2 The state of digitalisation of higher education in Hungary

This chapter provides an overview of the digitalisation of higher education in Hungary, first outlining key features of the Hungarian higher education system and then reviewing available information about digital readiness, practices and performance in the higher education system.

2.1. Hungary's higher education system

This section offers an overview of the state of Hungarian higher education to set out the context for the analysis provided in this report. It first looks at the profiles of Hungarian higher education institutions (HEIs). It then summarises student enrolment and graduation patterns and research capacity in Hungary.

Institutional profile, autonomy and financing

In Hungary, higher education institutions may be state owned (or, maintained), privately maintained (by business organisations, foundations, or public-interest trust foundations), or church owned. Higher education institutions are further classified as: universities, universities of applied sciences (UAS) and colleges, distinguished by 1) the number of bachelor's, master's and doctoral programmes offered; and 2) the share of teaching and research staff (employed directly or on a public service employment basis) that have a doctoral degree, offer academic student workshops, and are capable of offering some programmes in a foreign language; and 3) the features of programmes offered, for instance, whether the HEI offers dual education programmes. Foreign HEIs may also operate in Hungary if there is a bilateral agreement between the foreign government and Hungary's (Eurydice, 2021[1]). All higher education institutions, regardless of maintainer, are expected to be recognised by the state, and to fulfil the same accreditation criteria.

Across Hungary's higher education system, 43% of HEIs were maintained by the state in 2020 (see Table 2.1). In 2020, the Hungarian government began introducing new operating models in Hungarian universities, transferring a number of state-maintained universities to a new legal basis (a foundation status), involving new governance, management and employment arrangements (DSN/DHECC, 2020[2]).

Table 2.1. HEIs in Hungary by institution type and by maintainer (2020)

	University	UAS	College	Total
State	22	5	1	28
Private	2	2	7	11
Church	5	0	21	26
Total	29	7	29	65

Source: DSN/DHECC (2020[2]), *Position Paper on Digitalisation of Hungarian Higher Education.*

In 2018, most higher education students (87%) were enrolled in state-owned institutions (OECD, 2021[3]). In the 2015/16 academic year, among those in publicly funded HEIs, almost nine out of every ten students attended a university, 8% were enrolled in a university of applied sciences, and 2.5% were undertaking their degree in publicly funded colleges (OECD/European Union, 2017[4]).

The Higher Education Act of 2011 states that HEIs autonomously decide on the content and methods used in research and teaching activities. However, according to the 2017 University Autonomy Scorecard published by the European University Association (EUA), Hungarian universities have lower autonomy on organisational, financial, staffing and academic issues than many other European countries. Out of 29 European systems evaluated by the EUA in 2016, Hungarian universities ranked as follows:

- **23rd in organisational autonomy**, which is the ability of HEIs to decide independently on their internal organisation, such as their executive leadership, decision-making bodies, legal entities and internal academic structures
- **28th in financial autonomy**, which is the ability to decide independently on internal financial affairs and use funding to support institutional goals

- **22nd in staffing autonomy**, which is the ability to decide independently on human resource matters, including recruitments, salaries, dismissals and promotions
- **16th in academic autonomy**, which is the ability to decide on issues such as student admissions, academic content, quality assurance processes, the introduction of degree programmes and the language of instruction (European University Association, 2021[5]).

Examples of the limits of this autonomy include the requirement that universities comply with the Act on Public Finance and the Act on State Property, or the recent introduction of the position of chancellor in HEIs in 2014. The HEI chancellor is appointed by the Prime Minister and has wide-ranging decision-making powers regarding financial matters and staffing. This reduces the institution's ability to autonomously allocate public funding internally to hire staff or select its leadership (Eurydice, 2021[1]).

Public funding represents the majority of higher education institutional funding in Hungary (65%), although this share is below the average of EU higher education systems (73%) (OECD, 2020[6]). The state subsidy is calculated according to the number of students participating in state-subsidised programmes, with a potential top-up for institutions with high employment rates in priority sectors (Eurydice, 2021[1]). Other sources of institutional funding include various activities (e.g. research commercialisation) and student fees. However, 80% of newly admitted students in Hungarian HEIs hold a state-sponsored place and do not pay any fees to participate in their higher education programmes (MIT, 2016[7]).

Enrolment and outcomes

Admission to higher education is based on a combination of grade points from secondary school, grade points from secondary school leaving exams, and a top-up based on disadvantaged socio-economic conditions (if applicable) (Eurydice, 2021[1]). Access for all qualified students to higher education, however, remains a concern. Under-represented groups, including disadvantaged students and Roma, have meagre chances of admission (see Table 2.2). Women's tertiary attainment levels increased significantly in the last decade, continuing to outnumber men. However, employment patterns reveal one of the most significant gender gaps among OECD countries: among 25 to 34 year-olds, 94% of tertiary-educated men are employed, compared to 77% of tertiary-educated women (OECD, 2020[6]).

Hungary's share of international students in higher education is larger than the OECD average. Despite this, total enrolment in higher education is declining, and attainment among young adults ages 25-34 is below the EU and OECD average. Falling school-age cohorts have resulted in a substantial decline in the number of higher education entrants (MIT, 2016[7]) and there has been a decline in higher education enrolment rates (OECD, 2020[6]). Between the academic years 2011/12 and 2020/21, the number of higher education applicants dropped by 35%, due in part to the reduction of state-funded study places in 2012 and the tightening of admission conditions in 2020 (European Commission, 2020[8]). This decline in higher education enrolment is accompanied by a high level of attrition in Hungarian higher education, with a reported dropout rate of 30% (Table 2.2) (MIT, 2016[7]).

Table 2.2. Higher education in Hungary: Key indicators

A. Attainment and enrolment	HUN	OECD	EU23
Enrolment rate of students aged 25 or older in tertiary education (bachelor's, master's and doctoral equivalent) (2018, %)	1.4%	2.3%	2.0%
25-64 year-olds who attained tertiary education (2018, %)	25.0%	38.0%	35.0%
25-34 year-olds who attained tertiary education (2019, %)	31.0%	45.0%	44.0%
Men	25.0%	39.0%	38.0%
Women	37.0%	51.0%	51.0%
15-year-olds who are expected to attain tertiary education (2018, %)	52.0%	71.0%	67.0%
Programme pursued by first-time entrants in tertiary education (2018, %)			
Short cycle programme	9.0%	17.0%	13.0%
Bachelor's or equivalent	72.0%	77.0%	79.0%

A. Attainment and enrolment	HUN	OECD	EU23
Master's or equivalent	18.0%	6.0%	8.0%
Average age of first-time entrants (2018, %)	21	22	22
Share of international or foreign students in tertiary education (2018, %)	11.0%	6.0%	9.0%
Share of international first-time entrants (2018, %)	22.0%	10.0%	10.0%
Share of international first-time graduates (2018, %)	7.0%	9.0%	8.0%
Share of national tertiary students enrolled abroad (2018, %)	5.0%	2.0%	4.0%

B. Financial and human resources	HUN	OECD	EU28
Public expenditure from primary to tertiary education as a share of gross domestic product (GDP), after transfers between public and private sectors (2017, %)	3.30%	4.10%	3.90%
Public expenditure on tertiary education as a share of total government expenditure (2017, %)	1.70%	2.90%	2.60%
Total expenditure in tertiary education (including research and development [R&D]) as a percentage of GDP (2017, %)	0.90%	1.00%	0.90%
Total expenditure on tertiary education institutions per full-time equivalent student, by type of service (2017, USD PPP)	12 878	16 327	16 688
Of which are for core services (%)	76.00%	69.29%	65.56%
Of which are for ancillary services (%)	8.15%	4.96%	4.21%
Of which are for R&D (%)	15.85%	25.75%	30.23%
Total compensation of staff as a percentage of current expenditure in tertiary education (2017, %)	62.00%	67.00%	68.00%
National R&D spending as a % of GDP (2017, %)	1.53%	2.38%	2.03%

C. Graduation, employment and lifelong training	HUN	OECD	EU23
Employment rate, 25-34 year-olds with tertiary education (2019, %)	84.0%	85.0%	85.0%
Men	94.0%	89.0%	90.0%
Women	77.0%	81.0%	82.0%
Share of tertiary graduates in education (2018, %)	14.0%	10.0%	10.0%
Share of tertiary graduates in business and law (2018, %)	26.0%	25.0%	25.0%
Share of tertiary graduates in information and communication technology (ICT) (2018, %)	5.0%	4.0%	4.0%
Relative earnings of full-time full-year 25-64 year-old workers in all tertiary levels (2018, 100 = upper secondary school earnings)	177	154	149
Private net financial returns to tertiary education for a man (2017, USD PPP, discounted at 2%)	356 800	295 400	278 100
Private net financial returns to tertiary education for a woman (2017, USD PPP, discounted at 2%)	161 100	225 400	210 300
Annual hours of participation of 25-64 year-olds who participated in formal and/or non-formal education and training (2016)	155	131	N/A

D. Hungary-specific indicators	HUN
Number of students in publicly funded HEIs (2015/16)	220 058
Of which in publicly funded universities	196 949
Of which in publicly funded UAS	17 586
Dropout rate (2018, %)	30.0%
Among those who self-finance their studies	60.0%
Students in part-time distance education (2018, %)	6.0%
Students with a paid job while they study (2015, %)	41.0%
Students in Budapest-based HEIs (2019, %)	22.3%
Disadvantaged students admitted to higher education (2017, %)	1.4%
Roma admitted students	0.8%
Per capita financing of HEIs (2019, EUR)	EUR 410

Source: OECD (2020[6]), Education at a Glance 2020: OECD Indicators for Parts A, B and C of the table; European Commission (2019[9]), Education and Training Monitor 2019 – Hungary; MIT (2016[7])., Shifting of Gears in Higher Education – Mid-Term Policy Strategy 2016; OECD/European Union (2017[4]), Supporting Entrepreneurship and Innovation in Higher Education in Hungary for Part D of the table.

Tertiary graduates in Hungary have an employment rate and a wage premium higher than the EU average (European Commission, 2020[8]). Labour shortages are significant, particularly in sectors such as information and communication technology (ICT), economics, natural sciences and healthcare. Therefore, the 2012 decision to require financial aid beneficiaries to work for an employer in Hungary for "a period identical to the duration of the scholarship" within 20 years of their graduation is aimed at retaining more human capital in the country (Eurydice, 2021[1]).

Research

In the last decade, spending on research has risen in Hungary, with much of it driven by increases in corporate spending on research. The government aims to increase the number of researchers and the volume of research produced, create areas of research excellence, and foster links between higher education researchers and businesses (MIT, 2016[7]).

However, the government is concerned that there is an insufficient number of researchers to fill key research positions, which it attributes to issues such as: an insufficient emphasis on science, technology, engineering and mathematics (STEM) in doctoral programmes; a history of insufficient government research funding (which the government has begun to rectify); a failure by the private sector to enter into research contracts with universities (which would increase institutions' research revenue) (MIT, 2016[7]). This has led the government to identify a range of actions and objectives to enhance research, ensure its adequate financing, and expand postgraduate STEM enrolments (MIT, 2016[7]; MIT, 2021[10]).

2.2. Digitalising Hungary's higher education system

This section examines the current state of digitalisation in Hungarian higher education. It first provides a brief overview of the digitalisation of Hungary's economy and society. It then reviews three dimensions of digitalisation in higher education: digital readiness, digital practices and digital performance. Given the lack of indicators and data to quantify the performance of Hungary along these three dimensions, the following section is based on analyses conducted by government, stakeholder input received through interviews conducted by the OECD team for the project as well as several surveys.

Digitalisation in Hungary's economy and society

Hungary provides a reasonable degree of access to basic digital infrastructure, but individuals and firms tend to make limited use of digital tools (OECD, 2021[11]). The European Union's Digital Economy and Society Index (DESI) tracks the digital progress of EU member states along five key dimensions: 1) connectivity; 2) human capital; 3) use of the Internet; 4) integration of digital technology; and 5) digital public services, providing an overview of the digitalisation of EU economies and societies. In the latest DESI edition published in 2020, using data collected before the coronavirus (COVID-19) pandemic, Hungary ranked 21st among the 28 EU member states with a score of 47.5, almost 5 points lower than the EU average (European Commission, 2020[12]).

Connectivity is the only dimension in which Hungary exceeded the EU average, ranking seventh. Fast broadband coverage is now available in 90% of households (against 86% in the European Union). In addition, the country is now third in terms of its 5G readiness, following efforts of the recently formed "5G Coalition". On the other hand, mobile broadband is the lowest in the European Union: seven out of every ten people have a subscription, likely the result of above-average mobile broadband prices.

Hungary has a higher share of ICT graduates than the EU average (4.3% versus 3.6% of graduates) and approaches the EU average regarding the share of individuals employed in the ICT sector (3.7% versus 3.9% of total employment). Nonetheless, basic digital skills[1] in 2020 remained below the EU average (49% compared to 58%), and only 25% of people between the age of 16 and 74 had above-basic digital skills (the EU average was 33%). Moreover, there is a significant gender gap in ICT employment, with 0.7% of employed women working in ICT, compared to 1.4% on average in the European Union.

The use of Internet services in Hungary is broadly consistent with the EU average. Approximately 80% of the population used the Internet at least once a week (below the EU average of 85%), with usage concentrated on accessing news, music, videos and games, video calls and social networking. However, Internet use for e-learning activities is comparatively low: 7% of Internet users in Hungary have engaged

in an online course in the three months preceding the survey, against 11% on average in the European Union.

The integration of digital technology in businesses and public services is low: Hungary ranked 26th and 24th, respectively, on these dimensions. Almost six out of every ten companies have low levels of digitisation (against fewer than four out of ten on average in the European Union), and the country's high-performance computing capacity is insufficient for more advanced R&D needs. Moreover, digital public services remain incipient, with the open data maturity in Hungarian public services (i.e. index measuring incentives for, access to, quality, and impact of open data) half (32%) that of the EU average (66%).

In response, the government has prioritised digitalisation across all areas of Hungarian life. The National Digital Strategy 2021-2030 sets out a vision for increased adoption of digitalisation across a wide range of areas, with targets covering the digital skills of the population, network coverage, digitalisation of government services and adoption of digitalisation by firms (DSN/DHECC, 2020[2]). Several other government strategies aim to advance the digitalisation of Hungary's economy and society and position the country at the forefront of European efforts in this area. This includes for example the publication of a comprehensive Artificial Intelligence (AI) Strategy in 2020, which includes the creation of a number of new public organisations to implement the strategy including an AI Innovation Centre, a National Artificial Intelligence Laboratory and the National Data Asset Agency (AI Coalition/Digital Success Programme/MIT, 2020[13]).

Digital readiness in Hungarian higher education

The digitalisation of the Hungarian higher education sector is discussed below, focusing first on digital readiness. An examination of digital practices of higher education students and staff is presented, followed by an examination of digital performance (the extent to which digitalisation contributes to higher education performance). In each of these sections, Hungary's strengths are discussed first, followed by areas for improvement.

Digital readiness has two dimensions: 1) the level of access and suitability of digital technologies and content available to higher education leaders, managers and administrators (in government and HEIs), academic staff and students; and 2) public policies that set priorities and incentives for HEIs to embed digital practices across their core activities, and institutional strategies that strengthen the capability and motivation of academic staff, administrators and students to adopt digital practices.

Access and suitability of digital technologies in higher education

Digital technologies discussed in the following section include hardware and software used for teaching and learning, as well as data systems that provide information on the digitalisation of processes at HEIs.

In Hungary, most students enter higher education equipped with a range of ICT tools (with nearly all current students having personal laptops) (Digital Success Programme, 2016[14]; MIT, 2016[7]; DSN/DHECC, 2020[2]). The OECD's higher education stakeholder consultation survey undertaken in February-March 2021 as part of the present project (see Annex B for details) confirms a high level of availability of ICT tools among current higher education students. Approximately 90% of student respondents to the survey had access to an adequate computer, a mobile device and high-speed Internet. Nonetheless, the survey results show that investment in digital infrastructure remains at the top of stakeholder policy priorities; the shares of students, teachers and individuals in leadership roles at HEIs selected it as the most, or second-most, important policy area to support digitalisation among six policy areas presented (54% of students, 66% of teachers and 76% of leaders identified digital infrastructure as the top or second-most important policy area).

All Hungarian HEIs have introduced learning management systems (LMS) and virtual learning environment (VLE) systems (Digital Success Programme, 2016[14]; DSN/DHECC, 2020[2]). If widely used by teachers

and integrated with student management systems, these can be a powerful source of data for learning analytics (Guiney, 2016[15]; Georgia State University, 2018[16]). Around 85% of students and 80% of teachers who responded to the OECD's survey reported that they had sufficient access to the institution's LMS (see Annex B). Hungary also has a national higher education identity and access management system that regulates access to national databases by higher education researchers and by those responsible for the administrative data used in managing the higher education system (EDUID and EDUGAIN) (MIT, 2016[7]).

Hungary has well-developed higher education administrative data systems, most notably the Higher Education Information System (FIR), which provides a national view of the system from application for entry to higher education through to graduation. In addition, the country is innovative in linking higher education data at a unit record level to other government data systems, such as the tax and social assistance systems, to create the graduate tracking system (DSN/DHECC, 2020[2]). This has created a digital resource that provides Hungary with a powerful tool to analyse and map student performance and post-study outcomes (DSN/DHECC, 2020[2]).[2] However, it is not clear how much use is made of the graduate tracking data to measure system performance or of the LMS data to support student learning (DSN/DHECC, 2020[2]; MIT, 2021[10]). Furthermore, as will be discussed in Chapter 4, these administrative data systems currently do not provide information on the digital readiness, practices and performance in Hungarian institutions.

There are a number of additional areas in which there is scope for improvement in the nation's digital infrastructure for higher education: access to technology for all learners, access to suitable technology, and the ability of HEIs to support the effective development and use of digital infrastructure.

While many students own and use digital devices when they enter higher education, the opportunity to use those devices in their studies is limited because many HEIs do not have systems that allow students to make use of "bring your own device" (BYOD) access (and hence, to access software packages legally) (Digital Success Programme, 2016[14]; DSN/DHECC, 2020[2]). In addition, some higher education stakeholders interviewed by the OECD reported challenges in accessing digital devices and reliable Internet connections from their homes, an issue particularly relevant during the COVID-19 pandemic.

In addition, participation in Hungarian higher education by disadvantaged groups (such as Roma and those with disabilities) and by remote/regional communities is low at present (MIT, 2016[7]). It is not clear that those groups enjoy the same access to equipment and fast broadband Internet as other students. If the government succeeds in broadening access to higher education, some students from disadvantaged backgrounds would likely face problems of access to digital devices.

Some higher education stakeholders interviewed by the OECD argued that access to software subscriptions and highly specialised hardware and software could be insufficient (see Annex A). Many stakeholders described the government-centralised procurement policy (further described in Chapter 3) as an important barrier to accessing adequate technology in a timely manner, describing the procurement policy as rigid and slow to respond to new needs in institutions. In addition, a central prohibition on procurement in place for approximately four years has led to a high risk of equipment becoming obsolete (Digital Success Programme, 2016[14]; MIT, 2016[7]). Where HEIs have the freedom to procure their own digital solutions, they may do so without adequate guidance as there is no set of standards or a policy framework to guide those purchases. A further weakness is that the national shortage of high-quality ICT professionals (MIT, 2016[7]) might be limiting the ability of HEIs to manage their digital infrastructure effectively.

At the same time, some staff and students interviewed by the OECD reported confusion generated by the proliferation of available tools for digital teaching and learning, some calling for greater standardisation of digital tools. Others disagreed and advocated for flexible and customisable solutions (see Annex A). This variety of views reveals a key trade-off between standardisation and customisation and difficulty in

identifying which types of technology purchases should be a matter for the individual HEI or where they should be part of a nationwide process.

Public policies

Public policies supporting the digitalisation of higher education constitute the second component of digital readiness besides digital infrastructure. Two key government strategies support the digitalisation of higher education in Hungary: the *Magyarország Digitális Oktatási Stratégiája* (Digital Education Strategy, or DES) and the *Fokozatváltás a felsőoktatásban* (Shifting of Gears in Higher Education, henceforth "Shifting of Gears"). Both strategies provide an assessment of the current state of digitalisation of Hungarian higher education. The DES provides an assessment of strengths and weaknesses in the three areas covered in the project, outlined in Table 2.3. Shifting of Gears provides a broad overview of the state of higher education in Hungary. On the state of digitalisation of higher education, Shifting of Gears echoes the DES, noting:

- the presence of a national higher education identity and access management system, and a network backbone and sophisticated national administrative data systems
- gaps in broadband network coverage
- difficulties posed by the centralisation of information technology (IT) equipment procurement
- a shortage of skilled and qualified IT personnel
- the expectation, implicit in regulations, of face-to-face delivery
- weaknesses in IT support for students
- lack of training for instructors in online teaching.

Both strategies ran from 2016 to 2020 and had associated action plans. The strengths and limitations of these strategies and action plans are discussed in detail in the next chapter.

Table 2.3. Government assessment of digital readiness of Hungarian higher education

Strengths	Challenges
Digital infrastructure and data	
• Basic network infrastructure available across most institutions (HBONE+) and deemed to be high quality. • Most campuses have broadband access. • Almost 100% of students entering higher education have the appropriate digital equipment (laptop, smartphone, desktop computer). • Alleged openness of institutions to well-established digital solutions. • Digital authentication systems are aligned with international standards. • Growing access to scientific databases through Electronic Information Services that provide a range of subscriptions. • Data systems (e.g. FIR) are most often centrally managed, legally consistent and accessible to institutions.	• Issues with intra-institutional Wi-Fi at some institutions. • No standardisation of digital networks used across institutions. • Students resort to their own devices and social networks to share information among themselves. • Lack of integration of personal devices into educational processes and low computer-to-student ratio. • Replacement of IT infrastructure (machinery, legal software licenses) is rare, with low funding support. • Acquisition of specialised instruments and software for education and research is infrequent, and when occurring, software is rarely used. • Legal use of software is rare. • Lack of IT support for higher education institutions. • High telephony-related expenditure (absence of Voice over Internet Protocol [VoIP] systems) and poor familiarity with cloud-based technologies. • Data systems (e.g. FIR) are not integrated into day-to-day decision making at institutions.
Digital teaching, research and engagement	

Strengths	Challenges
• Significant number of institutions involved in digital content development. • Growing university-industry co-operation, especially in the ICT sector.	• Heterogeneity in the profile and role of those involved in digital content development. • Quality of digital support and materials in the classroom is heterogeneous. • Teacher competencies are insufficient to teach in digital learning environments. • Absence of internal teacher professional development programmes. • Centralised control (and incentive structure) of teaching work that rewards face-to-face activities.
Students' experience and learning	
• Requirements to engage in a digitalised world (and especially with the ICT sector) are being integrated daily into some education programmes through dedicated training courses on emerging topics of digital technology (e.g. Competence Centre at the University of Óbuda and the impact of its action on HEIs in northern Hungary). • Programmes targeting youth to learn ICT and science, technology, engineering, and mathematics (STEM) have been successful. • Career guidance / career orientation / international mobility / language-teaching services partially conducted digitally, with the support of competence centres.	• Persistence of "traditional" methodological approaches in higher education courses (lecture, seminar, practice). • Quality of digital support and materials in the classroom is heterogeneous. • Accreditation body does not recognise domestic and international online programmes. • Adult learners lack digital competencies. • Qualitative and quantitative shortage of IT personnel in the labour market (low number of applicants for training, high dropout rates). • Learning materials do no support quality e-learning (e.g. frequent use of text-heavy tools like PDF downloadable files). • Use of digital libraries is rare, and existing libraries at institutions are only partially digital. • Recognition and transfer of credits acquired in non-formal learning is rare.

Source: Compiled by the OECD team based on Digital Success Programme (2016[14]), *Digital Education Strategy of Hungary*, and Digital Success Programme (2017[17]), *Action Plan to Implement Government Decision No. 1536/2016 (X.13.) on the Digital Reform of the Public Education, Vocational Training, Higher Education and Adult Education System and on the Digital Education Strategy of Hungary*.

Digital practices

Digital practices refer to how higher education staff (in leadership, academic and non-academic roles) and students use digital technologies in their activities and how they adapt their practices as a result of the use of said technologies. This section considers digital practice in the core functions of HEIs – teaching, learning and research – and the use of digital technologies in institutional management. It also considers how the government uses digital technologies in managing and analysing Hungary's higher education system.

The use of digital technologies in teaching, learning and research

The take-up of digital tools by students and teachers

The COVID-19 pandemic has had a significant impact on the practices of students and teachers in Hungary. According to the OECD's higher education consultation survey, over 60% of student respondents indicated they used digital tools daily for class preparation and attending lectures, with around 30% doing so weekly. Around 40-50% used digital tools in accessing support from instructors and for assessment purposes at least weekly (see Annex B). Student responses indicate that online learning is viewed as beneficial for some activities and less so for others. For example, two-thirds of student respondents considered access to course and learning materials is best provided on line. In contrast, the same proportion thought small group classes, labs and collaboration is best conducted in person. Views were more split on lectures and exams – around half of student respondents indicated they thought attending large lectures and completing exams are best conducted on line. Around 50-60% believe collaboration

with other students (e.g. group work) and obtaining feedback from teachers are done best in person (Annex B).

Teachers, too, make extensive use of digital tools in their work. Three-quarters of teacher respondents reported using digital tools weekly or more often for their teaching activities, namely classroom instruction and student support. Around 35% do so weekly or more frequently when administering exams, with another 30% doing so monthly. In addition, 50-60% used digital tools weekly for research and institutional management activities (Annex B).

However, student respondents reported that teachers could improve the way they use digital tools in their work. For example, half of the students who participated in the OECD survey reported that their teachers use digital tools effectively, but 20% thought they did not. The survey also points to teachers' general preference for in-person, rather than online, teaching and learning, with around half reporting preferring in-person activities for most of their teaching and research activities, such as delivering lectures to large groups, supporting and supervising students, conducting assessments and collaborative research projects. Three-quarters reported preferring to teach small groups in person versus on line (Annex B). These findings suggest that many in the academic workforce are reluctant to embrace fully online provisions, especially as it was practised under conditions abruptly implemented due to the COVID-19 pandemic.

In addition, stakeholders interviewed by the OECD team reported a lack of innovation in pedagogy in general, not just in the take up of digital tools. They also reported the prevalence of traditional lecture-based teaching culture and insufficient focus on collaboration among instructors (see Annex A). These views are aligned with results of a survey targeting leaders of HEIs in four countries (Hungary, Ireland, the Netherlands and Poland), in the context of the OECD-HEInnovate "Supporting Entrepreneurship and Innovation in Higher Education in Hungary" project (OECD/European Union, 2017[4]). The questionnaire was conducted between June and November 2016, and 28 Hungarian HEIs took part in the study. Results suggest that Hungarian teachers resorted to lectures and other types of teacher-centred instruction more frequently than in the three other countries and used student-centred and digital tools less frequently than their international peers (Table 2.4).

Table 2.4. Prevalence of teaching practices across a sample of OECD countries (2017)

Areas	Hungary	Sample average	Ireland	Netherlands	Poland
Lectures and other types of teacher-centred instruction	3.64	3.57	3.61	3.42	3.60
Student-centred learning	3.12	3.23	3.33	3.37	2.99
Internships	3.00	3.11	2.99	3.32	3.06
Problem-based learning	2.59	2.81	2.99	2.84	2.86
Self-learning exercises using multimedia (digital learning environments)	2.65	2.76	2.78	2.74	2.86
Self-production of online lectures/courses	2.24	2.26	2.00	2.42	2.40
Usage of massive open online courses (MOOCs) or online courses	1.65	2.09	1.86	2.31	2.53

Note: Averages are calculated based on responses being coded as 1 = not used, 2 = rarely used, 3 = regularly used, and 4 = primarily used.
Source: Raw data from the survey described in OECD/European Union (2017[4]), *Supporting Entrepreneurship and Innovation in Higher Education in Hungary*, https://dx.doi.org/10.1787/9789264273344-en.

Online learning during the pandemic

The National Union of Students in Hungary conducted a survey shortly after the shift to remote emergency learning in spring 2020, reaching approximately 12 000 students from 229 disciplines at 22 HEIs mostly studying in bachelor's programmes. The survey suggested that about 40% of respondents believed that online classes could replace in-person classes. Whether students reported a preference for online versus in-person learning was associated with factors such as the quality of students' Internet connection, their satisfaction with their online experience to date, whether they studied part-time and needed the flexibility, and their programme level, with those in more advanced studies having a slightly higher preference for online learning. Student respondents also suggest that a small share of classes could not be moved on line (HÖOK, 2020[18]).

In addition, the pandemic has played an important role in making digitalisation a key priority of higher education leaders. For example, in September 2020, the Digital Higher Education Competence Centre (DHECC) developed summary results of a survey of HEIs about the establishment of digital readiness indicators in Hungary, which it shared with the OECD team. Some 54 out of the 62 institutions in the system responded to the survey. They indicated that digital learning materials were being developed at 95% of the responding institutions, 28% of institutions revised pedagogy to adapt to a digital environment, and digital literacy initiatives for students were implemented in just over half of the institutions. In addition, initiatives to support remote work of higher education staff were put in place by more than two-thirds of institutions, with asset purchases (e.g. computers, tablets, phones) comprising the vast majority of such initiatives (DSN/DHECC, 2020[19]). The OECD stakeholder consultation survey also shows that many HEIs enhanced their focus on digitalisation after the pandemic (see Annex B for details).

However, while the pandemic led to innovation in delivery, some stakeholders interviewed by the OECD have been critical of how well some institutions and some academics managed the sudden move to online delivery, with some reporting cases of notes and recorded lectures published on line with no other engagement by teachers (Annex A).

Research

Research is a core mission of HEIs. The DES discusses the access to research and scientific databases by Hungarian academics and opportunities for access to research networks through digitally-enabled networking. The DES does not comment, however, on whether researchers in Hungarian HEIs have access to advanced, digitally-enabled scientific equipment or to the large micro-data datasets that underpin much social science research in other countries. Furthermore, specialist digital tools used for research may have limited use and application; as a result, the procurement practices in Hungarian higher education may make their purchase by HEIs difficult (DSN/DHECC, 2020[2]).

The use of digital technologies in managing HEIs

The Hungarian government requires all public HEIs to use the same student information management system (NEPTUN) and ensures that private institutions' systems are interoperable with that system. This means that core data on students – including their enrolment, achievement, payments and student services – are held in consistent forms and, therefore, are readily integrated nationally into the Higher Education Information System (FIR), which provides a national view of the system, from application for entry to higher education, through to graduation (DSN/DHECC, 2020[2]).

Learning management systems, used by all HEIs, can be linked to the student administration data (Digital Success Programme, 2016[14]). While a LMS is a useful tool for higher education teachers, it also has strategic value for an institution. In particular, if all or most teachers use the LMS, then it is possible to link the LMS data to student administration data, creating the potential for the use of learner analytics at the institutional level (see Annex C) (Guiney, 2016[15]; Cardoso, Costa and Santos, 2017[20]; Bailey et al.,

2018[21]; Georgia State University, 2018[16]). However, neither the DES nor the Position Paper on Digitalisation provided to the OECD team as part of the project (DSN/DHECC, 2020[2]) discusses the take-up or potential use of learner analytics at an HEI level. This implies that the use of learner analytics at an institutional level is not the norm, potentially representing a missed opportunity.

In addition, HEIs use generic corporate systems to manage their finances and facilities, with human resource systems relatively undeveloped (DSN/DHECC, 2020[2]).

The use of digital technologies in managing the higher education system

The FIR system collates all HEI student data, from application to graduation, allowing for the creation of system-wide performance metrics. Likewise, the Database on Student Stipends (HÖSZ) collects data on state subsidies for student enrolments (DSN/DHECC, 2020[2]). These systems have the potential to provide a solid base of evidence to inform decision making on the higher education system.

Like many OECD countries, Hungary has linked administrative data from many sources, including FIR data, HÖSZ data, other education data, tax data, welfare benefits data and employment data (MIT, 2016[7]; Universities UK, 2019[22]; DSN/DHECC, 2020[2]; Stats NZ, 2020[23]). Coupled with graduate survey data, this data integration creates the opportunity for graduate tracking (DSN/DHECC, 2020[2]; MIT, 2021[10]), enabling researchers, institutions and government to map students' life courses, to assess the effectiveness of the education system in delivering outcomes for individuals and in adding value in the labour market. In Hungary, the government has created visualisations to facilitate the use of graduate tracking data (MIT, 2021[10]). However, the take-up of the research and analysis opportunity presented by this integrated dataset appears limited at present (DSN/DHECC, 2020[2]).

Digital performance

Efficiency, quality and equity

Digital performance refers to the efficiency, quality and equity of higher education in a digital environment compared to in-person education. While internationally comparative data is scarce on this topic, the research literature suggests that digitalisation presents both promise and risk, and thus has the potential to improve or worsen outcomes (see Box 2.1).

Box 2.1. Promises and risks of online learning

Researchers have examined the diversity of students' performance in digital learning environments, noting that not all learn equally well in online programmes (Xu and Jaggars, 2014[24]; Henderson, Selwyn and Aston, 2017[25]; Xu and Xu, 2019[26]). That difference is more marked for some student groups, some types of higher education, some fields of study and some aspects of the teaching process (Xu and Jaggars, 2014[24]; Bailey et al., 2015[27]; Guiney, 2016[28]).

The difference in performance may also vary by the mix of the online and face-to-face modules of courses (Guiney, 2016[28]).These include, for instance, the type of technology used, the extent of technology versus in-person components, itself dependent on the type of learning experience provided by HEIs (in particular, the prevalence of instructor-student and student-student interaction), as well as whether study fields have components that can be easily transferred into a digital learning environment (McPherson and Bacow, 2015[29]).

The use of learning analytics may benefit student success, but poses risks as well, especially to learner privacy (Daniel, 2015[30]; Davies et al., 2015[31]; Gašević et al., 2016[32]; Shelton, Hung and Lowenthal, 2017[33]; Jones, 2019[34]; Selwyn and Gašević, 2020[35]).

The costs of digital provision as compared to those of site-based instruction may be lower but are sometimes higher (Laaser, 2008[36]; Hoxby, 2014[37]; Hemelt et al., 2018[38]). The opportunity to deliver equivalent outcomes on line and in person at a lower cost has recently been demonstrated in the context of well-designed programmes in STEM fields (Chirikov et al., 2020[39]).

Blockchain technology can transform the management of learner credentials but does not address problems of trust in the quality of provision that hampers portability (Jirgensons and Kapenieks, 2018[40]).

Concerns also exist about the role of third-party providers in online education (Mintz, 2020[41]) and the risks posed to academic integrity by digital environments (Wiley, 2020[42]).

There is no information available to the OECD team that helps shed light on the extent to which online education in Hungary generates cost savings in either the delivery of teaching and learning or with respect to administrative and operational functions. Stakeholders interviewed by the OECD often pointed to the need for additional funding to ensure adequate digital infrastructure and supports for teachers and students to succeed in an online environment (Annex A).

There is also limited information available to assess quality in an online environment. For example, no metrics are available in Hungary to assess measures such as degree completion or graduate labour market outcomes of students according to different delivery modes. However, higher education stakeholders interviewed by the OECD team expressed concern about the risk of greater dropout rates in an online environment without adequate support for teachers and students (Annex A).

The OECD survey confirms the need for further support for teachers. Only about 40% of teacher respondents agreed that their institution provides them with opportunities to develop digital skills specific to their field of teaching and research (Annex B). In particular, because the pedagogy for online and in-person education differ, the material used in face-to-face teaching may require significant adaptation, which appears to have happened to a limited extent so far in Hungary (Annex A).

Furthermore, pedagogies such as teamwork, project-based work and independent work are all critical in developing the cognitive and socio-emotional skills valued in the workplace (Brunello and Schlotter, 2011[43]; Kautz et al., 2014[44]). Digital technologies can contribute to modernising pedagogies and providing students with skills relevant to the labour market as well. However, these pedagogies are not widespread in Hungarian higher education (MIT, 2016[7]).

Measures of student and teacher satisfaction with different modes of learning are more readily available through user surveys. In the OECD survey, for instance, student respondents are in general more likely to report positive impacts of online teaching and learning than teacher respondents. While over 60% of the students agree that online learning has made attending lectures and taking exams more convenient, less than 30% of the teachers shared that view. More than half of student and teacher respondents (around 50-60%) reported that the online setting has not increased student-teacher interactions and that it has not helped with the provision of more individualised feedback. While students acknowledged some positive impact of online learning – such as convenience – nearly half of them thought online learning has not made their studies more interesting, signalling a need to improve pedagogy (Annex B).

Ensuring equity in access and success in online education is an important concern of stakeholders interviewed by the OECD. They suggested that digitalising higher education, if not done carefully with a focus on ensuring strong supports for students at risk of dropping out, could exacerbate pre-existing socio-economic inequalities (Annex A). This concern is particularly prevalent for the Roma population and

disadvantaged groups overall, since disadvantaged groups are likely to lack access to commonly available digital resources and guidance for their effective use.

Opportunities to measure performance

The practice of aggregating administrative data from all institutions (to build the Higher Education Information System – FIR) creates opportunities to analyse the performance of the Hungarian higher education system. For example, the graduate tracking data is built by integrating data from HEIs with tax data, welfare benefit data and employment data. This data provides an opportunity for policy makers and educators to analyse and monitor the performance of higher education programmes and their contribution to Hungary's labour market and for prospective and current students to make informed educational and career choices. This system may also be used for administrative purposes, for example, to identify graduates who do not work in Hungary (this is relevant since the introduction in 2012 of a legislative provision requiring repayment of state financial aid for graduates not working in Hungary for a minimum duration following completion of their studies) (DSN/DHECC, 2020[2]).

In addition to these rich system-level data resources, Hungarian HEIs use LMS (whose primary purpose is to support the instructor's management of his/her teaching). An LMS is also a powerful analytical resource. If all teachers use the system, and if the data is aggregated and viewed by student (rather than by course), it provides detailed data on students' ongoing academic performance in their courses, meaning that it can be used to identify students at risk of failing in time to enable the instructor to take action (Guiney, 2016[15]; Cardoso, Costa and Santos, 2017[20]; Georgia State University, 2018[16]). However, this opportunity appears not to have been taken up widely in Hungary to date.

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Notes

1. This indicator is based on self-reported digital skills. Using the Eurostat's "Community survey on ICT usage in households by individual", individuals using the Internet during the last three months are asked whether they are able to do basic, above basic or below basic activities in four domains: information, communication, content-creation, and problem-solving. The indicator "Individuals with at least basic digital skills" measures the percentage of individuals who report having at least basic skills in these four domains.

2. Note that this fulfils one of the recommendations of the Digital Education Strategy action plan.