Annex C. Summary of comparative research on digitalisation in higher education

As part of the European Commission-Hungary-OECD "Supporting the Digital Transformation of Higher Education in Hungary" project, the OECD conducted a study of international policies and practices that support the digitalisation of higher education. This annex provides a summary of key insights from the study.

Presentation of the comparative study

The study of international policies and practices was a desk-based exercise conducted in fall 2020, which informed the analysis and recommendations provided in the report (see Chapter 3). The study aimed to:

- review recent research on the digitalisation of higher education
- identify practices and policies targeted at the digitalisation of higher education across a range of OECD countries to better understand at what level, with what aim, and with what degree of success these have been implemented
- organise insights obtained from an analysis of available resources on Hungarian higher education and digital transformation, as well as from stakeholder interviews (see Annex A), through a comparative lens.

The analysis includes a range of international examples relevant to digital higher education and general insights drawn from the literature. The selected examples may take the form of: 1) guiding principles to be taken into account before designing a policy (e.g. taxonomy); 2) institutional practices or policies that address an existing challenge (e.g. teacher training programme); or 3) instruments to provide a better understanding of user needs (e.g. survey).

The scope of the findings and examples in this analysis is broad, as the digitalisation of higher education can affect all functions of higher education systems, from the management and operations of higher education institutions (HEIs) to their core activities, i.e. teaching and learning, research and engagement.

The selection of the case studies was not restricted to specific stakeholders, geographies or research publications. Bearing in mind limitations in the body of examples and research in the area of digital higher education, the OECD team selected examples that:

- addressed issues identified as relevant in the Hungarian context based on inputs collected by the OECD team
- showcased the use of a variety of policy instruments (scorecard, procurement system, platform-based solution, etc.)
- are implemented through a combination of bottom-up and top-down mechanisms
- included some monitoring and evaluation information.

Table C.1 provides key insights from this exercise, discussing policy frameworks supporting digitalisation; digital infrastructure; digitally enhanced teaching and learning, research and engagement; and learning processes and outputs.

Table C.1. International examples of policies and practices regarding the digitalisation of higher education

Purpose of policy or practice	Country or organisation	Description
Policy framework		
Reduce the gap between policy goals and implementation; empower stakeholders to shape digitalisation strategy	Ireland	Ireland faced challenges in ensuring that educational institutions incorporated the government's policy priorities into their practices. The **Irish Digital Strategy for Schools 2015-2020** centred on the role of digital technologies in learning, teaching and assessment practices, but schools struggled to understand why and how to use digital tools. To help school communities understand how digital learning could be embedded in their day-to-day activities, the Irish authorities built a **Digital Learning Framework** with 32 standards that outline effective ways digital tools can enhance teaching and learning, leadership and management. A diverse group of stakeholders within the school identify which of the 32 standards the school would like to adopt and what actions it should undertake for that aim, designing a clear **Digital Learning Plan** for their school (PDST Technology in Education, n.d.[1]).
	European Union	The **European Union's Digital Education Action Plan 2018-2020** emphasised that all educational organisations should engage in thinking about how digitally ready their institution is and can be. For that purpose, the European Commission launched, in 2017, the **Self-reflection on Effective Learning by Fostering Innovation through Educational Technologies (SELFIE)** tool, a self-assessment instrument that provides a 360° view on the digital readiness of educational institutions based on stakeholder input. The SELFIE survey allows stakeholders to reflect on the extent to which the digitalisation of school strategies, teaching practices, infrastructure, curriculum, and the student experience has been successful. The results from the tool, which more than 650 000 individuals in 57 countries have used, serve as a basis to identify actions that can enhance the digital readiness of the institution with the participation of all stakeholders (European Commission, n.d.[2]) (Kampylis et al., 2019[3])
Ensure alignment across policy levers to ensure a successful approach to digitalisation	Ireland	Public authorities acknowledged their lack of awareness on why and how higher education stakeholders were engaging with digital tools. A survey focused on the **Irish National Digital Experience (INDEx)** was launched in 2019, leveraging lessons from Australian and British efforts. In its first iteration, it was answered by 30 000 individuals (students, lecturers, tutors, librarians, among others). The survey results provide a thorough overview of all key areas of digital higher education, from digital skills to digital infrastructure, but also of the attitudes and experiences of actors in the digital environment, helping to inform national policies. Institution-level results were shared with HEIs so they could conduct their own analysis and extract relevant insights. Just like the Digital Learning Framework for schools mentioned above, INDEx is an instrument designed at a national level but intended to be tailored and used by each educational institution as well, informing decision making at both levels (National Forum for the Enhancement of Teaching and Learning in Higher Education, 2020[4]).
Digital infrastructure		
Assign responsibilities for infrastructure development and management	Norway and University of Oslo	Digital infrastructure is developed and managed according to a subsidiarity principle in Norway. Services that can be shared nationwide, such as admissions, payroll, or digital identity credentials, are centralised and standardised. In contrast, institution-specific services, such as student data, modular learning platforms, or digital exam solutions, remain at the higher education institution level. The management of infrastructure becomes a responsibility of HEIs as soon as digital tools are more intricately tied with the core functions of institutions (teaching and research), and a more flexible use is expected to meet their specific needs. In addition to allowing for standardised solutions where efficient and customised ones when warranted, the Norwegian approach also allows for both standardised tools from well-established market players and in-house solutions to be integrated into the same digital ecosystem (Ministry of Education and Research of Norway, 2018[5]).
		At the institutional level, the subsidiarity principle has been reflected in the design of information and communication technology (ICT) environments, such as an enterprise architecture, which considers both the current and future use of ICT in an institution. For example, at the University of Oslo, a public university with around 28 000 students, the local Department of Informatics identified the institution's core activities using technology, mapped the digital resources supporting those activities, and organised these digital resources by "levels" associated with the provider (e.g. national government, market player, HEI) responsible for their provision and maintenance. The highest level is the national level, with other levels including groupings of institutions in the same geographical area, or the institution itself. Mapping the provider responsible for each component of the digital infrastructure ensures a swift response to emerging issues, as responsibilities can be clearly identified (Bygstad, Øvrelid and Oftedal, 2019[6]).

Purpose of policy or practice	Country or organisation	Description
Inform choice of digital infrastructure	Netherlands	**SURF** is an ICT co-operative with over 100 higher education and research institutions founded over 30 years ago in the Netherlands. Its mission is to promote system-wide collaboration of HEIs to address their shared ICT and learning needs, safeguarding the public interest in the introduction of ICT and alleviating concerns over how private firms may shape the digital learning environment. For that purpose, experts from member institutions help peers across the country ensure that services offered by educational technology providers are responsive to the needs of faculty and students and grounded in educational research. Among many areas of focus, advice is provided, for example, on learning analytics, digital educational resources, and infrastructure for student mobility, digital identities and digital certificates. With an annual budget of EUR 200 million, SURF is funded through contributions from member institutions, the Dutch government, and EU programmes (OECD and de Groot, 2021[7]).
	United Kingdom	Three professional bodies focusing on media, estate, and ICT management in higher education launched a toolkit in 2016 to help institutions incorporate technology in physical spaces like classrooms, but also school corridors and outside spaces. E-learning cafés, quick access terminals to the Internet, or glass writing walls are some examples. The guidelines explain how to develop new pedagogies for these spaces, couple learning and design insights, and overcome stakeholder resistance throughout the process. A case study-based toolkit was launched in 2018 with ten examples illustrating first results that speak to the added value of this approach (SCHOMS, AUDE & UCISA, 2016[8]).
	United Kingdom	The British Educational Suppliers Association (BESA), a trade association for providers of educational solutions, launched in 2019 a marketplace where educational staff can find, review, test, and purchase close to 300 products from more than 100 suppliers for a wide array of purposes, such as assessment, online safety, or management. BESA staff check each potential supplier for their reliability and quality before showcasing their products on line. Each customer can request a trial of the product before purchasing, and a peer review system is widely used, providing feedback to both customers and suppliers as to the product's usefulness. The cost of a product subscription is per pupil using the tool, although quantity and other discounts may apply (British Educational Suppliers Association, n.d.[9]).
Digitally enhanced teaching and learning, research and engagement		
Enhance professional digital competences	University of Oslo, Norway	Higher education teachers in Norway are no longer seen as recipients and implementers of national educational frameworks but are increasingly expected to exercise agency in technology-rich environments and demonstrate their professional digital competence (Brevik et al., 2019[10]). Teacher education programmes (for school-level teachers) lacked a structured approach to the development of professional digital competencies. The University of Oslo refined its programmes by adding to the curriculum a small private online course split into four modules, scheduled follow-up practice placements and subject-specific training. In this course, student teachers reflect on their experiences with digital tools and learn how to best integrate them into their teaching practices. Such an example may be helpful to consider in terms of pedagogical training in higher education as well.
	KTH Royal Institute of Technology, Sweden	The KTH Royal Institute of Technology, a public university in Stockholm with close to 14 000 enrolled students, provides an example of an initiative focused on increasing teacher engagement in the design and implementation of technology-enhanced learning to address the low adoption of digital tools by academic staff. In 2014, the institution introduced the Faculty Pedagogical Developer Initiative, creating the role of "pedagogical developer" and selecting for that role 24 faculty members recognised for their teaching excellence. Each pedagogical developer provides dedicated support to their colleagues on how to tangibly integrate digital tools and methodologies in teaching. While the institution's leadership launched and supported this initiative, faculty members have been driving its use, actively proposing initiatives (e.g. new pedagogical courses for teachers, certificate structures for digital competence of teachers) and responding to requests from their peers for expert input on how to use digital tools more effectively. Participating in the initiative is now integrated into KTH's mandatory faculty professional development programme (Berglund et al., 2017[11]) (Viberg et al., 2018[12]).
Use digital tools to expand quality, diversity, and access to educational materials	Wales (United Kingdom)	In 2012, the Welsh government started providing free, centralised, universal access to classroom-focused tools and resources for all teachers and learners in Wales. **Hwb** is the resulting government-led platform with over 2 800 educational resources from a wide range of providers (non-governmental organisations, media entities, museums, etc.), which can be used inside and outside the classroom by school-level students across many subjects. A pilot led by the Welsh government is currently taking place in a subset of HEIs to analyse whether to add higher education resources to the platform. Hwb enables every student and teacher from nationally funded schools to access premium elements for the customisation of learning resources and a set of tools to collaborate. In the wake of the coronavirus (COVID-19) pandemic, Hwb has been the platform of

Purpose of policy or practice	Country or organisation	Description
		reference on distance learning and student support, as it also includes, for example, guidance on digital literacy, security and pedagogy (Education Wales, n.d.[13]).
	Finland	In 2017, the Finnish Rectors' Conference for Universities of Applied Sciences (UAS) emphasised developing a high-quality digital offering and the free circulation of students across institutions as key priorities. To that end, it suggested that each higher education institution should contribute to the country's digital educational offering in their areas of expertise, and students should be able to access and fulfil their academic requirements by enrolling in any digitally enabled courses made available, even if not by their home institution. In line with these priorities, CampusOnline.fi was launched in 2018 as the online one-stop-shop for digitally-enabled courses. All 23 UAS in Finland offer on this platform over 1 300 free, credit-granting courses on both subject-specific and transversal skills all year round in different modalities (non-stop, fall or spring semester, or summer courses) and languages (Finnish, Swedish and English) (CampusOnline.fi, n.d.[14]) (eAMK, 2019[15]).

Learning processes and outputs

Purpose of policy or practice	Country or organisation	Description
Enhance student engagement and success based on learning design and learning analytics	Instituto Universitário de Lisboa (ISCTE-IUL), Portugal	In Portugal, learning analytics have led to a better understanding of the learning path of students. At ISCTE-IUL, a public university in Lisbon with 9 200 students, faculty and students can benefit from a learning scorecard dashboard to monitor course performance since 2016. The dashboard interface was developed by the institution and receives data from the learning management system (LMS) and students' academic records. Students are asked at the outset of a course to set their learning goals. For the duration of the course, their behaviour within the LMS is monitored on several dimensions, including student engagement, responsibility and collaboration. Both students and faculty have access to a dashboard with pre-defined metrics of performance and student grades, allowing students to self-assess against their peers (and adjust their behaviour) and faculty to have more granular feedback on class performance. Game design elements, such as badges or leader boards, are embedded in the platform and earned by students according to their performance and engagement (Cardoso, 2018[16]) (Cardoso, Costa and Santos, 2017[17]) (Cardoso et al., 2018[18]).
	Georgia State University and the United States	At Georgia State University, predictive analytics have been used since 2012 to follow student performance through its GPS Advising System. Over 40 000 students are assessed for 800 risk factors every day, including whether they are registered in relevant mandatory courses or if, albeit having a passing grade, significant issues on a given area critical for future coursework remain and need to be addressed in future coursework. Early intervention is a priority, and alerts are sent to both students and faculty, with one-to-one meetings to help the student improve. The first set of results demonstrate both a decrease of more than a semester in average time to degree and an improvement in attainment for disadvantaged students (Georgia State University, n.d.[19]). Data collected in LMS has also been used, for example, to identify mismatches between the intentions of academic staff and student study habits, leading staff to refine how learning resources are made available and organised (Viberg and Mavroudi, 2019[20]). Data from intelligent tutoring systems also provide a more nuanced understanding of a student's knowledge gaps through analysing students' reasoning, allowing three universities in the United States to provide more individualised support to close to 1 000 students (Davies et al., 2015[21]).
Improve international credential recognition	Several OECD countries	EMREX is a decentralised data exchange system launched in 2015 by a network of European countries interested in data exchange standards relevant for higher education. It has 9 full members (i.e. with a national contact point for EMREX), namely Croatia, Denmark, Finland, Germany, Greece, Italy, the Netherlands, Norway, Poland and Sweden, as well as 13 associate members (i.e. interested in supporting or working in some capacity with EMREX) from around the world, including Australia, Japan and the United States. Students can request that their academic data (i.e. credentials) be transferred across HEIs in EMREX member countries or be shared with future potential employers (EMREX, n.d.[22]). EMREX uses a custom-made plugin to allow for data exchanges, and the organisation is exploring how blockchain could be implemented to support secure data exchanges and verification. As data exchanges only take place upon student request, and data is transferred between student accounts, students know what data is registered and for what purposes they are used. To ensure the validity of credentials, national contact points oversee data transfers, and participating countries maintain a curated list of credentialing institutions (Mincer-Daszkiewicz, 2017[23]) (Mincer-Daszkiewicz, 2017[24]) (EMREX, n.d.[22]).
Improve digital provision of upskilling opportunities	Finland	Finland's CampusOnline.fi is an easily accessible, high-quality platform where students can develop transferable skills (e.g. time management, communication), foreign language skills and other competencies in areas which, although not their field of study, can bolster the skill levels and employability of students in the labour market (CampusOnline.fi, n.d.[25]).

Purpose of policy or practice	Country or organisation	Description
	Wales (United Kingdom)	In Wales (United Kingdom), the in-person regional offices of Seren, a cross-sector partnership supporting secondary and further education students in their preparation for higher education, were replicated on line during the COVID-19 pandemic. Masterclasses, mentoring, study advice, among other features, are made available for students to guide their tertiary education choices, stimulate lifelong learning and provide a preview of university life. Taken together, these activities are expected to have positive impacts on students' skill levels, labour market outcomes and higher education attainment (Education Wales, n.d.[13]). (Education Wales, 2017[26]).

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