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A Summary Comparison of Structures to Support the Knowledge Economy

April 2023

DFHERIS Evidence for Policy Unit

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1. Background and context

A well-educated workforce is a key factor in achieving greater aggregate productivity, innovation and long-term economic growth[1]. Key global challenges in terms of climate change, rapid technological advances, the need to respond to geopolitical uncertainty and the management of pandemic-driven reform highlight the need for an adaptive knowledge and skills ecosystem. This system must be capable of continued knowledge development through research, support the national capacity to identify opportunity and deliver change through innovation while continuing to grow human capital in an uncertain environment through a flexible and responsive education and training offering.

The Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) was formed in August 2020[2], bringing together the existing functions of Further Education and Skills, Higher Education, Research and Innovation (the Tertiary Sector) from the former Departments of Education and Skills and Business, Enterprise and Innovation. A key objective of the DFHERIS Statement of Strategy 2021-2023 is to enable Ireland to *become a leading knowledge economy*.

This paper provides firstly a summary of the initial impacts of the coalescing of the further education and skills, higher education, research and innovation portfolios. Secondly, alternative options for meeting the above challenges are explored through a brief comparison of governance and structures across comparable economies and their impact on supporting research, innovation and a flexible education and training system.

2. Ireland

Given the short existence of DFHERIS, medium term impacts and system outcomes may not yet be attributable to the changed governance of the constituent elements of the tertiary sector. Changes in system inputs and strategy for the constituent elements of the tertiary system which may be attributable to a single governance system will be outlined.

2.1. System inputs – policy developments

The Government has committed to investing in the knowledge economy to ensure that Ireland remains competitive at a global level[3].

Ireland's post-secondary education system was historically defined by two distinct streams: higher education (HE) and further education and training (FET). Broadening of the education and training offerings to learners and increased availability of programmes spanning the sectors has been facilitated through co-operative mechanisms including the establishment of the National Apprenticeship Office (NAO) in 2022 and the National Tertiary Office (NTO) in 2023. Both are joint

[1] The importance of human capital for economic outcomes: OECD, 2022
[2] Ministers and Secretaries and Ministerial, Parliamentary, Judicial and Court Offices (Amendment) Act 2020 was commenced on the 2nd August 2020[2], with the transfer of functions order signed on 20th October 2020
[3] Funding the Future: A funding and reform framework for higher education, DFHERIS, 2022

offices under SOLAS and the HEA and are operated under a Memorandum of Understanding between the organisations.

The 2022 endorsement of Skillnet Ireland's mandate to lead on demand-led workforce, development talent and skills engagement with the tertiary education system provides an opportunity to identify and action opportunities to further enhance the model, on a collaborative, cross-government basis linking with other enterprise strategies and initiatives as well as through intensified engagement with the tertiary education institutions

Assembling Ireland's generalist research funding agencies under a single Government department has allowed for greater coherence and strategic focus for the sector. *Impact 2030*, published in May 2022, provides the earliest indication of opportunities for Ireland's research system under the auspices of a single governance structure. Further consistency of approach to research funding across AHSS and applied research is expected to be progressed through the establishment of a single funding body to bring together the functions of SFI and the IRC.

Policy initiatives targeted to increased investment in research and innovation include progress towards sustainable funding for higher education[4] and improved student supports[5]. Expansion of the apprenticeship system[6] will not only support skills development, but also directly contributes to innovation through enhancing direct engagement between the education system and employers.

An increased recognition of the value of, and impetus for, skills development and supporting innovation through lifelong engagement with education and training is being enabled through *Future FET: Transforming Learning* in 2020, the *Action Plan for Apprenticeship 2021-2025* and the recognition of the importance of capital investment in FET as a driver of both economic development and social cohesion as called out in the *National Development Plan 2021-2030*.

The development of a Strategy for an Integrated Tertiary System has commenced[7,8] which will support geographic distribution of vocational and academic institutions, increased delivery of research within vocationally-oriented higher education through the Technological Universities and normalising vocational and academic further and higher education as a real choice for learners of all ages.

2.2. System inputs - Funding reform

Appropriate allocation of funding to support an integrated and lifelong approach to education, training and research engagement is key to supporting social preparedness for rapid reform, driven by factors including digitisation and climate change. These same attributes provide for economic success and the delivery of innovation at a regional and national level. A coordinated investment

[4] Funding the Future: A funding and reform framework for higher education, DFHERIS, 2022
[5] National Access Plan: A Strategic Action Plan for Equity of Access, Participation and Success in Higher Education 2022-2028, HEA, 2022
[6] Action Plan for Apprenticeship 2021-2025, DFHERIS, 2021
[7] Progressing a Unified Tertiary System for Learning, Skills and Knowledge - policy platform, DFHERIS, May 2022
[8] Progressing a Unified Tertiary System for Learning, Skills and Knowledge: Public Consultation Report, DFHERIS, Dec 2022

strategy across the entire sector, now segregated from the discrete expenditure pressures of primary and post-primary education, has created opportunity for a strategic approach to investment targeted at improving infrastructure and establishing a sustainable funding model across the tertiary sector.

Funding reform measures delivered to date include:

- Reform of the National Training Fund to ensure it functions as a strategic national asset to focus on investment in close-to-labour market skill requirements, and in targeted interventions to support enterprise training, including the movement of funding for vocationally focused PLC provision to the National Training Fund.
- Integration of climate and capital infrastructure into a single organisational area resulting in a joined-up approach to delivering and upgrading buildings and infrastructure which are fit for a low-carbon, flexible tertiary sector.
- Direct investment by the State in delivering student accommodation for the first time.

Excluding research, DFHERIS has seen an average annual growth rate in its capital allocation of 29%, with the largest proportional increase in allocation in FET as the recognition of FET as a driver for lifelong learning, skills development and locus for regional engagement as outlined in 2.1 above. *Impact 2030* highlights the need for investment in crucial infrastructural requirements in order to support the country's research and innovation objectives in the long-run.

In addition to structural reform driven by economic need, the 2022 DFHERIS paper: *Demographics in the Higher Education Sector* assessed the impact of demographic projections on full-time student numbers for higher education[9]. On a no policy change basis, demand for full-time enrolments in the HE sector which will continue to grow until at least 2030, putting existing infrastructure under increasing strain. An assessment of projected demand for FET is underway within the Department and is expected to report by year-end, providing a system level view of population-driven impacts on the tertiary system.

[9] Projections of full-time enrolments in state-aided third level institutions: 2021 - 2040

3. Country comparator

Small advanced economies (SAEs) are those that: have strong political and social institutions; promote inclusive growth; have the ability to attract substantial foreign direct investment; have the capacity to successfully integrate skills and innovation with a reliance on internationalisation and the development of solid economic policy[10]. SAEs are also characterized by heavy investment in R&D and human capital, with nations like Switzerland and Singapore leveraging this investment to develop their internationally competitive position[11]. It is also noted that due to the differences in the size of companies, governments often play a larger role in developing R&I systems in SAEs.

SAEs' flexibility and responsiveness to change has been demonstrated by out-performing larger economies through the pandemic, in terms of GDP growth as well as health outcomes[5]. The same attributes which target FDI and internationalisation also confer vulnerability to global economic and geopolitical trends.

Ireland, along with other SAEs, is moving to strengthen investment in knowledge, skills and innovation capabilities to support competitiveness and increase productivity while providing for mobility of labour across the economy. Firstly towards emerging growth areas including net zero and secondly by leveraging the digital transition to support geographic distribution of labour and innovation. Futureproofing economic and environmental sustainability is also a key factor in safeguarding Ireland's long term position.

This section will set out some of the key comparator structures across tertiary sector equivalents across key EU member states and SAEs. *Appendix I* sets out Ireland's performance in terms of Global Innovation; *Appendix II* sets out comparative performance in digital skills; *Appendix III* looks at performance on selected UN SDGs; *Appendix IV* sets out the key Ministerial structures and comparative indicators for selected countries. In all cases 'governance structure' refers to the key ministerial structures supporting relevant areas, as opposed to state agency or organisational structures sitting below the ministries.

3.1. Further Education and Training

Ireland's FET sector comprises both initial and continuing vocational education and training (VET) as well as second chance education and non-HE aspects of lifelong learning for non-vocational purposes. The broad reach of FET in Ireland provides a challenge in delivering international comparisons with countries which have a well-developed and distinct VET system spanning from school level to higher education equivalent education and training.

All six of the comparator countries which score higher than Ireland on the Innovation Scorecard and for which comparative data are available show a greater balance between lifelong learning and tertiary qualifications for 25-34 year olds (Appendix I). While a highly educated workforce is a key driver in supporting a knowledge economy, there is a need to support adaptability through engagement with lifelong learning with the OECD reporting that nearly half (44%) of Ireland's

[10] White Paper on Enterprise: 2022 – 2033 - DETE

[11] Review of industrial and Enterprise Policy in Small Advanced Economies and Implication for Irish Enterprise Policy

workforce in 2017 had some degree of skills mismatch with their occupation[12]. The digital and green transitions will require ongoing innovation, while engagement with learning at all levels provides a basis for societal resilience in the face of ongoing change.

Increased integration across the tertiary sector facilitated by a single government department provides Ireland with an opportunity to deliver greater lifelong engagement with the education and training system through flexible and integrated learning opportunities suited to the life stage and learning needs of individuals.

Opportunity for comparative analysis of the VET elements of the FET system in Ireland may be facilitated under the developing OECD PISA-VET programme which is in pilot[13]. Currently, case study analysis also provides for learning opportunities. France, which held a similar lifelong learning levels to Ireland in 2021 had, in fact, seen almost a halving of lifelong learning during COVID (from one of the best performers at 20% in 2019 to 11% in 2021)[14]. The €100bn two-year *France Relance* recovery plan was initiated in 2020 with €15bn targeted towards green and digital transformation through initial VET (iVET), continuing VET (cVET) and apprenticeship. This includes initiatives such as supporting employees to retrain while still in employment before moving to a new job needed in the local economy with employers.

Reflecting initial engagement with education as a priority towards keeping youth engaged with training and development, the *1 jeune, 1 solution* programme *(1 youth, 1 solution)* plan is a €6.7bn investment programme targeted to 16-25 year olds under three priorities:-

(i) 'entry into working life' provides employer grants of between €4-8k to businesses to recruit young people or apprentices; Paid civil service and sport sector placements of between 6-12 months have been established to deliver work experience and engagement with the workplace;
(ii) enhanced vocational guidance and training for young people promoting professions/sectors of the future, including retraining for low-qualified and digital training for the health sector and
(iii) tailored training pathways which are adapted to the individual, to support long-term unemployed young people to gain employment. This includes professional inclusion schemes targeting young people and also jobseekers over 26, a Youth Guarantee and training in the sports sector.

3.2. Higher Education and Research

Six EU member states (Denmark, France, Italy, Luxembourg, Poland and Portugal) have established ministries that have sole remit for supporting their higher education and science sectors. 11 of the

[12] OECD Economic Surveys Ireland 2020
[13] Improving evidence on vocational education and training (VET): OECD's new International VET Assessment - OECD
[14] Vocational education and training in France: short description. Cedefop (2022).

remaining member states have a ministry that has some level of integration between education and research, highlighting the benefits of this non-industrial holistic approach to supporting innovation.

All six countries have seen marked growth in the proportion of their population with a tertiary qualification since 2000. Ireland is a top-performer in this area, with 62.9% of its 25-34 year olds having acquired a tertiary qualification. Only France and Denmark, of these countries, have seen a growth rate in tertiary qualifications slower than the EU average of 90% over this period. However, their rate of growth closely mirrors the EU average rate and given they were already above the average in this regard, they remain some of the best countries for providing their citizens with a tertiary education. Italy (171%), Poland (187%), Portugal (266%) and Luxembourg (176%) are all significantly above the growth rates seen on average across the EU and OECD[15].

In fact of the of the seven countries who have a research expenditure as a proportion of GDP higher than the EU average, six of these have a government ministry responsible for education and research (Sweden, Austria, Germany, Denmark, Finland, France)[16].

However, these qualifications in tertiary might be favouring higher education over FET, or VET. In 2020 Poland, Portugal, Denmark and Italy were all below the EU average for the proportion of 18-24 year olds with a medium level VET qualification as their highest-level of education and who recently participated in further education or training. Only France was marginally above the EU average of 34%, with no information available for Luxembourg[17]. This result in France may be driven by the 15bn 2018 skills investment plan[18] and the 100bn 2020 *France Relance* recovery plan as discussed in section 3.1. Given France's 16-65 year olds scored below average in numeracy and literacy in the 2012 Survey of Adult Skills (PIAAC), it will be interesting to track how the country performs in the 2022 survey round which is due for publication in the current year[19].

Northern Ireland, which has a single department responsible for overseeing higher education and FET has historically promoted higher education as the preferred post-secondary education route. With Northern Ireland also noting difficulties in funding their higher education system, there is value in tracking their success in increasing FET participation. Using these international comparisons alongside DFHERIS's new dual educational mandate for FET and HE should help decrease the reliance on the Irish higher education system as the primary vehicle for personal growth and development.

In 2021, Ireland spent over 81% of its public research budget in the higher education sector[20]. While the proportion of spend is significantly higher than the EU27 average of 63% it remains close to, or below, spend within high performing comparator countries Denmark (90.1%) and Sweden (83.57%). Bringing responsibility for research, innovation and higher education together under a single Department should provide for greater efficacy at the research-HE interface.

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[15] OECD Education at a Glance: 2022
[16] R&D expenditure as a % of GDP - Eurostat
[17] Key Indicators on VET, CEDEFOP, 2023
[18] The French Skills Investment Plan – European Commission
[19] Survey of Adult skills (PIAAC) 2012 – France
[20] GERD by sector of performance and fields of R&D - Eurostat

DFHERIS provides opportunity for greater linkages between the country's public research output and the country's talent base, both in terms of identifying and linking key technological and other advances to skills development and in driving skills to support the research sector. At a local level, integrated programme development such as the advent of Professional Doctorate (Level 10) apprenticeships bring research and skills together with immediate impact and feedback for both research organisations and enterprise.

Comparisons may also be drawn from countries outside the EU. New Zealand for example is a small, open and advanced economy with a governance structure that is comparable to Ireland prior to the development of DFHERIS. Their system's performance can provide a baseline to benchmark the achievements of DFHERIS moving forward. Singapore provides a comparison to a system that has a significantly greater differentiation in regards to governmental responsibilities towards education and research. Together these countries provide a route into showcasing the results that a single structure of responsibility has against more diversified systems of management.

3.3. Supporting innovation

In term of the Global Innovation index, Ireland ranks 23rd overall and performs above the high-income group average in six pillars, including institutions (16th), human capital and research (23rd), Infrastructure (15th), and knowledge and technology outputs (14th)[21]. While human capital and research remains ranked lower than comparator economies, it should be noted that expenditure on education and research is rated as a % of GDP.

Denmark, Poland, Portugal and Thailand all include policy support for innovation with their higher education ministries. In general, the other countries have placed innovation within the framework of their enterprise ministries. It is difficult to ascertain the degree to which including innovation with higher education will bolster innovation based on these sample countries. With the exclusion of Denmark, the remaining countries do not rank highly in terms of their innovation. However, these nations are also generally less advanced in terms of economic development. Further research should focus on analysing the trends in innovative improvement in these countries versus those that have greater separation in the management of research and innovation activities.

NESC[22] have highlighted a number of opportunities in which an all-island approach to research could provide substantial benefits there is significant opportunities for leveraging and further developing the research links between the two jurisdictions. The Northern Ireland model provides an example of an established department incorporating research and innovation under a single framework. The Research Strategy for Northern Ireland notes that both jurisdictions need to continuously improve their research and innovation achievements or will face significant risks as small open economies.[23] At UK level, recognition of science and innovation as key driving factors in a modern economy has been acknowledged by the establishment of the UK Department for Science, Innovation and Technology in 2023.[24] This Department will have the responsibility of increasing R&D funding, driving

[21] https://www.globalinnovationindex.org/analysis-economy
[22] Shared Island Shared Opportunity: NESC Comprehensive Report
[23] Innovation Strategy for Norther Ireland: 2014-2025 – Northern Ireland Executive
[24] About us - Department for Science, Innovation and Technology

innovation that supports sustainable economic growth and creating physical and digital infrastructure that will support the country's skills base, public services and citizens.

The establishment of DFHERIS provides opportunity to leverage the full remit of the tertiary system across skills and research to deliver integrated connectivity with enterprise, supporting and driving a collaborative culture of integrated learning and ongoing innovation at a national level.

3.4. Performance on Sustainable Development Goals (SDGs)

In looking at options for broader comparison of overall tertiary system performance in a global context, Ireland's performance on three selected SDGs against the SAEs has been compared in *Appendix II*. Figures are as collated by the UN and relate to the mid-COVID period (2020).

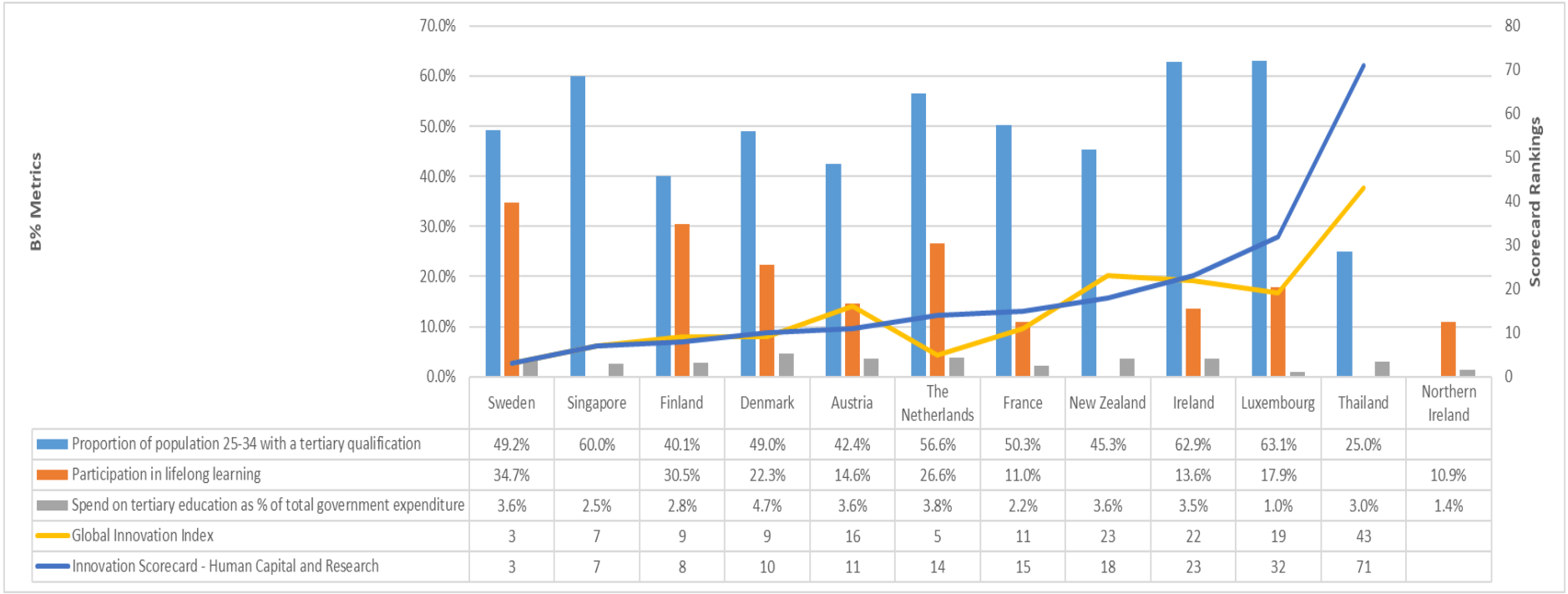
Ireland performs well in comparative terms in Target 4.4 – ICT and digital skills, performing equivalent to, or better than the recorded countries across the prevalence of the majority of skills across the population. This performance is also reflected in the Digital Economy and Society Index (DESI), which ranks Ireland as the fifth best country in the EU27.[25] This index is based on a composite methodology that ranks countries based on their achievements in developing human capital in digital environment, their overall digital connectivity, their existing level of digital integration and the availability of digital public services. Ireland scores above the EU average for all of the categories analysed in this index. The four higher-rated countries (Finland, Denmark, The Netherlands and Sweden) all also score higher than Ireland in the Global Innovation Index and in the Human Capital and Research Scorecard (see *Appendix I*).

Target 8.5 reflects youth employment and opportunity. For the purposes of this paper performance has not been disaggregated by gender. The proportion of 15-24 NEET is third highest of the comparator group, with Ireland ranked 6th highest of the 15 countries in unemployment rates of 15-24 year olds. Performance for age 25+ unemployment is at the 5th lowest, reflecting strong overall economic performance and retention of employment during COVID and its immediate aftermath.

Target 9.5 focuses on increasing international capacity through supporting scientific research, encouraging innovation and substantially increasing the number of research and development workers. Ireland's performance on FTE researchers mirrors comparative rankings in the Innovation scorecard as discussed above. Reported spend as a proportion of NDP is second lowest in the group, reflecting the general disconnect between NDP and economic performance.

[25] Digital Economy and Society Index 2022 – Ireland

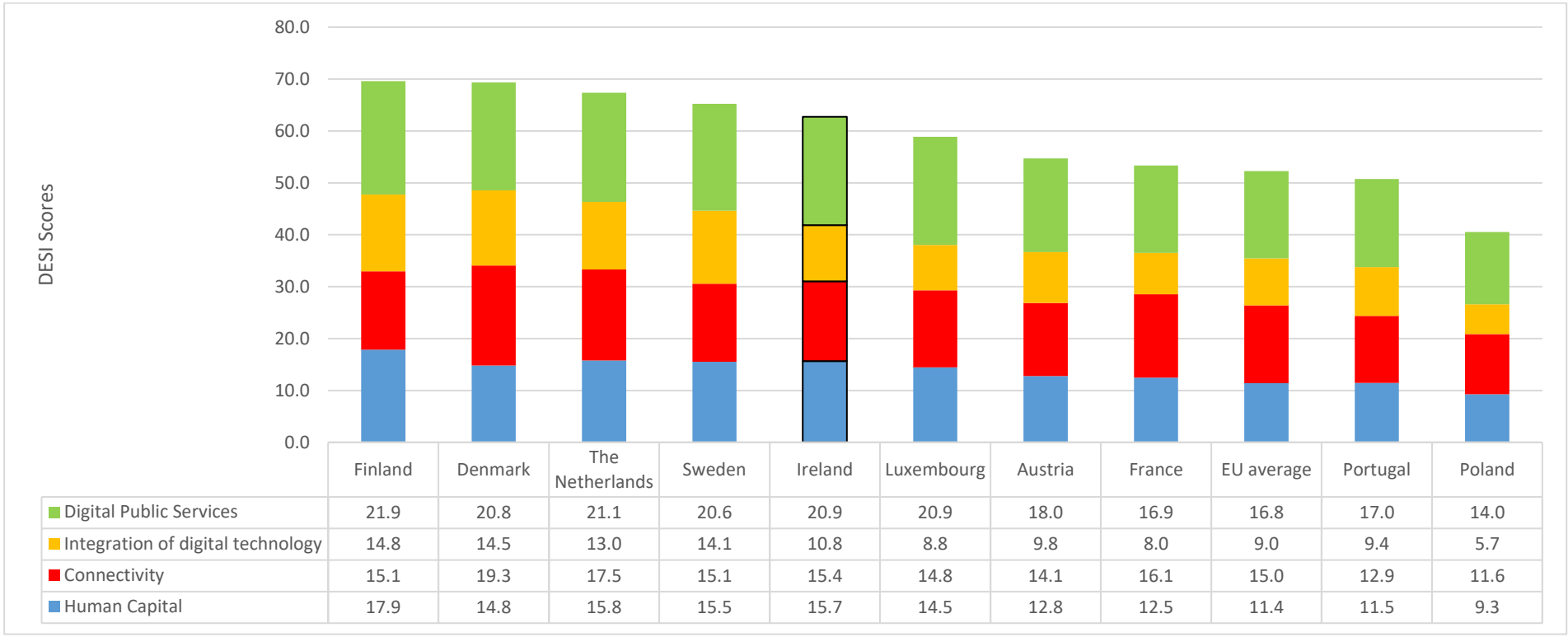
Appendix I– Country Comparison–Select SAE countries ordered by Human Capital and Research Performance Component Rankings[26][27][28][29]



	Sweden	Singapore	Finland	Denmark	Austria	The Netherlands	France	New Zealand	Ireland	Luxembourg	Thailand	Northern Ireland
Proportion of population 25-34 with a tertiary qualification	49.2%	60.0%	40.1%	49.0%	42.4%	56.6%	50.3%	45.3%	62.9%	63.1%	25.0%	
Participation in lifelong learning	34.7%		30.5%	22.3%	14.6%	26.6%	11.0%		13.6%	17.9%		10.9%
Spend on tertiary education as % of total government expenditure	3.6%	2.5%	2.8%	4.7%	3.6%	3.8%	2.2%	3.6%	3.5%	1.0%	3.0%	1.4%
Global Innovation Index	3	7	9	9	16	5	11	23	22	19	43	
Innovation Scorecard - Human Capital and Research	3	7	8	10	11	14	15	18	23	32	71	

[26] Proportion of the population aged 25-34 with a tertiary qualification - OECD
[27] Participation in lifelong learning - Eurostat
[28] Total Spend on tertiary education as a percentage of total government expenditure – Education at a glance
[29] Global Innovation Index - WIPO

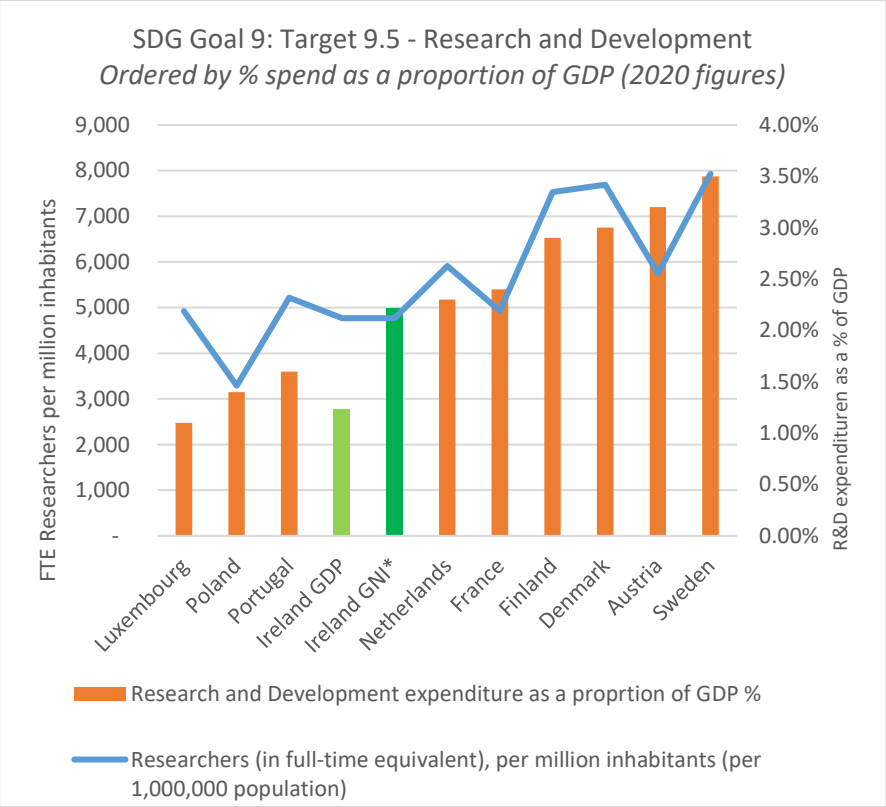
Appendix II – Digital Economy and Society Index (DESI) 2022 ranking[30]

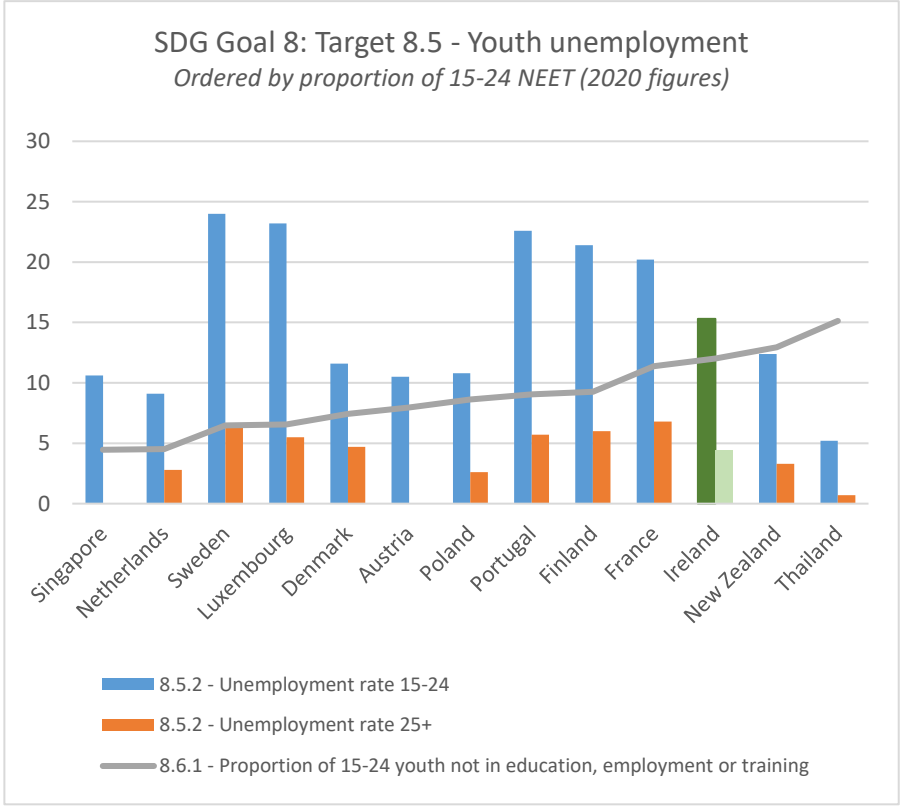


	Finland	Denmark	The Netherlands	Sweden	Ireland	Luxembourg	Austria	France	EU average	Portugal	Poland
Digital Public Services	21.9	20.8	21.1	20.6	20.9	20.9	18.0	16.9	16.8	17.0	14.0
Integration of digital technology	14.8	14.5	13.0	14.1	10.8	8.8	9.8	8.0	9.0	9.4	5.7
Connectivity	15.1	19.3	17.5	15.1	15.4	14.8	14.1	16.1	15.0	12.9	11.6
Human Capital	17.9	14.8	15.8	15.5	15.7	14.5	12.8	12.5	11.4	11.5	9.3

[30] Digital Economy and Society Index (DESI) 2022 – Country Profiles

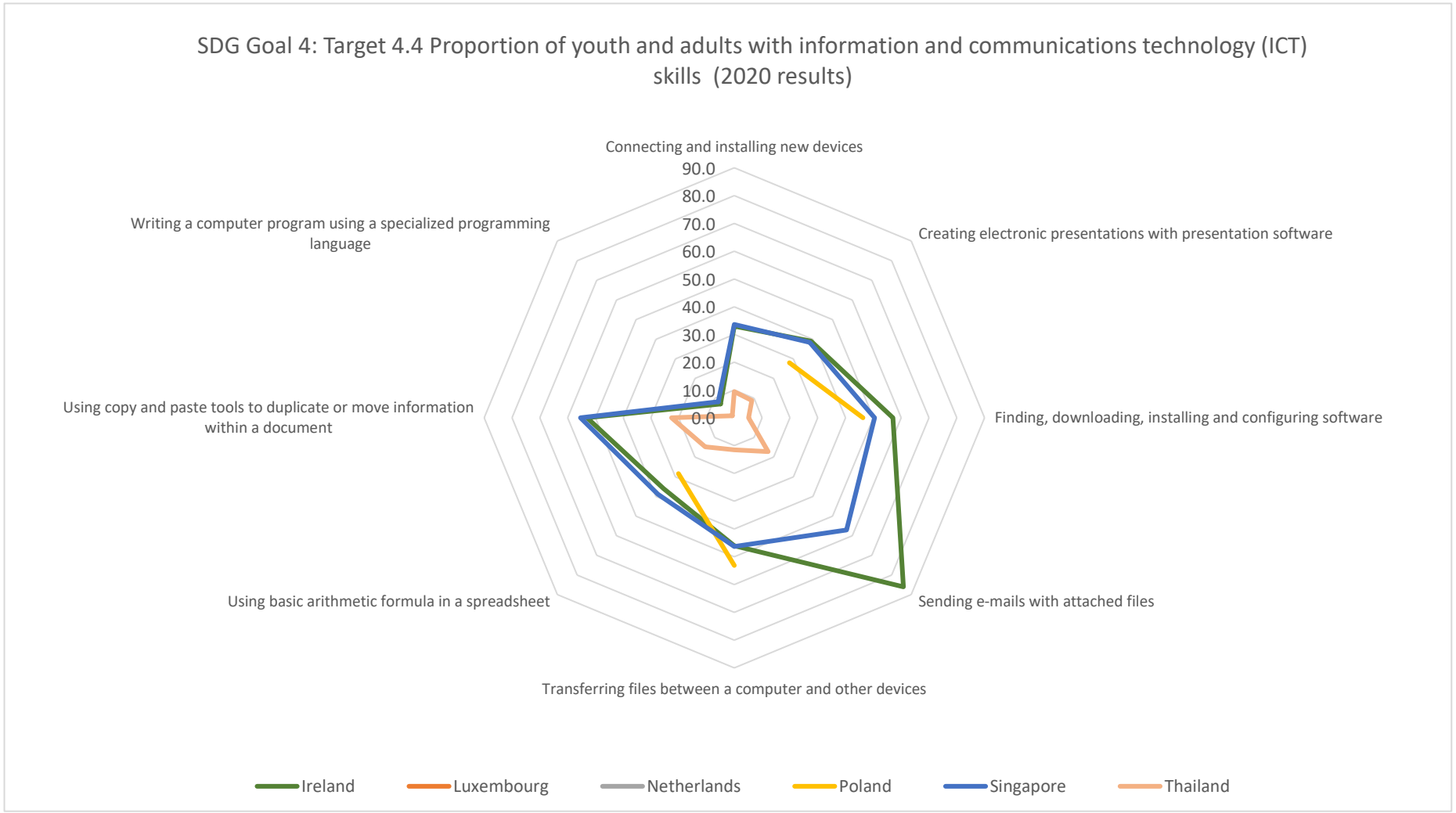
Appendix III – Comparative Performance on selected SDGs 2020/2021 indicators for SAE comparator countries[31][32]





[31] UN, SDG Country Profiles

[32] Research expenditure is taken as a proportion of GNI* due to greater accuracy associated with this metric when analysing the Irish Economy


SDG Goal 4: Target 4.4 Proportion of youth and adults with information and communications technology (ICT) skills (2020 results)
Connecting and installing new devices
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Creating electronic presentations with presentation software
Finding, downloading, installing and configuring software
Sending e-mails with attached files
Transferring files between a computer and other devices
Using basic arithmetic formula in a spreadsheet
Using copy and paste tools to duplicate or move information within a document
Writing a computer program using a specialized programming language
Ireland
Luxembourg
Netherlands
Poland
Singapore
Thailand

Appendix IV - Country Comparator – System structures and Scorecard breakdown

Country	Structure	EU Innovation Scorecard (2022)	Global innovation index[33] (Income group rank (Region rank*))	Innovation Scorecard – Human Capital and Research	Income Quintile Share ratio (S80/20)**	Labour force participation [34]	Proportion of population 25-34 with tertiary qualification [35]	Participation Lifelong learning	Total public spend on tertiary education (post secondary, non-tertiary OR secondary VET) as % government spend [36]
Ireland	Further Education (VET) Higher Education, Skills Research and Innovation policy are under the remit of a single Government Department which sits at the juncture of social and economic policy.	Strong Innovator	22 (15)	23	3.83	80.3% (OECD, 2021) 76% (CSO, Dec 2022)	62.9%	13.6%	3.5 (3.9)
Austria (SAE)	The *Federal Ministry of Education, Science and Research* manages the entirety of the Austrian education system, but shares governance responsibilities of apprenticeships with the *Federal Ministry of Labour and Economy*. The *Federal Ministry of Education, Science* and *Federal Ministry of Labour and Economy* also represent Austrian interest in the fields of research and science.	Strong Innovator	16 (9)	11	4.08	81%	42.4%	14.6%	3.6 (4.8)

[33] Global Innovation Index, 2022; WIPO 2022
[34] https://data.oecd.org/emp/labour-force-participation-rate.htm (The labour force participation rates is calculated as the labour force divided by the total working-age population. The working age population refers to people aged 15 to 64.)
[35] Population with a Tertiary Education: OECD
[36] Education at a Glance 2022; OECD 2022

Denmark (SAE)	*The Ministry of Higher Education and Science* is responsible for the governance of the higher education, research and innovation sectors, while VET falls under the remit of *the Ministry of Children and Education*	Innovation leader	10 (7)	10	3.93	84.1%	49%	22.3%	4.7 (5.5)
Finland (SAE)	*The Ministry of Education and Culture* is responsible for policy development in relation to the country's higher and vocational education sectors. *The Ministry of Economic Affairs and Employment* is responsible for implementing innovation policy.	Innovation leader	9 (6)	8	3.58	84.3%	40.1%	30.5%	2.8 (3.5)
France (Ministry)	Two main ministries are responsible for vocational and academic *Ministry of Higher Education and Research* including responsibility for innovation with the *Ministry of Labour, Employment and Economic Inclusion* is responsible for apprenticeship, VET and recognition of professional qualifications	Strong Innovator	11 (8)	15	4.42	80.8%	50.3%	11.0%	2.2 (2.9)
Luxembourg	*The Ministry of Higher Education and Research* is responsible for overseeing policy in the country's research tertiary education systems, while the *Ministry of National Education, Children and Youth* manages primary VET. Responsibility for innovation is split between *The Ministry of Higher Education and Research* and the *ministry of digitalisation*.	Strong Innovator	19 (11)	32	4.8	80.5%	63.1%	17.9%	3.6% (2018)
The Netherlands (North Europe SAE)	*The Ministry of Education, Culture and Science* oversees the operation of the entire Dutch education system and is supported by *the Ministry of Economic*	Innovation leader	5 (4)	14	3.88	84.8%	55.6%	26.6%	3.8 (5.4)

	Affairs and Climate Policy in developing research and innovation policy.								
New Zealand (SAE)	*The Ministry of Education* oversees the management of New Zealand's tertiary education sector. The core ministry for promoting science, technology and innovation the *Ministry of Business, Innovation and Employment*		23 (6 – SEA. EA & Oceania)	18	5.4 (2020)	85.6%	45.3%		3.6 (4.5)
Poland	*The Ministry of Science and Higher Education* is responsible for higher education, tertiary VET and research/innovation while the *Ministry of Education and Science* oversees primary VET.	Emerging Innovator	38 (24)	36	4.3	80%	40.6%	5.4%	4.6%
Portugal	The Ministry of Science, Technology and Higher Education has responsibility for supporting the tertiary education system and the research and innovation sector. The primary VET sector is overseen by the *Ministry for Education*.	Moderate Innovator	32 (20)	22	4.9	84.3%	47.5%	12.9%	4.7% (2018)
Singapore (FDI intensive SAE)	Governance of research, skills and education across three Ministries:- *Ministry of Education* (Tertiary and Technical Education Policy). *Ministry of Manpower* (Jobs & Skills Strategy). *Ministry of trade and industry* (Innovation, research and development)		7 (2- SEA. EA & Oceania)	7		70%[37]	60%[38] ***		2.5**** (11.9% total education spend.)

[37] Labour, Employment, Wages and Productivity: Statistics Singapore

[38] Gender Differentials in Educational Profile and Field of Study among Residents: Singapore Department of Statistics

Sweden (SAE)	*The Ministry of Education and Research* is responsible for the success of Sweden's education sectors, including VET, higher education and research policy. Innovation is overseen by *Ministry of Climate and Enterprise.*	Best performer in EU	3 (2)	6	4.04	89.1%	49.2%	28.6%	3.6 (4.8)
Thailand	*The Ministry of Higher Education, Science, Research and Innovation* has management responsibilities for the country's research, innovation and higher education systems, while the *Ministry of Education* oversees the provision of VET.		43 (9- SEA, EA & Oceania)	71		68.3%[39]	25%[40]		3% *** (2019)
UK / NI **** *(NI specific rates in Red)*	At UK level, the recently established (Feb 2023) Department for Science, Innovation and Technology holding responsibility for driving innovation that will deliver improved public services, create new better-paid jobs and grow the economy. This includes the UK Government's Research and Development schemes, optimising public investment to support areas of relative UK strength and increase the level of private investment in an effort	Strong Innovator *****	4 (3) *****	6 *****	5.63 *****	69% (*Dec 2022 rate for NI*)[41]	57.5% ***** *(NI Age 16+ with L4 qualifications or above 32.11%)*[42]	10.9[43]	1.44%[44]

[39] Thailand Labour Force Participation Rate: CEIC Data
[40] VET in Thailand: OECD, 2021
[41] Dec 2022 employment/NI Census 2021 population ages 15-64, NISRA
[42] NI Census 2021, March 2023 Release
[43] Creating a culture of lifelong learning in Northern Ireland - OECD, 2020
[44] HM Treasury Public Expenditure Statistical Analyses 2022

	to make the UK economy the "most innovative" in the world The *Department for the Economy* is responsible for overseeing the management of Northern Ireland's higher and further education, research and innovation systems. In England, the Department for Education holds responsibility for higher and further education policy, apprenticeships and wider skills.								

*Europe unless indicated

**Eurostat 2021. NZ figures are OECD from 2020.

*** Highlights the proportion with a university degree and assumed a 50:50 gender split in the total population.

****Total government spend on education as % GDP, 2020 – Worldbank

***** Where indicated numbers are provided for the United Kingdom due to issues around data availability