



Education and Training

Title:

Survey on policies and practices of digital and online learning in Europe

Prepared on behalf of the European Commission by:

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Table of Contents

1. ACKNOWLEDGEMENTS	5
2. INTRODUCTION	5
3. SURVEY APPROACH	6
4. SURVEY RESPONSES	6
5. POLICIES ON DIGITAL AND ONLINE LEARNING	8
6. CHANGES IN POLICY FRAMEWORK	10
CHANGES IN THE HIGHER EDUCATIONAL SECTOR	12
CHANGES IN THE SCHOOL SECTOR	14
7. THE ROLE OF GOVERNMENT IN THE DIGITAL TRANSFORMATION OF THE EDUCATIONAL SECTOR	14
8. BENEFITS OF DIGITAL AND ONLINE LEARNING	16
A SUB-SECTOR PERSPECTIVE – HIGHER EDUCATION	17
DIGITALLY ENABLED INNOVATION IN HIGHER EDUCATION	18
A SUB-SECTOR PERSPECTIVE – THE SCHOOL SECTOR	19
9. ADDED-VALUE OF DIGITAL AND ONLINE LEARNING	20
DIGITAL AND ONLINE LEARNING TECHNOLOGIES AS DRIVER OF MORE CREATIVE TEACHING AND LEARNING	21
ADDED VALUE- BUT HARD EVIDENCE IS STILL NEEDED	21
ADDED VALUE ON DIGITAL AND ONLINE LEARNING- HIGHER EDUCATION	22
PROGRESS MADE - THE SCHOOL SECTOR	23
10. MAINSTREAMING DIGITAL AND ONLINE LEARNING	23
11. BARRIERS TO MAINSTREAM DIGITAL AND ONLINE LEARNING	28
12. ENABLERS FOR DIGITAL AND ONLINE LEARNING	29
13. IMPACT OF THE EC COMMUNICATION 'OPENING UP EDUCATION'	30
14. DISCUSSION AND CONCLUSIONS	33
POLICY CHANGES	33
NATIONAL AND/OR REGIONAL ENGAGEMENT	34
DIGITAL SKILLS AND DIGITAL AND ONLINE LEARNING ARE CLOSELY INTERTWINED	34
ADDED VALUE	35
MAINSTREAMING	36
15. REFERENCES	38
16. ANNEX – SURVEY QUESTIONNAIRE	40

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2. Introduction

The education policy from pre-primary to higher education (HE) including curricula development, modernisation of educational system(s), quality and recognition is strongly anchored in the Member States (MS) across the European Union (EU). In some MS, policies are designed and implemented at the regional level. This gives large autonomy to the European regions to develop their educational strategies and policies. Consequently, in this vast educational landscape much diversity can be observed amongst the MS and/or the European regions, with some MS leading with advanced educational systems and others lagging behind.

The European Commission (EC) can support dialogue and peer reviews between MS, focusing the discussion on common challenges, seeking to bring to the fore policy approaches which are considered to work well.

Under the E&T 2020 strategic framework for European cooperation on education and training, the Open Method of Coordination (OMC) provides a framework to support and foster dialogue across MS. Within the OMC, the Working Group on Digital and Online Learning (WG DOL) was established in 2014 as a follow-up to the Thematic Working Group on Information and Communication Technologies (ICT) and Education. With an 18-months mandate, the main aim of WG DOL was to foster mutual learning between Member States and spur further policy development on digital and online learning.

The composition of the WG DOL was horizontal, implying that it covered the entire educational sector. It was composed of specialised experts on digital and online learning coming from the MS as well as from EFTA countries. The majority of experts came from the school sector and from the higher education (HE) sector. However, experts from associations of stakeholders and civil society were also represented.

The WG DOL focused on how technologies and ICT can bring innovation into teaching and learning environments in Europe. Some of the key questions were about how digital technologies can contribute to organisational innovation in educational institutions, the quality models, processes, and tools that could enable innovation in teaching and learning to the benefit of learners, and how examples of innovative education can be scaled and mainstreamed.¹ This led to rich discussions in the working group about the characteristics of digitally innovative learning environments and the nature of the wider enabling framework conditions. Questions on quality assurance of open education resources (OER) and copyright continue to be a challenge for practitioners as well as for system level actors, and a wide range of approaches and concrete tools were presented.

¹ For more information about the mandate and the composition of the WG DOL:
<http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail&groupID=3092>

The WG DOL provided examples of how digital and online learning education policies and practices are implemented in Member States.²

A part of the WG DOL activities, under the policy challenge 3 aimed to observe new trends in ICT and education and their possible implication for policy making. A survey was developed to obtain an insight into the uptake of digital and online learning in institutional environments, practices and policies across MS and beyond. The aim was to capture the progress made and the remaining challenges regarding digital and online learning at the European level from the perspective of national policymakers and senior officials in charge of digital and online learning. This exercise would serve as a starting point for further analysis on digitally enabled reforms of education systems.

Danish Technological Institute conducted the survey on behalf of the EC Directorate-General for Education and Culture (DG EAC) under the auspices of WG DOL.

3. Survey approach

Initially, an international literature review was undertaken to map methodologies in a number of recent policy surveys on digital and online learning. The mapping exercise fed into the design of the survey undertaken within the WG DOL (see annex). The survey design was developed, in part, in collaboration with the EC DG EAC and the Institute for Prospective Studies in Seville (JRC). The survey was carried out from mid-August 2015 until 21 September 2015 using the online survey tool 'Enalyzer'. The members of the WG DOL received a link to the tool to complete the survey. In addition, the national experts were invited to identify additional regional or national senior officials with expertise in digital and online learning to gain insights into and a wider perspective of developments in digital and online learning across the educational sector in the MS.

4. Survey responses

From the outset, the survey was not intended to give a very detailed view on developments in digital and online learning policies in Europe. The aim was rather to complement the rich discussions and insights already shared within the WG DOL by posing a common set of questions on instrumental policies for digital and online learning and perceptions regarding barriers and enablers in the current policy environment for digital and online learning.

In total, the survey was accessed 221 times resulting in 114 complete or partly complete responses and 107 non-completions. The degree of completion among the 114 valid respondents varies considerably. There is a wide geographical distribution of responses from across the MS. The number of responses received from each MS varies substantially and does not reflect the size of the corresponding country. Moreover, a member of WG DOL representing EUNIS³ sent the survey link to a European network of higher educational institutions. This explains why there is a higher response rate from the higher educational sector across the EU than from the school sector.

² See highlights from all ET 2020 Working Groups from the 2014 – 2015 Working Group cycle, including the WG DOL: http://ec.europa.eu/education/policy/strategic-framework/expert-groups/2014-2015/group-highlights_en.pdf.

³ www.eunis.org.

Table 1: Distribution of respondents

Country	Count	Pct.		Sector	Count	Pct.
Austria	2	1.8%		Higher education	88	77.2%
Belgium	3	2.6%		School	12	10.5%
Bulgaria	2	1.8%		Other sectors	14	12.3%
Croatia	1	0.9%		Total	114	100.0%
Czech Republic	4	3.5%				
Denmark	5	4.4%				
Finland	6	5.3%				
France	2	1.8%				
Germany	11	9.6%				
Greece	4	3.5%				
Hungary	1	0.9%				
Ireland	5	4.4%				
Italy	3	2.6%				
Lithuania	1	0.9%				
Malta	4	3.5%				
The Netherlands	17	14.9%				
Norway	3	2.6%				
Poland	4	3.5%				
Portugal	8	7.0%				
Slovakia	3	2.6%				
Slovenia	3	2.6%				
Spain	6	5.3%				
Sweden	2	1.8%				
Switzerland	5	4.4%				
United Kingdom	7	6.1%				
Turkey	2	1.8%				
Total	114	100.0%				

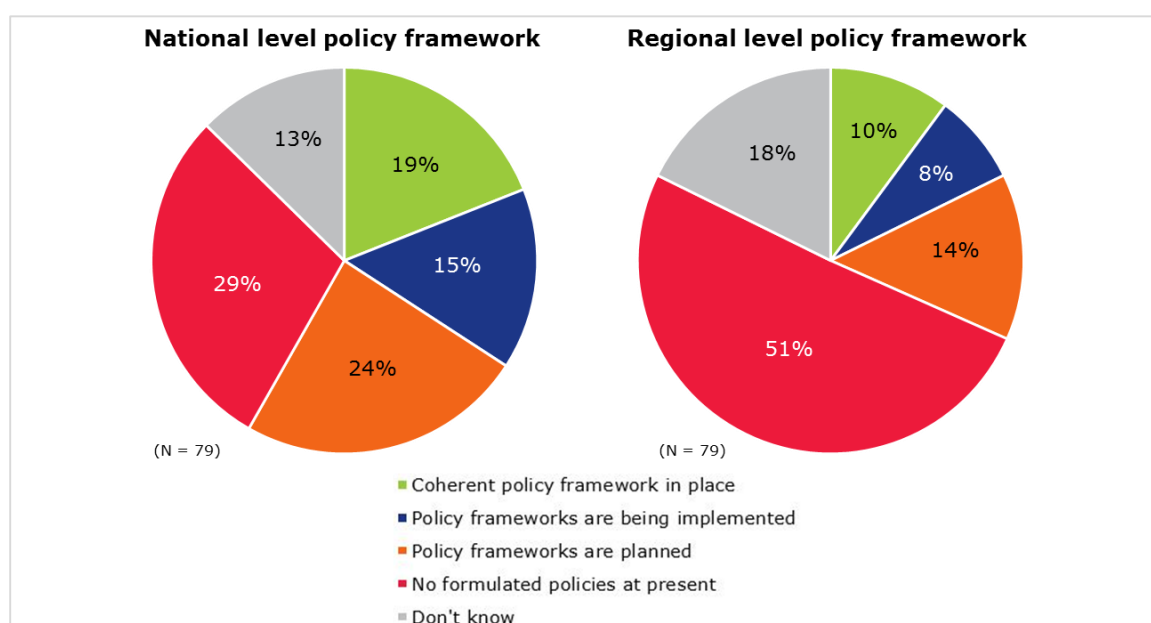
Note: The category 'other sectors' encompasses adult education, VET, and employer organisations.

Table 1 shows the countries which responded to the survey. The higher education sector provided more responses than the school sector. In particular, many responses were received from Germany and the Netherlands. Generally, there were fewer responses from regional level actors than from national actors. Other sectors include adult learning, VET and employer and employee representatives. For these latter sectors, the responses were so few that no further subsector analysis has been made. Apart from completing the questionnaire survey, respondents were also asked to provide links to relevant policy documents.

5. Policies on digital and online learning

The survey first asked if policy frameworks were in place in the respondent's country. Figure 1 shows the distribution of responses at national and regional level. At national level, around 1/3 of the respondents indicated that there are national policies for digital and online learning in place or under implementation, around 1/4 of the respondents indicated that they are being planned, while 29% that there are no policies at present. At regional level, 18% indicated that there are policies in place or being planned, 14% that no policies are being planned, and a little more than half of the respondents stated that there are 'no regional policies formulated at present'.

Figure 1: Policy frameworks in place for digital and online learning



For most countries, policies on digital and online learning are designed and implemented at national level. In this survey however, some countries reported that they have regional policy frameworks in place - this also applies to countries that do not have a federal education system such as Denmark and the Netherlands. A plausible explanation might be that structural funds have been used to develop regional approaches to digital and online learning. It is also plausible that digital and online learning represents a new priority in regional educational policies in several countries as well as in non-federated systems. Alternatively, some MS regions could be used to steer experimental policy/practices for digital and online learning.

The survey also helped to identify examples of policies related to digital and online learning:

- In Ireland a roadmap was launched in April 2015 for Enhancing Digital Capacity for Teaching and Learning.⁴
- In the Netherlands, national funding is available for experiments with open and online education.⁵

⁴ <http://www.teachingandlearning.ie/priority-themes/benchmarking-digital-platform/>

⁵ <https://www.surf.nl/kennis-en-innovatie/innovatieprojecten/startdatum-2014/open-en-online-onderwijs/stimuleringsregeling-open-en-online-onderwijs/index.html>

- In Finland, like in other EU countries, HEIs (higher education institutions) have autonomy regarding most policy aspects of digital and online learning. The Finnish government programme of 2015 focuses on digitalisation of educational contents.⁶

Other countries reported that multiple initiatives are currently being implemented, but an overarching policy has not been yet put in place.

Occasionally, the answers from the individual countries showed some level of ambiguity. While one respondent from a country indicated the existence of policy frameworks in place, another respondent from the same country indicated that this is not the case. There can be several explanations for this. One could be that respondents representing different educational sectors responded accordingly. Another factor could be that policies may be in place, but they are recent and are not followed up by specific measures yet. Along the same lines it is possible that policy frameworks have not lead yet to transformation of institutional strategies and practices, which can take a substantial amount of time to evolve fully. This possibility is supported by the indication that several respondents refer to a '*lack of leadership*' as a barrier to the implementation of digital and online learning (see Section 11). This response could mirror the time necessary for an institution to discover the potential transformative effects of digital and online learning. The tendency may therefore be that at first digital and online learning is an add-on or has moderate incremental innovation effects, as illustrated in Table 2 on the 21st century learning environment.

Table 2: Building technology rich learning environments

Criteria/phase	Emerging Add-on	Applying Improving	Integrating (incremental innovations)	Transforming (radical innovation)
Vision	Limited pragmatic - driven by interested individuals	Driven by ICT specialists	Driven by subject specialists	Entire learning community
Learning pedagogy	Teacher centred	Teacher centred- ICT as a separate subject	Learner centred collaborative	Creative and critical thinking - and doing personalised learning environments- experimental and influenced by design thinking
Development plans and policies	Accidental and restrictive	Limited central policies, project based funding	Individual subject based plans for ICT integration- with associated funding, e.g. STEM education	ICT integral to overall sector development/institutional development- systemic approach
Facilities and resources	Limited and non-current standalone digital resources	Diverse and varying in platforms with specific content and pedagogy	Diffused access to various digital resources through portals and institutional infrastructures	Rich infrastructures enabled by the ecosystem for digital and online learning between innovative producers of resources and platforms and practitioners
Understanding of curriculum	Focus on ICT literacy- PC driving license metaphor	Use of OER and software on a subject basis	Integrated- project and problem based- Digital literacy	Integrated- open learning environments- tackling real life problems- enabled by digital technologies

⁶ The Finnish government program from 2015 has content with digitalization of education (pages 18-20): http://valtioneuvosto.fi/documents/10184/1427398/Ratkaisujen+Suomi_EN_YHDISTETTY_netti.pdf/8d2e1a66-e24a-4073-8303-ee3127fbfcac

Professional Development	Individual interest	Ad-hoc training on ICT applications	Subject specific evolving	Integrated- community of practice- supported by school leadership and vision for school transformation
Community	Accidental	Some parental involvement (e.g. parents as experts)	Subject based community Offering some advice	Global community- networked- fluent Multi-dimensional
Assessment	Responsibility of individual teacher; didactic; paper-and-pencil based	Teacher-centred; subject-focused	Learner-centred; subject-oriented; integrated; multiple media to demonstrate alignment	Continuous; holistic, embedded assessment, summative and formative purpose - use of learning analytics feeding into personalization of the learning space and promoting students' learning to learn competences

Note: Adapted from OECD: [Groff, J. \(2013\), 'Technology rich innovative learning environments'](#) .

Table 2 provides a conceptual framework for understanding how the uptake of digital and online learning typically will occur through different stages of implementation. At first, there may be pockets of innovations regarding, for example, the integration of ICT in curricula. Later on, this could be mainstreamed since OER are more widely available. Meanwhile teachers could feel more confident in using ICT in education after having received training. Although the responses to the questionnaire will be analysed in depth, Table 2 is useful because it contextualises the understanding and ratings of the respondents and how they position themselves in respect to the advancement and update of policy reforms in digital and online learning. Innovation in education is an ongoing process, and digitally enabled innovations are likely not to have a definite end. Continuous developments in emerging technologies such as visualisation, artificial intelligence and learning analytics have the potential to drive innovation in education. The following sections provide insights into how the members of the WG DOL and other senior officials with responsibility for digital and online learning perceive the progress made and the issues still at stake.

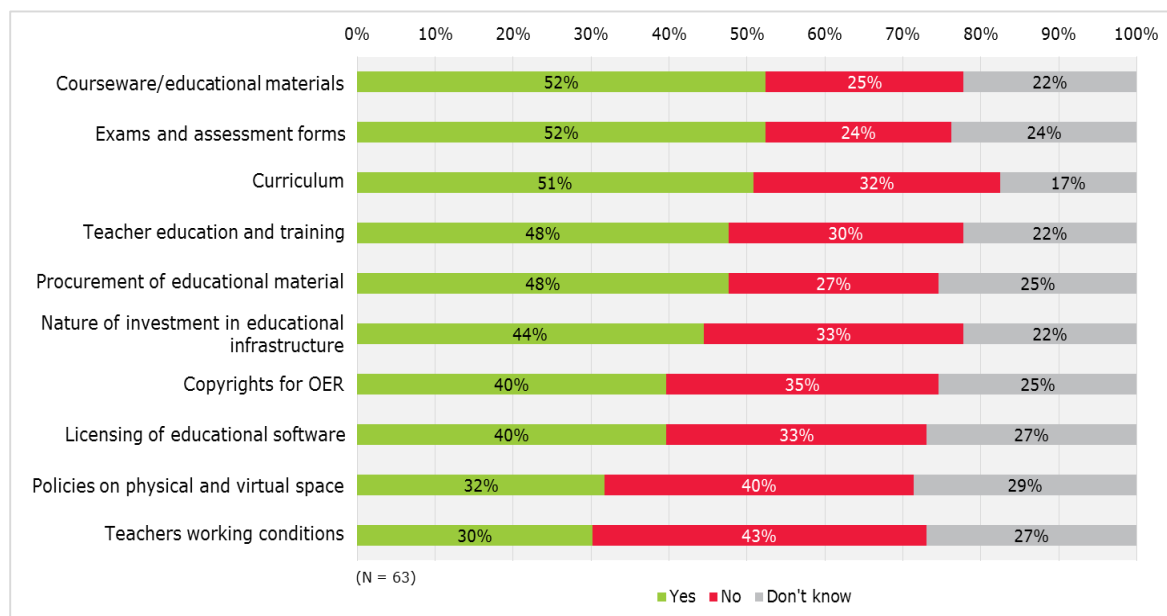
6. Changes in Policy Framework

As digital and online learning has developed in recent years, European countries have begun policies and programme actions to support educational institutions to integrate digital technologies in their education practices. Figure 2 shows the respondents' perception of how targeted policies have affected educational practices. The most important effects of digital and online learning are occurring in policies on educational materials and courseware and in the assessment and exam forms. 52% of the respondents reported changes in educational materials and in exam and assessment forms. 51% reported that digital and online technologies have affected the curriculum.

Development in digital technologies is not the only driver of change. For instance, changes in policies can further accelerate the uptake of digital technologies. Policies supporting teacher education and training in digital technologies are an example of an enabling accelerator. When teachers feel confident about the use of ICT, they feel more secure about experimenting with digital and online learning practices in a more structured way and able to focus on pedagogical objectives and students' learning needs. Highly complex innovations such as those in teaching and learning practice involve

considerable individual and institutional changes beyond the provision of technology (Salmon, 2015). This is why teacher training, peer learning activities and support are so important if innovation in digital and online learning is to become systemic in nature.

Figure 2: Changes in national policies due to developments in digital and online learning (educational sector as a whole)



It is therefore positive that 48% of the respondents reported that digital and online technologies have had an impact on teacher training. Yet, 30% still stated that this is only partially the case. This suggests that efforts should be made to ensure that digital and online learning is mainstreamed as an ongoing feature through the curriculum in teacher training programmes as well as in continuing education and training provision. It should not occur as add-on separate courses. This is also reflected in the scoring of policies on physical and virtual space and teachers' working conditions with respectively 32% and 30%.

In regard to policies on physical and virtual space, it is worth highlighting that MOOCs in HEIs have influenced policies on physical and virtual space. In particular, higher educational institutions were prompted to collaborate with both national and international providers to set up joint courses. MOOCs have resulted in new opportunities for HE providers. However, they have also led to institutional challenges, particularly regarding the recognition and accreditation of MOOC courses offered on the open market. There are examples of digital and online learning that have led to a rethinking of the learning space (Lippman, 2010) (Keppell, et al., 2012).

It is worth noticing that between 1/5 and 1/4 of the respondents answered '*do not know*' to specific questions on the impact on educational practices of digital and online learning. The most likely explanation is that the respondents in general did not have an overview of the impact of digital technologies across the educational sectors. Although coherent policy frameworks *per se* are not a guarantee of changes in educational practices, enabling policy frameworks can be conducive to innovations if, for example, policy changes ensure that teachers may use other types of educational materials than books. Changes in policies on curriculum foster the development of project-based learning that integrates a range of subjects and involves authentic tasks. Similarly,

changes in the assessment forms can facilitate the alignment of pedagogical practices, curriculum, assessment and exams. From an innovation perspective, curriculum, course materials and assessment are closely intertwined. Policy changes in these three areas are therefore likely to have a mutually reinforcing effect. In centrally controlled systems, policy changes in these three areas can be part of a wider reform aiming to give institutions more autonomy, support personalisation and open up of the classroom to external cooperation through digital and online learning.

Finally, teacher training is a key to ensure that digital technologies do not become an add-on to educational practices of yesterday; rather the teachers become familiar with digital and online technologies and have opportunities to experiment with them. Digital technologies can thus become a potential lever for bottom-up pedagogical and organisational innovation with the teacher as a confident change agent.

Changes in the higher educational sector

Similarly, HE respondents were asked whether digital and online learning has led to changes in national policies in HE. The data on the HE sector (Figure 3) show lower ratings than for the educational sector as a whole. This is most likely due to the established institutional autonomy of HE institutions. Rather than national legislation being a barrier to innovations in higher teaching practices, barriers are more likely to be found within the HE institutional regulations. The professionals themselves, their motivation to change, and/or the lack of institutional incentives, together with the rewarding and promotion methods applied to HE staff could represent the real barriers to innovation. According to the respondents, the areas most impacted by digital and online learning are the exams and assessment forms, educational materials and curriculum.

A European study on innovation in HE enabled by digital technologies suggests that digital innovation in the HE sector is incremental in nature and often bottom-up driven. It is therefore often implemented without any change of regulatory frameworks (Brennan, et al., 2014). Developments in digital and online learning in HE have led to a range of initiatives to spur the development and access to OER through licensing arrangements such as Creative Commons⁷. This is reflected in the respondents' answers, where 35% indicated that policies have led to changes in licensing of educational software (Figure 3). The project 'Open Educational Resources Policy in Europe'⁸, a project under Creative Commons⁹, is one of many examples of initiatives that bring together a coalition of international experts and practitioners to strengthen the implementation of open education policies across Europe.

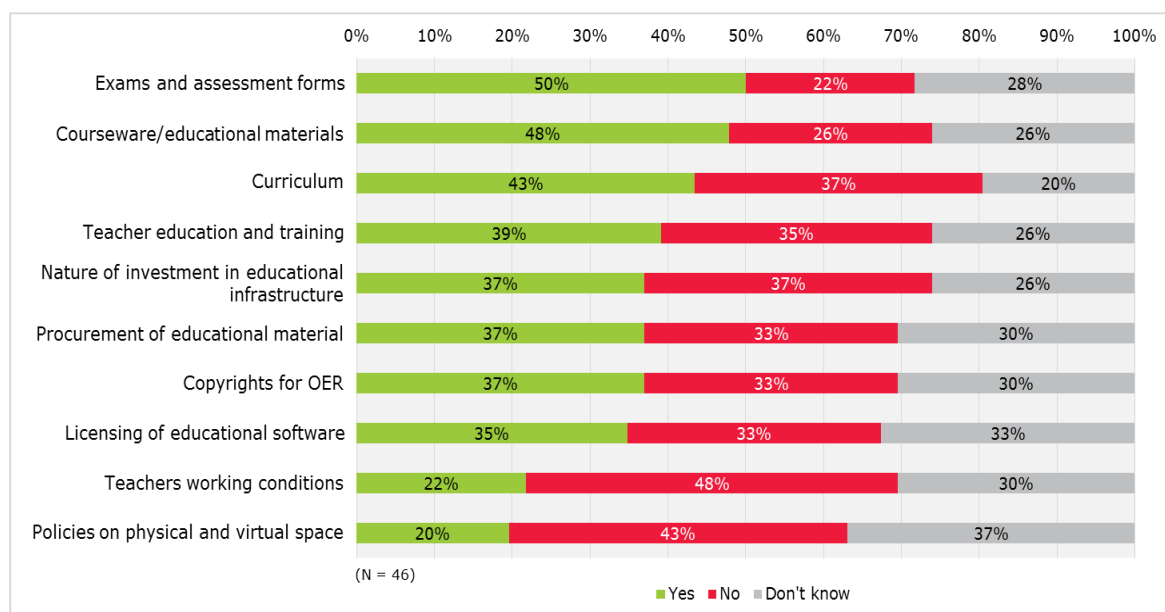
As shown in Figure 2 and Figure 3, policies on teachers' working conditions and policies regarding physical and virtual space are the areas that have been affected the least by digital and online learning.

⁷ https://en.wikipedia.org/wiki/Creative_Commons

⁸ <http://oerpolicy.eu/>.

⁹ <http://creativecommons.org/>.

Figure 3: Changes in national policies due to developments in digital and online learning (higher education)



Therefore, according to the respondents, developments in digital and online learning have impacted the very core of HE provision, i.e.: curriculum, educational materials, and exams and assessment forms. A possible explanation is that innovations in the HE provision have been accelerated by developments in MOOCs as pointed out by the EADTU report on 2014 (EADTU, 2015). There are many different models of MOOC provision, as emphasised by the Canadian researcher George Siemens¹⁰, and MOOCs have opened up new forms of batch certification. Norway formed a task force to assess the opportunities of MOOCs in a Norwegian HE context. The task force published an extensive report in 2015. The report is also available in English (Norwegian Ministry of Education and Research, 2014).

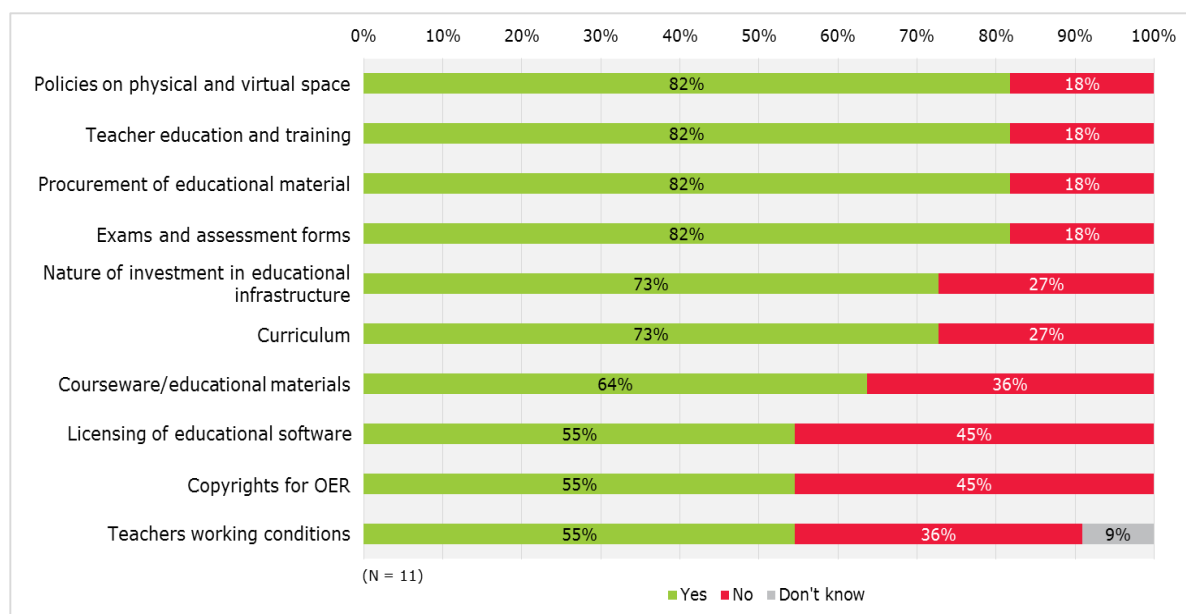
Finally, it is worth remembering that in some universities the uptake of digital and online learning is embedded in wider institutional strategies linked to open science (DG Research, 2014). Open science builds on the notion of how digital technologies can drive fundamental changes in the production, publication and use of knowledge. This in turn will have an impact on the research and innovation system. There is a growing interest in open science due to the complexity and abundance of data combined with the fact that universities no longer are the sole producers of scientific knowledge (DG Research, 2014).

Changes in the school sector

The response rate for the school sector is low (Figure 4), hence the data should be interpreted with caution. Yet, those that have responded that developments in digital and online learning have had a major impact on transformation of national policies. The three most important areas mentioned are policies on virtual and physical space, teacher training, and procurement of educational material.

¹⁰ See for example: <http://www.learningrevolution.net/george-siemens-mooc/>

Figure 4: Changes in national policies due to developments in digital and online learning (school sector)



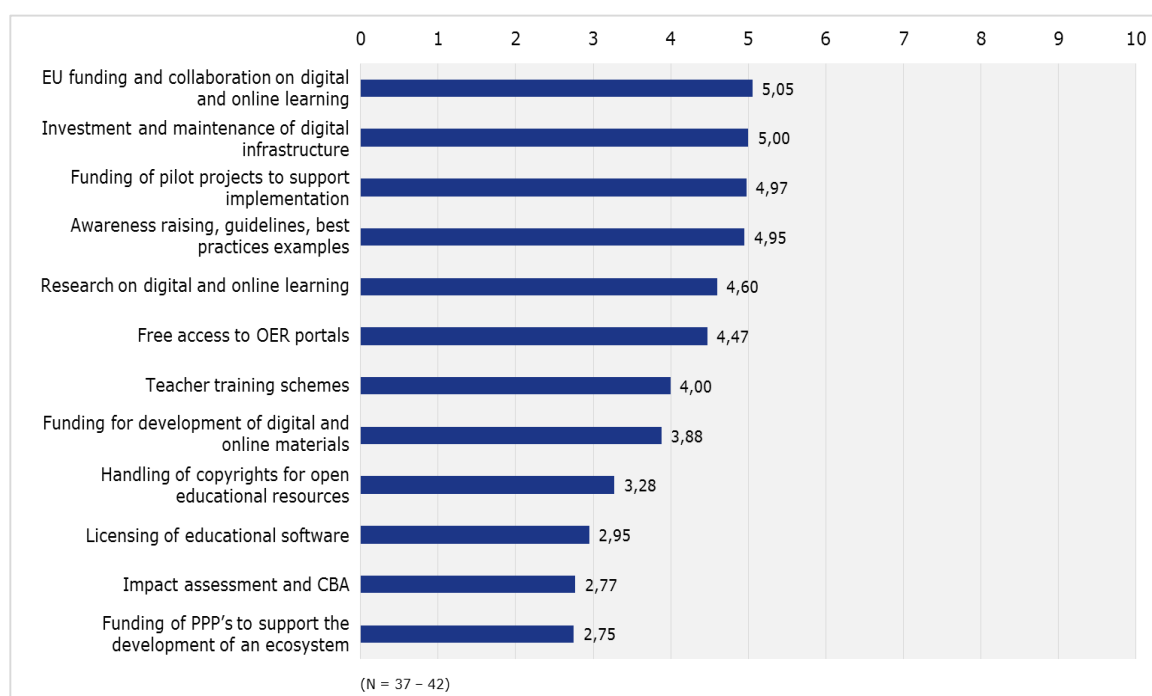
7. The role of government in the digital transformation of the educational sector

Naively, European governments are instrumental to pursue innovation and their role and engagement is fundamental to support digital and online learning for the educational sector. Hence, the respondents were asked to score the level of involvement on a scale from 1 to 10, with 10 being the highest level and 1 the lowest level of involvement on a set of given topics (Figure 5). The results show that the support of governments in accessing EU funding and facilitating collaborations with partners from the EU is the most important form of government engagement to foster the implementation of digital and online learning (average 5.05). This is followed by investments and the maintenance of infrastructures. However, the scores given are not very high (<5), which suggest a moderate direct involvement of MS governments. The perceived lack of direct engagement might be due to limited dedicated national funding for digital and online learning in the form of programmes. Another reason could be that digital and online learning are still not mainstream policy priorities, or, on the contrary, that digital and online learning has now moved to such a level of maturity that governments no longer find it necessary to take proactive measures to drive the uptake of digital and online learning. On the other hand, funding of public/private partnerships in support of the development of an ecosystem for digital and online learning and of methods for impact assessment and cost-benefit analysis, are characterised by modest government involvement. However, priorities vary across countries. In several countries, such as Denmark, Finland, Slovenia, the Netherlands, Portugal¹¹, dedicated national funding for the development of OER has been a government priority for the school sector in recent years. Thus, the governments have aimed at stimulating the development of an ecosystem for digital and online learning by providing funding for the development of professional digital OER for the educational sector. This has resulted in the emergence of

¹¹ See: http://www.poerup.info/key_outputs.html

new players in the field of digital courseware. For countries like Denmark, with a small home market for digital and online learning resources, nurturing the development of a market with new professional producers of digital and online learning resources can be a challenge.

Figure 5: Government engagement at national level to promote and support implementation of digital and online learning (educational sector as a whole)



CBA: cost analysis benefit; OER: open educational resources; PPP: public-private partnership.

Governments mainly support the wider implementation of digital and online learning through the facilitation of EU partnerships and thereby the access to EU funding (Erasmus+; H2020, ESIF, EIF etc.). This is important, particularly because in many EU countries' the education development funds were negatively impacted by the financial crisis. It is evident that the scores (on a scale from 1 to 10, and being lower than 5) are relatively low, which could indicate that promotion and support from governments are perceived to be rather low. An explanation could be that most of the survey respondents represent the HE sector where government involvement is of a more indirect nature so as not to conflict with institutional autonomy. Alternatively, the relatively low scores given to government engagement in promotion of digital and online learning could mirror the differences in government engagement in a digital Europe, where some countries in the EU still lag behind, as the Digital Agenda Scoreboard indicates¹². The most recent data from the Digital Agenda Scoreboard show that investments are still needed in infrastructures, digital educational resources and teacher training for digitally enabled innovation of the educational sector. It is worth noting that impact assessment and cost-benefit models as well as the development of ecosystems for digital and online learning receive low scores. Both elements are associated with bringing digital and online learning on sustainable public-private partnership business models (Jisc, 2016) (Thomas Fordham Institute, 2011).

¹² <https://ec.europa.eu/digital-single-market/en/digital-scoreboard>

The regional level scores are much lower (data not shown). This seems to suggest that the engagement of regional governments on policies and actions for digital and online learning has been less significant, although the Structural Funds could, in some cases, have been used as a lever to develop regional approaches.

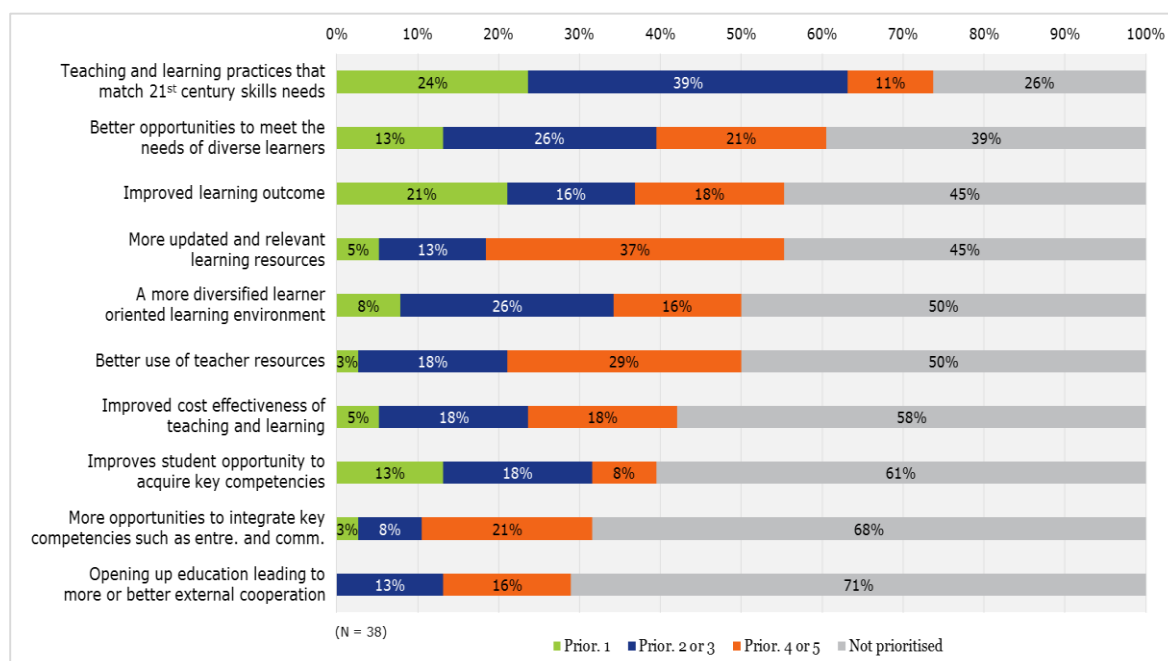
8. Benefits of digital and online learning

Next, the survey asked to the respondents to assess the benefits of digital and online learning in the educational sector as a whole (Figure 6). Out of a selected list of items, the respondents were asked to rank the five most important benefits. The top priorities listed are:

- to ensure that learners have competences that match 21st century demands (24%);
- to improve learning outcomes (21%);
- to improve opportunities to meet the diverse needs of learners (13%); and
- to acquire key competences (13%).

Only 8% of the respondents rated a more diversified learning environment as the most important benefit. It is remarkable that no one ranked 'opening up education to external cooperation' as a key benefit, given its relative importance in European policy-making. However, prior to the survey many countries had initiated processes of reform of their education systems mirroring the Communication on Opening up Education¹³ from the EC. Another factor could be that opening up education is not itself an end goal, but rather a means to achieve more creative and authentic learning environments.

Figure 6: Prioritisation of benefits of digital and online learning (educational sector as a whole)



Note: The respondents were asked to prioritise five of the mentioned benefits from 1 to 5; entre.: entrepreneurship; comm.: communication.

¹³ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52013DC0654>.

The survey's responses indicated the acquisition of 21st century skills as a top benefit of digital and online learning scoring the 24% as a top priority, and another 39% as a priority 2 or 3. Moreover, these responses suggest that an integrated environment for digital and online learning is closely intertwined with the opportunity to acquire digital skills and other types of digital-related skills and competences such as creativity and problem solving. A recent global survey about the future of jobs situates these types of skills as critical to future employability (World Economic Forum, 2016).

One of the often-mentioned benefits of OER is that they can ensure more updated and relevant learning resources as well as better use of teacher resources, where both factors are important means to improve learning outcomes. Nevertheless, only 5% of the respondents indicated opportunities to ensure more updated and relevant learning resources as the most important benefit. One reason could be that many of the current OER resources in reality offer limited opportunities for re-editing, and many teachers still lack tools and skills to adapt and tailor OER. Another point is that many of the public OER portals lack embedded strategies and practices for updating OER as part of quality assurance processes (Camilleri, et al., 2014).

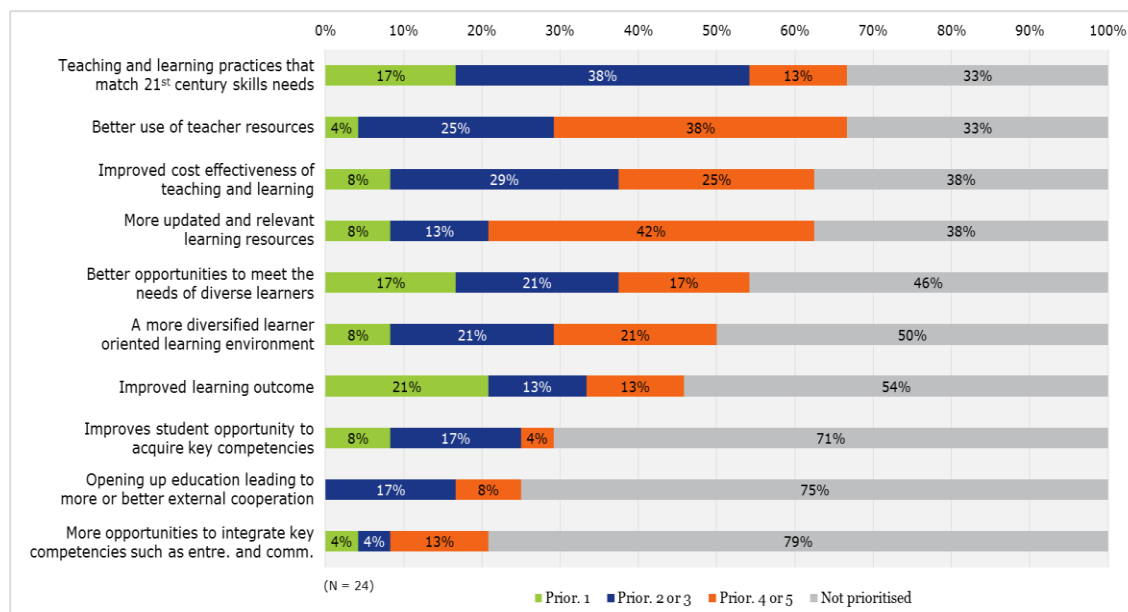
A sub-sector perspective – Higher education

Figure 7 shows the respondents' perception of the main benefits of digital and online learning in the higher educational sector. The benefits indicated as top priority by the respondents from the higher educational sector are the improvement of learning outcomes (21%), 21st century skills (17%) and opportunities to meet the needs of diverse learners (17%).

Only 4% of the HE respondents indicated as their first priority the 'better use of teacher resources' and another 4% 'key competences'. None of the respondents reported 'opening up to external cooperation' as a key priority. However, in studies on universities as a driver in local, regional and national innovation¹⁴, cooperation with external players is seen as a driver to developing more innovative and relevant HE provision.

¹⁴ <http://www.oecd.org/edu/imhe/highereducationinregionalandcitydevelopment.htm>

Figure 7: Prioritisation of benefits of digital and online learning (higher education)



Note: The respondents were asked to prioritise five of the mentioned benefits from 1 to 5; entre.: entrepreneurship; comm.: communication.

Digitally enabled innovation in higher education

Universities with strong external cooperation tend to provide students with rich opportunities to work on authentic tasks supplied by companies in the private or public sector. Such models support an integrated approach to entrepreneurship in teaching and learning (Deiss & Shapiro, 2014).

Digital technologies can act as a lever to opening up external cooperation creating new dynamics in the knowledge triangle (research, innovation, and education). Yet none of the respondents scores 'opening up education to more and better external cooperation' as a key benefit/priority (Figure 6 and 7). Case studies on higher educational institutional practices provide numerous examples of digital technologies that have these enabling effects in practice, but they most likely occur in local and regional pockets of innovation that are yet to have a systemic effect on the higher education sector (Brennan, et al., 2014).

In that respect the study (ibid) found that the more autonomous higher education institutions, which have more control over their financial resources and allocation of these, tend to develop more bottom-up practices, which is not so surprising. On one hand, the direct impact of these types of innovations enabled by digital technologies may be more immediate, but also more limited and often confined to the boundaries of the innovating institution. On the other hand, less autonomous higher education institutions tend to have a more top-down driven approaches to innovation according to the study. One of the key barriers to innovation through digital and online learning is staff aversion to change (Brennan, et al., 2014). One of the drawbacks found by the study was that top-down driven digital innovation initiatives with the government involvement tended to take a long time to implement. However, if successful, the top-down digital innovations could have an impact spanning more than one institution. It should be noted that this study builds on very few cases. In the USA, there is a growing debate on the idea that the real innovation in digital and online learning in HE do not involve MOOCs, but a

growing offer of modularised competence-based programmes aims to build pathways from general oriented university degrees to the labour market. These programmes typically target recent graduates who continue to find it difficult to enter the labour markets and jobs that indeed require a bachelor degree. A small but growing number of education institutions such as College for America (CfA), Brandman, Capella, University of Wisconsin, Northern Arizona, and Western Governors are implementing such online competence-based programmes, which also include an assessment and accreditation of prior learning. Digital and online learning has become a priority in the HE sector for many different purposes and the uptake is wide. An EADTU study from 2014 shows that at the time 71% of the organisations which participated in the study had implemented a MOOC or were planning to do so. (EADTU, 2015)

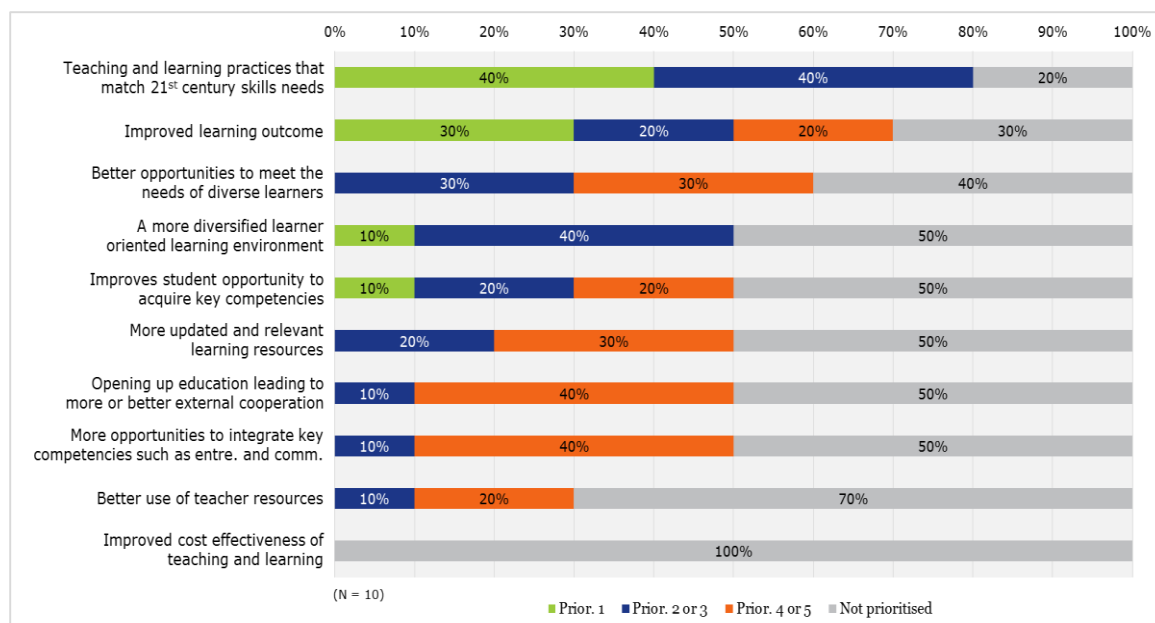
A similar type of online assessment tool has also been implemented in the EU¹⁵. Although many of them are in the nascent stages, the online competence-based programmes have the potential to create high-quality learning pathways that are affordable, scalable, and tailored for a wide variety of industries. They are likely to gain traction and proliferate over time.

A sub-sector perspective – The school sector

Figure 8 shows the responses for the school sector. The school sector responses are concentrated on fewer areas than HE responses. The benefits indicated as top priority by the school respondents are 21st century skills (40%), improved learning outcomes (30%), and greater learner-oriented environment/opportunities to acquire key competences (10%). Again, the low number of respondents should be taken into consideration when analysing this data. Benefits often associated with opening up classrooms are scored lower. A reason may be that educational institutions are still in the process of developing scalable models for opening up of the classroom. This is complex and therefore requires time to implement. All the other benefits are scored low by the school respondents including cost-benefit potentials.

¹⁵ <https://karjera.lt/>

Figure 8: Prioritisation of benefits of digital and online learning (school sector)

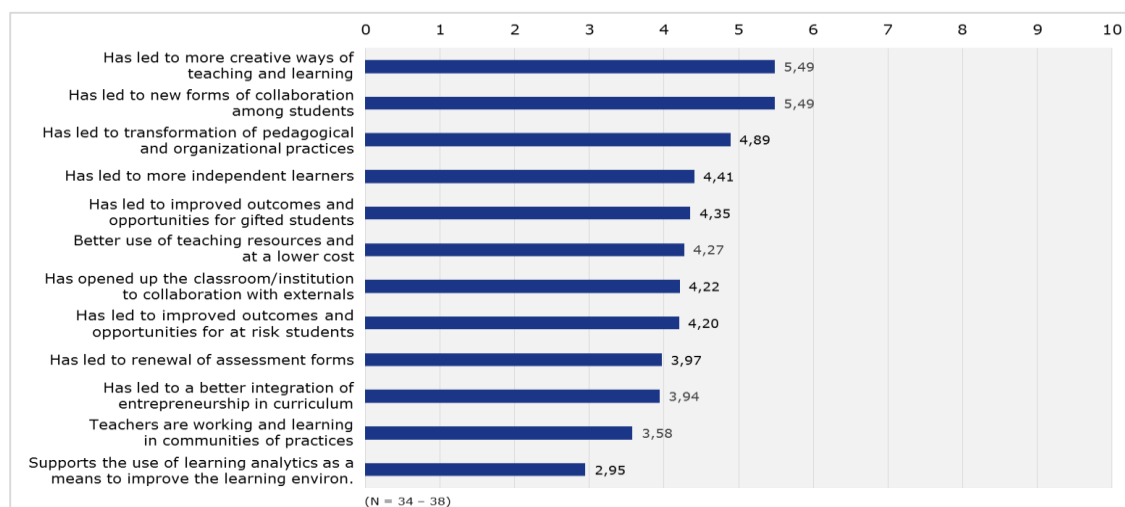


Note: The respondents were asked to prioritise five of the mentioned benefits from 1 to 5; entre.: entrepreneurship; comm.: communication.

9. Added-value of digital and online learning

The survey asked the respondents to assess the progress made in implementing digital and online learning and its added value in the educational sector as a whole on a scale from 1 to 10, with 10 being the highest score. The respondents scored the impact on creative teaching and learning and the impact on collaboration among students as the highest at 5.49.

Figure 9: Progress made in terms of added value of digital and online learning (educational sector as a whole)



Note: environ.: environment.

Changes in pedagogical and organisational practices scored even lower at 4.89 and more independent learners at 4.41. The lowest rank is given to teachers' collaboration in communities of practice and the use of learning analytics, i.e. 3.58 and 2.95 respectively.

Digital and online learning technologies as a driver of more creative teaching and learning

Figure 6 shows that the respondents scored the benefit of digital and online learning low in terms of its impact on opening up education. Figure 9 shows how the respondents saw digital and online learning as a driver of more creative ways of teaching and learning. However, the score of 5.49 on the scale, with 10 being the highest, is an indication that digital and online learning has led to some level of added value when it comes to more creative ways of teaching and learning as well as new forms of collaboration among students. These practices are associated with the views of the EC Communication '*Opening up Education*', showing that a positive transformation has begun in the educational sector. However, the score values also suggest that this transformation needs to be accelerated to achieve a systemic innovation impact in the educational sector. This is supported by the fact that all of the average scores in Figure 9 are below 5.5.

It is worth mentioning that in the USA learning analytics software has reached a higher level of maturity embedded in personalised digital and online learning environments¹⁶ (SRI, 2012). In the EU, the potential of learning analytics remain to be explored further as a basis for personalising digital learning environments. Improved learning outcomes for gifted students, as well as for at-risk students, receive an overall lower score as the 4th and 8th most important outcomes respectively. An explanation could be that evaluations of major digital and online learning initiatives have not explicitly prioritised assessing whether and in which contexts digital and online learning leads to improved learning outcomes. The digital Agenda Scoreboard shows that there are still substantial differences in the digital skills base across the MS. As part of the agenda for digital skills, it is therefore important to continue to research and thoroughly assess which learning environments are the most conducive to improving the skills base for at-risk groups.

Added value- but firm evidence is still needed

In this respect, research and policy studies on digital and online learning in Europe differ substantially from those in the USA (US Department Office of Education Technology, 2014), (Bakkia, et al., 2015). There has been a tendency in European evaluations and impact studies to focus on particular aspects of teaching and learning practices, as well as on soft evidence rather than on measurable factors, thereby partly describing the potential benefits of digital and online learning. The recent debates about the OECD publication (OECD, 2015) on digital and online learning based on PISA data could indicate that impact evaluations of digital and online learning have been less of a priority in many countries, partly because digital and online learning so far has been considered a field in the early stages of development. In the coming years, it is likely that an increased use of learning analytics will contribute to strengthening the knowledge base about what works for whom and in which contexts. Moreover, it will raise new

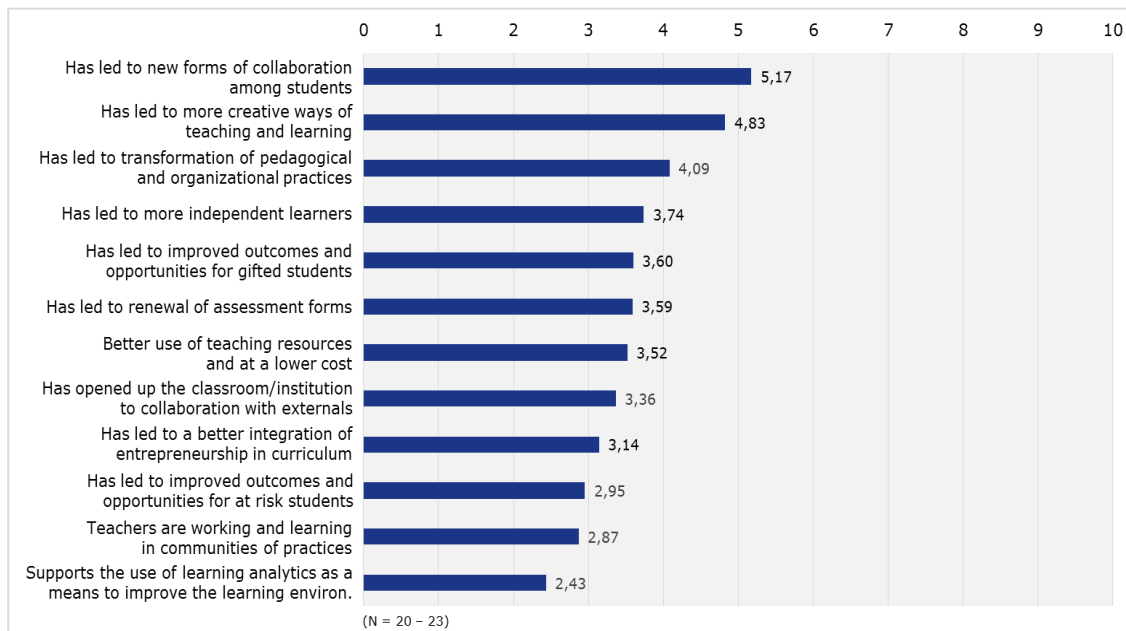
¹⁶ Educause includes a range of links, which are updated on an on-going basis on the deployment of learning: <http://www.educause.edu/library/learning-analytics>.

questions, debates and potential new challenges in terms of who owns student data and for which purposes they can be used.

Added value on digital and online learning- higher education

Similarly to the data presented in Figure 9, the responses from the higher educational sector shown in Figure 10 mimic the data reported for the school sector. The responses from the higher educational sector representatives indicated that progress and added value have been achieved at the very core of education delivery, which is positive. However, the scores of 5.15 (new forms of collaboration) and 4.83 (creative ways of teaching and learning) respectively imply that the implementation is in progress, and that the full added value of digital and online learning in HE provision remains to be achieved. In the medium term, this could promote innovations in the models of an entrepreneurial university, which at present is scored at 3.14. Seen as a whole, the answers illustrate a diversity of views when it comes to rating progress made and benefits achieved among HE stakeholders in the EU. The use of learning analytics is scored the lowest. However, there are examples of European universities that have begun to explore the opportunities that these technologies offer including the University of Derby in the UK, the University of Amsterdam and the Free University of Amsterdam in the Netherlands (Brennan, et al., 2014).

Figure 10: Progress made in terms of added value of digital and online learning (higher education)

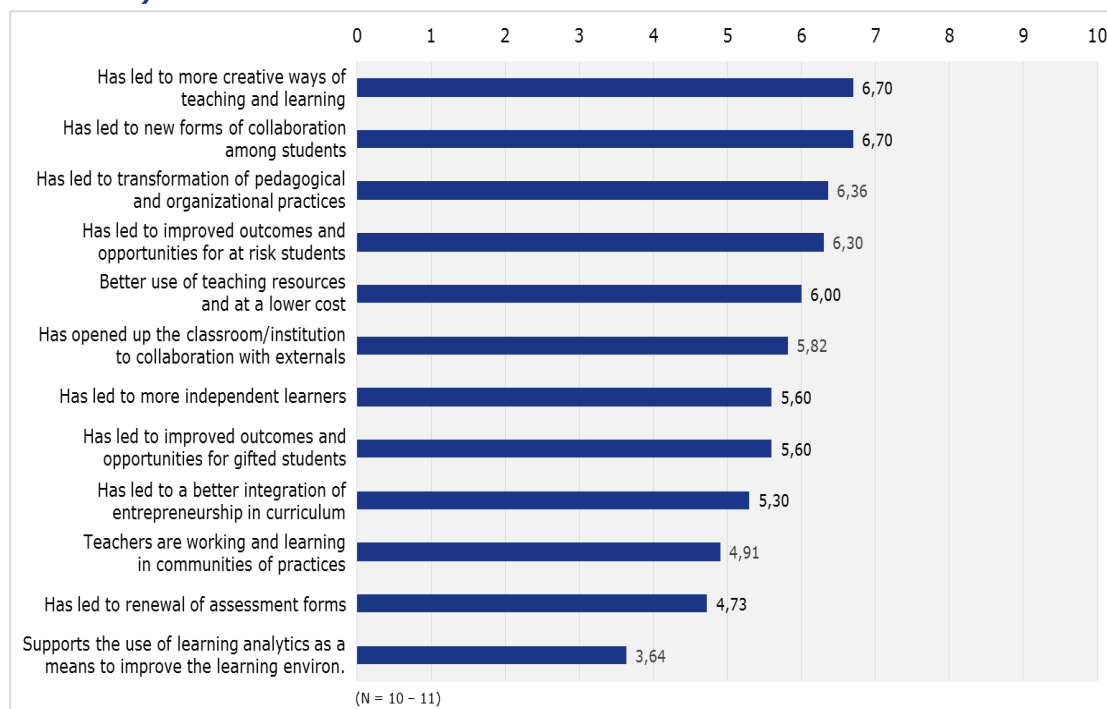


Note: environ.: environment.

Progress made - the school sector

The relative progress made and added value of digital and online learning scored somewhat higher for the school sector than for the higher educational sector (Figure 11). However, the low number of responses from the school sector should be taken into account.

Figure 11: Progress made in terms of added value of digital and online learning (higher education)

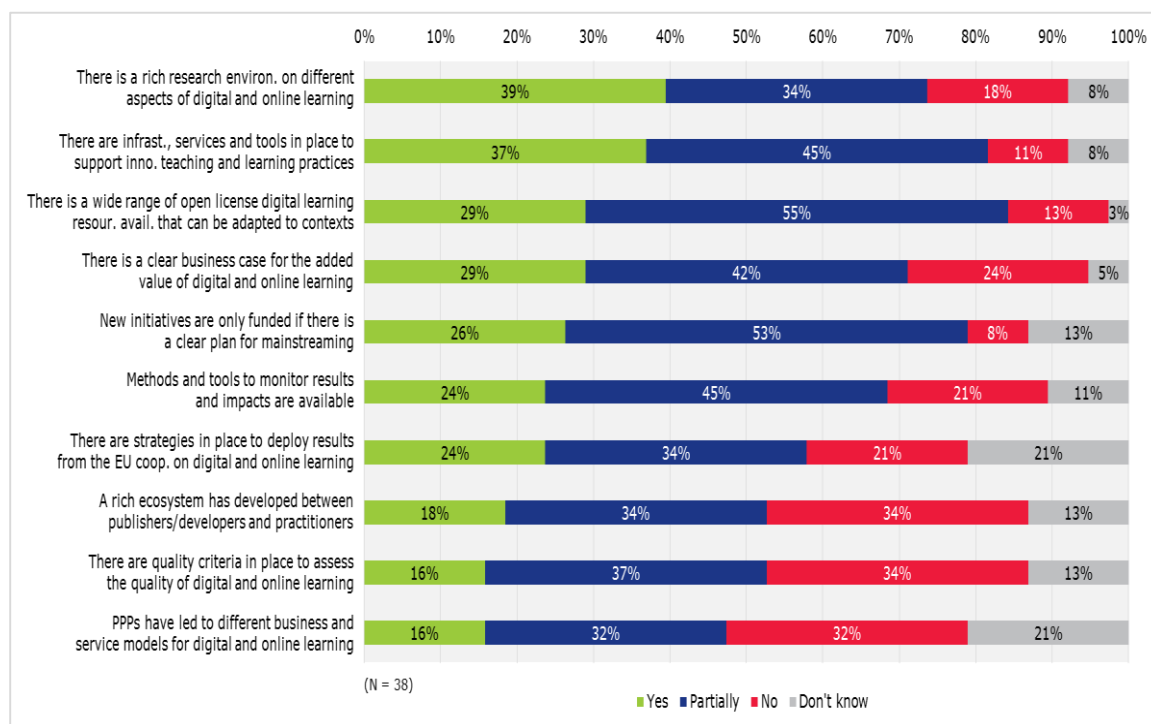


Note: environ.: environment

10. Mainstreaming digital and online learning

The respondents were asked to assess different aspects/levels of mainstreaming digital and online learning on a scale of '*fully in place*', '*partially in place*', and '*not in place*', with an option to indicate '*do not know*'. For the educational sector as a whole, mainstreaming is perceived to have occurred mainly in relation to research, infrastructures, and OER (Figure 12). 39% of the respondents expressed that there is a rich research environment fully in place, whereas 34% that it is partially the case; 37% indicated that there are infrastructures, services and tools in place, while 55% that this is partially the case; 29% indicated that there is a wide range of OER available, while 45% that it is partially the case. When it comes to a business case for digital and online learning, 29% reported that it is fully in place, while it is partially in place for 42%. The lowest scores are given to 'clear quality criteria in place to assess digital and online learning' and to 'public private partnerships with different business models' (Figure 12).

Figure 12: Level of mainstreaming of digital and online learning (educational sector as a whole)



Note: avail.: available; coop.: cooperation; environ.: environment; infra.: infrastructures; inno.: innovative; resour.: resources.

When interpreting the data, the relative low number of '*do not know*' responses should be taken into account. Questions that are more related to institutional practices than system level practices seem to get more '*do not know*' responses. This is likely to be an effect of the respondents primarily being policymakers. Discussions in the WG DOL have highlighted that at this stage both policymakers and institutions are looking to tools and practices that can leverage the value of digital and online learning and enable scaling through, for example, integrated practices for quality assurance, which can provide the necessary tools at system and institutional levels.

At the inception of the 'Opening up Education Communication' from the EC, one concern applied to the relatively few examples of scaled and mainstreamed practices of digital and online learning in spite of substantial investments in this sector.

Although this analysis does not build on a comprehensive data set from all European area, it does provide some indications of achievement and progress regarding scaling and mainstreaming. The respondents scored '*a clear business case*' item relatively high, indicating the relative confidence of respondents regarding the maturity and added value of digital and online learning solutions. It is therefore surprising that clear quality criteria for assessment of digital and online learning and business as well as service models for digital and online learning score relatively low, as these elements are typical features in a mature model and business case for digital and online learning. A possible reason could be that the issues of cost-benefit and economics of digital and online learning until now have not been major priorities in research. In addition, there is a lack of tools and approaches to assess the relative cost-benefits.

The US Office of Educational Technology has attempted to assess the productivity effects of digital and online learning in a study commissioned to SRI (Bakia, et al., 2012).

The study provides the basic building blocks to examine and understand the potential contributions of online learning to educational productivity, including a conceptual framework for understanding the necessary components of rigorous productivity analyses, drawing the attention in particular on cost effectiveness analysis as a plausible method to assess the economics of digital and online learning. The study could represent a baseline for further development in an EU context.

With growing pressure on the educational sector to accommodate more learners and improve educational outcomes for more students, it becomes critical for both policymakers and institutional leaders to have the appropriate tools to support the use of digital and online technologies to scale learning environments in a cost-efficient manner without hinder the quality of education.

The relative ratings provided through this survey indicate that although progress has been made, there is still room for improvement when it comes to integrating digital and online learning in a more systemic way, typical of more mature digitally educational institution. According to the survey responses, there are for example gaps when it comes to:

- Strategies to support the uptake of results from EU cooperation. Major investments have been made in digital and online learning through European programmes. WG DOL and Online Learning and Digital Skills are ways to stimulate exploitation and dissemination of results, which can lead to cost efficiency gains and accelerate digitally enabled innovations.
- Clear quality criteria to assess the quality of digital and online learning. Without clear quality criteria to assess the quality of digital OER, those responsible for procurement of educational materials may hesitate to invest in them.
- A rich ecosystem to enable critical factors. As seen in other sectors, ecosystems can accelerate a transformation through the value chain for digital and online learning – in the case of digital and online learning notably through collaboration on high-quality professional OER and embedded assessment systems. Furthermore, the involvement of the private sector represented by publishers and educational software providers may be critical to OER portals having a sufficient level of quality with indexes and structures so that they are attractive to practitioners.

The US Federal Strategy (Office of Educational Technology, 2010) has explicitly built on an innovative ecosystem to accelerate mainstreaming of business and service models. It has since been followed up by the 2016 Plan 'Future Ready Learning: Reimagining the Role of Technology in Education'¹⁷ (US Office of Educational Technology, 2016).

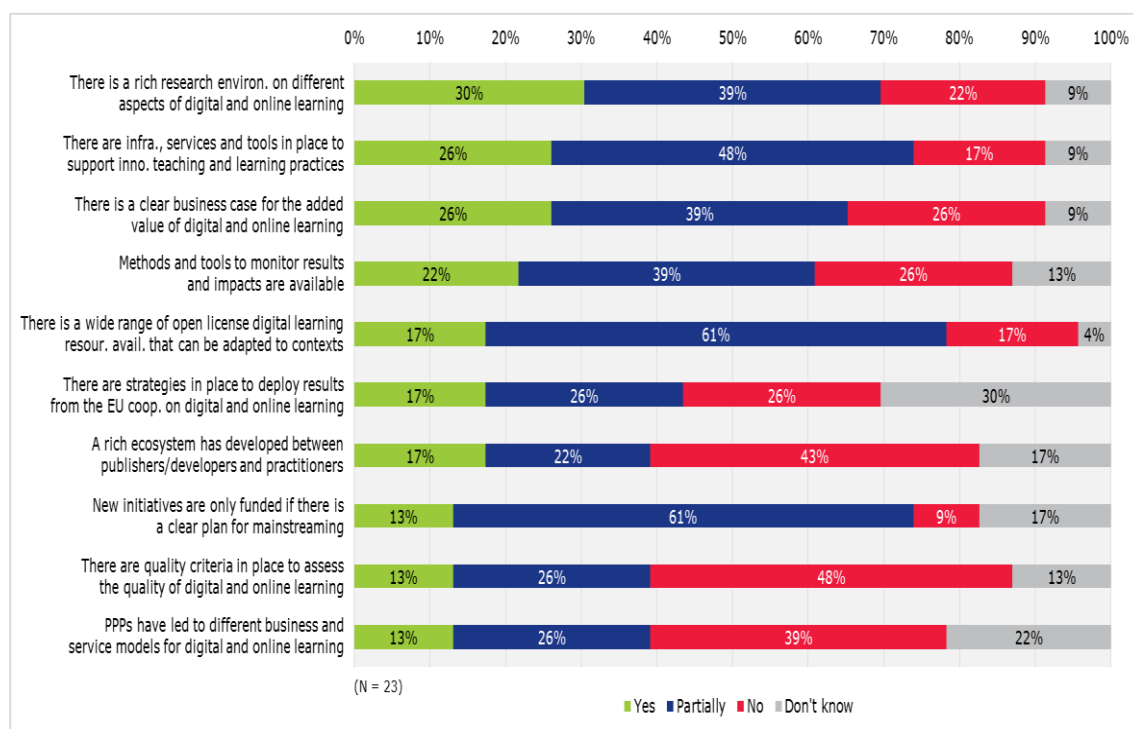
'Clear quality criteria to assess digital and online learning' are indicated as being fully in place by 16% and partially in place by 37% by the respondents. As the national experts in the WG DOL have indicated, there is a growing abundance of OER. However, the quality of the resources varies substantially, which makes the issue of quality criteria even more pertinent. Quality criteria that consider the learning context and are easy to use are critical when it comes to procurement of digital education materials. It is also critical for practitioners who, with limited time to prepare digital educational material, may need guidance to assess the quality of materials available at OER portals.

¹⁷ <http://tech.ed.gov/files/2015/12/NETP16.pdf>

16% of the respondents indicated that public and private partnerships leading to different business and service models for digital and online learning are fully in place, and 32% stated that this is partially the case. The responses suggest that there is a need to investigate further the underlying business and service models in different measures that have been scaled and are considered as current best practice. Without such knowledge, there will be limited motivation to invest in new developments and improve the functionality of existing portals and platforms.

Figure 13 shows how HE respondents have rated the level of mainstreaming that occurred in this sector. Top scores are given to 1- research environments in place (30% indicating fully and 39% indicating partially in place); 2- infrastructures and services (26% indicating fully and 48% indicating partially in place), and 3- a clear business case (26% indicating fully and 48% indicating partially in place). The lowest scored features are 'the availability of quality criteria' and 'public private partnerships with varied and sustainable business models and practices', both with 13% of the respondents indicating fully and 26% indicating partially in place.

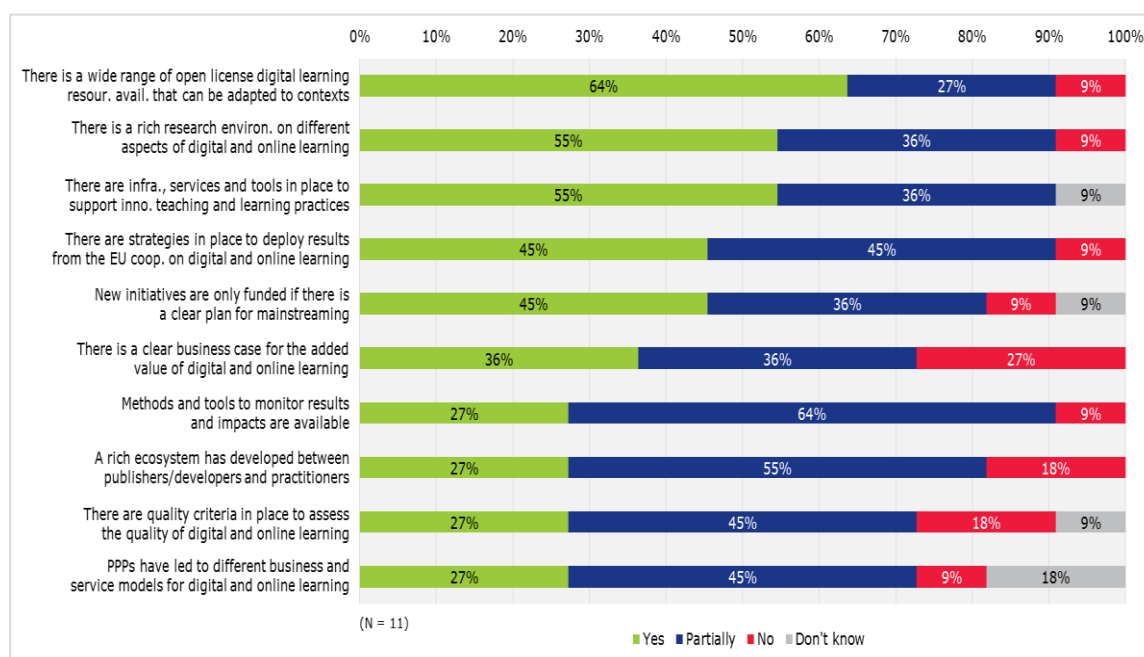
Figure 13: Level of mainstreaming of digital and online learning (higher education)



Note: avail.: available; coop.: cooperation; environ.: environment; infra.: infrastructures; inno.: innovative; resour.: resources.

As mentioned above, the responses from the school sector are few, so the results should be interpreted with caution. Nevertheless, the data show that 64% of the respondents indicated that there is a wide range of OER resources available, and another 27% that this is partially the case. In addition, 55% indicated that there is a rich research environment in place, whereas 36% that this is partially the case. The same figures are seen with regard to infrastructures. Strategies in place to exploit results from European projects are indicated as fully in place by 45% and partially in place by 45% of the respondents.

Figure 14: Level of mainstreaming of digital and online learning (school sector)



Note: avail.: available; coop.: cooperation; environ.: environment; infra.: infrastructures; inno.: innovative; resour.: resources.

The active diffusion of results from European projects is at times hampered by insufficient internal capacity and networking ability of individual promoters. In this respect, organisations such as the European Schoolnet can have an important multiplier effect by promoting mainstreaming of European funded projects.

Although the data from the school sector are limited, they reflect a trend similar to that of the higher educational sector. Thus, 36% of the school respondents indicated that there is a 'clear business case' for the value added for digital and online learning, 36% that this is partially the case, whereas 27% expressed a 'no,' i.e., that this is not the case. Similarly, 27% stated that there are tools and methods to monitor results, 64% that this is partially the case, and 9% that this is not the case (Figure 14).

Numerous studies on digital and online learning in the school sector have been published (European Schoolnet, 2015) in recent years, but many of these only look at particular parts of the school as a system (Cachia, et al., 2010) (Mutka, et al., 2008). The integration of digital and online learning in school education is now so common that the next natural step is to create an assessment framework able to identify those circumstances where digital and online learning contributes to improving learning experiences and learning outcomes of learners. The OECD publication (OECD, 2015)

'Students, Computers, and Learning: Making the Connection'¹⁸ and the subsequent debate showed the flaws in current evaluation and assessment frameworks for digital and online learning. Since the recent financial crisis, ministries of education and educational institutions have been under pressure to improve efficiency. If digital and online learning is to be further mainstreamed, there is a need for more rigorous methodologies to assess how and when digital and online learning can improve learning outcomes to impact policy making and practice. The EC could play an enabling role by supporting the development of a European impact assessment framework for digital and online learning similar to the reference framework for the Digitally Competent Educational Organisations. The advantage of a common European framework would be that it could spur learning between countries both at policy and institutional level.

11. Barriers to mainstream digital and online learning

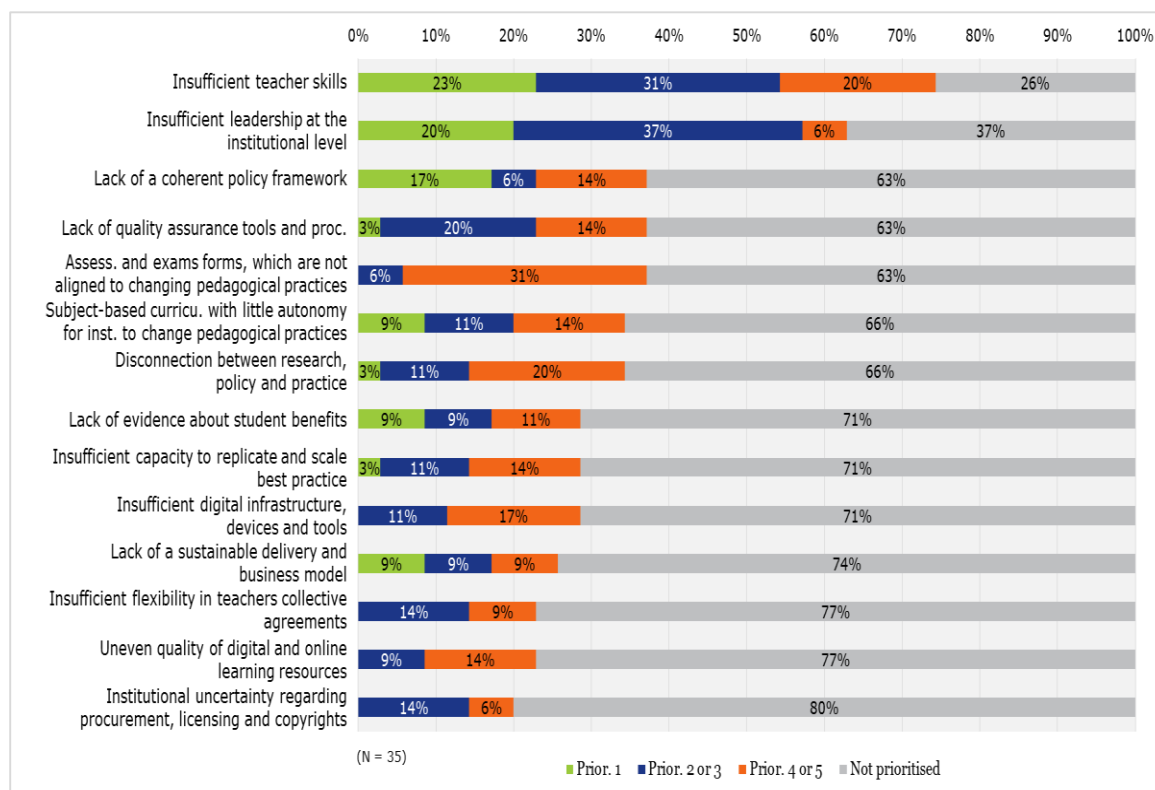
Next, the survey tried to identify obstacles limiting the mainstreaming of digital and online learning among a short list of possible barriers. The respondents were asked to prioritise barriers by indicating the five most important barriers to digital and online learning. 'Lack of teacher skills' is indicated by 23% as the most important barrier, followed by 'lack of institutional leadership' (20%), and 'lack of a coherent policy framework' (17%). 'Subject-based curriculum leaving little autonomy to the institutions to change pedagogical practice', 'lack of evidence about student benefits', and 'lack of sustainability in delivery and business models' are perceived to be the key barriers by 9% of respondents, followed by 'lack of quality assurance processes', 'insufficient capacity to replicate and scale best practice', and 'disconnect between research, policy and practice' with 3% each. Whereas the nature of curriculum can be a barrier that may only be removed through changes in the regulatory framework, the other barriers can more easily be addressed by the institutional leadership (Figure 15).

The assessment shows that digital infrastructures no longer constitute the main barrier to the further uptake of digital and online learning, but also that the institutional capacity to deploy digital and online learning technologies to innovate teaching and learning remains critical if digital and online learning is to be more than an add on to traditional educational practices. The Reference Framework for the Digitally Competent Educational Organisations (DigCompOrg)¹⁹ is therefore a timely response to this challenge, as it focuses on the systemic innovation potential of digital and online learning in a holistic and 'all-of institution' approach.

¹⁸ <http://www.oecd.org/publications/students-computers-and-learning-9789264239555-en.htm>.

¹⁹ <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/promoting-effective-digital-age-learning-european-framework-digitally-competent-educational>

Figure 15: Barriers to mainstreaming digital and online learning (educational sector as a whole)



Note: The respondents were asked to prioritise five of the mentioned main barriers from 1 to 5; assess.: assessment; curricu.: curriculum; inst.: institution; proc.: processes.

12. Enablers for digital and online learning

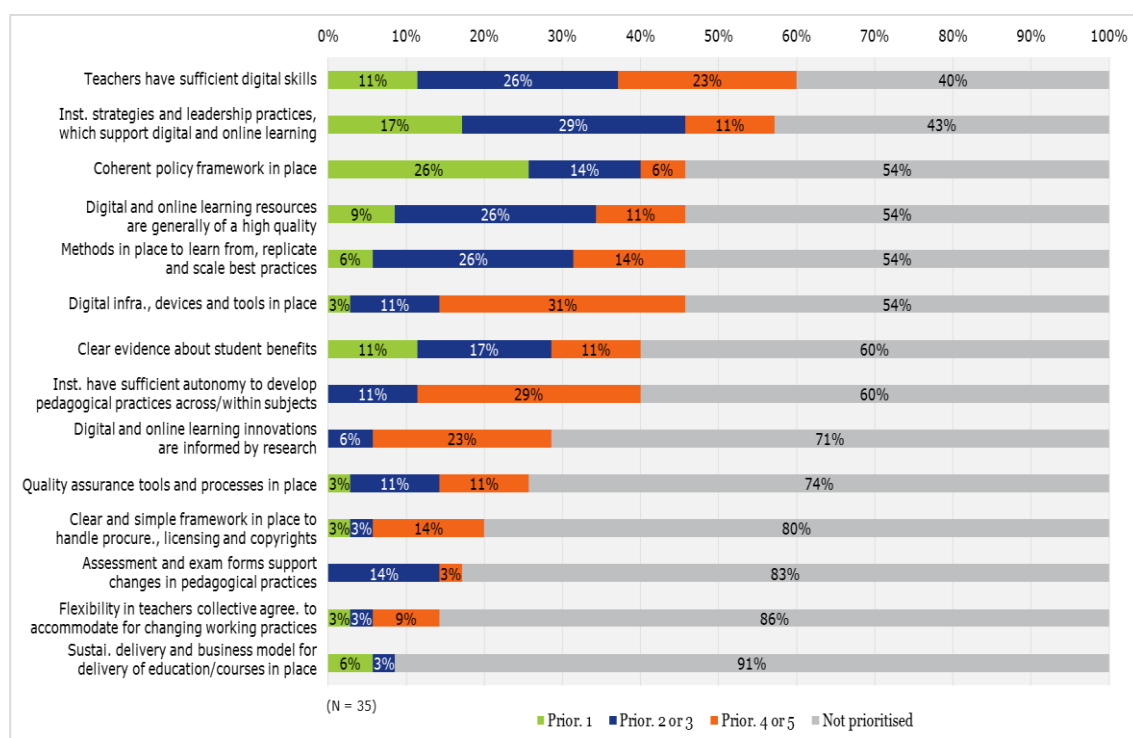
The respondents were asked to assess the most important enablers for digital and online learning. As shown in figure 16 a 'coherent policy framework' is the number 1 priority for 26% of respondents, followed by 'institutional strategies and leadership practices' (17%) and 'teachers digital skills' (11%). This mirrors the responses given about the most important barriers. 'Student benefits' are indicated by 11% of the respondents, 'quality in digital and online learning resources' by 9%, and both 'methods to learn from' and 'scale best practices and sustainable business and service models' by 6%.

It is worth pointing out the relatively low level of importance given to institutional autonomy to develop pedagogical practices; 11% saw it as the 2nd to 3rd most important enabling factor, 29% as the 4th to 5th most important factor, and no one indicated it as the most important factor. The score could be explained by the dominance of HE respondents. Due to the relative institutional autonomy in the higher education sector, institutional strategies and leadership practices are key factors in digital and online learning to innovate educational practices and service and delivery models in HE. This is confirmed by the European study on innovation in HE through digital and online learning (Brennan, et al., 2014).

Fully integrated digital and online learning environments can have major transformative and at times disruptive effects not only on teaching and learning practices in higher education, but also on the student population, staffing, and R&D practices

linked to phenomena such as Open Science and new dynamics in the collaboration between university lecturers, students, and external firms. However, as previously discussed in this report, the uptake of digital technologies in HE has mainly led to incremental innovations.

Figure 16: Enablers to mainstreaming digital and online learning (educational sector as a whole)



Note: The respondents were asked to prioritise five of the mentioned main enablers from 1 to 5; agree.: agreement; inst.: institution; infra.: infrastructures; proc.: processes; procure.: procurements; sustain.: sustainable.

13. Impact of the EC Communication 'Opening Up Education'

The respondents were asked to assess the impact of the EC Communication 'Opening up Education'²⁰ (Figure 17). 64% of the respondents indicated that their country had already made full (25%) or partial (39%) progress before the 'Opening up Education' Communication was published, whereas up to 58% indicated that the Communication is important (22%) or partially important (36%) for the skills agenda.

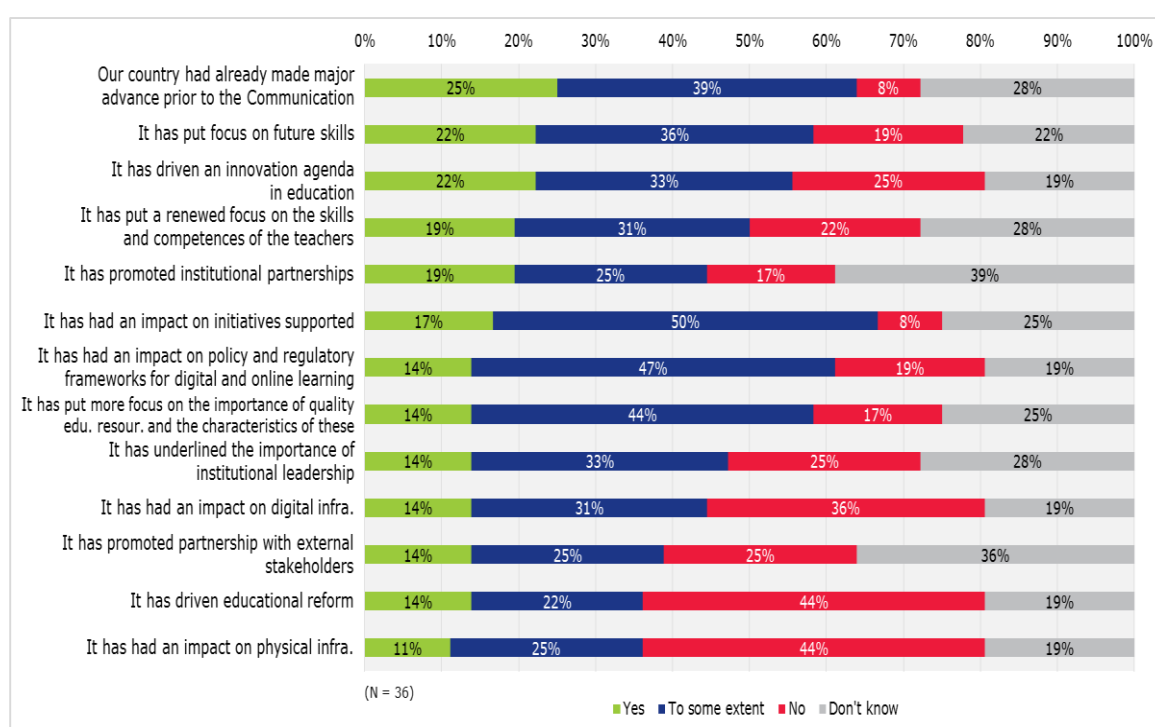
22% of the respondents indicated that the Communication served as a driver for a new agenda in education, while this was partially the case for the 33%. 19% indicated that the Communication has renewed the focus on teacher skills, while for 31% this was partially the case. Furthermore, 19% reported that the Communication has placed renewed focus on institutional partnerships, while 25% indicated that this was partially the case.

Combined, the responses show that the 'Opening up Education' communication has driven a broad-based reform agenda in education across the EU with a strong emphasis on the innovation potential that can be derived from digital and online learning technologies.

²⁰ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52013DC0654>

The respondents see the Communication on Opening Education and hence digital and online learning as closely linked to the agenda on 'New Skills for New Jobs'²¹. This is not surprising, given that digital and online learning does not merely enable learners to acquire basic digital skills. When digital and online learning is fully integrated, students can search for materials, which can bring new insights to a particular problem with modalities and outcomes far beyond those of the traditional school library. Students may contact experts outside the educational institution, and digital platforms can enable students to solve complex open-ended problems in a collaborative manner through a digital interface. 'Computational thinking,' whether in universities or in school education, has become of increasing interest to educational researcher as the way to design learning environments that will better prepare students for dealing with increasingly complex problems²². The competences associated with computational thinking are of increasing importance, due to the pervasiveness of digital technologies across sectors and jobs, which is why computational thinking is a topic of growing interest in the education sector in response to 21st century skills demands²³

Figure 17: Overall impact of the Communication 'Opening Up Education'



Note: The respondents were asked to prioritise five of the mentioned main enablers from 1 to 5; edu.: educational; infra.: infrastructures; resour.: resources.

The survey ended with a question about the potential future topics that the WG DOL could expand, provided that digital and online learning continues to be a theme (Figure 18). The respondents were asked to prioritise a number of possible actions on a scale from 1 to 5, with number 1 being the most important priority. Their answers gave a clear indication of their opinions. 42% of the respondents reported 'strategies and practices for scaling and mainstreaming' as a priority 1, and another 11% as a priority 2 or 3. Much lower in the priority list, 14% reported 'scenarios and design for digital and online

²¹ <http://ec.europa.eu/social/main.jsp?catId=568>.

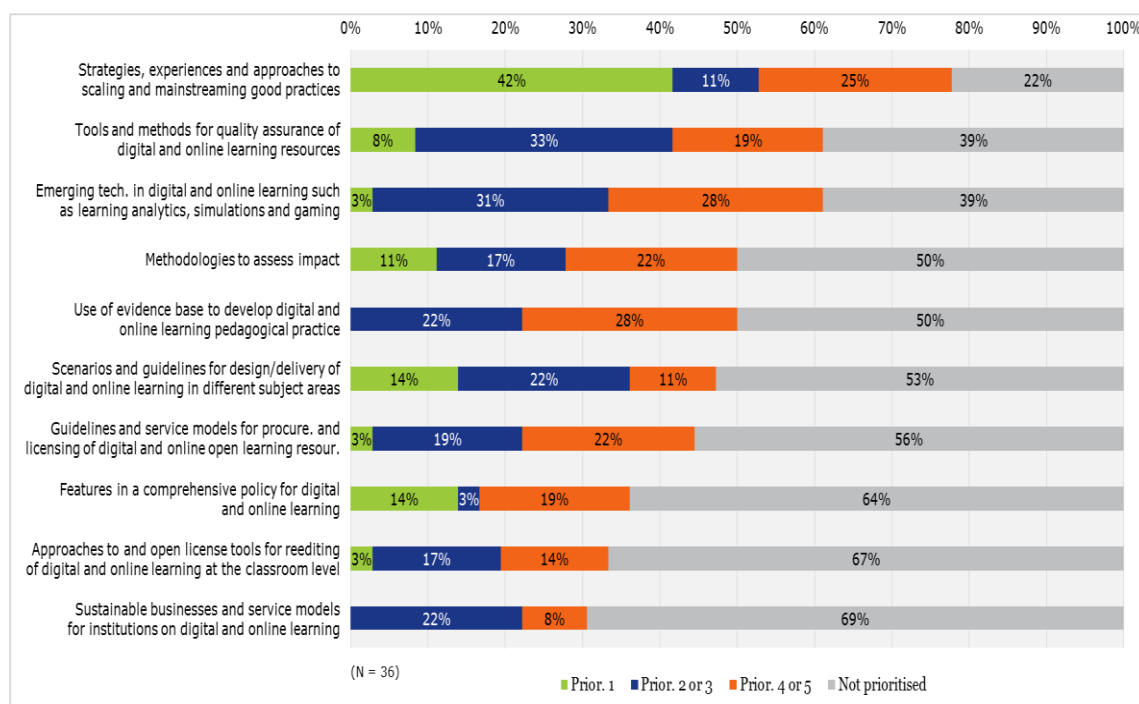
²² <https://www.google.dk/edu/resources/programs/exploring-computational-thinking/>.

²³ <https://web.jrc.ec.europa.eu/callsfortender/index.cfm?action=app.homepage&cpv=7433&level=2>

learning in different areas' as priority 1, while 22% as priority 2 or 3. Another 14% indicated 'features in comprehensive policy making for digital and online learning' as priority 1, whereas only 3% as priority 2 or 3. It is surprising that 'sustainable service and business models for digital and online learning' scores so relatively low, with no one giving to it a first priority score, 22% giving priority 2 or 3 and 8% priority 4 or 5, since sustainability of business models and services is closely associated with scaling and mainstreaming.

More or less all priorities are linked to with strategies, methods and experiences regarding scaling and mainstreaming practices, including methods to assess impact and ensure the quality of resources and practices. Issues relating to scaling and mainstreaming are well suited for European working groups aligned to the nature and purpose of the ET2020 working groups. Structured and facilitated ways of sharing and contextualising practices can accelerate the scaling and mainstreaming of digital online learning. Furthermore, collaboration and sharing of experiences can reduce the risk of institutional innovation fatigue because practices and approaches that have not worked do not need to be repeated.

Figure 18: Prioritised topics for the next Working Group cycle related to digital and online learning



Note: The respondents were asked to prioritise five of the mentioned topics from 1 to 5; resour.: resources.

14. Discussion and conclusions

This survey originated within the activities of the E&T2020 WG DOL and aimed at obtaining a snapshot across Europa of policy initiatives in digital and online learning and assessing the extent of the impact at national/regional and sectorial level that the implementation of such initiatives has had. Here below, the main conclusions are drawn from the survey responses and some ideas are proposed as sources of further discussions about digital education and its potential to innovate educational systems.

Policy changes

The survey indicates that progress has occurred in the educational sector concerning the integration of digital and online technologies to improve teaching and learning processes as well as learning outcomes (Figure 2).

Changes in assessment forms can lead to a better balance between formative and summative technologies. The adoption of digital and online learning in the EU has played an enabling role in re-orienting the assessment from an almost exclusive focus on student performance towards the on-going assessment including e-portfolios to strengthen learners' reflection on what they have learned and how learning has occurred. Such practices may stimulate students' learning-to-learn competences, and they may enable students to become better at assessing good quality in their own work, which is a key element in learning-to-learn competences. This was clearly illustrated during a WG DOL session by an Irish schoolteacher. The Irish teacher demonstrated how she worked with her students using the digital and online learning environment to ensure that her students got on-going feedback on their project work, and this in turn resulted in students being much more motivated to improve their reports based on the teachers' feedback. One of the emerging trends is that technology enabled assessments are likely to be increasingly embedded in students' learning activities based on the use of learning analytics in coming years (Quellmalz, 2013) (Jisc, 2010).

Embedded assessments have the potential to further support the personalisation of learning through diagnostic functionalities that exploit learning analytics. Teachers can thus obtain more insight into why a particular student may have difficulties in tackling a particular problem. Students, in turn, can provide real-time feedback to the teacher(s) on how to best facilitate their progresses based on their learning characteristics, be it in school education or in higher education. While these opportunities are still mainly in the research stage in Europe (Verbert, et al., 2014), there are examples of digital platforms that are used in schools. Moreover, there are emerging applications in the UK in early childhood education (Hylan, 2015).

In the USA, there are significant examples such as the public summit schools in California²⁴ or the Purdue University (USA) which developed the 'signals learning analytics programme'²⁵. In this latter example, a coloured display tells individual students if things seem to be going well (green), if the system has detected a cause for concern (amber) or if they have been classified as at high risk (red). These colours are linked to advice about actions that students can take to get back on track. The University of Columbia in New

²⁴ <http://summitps.org/>.

²⁵ <http://er.educause.edu/articles/2010/3/signals-applying-academic-analytics>

York offers highly recognised teacher training programmes and claims to be the only university to currently offer a degree in learning analytics²⁶.

National and/or regional engagement

A role played by the national or regional governments in promoting the digital transformation of the educational sector is that to bridge available support from the EC to the modernisation of education programmes. Education is a public service area. It is therefore not surprising that governments have played a major role in stimulating the uptake of digital and online learning over time, in particular because of the major investments in infrastructure that are required also to ensure sufficient bandwidth. Although the digital infrastructures have improved in recent years, there are still differences in bandwidth across the MS and within the MS themselves. This has a negative impact on online access and hence on the opportunities to learn through digital and online learning, whether in households or in institutions or other settings. In recent years, the price of computers and tablets has gone down. This has enabled some countries to abandon former computer labs and to ensure that each student has a laptop or a tablet instead. Digital devices thus become mobile and easy to use inside and outside education institutions. These developments are reflected in the responses given to the question on government involvement in the promotion and support of the implementation of digital and online learning. The respondent sample clearly perceived a lack of national/regional engagement to support institutional changes (Figure 5). However, it is a fast-evolving engagement where EU countries and beyond are now revising and putting in place funding to support digital and online learning within their countries (Italy, Ireland, Denmark, Turkey).

Investments in infrastructure continue to be one of the top of priorities for government involvement in digital and online learning, but the relative score of 5.05 could suggest that it is less urgent as infrastructures have matured (Figure 5).

As many governments are under pressure to prioritise scarcer public funding for public goods such as health and education, the EC can continue to play a critical enabling role in ensuring documentation and diffusion of best practices. This can help the MS assessing the cost effectiveness of different solutions, and the EC will continue to play an enabling role in disseminating best practices through portals such as Open Education Europe²⁷, or EPALe, the electronic platform for adult learning in Europe²⁸.

Digital skills and digital and online learning are closely intertwined

Digital and online learning have been going on for over 25 years, with the EC playing a central role in stimulating European wide collaboration through pilot projects, R&D programmes and facilitating knowledge diffusion through working groups, publications and repositories with outputs concerning digital and online learning. Developments in bandwidth, hardware, software, digital content, and especially teachers' skills and competences have resulted in digital and online learning developing from primarily being an add-on to existing educational practices (the electronic classroom, the electronic book) to now, when digital and online learning is gradually integrated into educational practices.

²⁶ <http://www.tc.columbia.edu/human-development/learning-analytics/>

²⁷ <http://openeducationeuropa.eu/>

²⁸ <https://ec.europa.eu/epale/>

Consequently, policymakers and practitioners can focus on the qualitative benefits of digital and online learning including how to best scale and replicate successful practices. In this sense, discussions and priorities regarding digital and online learning have developed from being technically focused on topics such as interoperability and standards, to dealing with deeper level questions concerned with the fit between the views and goals of the teaching and learning environments, pedagogical and organisational design choices. Views of the digitally enabled learning environment have advocated that innovations in digital and online learning facilitate learners to become 'co-creators' of their learning environment and that the learning environment is a supportive space, which can assist students to gradually learn to work on open-ended and 'fuzzy problems' in a creative, collaborative and analytical manner. This has in turn led to growing policy interest in computational thinking²⁹. Although computational thinking is an evolving field in education research and practice, one definition that has been highly influential stems from Wing, (Wing, 2006). She states that 'Computational thinking (CT) involves solving problems, designing systems, and understanding human behaviour, by drawing on the concepts fundamental to computer science'. CT's essence is thinking like a computer scientist when confronted with a problem.' See also (Grover & Pea, 2013-42:38).

Added value

It is necessary to improve impact evaluations of digital and online learning in Europe. More rigorous impact studies are central to mainstreaming and scaling based on work evidences. Furthermore, these studies will be a key to ongoing improvements. Better data would also support institutions that have invested substantially in developing and innovating teaching practices, to bring these to scale. At present, evaluation and impact assessment studies vary considerably in the methodologies they adopt. A meta-study to systematically and globally review methodologies for impact assessment of digital and online learning could drive mainstreaming and scaling of quality practices in digital and online learning. Such a measure could be initiated by the EC and feed into a research-based European framework for impact assessment of digital and online learning.

Furthermore, the [DigCompOrg](#) reference framework, developed by the Institute for Prospective Studies with the support of the WG DOL, may be of great value in supporting institutions and governments in further developing strategies and practices that support an innovation-driven approach to the uptake and further use of digital and online technologies.

It is interesting to note that a framework somewhat similar to the DigCompOrg has been launched as part of the most recent federal strategy for digital and online learning in the USA, Future Ready Learning- Reimagining the Role of Technology in Education³⁰ (US Office of Educational Technology, 2016). In 2015, a separate initiative was created under the Alliance for Excellence in Education, a Washington DC-based national policy and advocacy organisation dedicated to improving K-12 education, particularly for at-risk students. The initiative is called 'Future Ready Schools' (FRS)³¹. The aim is to support school districts in the transformation of strategies and practices by leveraging ICT to personalise learning. The Future Ready School initiative has created a one-stop shop,

29 <http://scratched.gse.harvard.edu/ct/defining.html>

30 <http://tech.ed.gov/files/2015/12/NETP16.pdf>

31 <http://www.futurereadyschools.org/network>

which, in addition to a range of services, offers access to the Future Ready Assessment Framework³².

Mainstreaming

To further promote the mainstreaming of digital and online learning, it is necessary to understand digitalisation of education from a systemic perspective both at system and at institutional level. Indeed, neither 'quality criteria in place' nor 'public private partnerships that have led to different service and business models' score particularly high (Figure 12, Figure 13 and As mentioned above, the responses from the school sector are few, so the results should be interpreted with caution. Nevertheless, the data show that 64% of the respondents indicated that there is a wide range of OER resources available, and another 27% that this is partially the case. In addition, 55% indicated that there is a rich research environment in place, whereas 36% that this is partially the case. The same figures are seen with regard to infrastructures. Strategies in place to exploit results from European projects are indicated as fully in place by 45% and partially in place by 45% of the respondents.

Figure 14), as both these factors would seem to have an impact on a sustainable business case for digital and online learning whether based on a for-profit or non-profit business model. Digital and online learning technologies hold the potential to disrupt traditional business models in higher education. They can bring major benefits to higher education institutions, such as new user groups and new revenue streams and markets, provided proper institutional strategies are in place with appropriate risk assessment. Moreover, institutional strategies should take into account how digital and online technologies can stimulate new dynamics between research, education, and innovation.

It is also in this context that the DigCompOrg reference framework can add real value to institutional development by framing the uptake of digital and online learning technologies as part of a broad innovation strategy. The University of Aalto in Finland is an interesting case in that respect³³. To support digitally enabled innovation in HE further, it could be of value to develop case studies that deal with the organisational and strategic perspectives of digital and online technologies.

In 2014, a study providing some European cases on how universities have implemented digital and online learning as part of a wider innovation strategy was published (Brennan, et al., 2014). The study concludes that changes induced in a HE innovation system by innovative practices tend not to be radical in nature. They provide new ways of doing traditional things and respond more efficiently to changing requirements in higher education. Furthermore, the case studies suggest that ICT-enabled innovation to improve practices does not depend on a particular regulatory or policy context in higher education. Rather, it is related to the strength of the institutional support given to what usually starts as a bottom-up initiative bringing together different institutional stakeholders. However, digitally enabled innovations will be enhanced by top-down incentives in the form of funding to support small-scale experimentation before being scaled and implemented more widely within the institution and by a mindset change in the institution. Case studies such as those conducted by Brennan et al (2014) can help institutions that are still in the early phases of digital integration, and could

³² <http://dashboard.futurereadyschools.org/framework>

³³ <http://addlab.aalto.fi/>

complement the reference framework for the digitally competent educational institutions from the Institute for Prospective Studies.

Access to digital infrastructures does not constitute the key barrier (Figure 15) to further uptake of digital and online learning. However, the Digital Agenda Scoreboard shows that limited access to high-speed broadband still constitutes a barrier to wider universal access to digital and online learning environments in some parts of Europe³⁴.

Compared to research in the USA, development and uptake of learning analytics in the EU is at an early stage. Over time, integrated digital learning environments will offer new opportunities to perform real time assessment that can be used for diagnostics. The EC can accelerate opportunities to innovate assessment models through learning analytics, research and experimental pilots. To fully benefit from such investments, future actions need to consider data privacy and security issues, in addition to supporting the availability of sufficient technical and pedagogical capacity to exploit these opportunities. If learning analytics are to become a meaningful tool in classroom practice, teachers need to be supported so they can work with learning analytics in a structured way, for example through learning dashboards, which is one of the research fields of Leuven University³⁵.

Though progress has been made, responses provided by the participants also suggest that there is still room for improvement in a range of areas that constitute key building blocks of a digitally competent educational institution. The work undertaken by the Institute for Prospective Studies on the reference framework [DigCompOrg](#) and supported by the WG DOL may accelerate an innovation-driven uptake and mainstreaming of digital and online learning. This example shows the importance of collaboration if we are to make progress on the uptake of digital and online learning - also beyond the borders of the EU.

³⁴ <https://digital-agenda-data.eu/>

³⁵ <http://www.slideshare.net/erik.duval/learning-dashboards>

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16. Annex – Survey questionnaire

Introduction to survey

On behalf of the European Commission, Directorate Education and Culture (DG EAC), the Danish Technological Institute is conducting a survey on digital and online learning. The Member State working group on digital and online learning (WG-DOL) is established in the context of the Open Method of Coordination under the ET 2020 strategic framework for European cooperation on education and training. The main aim of the working group is to foster mutual learning between Member States and to further policy development on digital and online learning. To support that Member States are kindly invited to respond to the survey with focus on respectively the school sector and the higher educational sector.

The aim of the survey is to get insights into policies and practices on digital and online learning, priorities for collaboration and potential barriers to further mainstreaming. Moreover, the survey aims to get an understanding of how digital and online learning is evolving in the Member States from the perspective of policymakers and to promote PLA within the WG-DOL.

The data will provide valuable new knowledge, which can contribute to the dialogue and cooperation on digital and online learning in the EU and at Member State level. When the analysis has been finalised, it will be made available to members of the working group.

On behalf of DG EAC we would like to thank all of you to take part to this survey and for your support.

Please indicate your country.

(State one answer only)

A	B	B	C	R	D	E	F	F	G	G	H	I	I	L	L	L	T	N	N	P	P	R	S	S	S	S	U	U
u	e	e	r	e	e	s	i	r	e	r	u	c	r	a	u	u	u	e	o	o	o	o	o	o	o	o	u	u
s	l	l	o	p	n	t	n	a	m	a	n	e	e	l	h	e	m	t	r	r	u	a	l	o	o	o	z	k
t	g	g	f	u	m	a	a	n	a	n	e	a	a	a	a	a	a	a	a	a	a	a	a	a	a	e	r	
r	i	i	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	a	n	
i	a	a	y	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	p	d	g	
a	m	a	p	r	k	a	d	e	y	e	y	d	d	a	i	o	a	l	a	a	a	a	a	a	a	n	d	o
			u	s																							m	

☐ ☐

Other, please specify:

1. Please indicate which educational sector you represent. (If you represent more than one sector, please indicate your primary sector. Throughout the survey we will ask you to answer the questions based on this sector.)

(State one answer only)

Higher educational	School sector	Adult educational	Vocational education and	Teacher union	Employer organisation
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sector

sector

training sector

☐☐☐☐☐☐

Other, please specify:

2. Please indicate your function in your organisation

3. How many years have you been working with issues relating to digital and online learning? (Please indicate number of years)

4. Does your country have national policy frameworks in place for digital and online learning in your sector (Please choose only one answer) (State one answer only)

Coherent policy frameworks are in place covering important aspects of digital and online learning

☐

Policy frameworks are being implemented

☐

Policy frameworks are currently being planned

☐

No formulated policies at present

☐

I do not know

☐

Other, please specify:

5. Does your country have regional policy frameworks in place for digital and online learning in your sector? (Please choose only one answer) (State one answer only)

Coherent policy frameworks are in place covering important aspects of digital and online learning

☐

Policy frameworks are being implemented

☐

Policy frameworks are currently being planned

☐

No formulated policies at present

☐

I do not know

☐

Other, please specify:

6. Please add supplementary comments or links to relevant legislation and other policy and strategy documents at the national or regional level, or at sub-sector level as relevant.

**7. Have developments in digital and online learning led to changes in national policies in any of the following areas in your sector?
(State only one answer per question)**

	Yes	No	I do not know
Policies on physical and virtual space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teacher education and training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teachers working conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procurement of educational material/courseware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Licensing of educational software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Copyrights for open educational resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nature of investment in educational infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exams and assessment forms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Curriculum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Courseware/educational materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other, please specify:

**8. Have developments in digital and online learning led to changes in regional policies in any of the following areas in your sector?
(State only one answer per question)**

	Yes	No	I do not know
Policies on physical and virtual space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teacher education and training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Teachers working conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procurement of educational material/courseware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Licensing of educational software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Copyrights for open educational resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nature of investment in educational infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exams and assessment forms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Curriculum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Courseware/educational materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other, please specify:

9. Please add supplementary comments or links to relevant legislation and other policy and strategy documents at the national or regional level, or at sub-sector level as relevant.

10. Is the government at national level engaged in the promotion and support to implementation of digital and online learning in your sector? Please indicate on a scale from 0-10 where 0= no involvement and 10= a major involvement. (State only one answer per question)

	0	1	2	3	4	5	6	7	8	9	10	I do not know
Investment and maintenance of digital infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Licensing of educational software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling of copyrights for open educational resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teacher training schemes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Funding for development of digital and online materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Free access to OER portals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Funding of public private partnerships to support the development of an ecosystem	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Funding of pilot projects to support implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research on digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EU funding and collaboration on digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Awareness raising, guidelines, best practice examples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impact assessment and cost-benefit models	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other promotion and support to implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. If you have selected 'Other', please describe the promotion and support to implementation.

12. Is the government at regional level engaged in the promotion and support to implementation of digital and online learning in your sector? Please indicate on a scale from 0-10 where 0= no involvement and 10= a major involvement. (State only one answer per question)

	0	1	2	3	4	5	6	7	8	9	10	I do not know
Investment and maintenance of digital infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Licensing of educational software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling of copyrights for open educational resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teacher training schemes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Funding for development of digital and online materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Free access to OER portals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Funding of public private partnerships to support the development of an ecosystem	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Funding of pilot projects to support implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research on digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EU funding and collaboration on digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Awareness raising, guidelines, best practice examples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impact assessment and cost-benefit models	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other promotion and support to implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. If you have selected 'Other', please describe the promotion and support to implementation.

14. Please add links to relevant sources such as studies and reports, links to large pilot projects etc.

****15. What do you consider to be the most important benefits of digital and online learning in your sector? Please indicate the five most important benefits in a prioritized order where 1 is the most important, 2 is the second most important, and so on. (Please prioritize exactly 5 options with incremental numbers 1-5, where 1 is best)**

Improved cost effectiveness of teaching and learning	_____
Improved learning outcomes	_____
Teaching and learning practices that match skills needs required in 21st century	_____
Better use of teacher resources	_____

A more diversified learner oriented learning environment _____

Better opportunities to meet the needs of diverse learners _____

More updated and relevant learning resources _____

Improves student opportunity to acquire key competences _____

Opening up education leading to more or better external cooperation _____

More opportunities to integrate key competences such as entrepreneurship and communication _____

I am uncertain about potential benefits _____

Other benefits _____

**16. If you have selected 'other', please specify the benefit.
Also, please add supplementary comments or links to sources that illustrate your assessment.**

**17. Please make an overall assessment on progress made and added value of digital and online learning in your country as a whole on a scale from 0 to 10.
10= Mirrors fully the situation, 5= Mirrors the situation to some extent, 0 = Is not the case.
(State only one answer per question)**

	0	1	2	3	4	5	6	7	8	9	10	I do not know
Has led to transformation of pedagogical and organisational practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teachers are working and learning in communities of practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to renewal of assessment forms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better use of teaching resources and at a lower cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Has led to more independent learners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has opened up the classroom/institution to collaboration with externals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to more creative ways of teaching and learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to a better integration of entrepreneurship in curriculum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to new forms of collaboration among students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supports the use of learning analytics as a means to improve the learning environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to improved outcomes and opportunities for at risk students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to improved outcomes and opportunities for gifted students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other progress made	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. If you have selected 'other', please specify the progress made.

19. Please make an overall assessment on progress and added value of digital and online learning in your sector on a scale from 0 to 10.
10= Mirrors fully the situation, 5= Mirrors the situation to some extent, 0 = Is not the case.
(State only one answer per question)

0	1	2	3	4	5	6	7	8	9	10	I do not know
---	---	---	---	---	---	---	---	---	---	----	---------------

Has led to transformation of pedagogical and organisational practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teachers are working and learning in communities of practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to renewal of assessment forms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Better use of teaching resources and at a lower cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to more independent learners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has opened up the classroom/institution to collaboration with externals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to more creative ways of teaching and learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to a better integration of entrepreneurship in curriculum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to new forms of collaboration among students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supports the use of learning analytics as a means to improve the learning environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to improved outcomes and opportunities for at risk students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has led to improved outcomes and opportunities for gifted students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other progress made	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20. If you have selected 'other', please specify the progress made.

21. Please add links to studies, evaluations, data etc. which may illustrate your assessment.

22. How would you assess the level of mainstreaming of digital and online learning at the system level?

(State only one answer per question)

	Yes	No	Partially	I do not know
New initiatives are only funded if there is a clear plan for mainstreaming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are infrastructures, services and tools in place to support practitioners and institutional management to implement and support innovative teaching and learning practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A rich eco system has developed between publishers, developers of SW and devices for digital learning, and practitioners, which contributes to sustainability of initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a clear business case for the added value of digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a wide range of open license digital learning resources available that can be adapted to the specific learning context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public-private partnerships have led to different business and service models for digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are quality criteria in place to assess the quality of digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Methods and tools to monitor results and impact are available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a rich research environment on different aspects of digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are strategies in place to deploy results from the European cooperation on digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, please specify:				

23. Please add supplementary comments and links to sources that support your assessment.

24. Please assess the level of mainstreaming of digital and online learning at the institutional level in your sector.

(State only one answer per question)

	Yes	No	Partially	I do not know
Institutions have elaborated comprehensive strategies that are communicated to and shared with stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Institution leaders feel confident regarding the institutional practices for procurement licensing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deployment of copyright for digital and online learning resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teachers feel confident to use digital and online learning in a purposeful and innovative manner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Digital and online learning is integrated in teacher curriculum and in training of teacher's activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There are institutional practices in place to assess the quality of digital and online learning resources, which teachers use in their practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Institutions monitor the learning outcomes of digital and online learning to continuously improve practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A sustainable delivery and business model is in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other, please specify:

25. Please add supplementary comments and links to sources that support your assessment.

****26. What are the five most important barriers to mainstreaming digital and online learning in the educational system as a whole?**
Please indicate the barriers in a prioritized order; 1 is the most important, 2 is the second most important and so on.
(Please prioritize exactly 5 options with incremental numbers 1-5, where 1 is best)

Lack of a coherent policy framework	_____
Lack of a sustainable delivery and business model	_____
Lack of evidence about student benefits	_____
Insufficient teacher skills	_____
Insufficient leadership at the institutional level	_____
Insufficient capacity to replicate and scale best practice	_____
Lack of quality assurance tools and processes	_____
Institutional uncertainty regarding procurement, licensing and copyrights	_____

Uneven quality of digital and online learning resources	_____
Insufficient digital infrastructure, devices and tools	_____
Disconnection between research, policy and practice	_____
Insufficient flexibility in teachers collective agreements	_____
Assessment and exam forms, which are not aligned to changed pedagogical practices	_____
Subject based curriculum that leaves little autonomy to the institutions to change pedagogical practices	_____
Other barriers	_____

27. If you have selected 'other', please specify the barrier.

****28. What are the five most important barriers to mainstreaming digital and online learning in your sector? Please indicate the barriers in a prioritized order; 1 is the most important, 2 is the second most important and so on. (Please prioritize exactly 5 options with incremental numbers 1-5, where 1 is best)**

Lack of a coherent policy framework	_____
Lack of a sustainable delivery and business model	_____
Lack of evidence about student benefits	_____
Insufficient teacher skills	_____
Insufficient leadership at the institutional level	_____
Insufficient capacity to replicate and scale best practice	_____
Lack of quality assurance tools and processes	_____
Institutional uncertainty regarding procurement, licensing and copyrights	_____
Uneven quality of digital and online learning resources	_____

Insufficient digital infrastructure, devices and tools	_____
Disconnection between research, policy and practice	_____
Insufficient flexibility in teachers collective agreements	_____
Assessment and exam forms, which are not aligned to changed pedagogical practices	_____
Subject based curriculum that leaves little autonomy to the institutions to change pedagogical practices	_____
Other barriers	_____

29. If you have selected 'other', please specify the barrier.

30. Please add supplementary comments and links to sources that support your assessment.

****31. What are the five most important enablers for digital and online learning in the educational system as a whole? Please indicate the enablers in a prioritized order; 1 is the most important, 2 is the second most important and so on. (Please prioritize exactly 5 options with incremental numbers 1-5, where 1 is best)**

There is a coherent policy framework in place	_____
Sustainable delivery and business model for delivery of education/courses are in place	_____
There is clear evidence about student benefits	_____
Teachers have sufficient digital skills	_____
There are institutional strategies and leadership practices in place, which support digital and online learning	_____
There are methods in place to learn from, replicate and scale best practice	_____
There are quality assurance tools and processes	_____
There is a clear and simple framework in	_____

place to handle procurement, licensing and copyrights

Digital and online learning resources are generally of a high quality

There are digital infrastructure, devices and tools in place

Digital and online learning innovations are informed by research

There is flexibility in teachers collective agreements to accommodate for changing working practices

Assessment and exam forms support changes in pedagogical practices

Institutions have sufficient autonomy to develop pedagogical practices across subjects and within subjects

Other enablers

32. If you have selected 'other', please specify the enabler.

****33. What are the five most important enablers for digital and online learning in your sector? Please indicate the enablers in a prioritized order; 1 is the most important, 2 is the second most important and so on.
(Please prioritize exactly 5 options with incremental numbers 1-5, where 1 is best)**

There is a coherent policy framework in place

Sustainable delivery and business model for delivery of education/courses are in place

There is clear evidence about student benefits

Teachers have sufficient digital skills

There are institutional strategies and leadership practices in place, which support digital and online learning

There are methods in place to learn from, replicate and scale best practice

There are quality assurance tools and processes

There is a clear and simple framework in place to handle procurement, licensing and copyrights _____

Digital and online learning resources are generally of a high quality _____

There are digital infrastructure, devices and tools in place _____

Digital and online learning innovations are informed by research _____

There is flexibility in teachers collective agreements to accommodate for changing working practices _____

Assessment and exam forms support changes in pedagogical practices _____

Institutions have sufficient autonomy to develop pedagogical practices across subjects and within subjects _____

Other enablers _____

34. If you have selected 'other', please specify the enabler.

35. Please add supplementary comments and links to sources that support your assessment.

**36. How would you assess the overall impact of the Communication: Opening Up Education?
(State only one answer per question)**

	Yes	No	To some extent	I do not know
Our country had already made major advance prior to the Communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has had an impact on policy and regulatory frameworks for digital and online learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has an impact on initiatives supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has promoted partnership with external stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has promoted institutional partnerships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has had an impact on physical infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

It has had an impact on digital infrastructures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has driven educational reform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has driven an innovation agenda in education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has put focus on future skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has put a renewed focus on the skills and competences of the teacher workforce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has underlined the importance of institutional leadership	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has put more focus on the importance of quality educational resources and the characteristics of these	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other, please describe:

37. Please add supplementary comments and links to sources that support your assessment.

****38. For the next working period, which topics do you propose for a WG if digital and online learning continues to be the basis for a WG?**

Please prioritise the five most important topics; 1 is the most important; 2 is the second most important etc.

(Please prioritize exactly 5 options with incremental numbers 1-5, where 1 is best)

Strategies, experiences and approaches to scaling and mainstreaming good practices _____

Methodologies to assess impact _____

Tools and methods for quality assurance of digital and online learning resources _____

Approaches to and open license tools and tool boxes for reediting of digital and online learning at the classroom level _____

Sustainable business and service models for single institution or networks of institutions on digital and online learning _____

Scenarios and guidelines for design and delivery of digital and online learning in different subject areas (natural science, languages, creative subjects) _____

Features in a comprehensive policy for digital and online learning	_____
Emerging technologies in digital and online learning such as learning analytics, simulations, gaming and how they can support different pedagogical practices	_____
Guidelines and service models for procurement and licensing of digital and online open learning resources	_____
Use of the evidence base to develop digital and online learning pedagogical practice	_____
Other topics	_____

39. If you have selected 'other', please specify the topic.

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