specifically dedicated to digital education. Digital communities of teachers usually operate on-line, often through digital resource platforms or portals that provide access to various types of support such as digital learning resources, including open education resources (OER), and informal on-line professional development opportunities.

Assessment of digital competences in national tests

- In half of the education systems, digital competences are never assessed at school through national testing. Only two countries (Austria and Norway) have tests in digital competences at all school education levels. Latvia tests digital competences only at lower secondary level, while 11 ([14]) other education systems have national tests on digital competences at both lower and general upper secondary level. In nine ([15]) education systems, digital competences are tested only at general upper secondary level (see Figure 4).

Only half of the education systems assess digital competences through national testing in at least one school education level.

([11]) Belgium (BE fr and BE nl), Estonia, Ireland, Spain, France, Croatia, Lithuania, Hungary, Netherlands, Austria, Romania, Slovenia, United Kingdom (all four jurisdictions), Montenegro, North Macedonia, Norway and Serbia

([12]) Bulgaria, Czechia, Estonia, Spain, France, Cyprus, Austria, Portugal, Slovenia, Finland, United Kingdom (ENG, WLS and NIR), Switzerland and Serbia

([13]) http://mentep.eun.org/tet-sat

([14]) Czechia, Denmark, Estonia, Greece, France, Croatia, Cyprus, Malta, Austria, Norway and Serbia

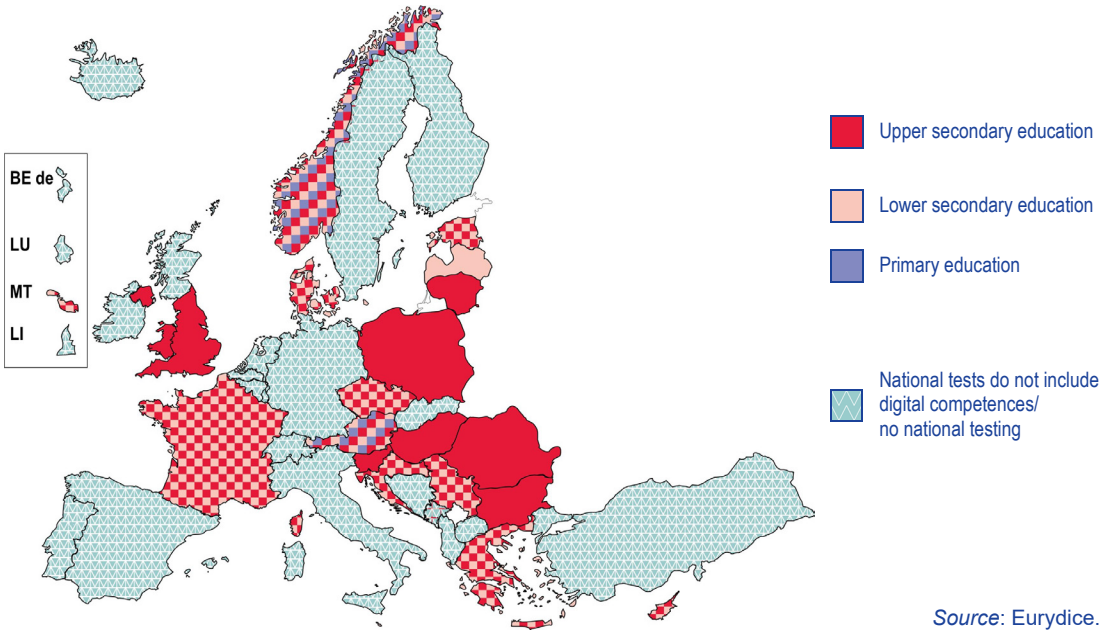
([15]) Bulgaria, Lithuania, Hungary, Poland, Romania, Slovenia and United Kingdom (ENG, WLS and NIR)

- National tests are carried out for two main reasons: to evaluate and certify the competences of individual students; or to collect data that can be used to support students and teachers, and to evaluate schools and/or the education system as a whole. In most cases, the assessment of individual students' digital competences is the main focus of national tests, while only four countries test pupils for quality assurance purposes (Croatia in lower secondary education and Czechia, Estonia and Serbia in lower and upper secondary education). The testing of digital competences for quality assurance purposes is never carried out at primary level.

More countries test digital competences at upper secondary level compared to other education levels. However, the cohort of students tested is often limited to those following particular education pathways such as STEM.

- Although many more countries have national tests at upper secondary level compared to other education levels, the cohort of students tested is limited. In 12 education systems ([16]), digital competence tests carried out for assessment/ certification purposes only involve students on a particular educational pathway (e.g. STEM), or those who decide to take the specific test (e.g. for reasons linked to higher education admission requirements). Only in Bulgaria, Denmark, Malta and Romania are all upper secondary education students required to take a national test to assess their digital competences. In the four countries where digital competences are assessed for quality assurance purposes, the cohort of students is also limited as these tests are usually carried out on a sample basis.
- The national tests carried out for assessment/certification purposes can either be a specific test in digital competences or related subject area (e.g. ICT), or a test in another competence area (e.g. mathematics), which also includes an assessment of digital competences. The latter approach exists only in a few countries. In France and Norway, this approach is used for lower secondary students, and in Denmark for lower and general upper secondary students.

Figure 4: National tests to assess students' digital competences by education level, primary and general secondary education (ISCED 1-3), 2018/19



Source: Eurydice.

Explanatory note

This Figure is based on Figure 3.1 located in Chapter 3 'Assessing digital competences and using digital technologies in assessment'.

([16]) Greece, France, Croatia, Cyprus, Lithuania, Hungary, Poland, Slovenia, United Kingdom (ENG, WLS and NIR) and Norway

Guidance on the assessment of digital competences in the classroom

Teachers across Europe receive very little guidance on the assessment of digital competences in the classroom.

- Teachers across Europe receive very little guidance from top-level authorities on the assessment of digital competences in the classroom. In 13 education systems ([17]), the only guidance available at any school level is through the learning outcomes stated in national curricula.
- Overall, 11 education systems ([18]) have developed criteria and/or standards that can be used by teachers as guidance for assessing proficiency in digital competences in the classroom. However, only five ([19]) apply the criteria/standards at all school levels. It is also to be noted that these criteria and/or standards are not necessarily prescriptive and teachers have a good deal of autonomy in how and when to use them.
- National test specifications that can be used by teachers to assess students in the classroom are available in 15 education systems. At primary level, these are found only in Austria and Norway, and at lower secondary level in France, Greece, Austria and Norway. Conversely, in general upper secondary education, they are available in all 15 education systems ([20]). National test specifications vary in the types of information they provide in terms of the competences tested, tasks students undertake, and marking methods used.
- The tendency to rely on the specifications for national tests at upper secondary level is consistent with the fact that these tests mostly take place within the framework of the official examinations to certify students' digital competences at the end of this education level. While this approach has a number of benefits such as transparency for students, an approach exclusively based on exam expectations carries the risk of distorting teachers' perceptions of what is important for students to know and be able to do, and so classroom learning activities might be limited to the requirements of the standardised test.

Recognition of digital competences on certificates awarded at the end of secondary education

- In the vast majority of education systems across Europe, students receive a certificate at the end of secondary education. However, only 23 education systems ([21]) include information on digital competences on such certificates, and only three (Bulgaria, Malta and Romania) apply this to all students. In the remaining 20 education systems, only students who have taken specific related subjects or learning pathways, or those who have chosen to take the digital competence related final exam have their digital competences acknowledged on their certificates.
- The information included on certificates varies. In all but two countries (France and Serbia), the certificates include a reference to the exam result or more generally to the final grade. In France and Serbia, the certificates make only a general reference to digital competence without any further detail. In addition to the test results, in Malta and Romania, the certificates report achievement in specific competences,

([17]) Belgium (BE nl), Czechia, Denmark, Germany, Spain, Italy, Portugal, Slovakia, Sweden, Finland, Switzerland, Liechtenstein and North Macedonia

([18]) Estonia, Ireland, Croatia, Latvia, Malta, United Kingdom (WLS, NIR, SCT), Iceland, Montenegro and Serbia

([19]) Estonia, Ireland, Latvia, United Kingdom (NIR) and Montenegro

([20]) Bulgaria, Greece, France, Cyprus, Lithuania, Hungary, Malta, Austria, Poland, Romania, Slovenia, United Kingdom (ENG, WLS and NIR) and Norway

([21]) Bulgaria, Denmark, Czechia, Estonia, Greece, France, Croatia, Cyprus, Malta, Latvia, Lithuania, Hungary, Austria, Poland, Romania, Slovenia, United Kingdom (ENG, WLS and NIR), Liechtenstein, Montenegro, Norway and Serbia

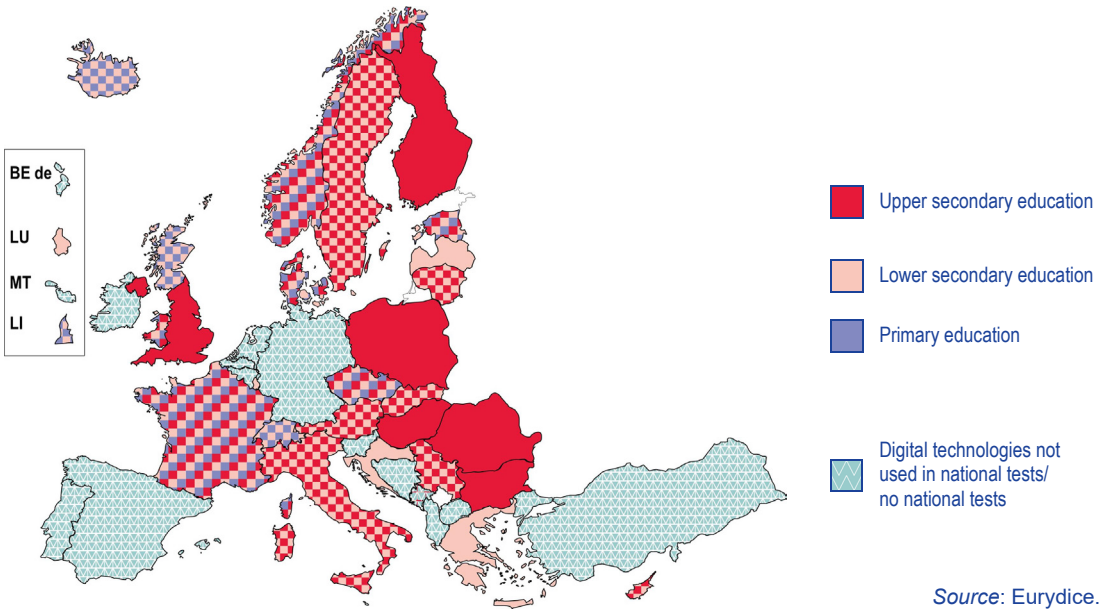
while in Norway there is reference to the instruction time received. In Lithuania, all three elements are provided on the certificates.

Use of digital technologies in national testing

More countries perform technology-supported national tests at upper secondary level compared to other education levels.

- There are some examples of countries in Europe moving towards integrating digital technologies into national testing. For example: in Finland, the 'Matriculation examination', the national test carried out at the end of upper secondary education, has been gradually digitalised since autumn 2016, and as of spring 2019 the test is fully digital nationwide and for all subjects. Similarly, in Sweden, schools have been using digital devices in some tests since June 2018, and digital national tests will continue to be trialled during the period 2018-2021 before full-scale adoption. Currently, three quarters of education systems make use of digital technologies in national testing in at least one school level. The number of countries performing technology-supported national tests increases with the education level. While 10 education systems ([22]) make use of technology in national testing at primary level, at upper secondary level the number rises to 20 ([23]) (see Figure 5).

Figure 5: Use of digital technologies in national tests, primary and general secondary education (ISCED 1-3), 2018/19



Source: Eurydice.

Explanatory note

This Figure is based on Figure 3.4 located in Chapter 3 'Assessing digital competences and using digital technologies in assessment'.

- While the assessment of individual pupils is the main purpose of national tests at both primary and upper secondary levels, more countries use technology-supported testing for quality assurance purposes at lower secondary level. This is the case in fact for 11 education systems ([24]) compared to five in primary education (Czechia, Estonia, France, Switzerland and Liechtenstein), and four in general upper secondary education (Czechia, Estonia, Italy and Serbia).

([22]) Czechia, Denmark, Estonia, France, United Kingdom (WLS and SCT), Switzerland, Iceland, Liechtenstein and Norway

([23]) Bulgaria, Czechia, Denmark, Estonia, France, Italy, Cyprus, Lithuania, Hungary, Austria, Poland, Romania, Slovakia, Sweden, Finland, United Kingdom (ENG, WLS and NIR), Norway and Serbia

([24]) Czechia, Estonia, France, Croatia, Italy, Lithuania, Luxembourg, Slovakia, Switzerland, Liechtenstein and Serbia

- Digital technologies are, unsurprisingly, mostly used in national tests to assess individual students' digital competences. This is the case in 13 education systems ([25]), where national tests to assess digital competences at upper secondary level may use digital technologies in the testing procedures. However, it is to be noted that upper secondary students in Greece, Croatia, Malta, Slovenia, and partly Cyprus have their digital competences assessed through paper-based tests. In Malta, this is also the case for lower secondary students, and in Austria for primary pupils. In Greece, a pilot project is taking place at lower secondary level to certify students' digital competences through a technology-supported national test. In Cyprus, out of the three subjects that integrate digital competences at upper secondary level, only one is tested using digital technologies (computer applications).

Digital technologies are mostly used to assess individual students' digital competences.

- In nine education systems ([26]), digital technologies are used in national tests related to individual student achievement to assess other competences, sometimes in addition to digital competences. Usually, these are literacy and numeracy.
- In some of the Nordic countries, digital technologies are used in the assessment of a wider range of subjects. This is the case in Norway at all education levels, in Denmark and Iceland at primary and lower secondary levels, and in Finland for the national test taken at the end of upper secondary education.
- In total, 14 education systems ([27]) do not use digital technologies in any of their national tests (see Figure 5).

One third of the education systems do not use digital technologies in any of their national tests.

- The assessment of digital competences in technology-supported national tests in general upper secondary education most commonly combines on-screen testing with practical testing. This is the case in nine education systems (Bulgaria, Denmark, Lithuania, Austria, Poland, Romania, and the United Kingdom – England, Wales and Northern Ireland). In France, Cyprus and Hungary, testing is based only on practical demonstrations of the acquired competences, while in Norway only on-screen testing is used.

Digital education strategies, monitoring and implementation

- The continuous and increasing digitalisation in society, as well as changes in technology itself, results in strategies and policies becoming rapidly out of date. European countries need to continually review and develop new strategic policies and measures to meet the new demands for high quality digital education. Therefore, virtually all education systems currently have strategies for digital education.

Virtually all education systems currently have strategies for digital education but only few undertake regular monitoring or evaluation.

- Almost half of the countries (mostly in eastern and south-eastern Europe) address digital education within a broader strategy. However, 18 education systems (mostly in western, central and northern Europe) ([28]) have a specific strategy in place.
- While most countries across Europe have strategies in place for digital education at school level, procedures for the monitoring and evaluation of these strategies and related policies are not widespread, and where they do occur, they are rarely carried out on a regular basis. In the last five years, around half of the European education systems have undertaken some form of monitoring and/or evaluation of digital

([25]) Bulgaria, Denmark, France, Cyprus (partly), Lithuania, Hungary, Austria, Poland, Romania, United Kingdom (ENG, WLS and NIR) and Norway

([26]) Denmark, France, Slovakia, Finland, Sweden, United Kingdom (WLS and SCT), Iceland and Norway

([27]) Belgium (BE fr, BE de, BE nl), Germany, Ireland, Spain, Netherlands, Malta, Portugal, Slovenia, Albania, Bosnia and Herzegovina, Montenegro and North Macedonia

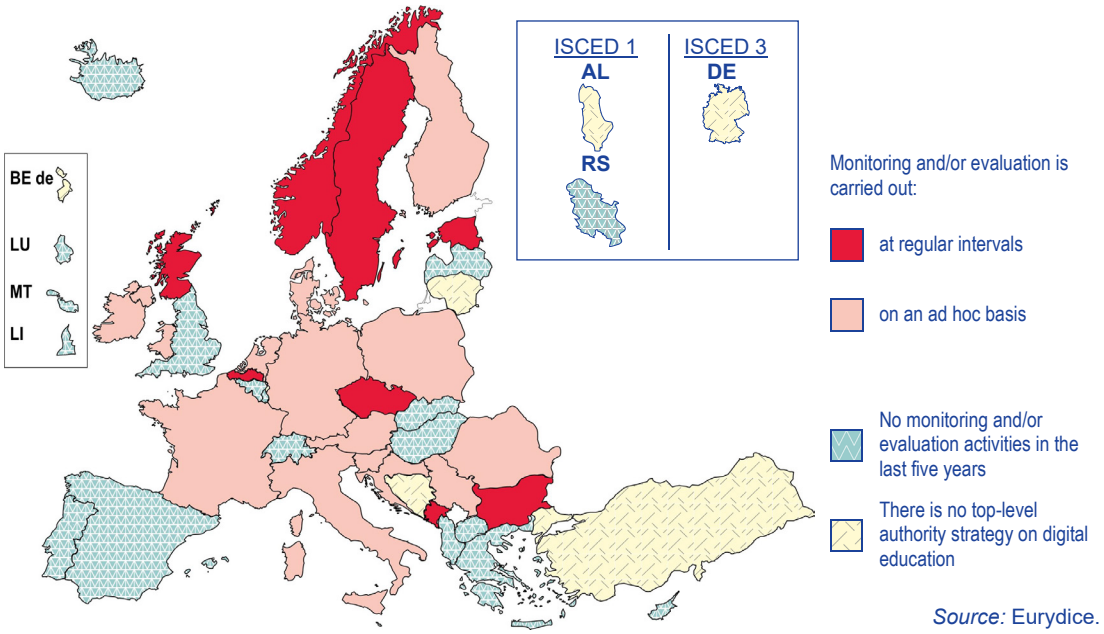
([28]) Bulgaria, Czechia, Denmark, Germany, Ireland, Spain, France, Italy, Luxembourg, Hungary, Austria, Slovenia, Slovakia, Sweden, United Kingdom (WLS and SCT), Switzerland and Norway

education policies, and only eight have done so at regular intervals (Flemish Community of Belgium, Bulgaria, Czechia, Estonia, Sweden, the United Kingdom – Scotland, Montenegro and Norway). In another 15 systems ([29]), monitoring and/or evaluation has taken place, but only on an ad hoc basis (see Figure 6).

Almost two thirds of the countries support external agencies responsible for digital education at school.

- Almost two thirds of the top-level education authorities support one or more external agencies or bodies that have responsibilities in the area of digital education at school level. These agencies offer support to schools, school heads, teachers, students and policy-makers. They offer a range of different services such as continuing professional development, creation and dissemination of digital resources, raising awareness, providing assessment methods and tools, running digital platforms, and developing and maintaining a working digital infrastructure. Most top-level authorities support only one agency, while seven (Estonia, Greece, Lithuania, Austria, Poland, Slovenia and Sweden) support multiple agencies. In 20 education systems ([30]), they operate with a mandate that is wider than digital education at school level, and in eight (Greece, the Netherlands, Austria, Slovenia, the United Kingdom – England, Wales and Northern Ireland, and Switzerland), the mandate is focused exclusively on digital education.

Figure 6: Monitoring and/or evaluation of digital education strategies and policies carried out in the last five years by top-level authorities, 2018/19



Source: Eurydice.

Explanatory note

This Figure is located in Chapter 4 'Strategies and policies' (see Figure 4.2).

([29]) Denmark, Germany, Ireland, France, Croatia, Italy, the Netherlands, Austria, Poland, Romania, Slovenia, Finland, United Kingdom (WLS and NIR) and Serbia

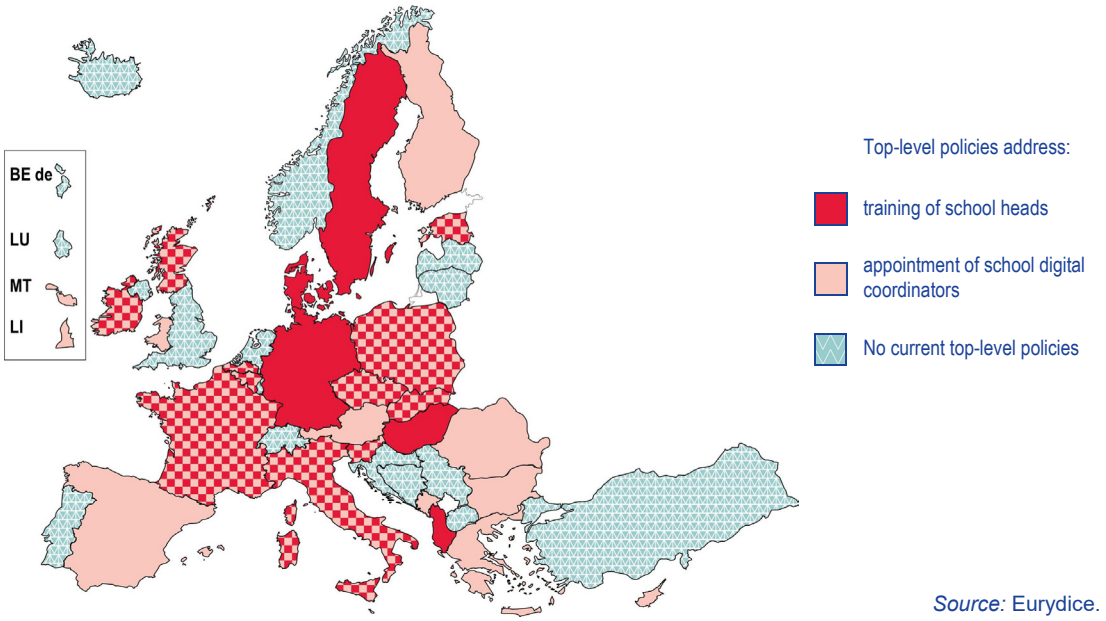
([30]) Belgium (BE nl), Denmark, Estonia, Ireland, Greece, France, Croatia, Cyprus, Lithuania, Hungary, Malta, Poland, Slovenia, Finland, Sweden, United Kingdom (SCT), Albania, Iceland, Montenegro and Norway

Support to schools

A large majority of European countries currently have definite plans to invest in schools' digital infrastructure.

- A large majority of European countries currently have definite plans to invest in schools' digital infrastructure. In many countries, investment in infrastructure is clearly indicated among the objectives of the digital education strategy. In some countries, investment in digital infrastructure is still an important need identified in relation to digital education and therefore a major focus of the strategy (e.g. in Bulgaria, Italy and Hungary).
- While the 2nd Survey of Schools on ICT in Education ([31]) finds that around one third of students in primary and secondary education attend schools that have written statements on the use of ICT for pedagogical purposes (European Commission 2019, p. 98-99), only a few European education systems refer to school development plans or digital development plans in their digital strategies or regulations.
- While the role of school heads is fundamental in promoting digital education at school, their training is less frequently and less explicitly stated in terms of objectives in current national strategies. Only one third of the education systems have, in fact, current measures in this area as part of their current strategy (see Figure 7).

Figure 7: Digital leadership in schools: training for school heads and appointment of digital coordinators, primary and general secondary education (ISCED 1-3), 2018/19



Source: Eurydice.

Explanatory note

This Figure is located in Chapter 4 'Strategies and policies' (see Figure 4.5).

([31]) This survey was conducted on behalf of the European Commission and has two objectives: to benchmark progress in ICT in schools and to model for a 'highly equipped and connected classroom'.

About half of the European education systems have policies to support the appointment of digital coordinators in schools. One third have current measures to train school heads.

- In about half of the European education systems, there are policies to support the appointment of digital coordinators in schools (see Figure 7). Digital coordinators, known also as ICT coordinators, may be assigned different tasks and responsibilities, but these usually cover both technical and pedagogical aspects. The digital coordinator role is usually assigned to ICT teachers or teachers specialising in digital education. In Ireland, Slovenia ([32]), Finland and the United Kingdom (Wales), a separate digital coordinator position may be created, while in Greece, Cyprus ([33]) (primary schools), Malta and Poland, the digital coordinators provide support to several schools.
- Parents' own attitudes and abilities are important in determining whether they can provide effective support for the development of their children's digital competences. However, only a minority of education systems currently report practical measures to involve and support parents in digital education. It is very rare for such measures to feature in the main objectives of digital education strategies.
- Digital learning resources are on the political agenda in many European education systems. Policies to improve the development and availability of digital learning resources (including Open Educational Resources) are evident in 32 education systems ([34]). Additionally, in 11 of these systems ([35]), top-level authorities have taken practical steps to ensure the quality of digital resources and Czechia is in this process. Moreover, in Czechia, Estonia, Croatia and Austria, top-level policies include the development of specific standards or qualitative requirements for digital learning resources (see Figure 4.6).

External school evaluation includes specific criteria related to digital education in only one third of the education systems.

- Only 14 countries ([36]) include specific criteria related to digital education in their external school evaluation frameworks. In these education systems, evaluators are required to consider different aspects of digital education including how well digital technologies are integrated into teaching and learning or school management processes, or whether the quality of IT infrastructure meets the required standards.

ABOUT THE EURYDICE REPORT

The report is divided into four chapters covering: (1) school curricula and learning outcomes related to digital competence; (2) the development of teacher-specific digital competences; (3) the assessment of students' digital competences and use of digital technologies for assessment; (4) top-level strategies and policies on digital education at school level.

The information analysed deals with aspects linked to both dimensions of digital education: the teaching and learning of digital competences, and the pedagogical use of digital technologies. The first dimension is explored through an analysis of guidance and regulations on curricula and assessment practices, while the second dimension is based

([32]) In small-size schools, there are no full-time digital coordinator posts. Digital coordinator's role may be performed by a teacher having appropriate qualification or assumed by school heads or their deputies.

([33]) In secondary education, an ICT/computer science teacher is assigned the task of coordinating technical aspects/maintenance of digital technologies in each school.

([34]) Belgium (BE fr and BE nl), Czechia, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Luxembourg, Hungary, Malta, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, United Kingdom (all four jurisdictions), Albania, Switzerland, Liechtenstein, Norway and Turkey

([35]) Estonia, Ireland, Greece, France, Croatia, Malta, Austria, Slovenia, Slovakia, Switzerland and Norway

([36]) Czechia, Estonia, Ireland, Spain, Latvia, Lithuania, Hungary, Malta, Poland, Romania, United Kingdom (all four jurisdictions), Albania, Liechtenstein and North Macedonia

on an examination of teacher competence frameworks and regulations on initial teacher education, and any top-level guidance available on national testing procedures.

This report addresses digital education in Europe at primary and general (lower and upper) secondary levels for the school year 2018/19 in all 28 EU Member States, as well as Albania, Bosnia and Herzegovina, Switzerland, Iceland, Liechtenstein, Montenegro, North Macedonia, Norway, Serbia, and Turkey, covering 43 education systems in total.

The prime sources of information and the analysis contained in the report always refer to regulations/legislation and official guidance issued by top-level education authorities. Policies and practices at local and school levels, even when these are delegated responsibilities, are not within the scope of the report. The annexes provide additional country material and the glossary provides definitions of the specialist terms used in the report.

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