Northern Ireland Screen

Final Report

Review of Digital Education Policy and Implementation in UK and Ireland

September 2018

RSM

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1 EXECUTIVE SUMMARY

1.1 Introduction

RSM Consulting LLP were commissioned to conduct a review of digital education policy and implementation in the UK and Ireland. This executive summary presents the conclusions and recommendations for future development.

1.2 Terms of Reference

The terms of reference required a review of digital education policy and implementation throughout the UK and the Republic of Ireland (RoI), specifically to:

- Complete a full research study and report addressing the development and implementation of policies designed to improve digital education across the UK and RoI. This was to focus on the whole of education, for example, funding, leadership, teacher training/professional development, classroom practice and hardware and software;
- Include how this links to other policies, in particular covering social and economic policy development; and
- Present report findings to the Education Committee at Stormont (or agreed alternative).

1.3 Methodology

The evaluation methodology was agreed with Northern Ireland Screen (NI Screen) in March 2018 to focus on education policy and its implementation in relation to primary and secondary education. The following key stages of work have been completed in relation to Northern Ireland (NI), the rest of the UK and RoI:

Desk research (digital education policy) – review of relevant documents setting out the policy context for digital education. This includes links to the Programme for Government (PfG); presence of a digital strategy and link to economic / social outcomes; and presence of a digital education strategy.

Desk research (benchmarking) – review of how digital education is implemented in relation to: presence of leadership at strategic level; funding and infrastructure provision; teaching standards / competences; initial teacher education (ITE) and professional development; the curriculum; and how digital education is assessed as part of school inspections. How industry works with education stakeholders to develop and / or deliver the digital skills curriculum was also reviewed where information was available.

Stakeholder consultations – interviews were completed with stakeholders: Department of Education NI (DENI); Education Training Inspectorate (ETI); Education Authority (EA); Council for the Curriculum, Examinations and Assessment (CCEA); Invest NI (INI); General Teaching Council for Northern Ireland (GTCNI); General Teaching Council Scotland (GTCS); Education Workforce Council (EWC); the Teaching Council and the

University of Glasgow. Interviews were used to gather feedback on strategic developments in each country, how digital education has been implemented locally and any areas for future development.

Analysis and reporting – analysis of the information and development of a draft and final report.

1.4 Context

According to a report by Tech City / NESTA[1] the UK digital economy is growing 32% faster than the rest of the economy and creating jobs 2.8 times quicker, indicating the important part digital technology plays in creating jobs in the modern economy. Moreover, the House of Commons Science and Technology Committee Digital Skills Crisis Report[2] highlighted that almost 90% of new jobs across the whole economy require digital skills in some form. In addition, the fast-moving nature of technology means 65% of school children will be working in roles that do not yet exist, indicating the importance of not only addressing the current skills gap but also future employment needs.

Since 2000 DENI has invested over £632 million to provide Information and Communications Technology (ICT) infrastructure in schools through the Classroom 2000 (C2k) project, making NI a recognised leader in the use of ICT in education at one time.[3] However infrastructure is only one part of the system needed to develop digital skills. It is vital that NI does not fall behind other countries in relation to the policies, supports, partnerships and training it has in place to provide young people with the skills they need to fully access a digital society.

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[1] https://www.information-age.com/tech-nation-2018-report-uk-tech-faster-economy-123471982/
[2] House of Commons Science and Technology Committee (2016) Digital Skills Crisis
[3] https://www.education-ni.gov.uk/articles/ict-schools

1.5 Key Findings and Recommendations

A summary of the key findings is illustrated below to highlight how NI compares with the rest of the UK and RoI.

Table 1:1: Assessment of how NI compares in relation to digital education policy and implementation

Element	England	Scotland	Wales	RoI	NI
Digital skills / digital education included in the PfG	NR[4]	✓	✓	✓	X
Digital Strategy	✓	✓	X	X	X
Digital Education / Teaching Strategy	X	✓	X	✓	X
National / regional leadership	✓	✓	✓	✓	X
Investment in digital infrastructure	✓	✓	✓	✓	✓
Teaching standards / competencies relating to digital skills	✓	✓	✓	✓[5]	✓[6]
Initial Teacher Education includes digital skills	X	✓	✓	✓	X
National level CPD programmes for teachers	✓	✓	✓	✓	X
Digital education incorporated as part of the national curriculum	✓	✓	✓	✓	✓

The table above shows that NI is less developed than the rest of the UK and RoI in several areas. While the different elements of digital education have been progressed to differing degrees in each area, it is evident that NI is missing strategic level leadership that is in place in the rest of the UK and RoI. NI has no specific reference to digital skills in its PfG despite its importance to the economy and social inclusion. It also does not have a digital

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[4] England has a different structure which means it does not have a PfG
[5] RoI does not does not have a standard for digital literacy however digital is built into each standard
[6] Competences include that 'teachers will have developed a knowledge and understanding of how to use technology effectively, both to aid pupil learning and to support their professional role' however there is insufficient detail on what knowledge and understanding means

strategy or a digital education strategy while other countries reviewed have either one or both. Strategic leadership by government is key to ensuring there is a shared understanding of the importance of digital skills and cross departmental / stakeholder support for achieving agreed outcomes.

Policy

While the NI PfG states the need to improve digital infrastructure there is no reference to digital skills or digital education. NI has completed some work on digital education policy however design and implementation of a strategy would provide more direction and focus to this work than currently exists. It should also include other departments outside of DENI to ensure interdepartmental collaboration.

1. Recommendation: we recommend NI develop a Digital Education Strategy / Skills Investment Plan with joint ownership by DENI and Department for the Economy. It should set out the education outcomes and the actions needed from DENI, the GTCNI, CCEA, ETI, the EA, teaching training colleges, teachers, businesses, pupils and parents to develop the digital economy.

Leadership and supports

Evidence from other countries demonstrate leadership at a national, regional and local level is key to ensuring digital skills are understood and actions are being taken to deliver on strategic objectives.

Partnership working is needed across departments as well as with industry, academic and education stakeholders to ensure all systems are aligned.

2. Recommendation: we recommend any Digital Education Strategy / Skills Investment Plan recognise that regional leadership is key to maximising effective teacher education investment. It should also incorporate collaboration with industry and the third sector to ensure different programmes and sources of funding are easily accessible to teachers / school governors to plan teacher education investment.

3. Recommendation: we recommend a cross departmental group with representatives from education and business is established, focused on delivery of a Digital Education Strategy / Skills Investment Plan. The group should have resource to monitor and support it in its delivery**.**

4. Recommendation: local government also have a role to play in recognising the importance of digital skills to their local economies and ensuring local primary / secondary schools have pathways in place to meet these needs. We recommend that local authorities should be encouraged to include digital skills in their local economic development strategies.

5. Recommendation: we recommend there should be school level leadership to ensure teachers have the digital skills needed to deliver on their subject areas and in line with the DENI strategy Learning Leaders strategy.

Funding

All countries reviewed have invested in ICT infrastructure. NI started investing in digital infrastructure from 2000 and was once recognised by stakeholders as a leader in this field. However, there is evidence that some countries provide national funding to support the digital skill development of teachers and pupils as well as incentivising computing graduates to become teachers. In NI the largest government programme is Creative Learning Centres (CLCs), however it is not clear which schools have accessed individual training programmes. Moreover, generally schools are expected to fund training from their own budgets, which limits provision at local levels.

6. Recommendation: we recommend any Digital Education Strategy / Skills Investment Plan consider strategic developments and funding allocated to teacher and pupil digital skill development in other parts of the UK / RoI in comparison with NI.

7. Recommendation: we recommend any Digital Education Strategy / Skills Investment Plan review existing funding for teacher CPD and consider if further funding is needed.

8. Recommendation: we recommend any monies spent are evaluated to ensure they are delivering on the required digital education outcomes.

Teaching standards / competencies

All areas have teaching standards however only Scotland and Wales incorporate specific standards in relation to digital skills and / or competences. While GTCNI have developed competences for the teaching profession that refer to using technology, the generality of the statement means what is required is open to interpretation. In NI there is no requirement for existing teachers to reach and / or maintain a specified level of competency in digital skills.

9. Recommendation: we recommend the NI teaching competences incorporate additional detail to ensure teachers are aware what is expected from them in relation to digital competence.

10. Recommendation: we recommend that given the changing pace of digital and ICT development GTCNI consider how they can ensure teachers have the necessary digital skills and competences to support teaching and learning on an ongoing basis.

Initial Teacher Education and Professional Development

In the rest of the UK and RoI there is a focus on upskilling existing teachers as well as training new teachers in digital skills. Feedback from NI interviewees indicates that while ITE training and ensuring there is digital / ICT content within this is important, teachers also

require ongoing support to implement this training. It was suggested an important element of this is sharing good practice case studies.

Moreover, research completed by NI Screen highlights that teachers in NI lack the confidence to use ICT to support teaching and a robust support structure is needed for the future.

11. Recommendation: we recommend further work / research is completed to provide a detailed review and action plan reference all teachers' training needs in relation to digital skills to support teaching and learning.

12. Recommendation: we recommend GTCNI review their resources in-house and at board level to ensure they have access to the expertise to accredit the digital skill elements of ITE programmes for teachers.

13. Recommendation: we recommend that GTCNI also quality assure digital skills CPD for existing teachers.

14. Recommendation: we recommend GTCNI consider how teachers can be supported and encouraged to use online assessment tools to understand their strengths and any areas for development against the digital competences required.

15. Recommendation: we recommend that NI consider the support provided by Glow in Scotland for teacher professional development, assess what information / support is provided by CAS, CCEA and the CLCs in NI and identify any gaps to be addressed. Existing supports should be linked to allow teachers access to a 'one stop shop' for professional development resources.

Curriculum

The NI curriculum incorporates digital skills and computer science elements and is in line with good practice in other areas of the UK / RoI. However, interviewees suggested pupils may choose not to participate in the digital skills pathway after years 9 and 10 due to factors other than a lack of adequate provision within the curriculum. Other factors suggested includes:

- Gender differences – most young people competing the GCSE / A-Levels relating to digital / computational skills are male;
- Lack of skills in problem solving mathematics – to improve confidence with ICT and coding there is a need to develop mathematical skills first; and
- Perceptions of pupils / parents - for example while a school may be able to develop programme content, have pupils demand to learn it and the required teacher skillset to deliver it, the perception of digital skills amongst parents in terms of future prospects can hinder progression.

16. Recommendation: we recommend the Digital Education Strategy / Skills Investment Plan include an objective to raise parents' awareness of the need for digital skills regardless of the career path being chosen by their child.

17. Recommendation: the next revision of the NI curriculum will provide an opportunity to integrate digital skills across the phases. We recommend the curriculum ensures there is effective progression across all stages regarding digital skills.

Digital Practice Awards in the classroom

There are areas of excellent practice in NI (for example Seaview primary school in Belfast won the TES award for best in the UK at using technology[7]). However interviewee feedback highlighted there is no central system for monitoring which schools have received awards or the digital skills standards this means they have.

18. Recommendation: DENI should monitor the number of schools undertaking and completing appropriate digital awards, the value of these awards in raising standards and if the standards for each award is consistent.

Inspection

The current NI school inspection process does not include an assessment of digital education or ICT standards as part of every inspection, this contrasts with Wales where the Estyn evaluate standards in ICT in the same way as they do for literacy and numeracy. NI should consider adopting a similar approach to fully understand the consistency of digital skills / ICT provision across schools and the extent to which digital technology is used to deliver subjects across the curriculum.

19. Recommendation: we recommend NI consider adopting an inspection approach that includes digital skill provision / ICT standards as part of every inspection, reflecting equitable status with literacy and numeracy.

Collaboration and Partnership Working

NI needs to develop information on the digital skills of the existing population against the needs of business and use this to inform the Digital Education Strategy / Skills Investment Plan. For example, the Belfast Region City Deal currently at the planning phase has a focus on employability and skills and innovation / digital. The partners are developing a vision for digital infrastructure and skills for the region. This is in line with work across England to develop Local Digital Skills Partnerships (Local DSPs) at local authority levels.

20. Recommendation: we recommend NI develop information on the digital skills of the existing population against the needs of business and use this to inform the digital education strategy / skills investment plan for NI and relevant local authority plans. The

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[7] https://www.bbc.co.uk/news/uk-northern-ireland-44589816

metrics used for the DSP in England are an example of the information and data to be collected.

2 TERMS OF REFERENCE AND METHODOLOGY

2.1 Background

Digiskills NI represents industry professionals, educators and key stakeholders across government who are committed to developing develop NI's digital skills capacity. It is a cross-departmental initiative which aims to ensure young people in NI have the essential skills to create digital services and use their digital skills, creativity and innovation to best effect in the workforce, regardless of sector.

Building on research and engagement with primary schools carried out in 2015-16, Digiskills NI aims to develop a Digital Learning in School Programme across NI. This programme seeks to support the development of excellence in the teaching of digital skills and computing to support young people in NI to become digitally prepared and successful in future employment markets. It seeks to ensure that young people can create the new digital services and businesses the economy needs, but not yet imagined, and to use creativity and innovation to best effect in the workplace, regardless of sector.

NI Screen, as part of its Opening Doors strategy, is committed to developing education and skills programmes that help young people achieve their potential and to participate fully in the social, cultural and economic life of NI. This strategic intervention will also help support the future development of film, television and digital content industries in NI.

This report was commissioned to provide information regarding the steps, policies and implementation measures already taken elsewhere in the UK and Republic of Ireland (RoI) and to benchmark how NI compares.

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- Include how this links to other policies, in particular covering social and economic policy development; and
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Desk research (benchmarking) – review of how digital education is implemented in relation to: presence of leadership at strategic level; funding and infrastructure provision; teaching standards / competences; initial teacher education and professional development; the curriculum; and how digital education is assessed as part of school inspections. How industry works with education stakeholders to develop and / or deliver the digital skills curriculum was also reviewed where information was available.

Stakeholder consultations – Stakeholder consultations – interviews were completed with stakeholders: Department of Education NI (DENI); Education Training Inspectorate (ETI); Education Authority (EA); Council for the Curriculum, Examinations and Assessment (CCEA); Invest NI (INI); General Teaching Council for Northern Ireland (GTCNI); General Teaching Council Scotland (GTCS); Education Workforce Council (EWC); the Teaching Council and the University of Glasgow. Interviews were used to gather feedback on strategic developments in each country, how digital education has been implemented locally and any areas for future development.

Analysis and reporting – analysis of the information and development of a draft and final report.

2.4 Definitions

There are differing definitions and interpretations relating to 'digital', the following section details the definitions used in this report.[8]

Digital literacy - a digitally literate person will be able to demonstrate a range of digital skills as well as a deeper knowledge and understanding of the application of digital technologies and possess higher-level creative / critical thinking skills when using digital technology.

Digital skills - relates to the range of skills necessary for an individual to use digital devices such as computers, laptops, mobile devices, 3D printers, smartphones etc. Digital skills can be entry level or expert. For example, it could mean record and playback video on a smartphone or post-production the film industry.

Digital competence for teachers - digital competences relate to the educator-specific skills and knowledge that professional teachers should have to be able to utilise the potential of digital technologies for enhancing and innovating education.

Digital education - relates to the holistic experience of digital education or digital-age learning that a young person has in school. Includes: leadership and standards, professional engagement of teachers, digital resources, teaching and learning, curriculum & assessment, empowering learners, equality of access, and providing progression.

Digital competence (general) - the EU Digital Competence Framework for citizens[9] summarises the key components of digital competence as:

1) Information and data literacy: to articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.

2) Communication and collaboration: to interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital identity and reputation.

3) Digital content creation: to create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.

4) Safety: to protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social

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[8] Definitions are those used by Digiskills NI and as provided by NI Screen to RSM Consulting LLP (August 2018) unless otherwise sourced
[9] DigiComp (2016) 'Digital Competence Framework 2.0'.

well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.

5) Problem solving: to identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.

The House of Lords report 'Make or Break: The UK's Digital Future'[10] refers to the UK Digital Skills Taskforce's three-band definition of different skills levels:

- Digital citizens - skills that enable people to take part in digital aspects of society, safely and without hindrance;
- Digital workers – people who can apply their digital skills to further their learning or in a work-related setting; and
- Digital Makers - people who are starting to build their own digital technology.

The training / education of relevance to this report are those being delivered through primary and second level schools only.

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[10] House of Lords (2015) 'Make or Break: the UK's digital future'

3 POLICY

This section examines digital education policy across the UK and RoI.

3.1 Importance of Digital Skills to Economic / Education Policy

According to a report by Tech City / NESTA[11], the UK digital economy is growing 32% faster than the rest of the economy and creating jobs 2.8 times quicker, indicating the important part that digital technology plays in creating jobs in the modern economy. Moreover, the House of Commons Science and Technology Committee Digital Skills Crisis Report[12] highlights that almost 90% of new jobs require digital skills in some form. In addition, the fast-moving nature of technology means 65% of school children will be working in roles that do not yet exist, indicating the importance of not only addressing the current skills gap but also providing for future employment needs.

Digital skills are and will be key to helping people access employment and maximise opportunities in their lives. It is vital that NI does not fall behind other countries / regions in ensuring that it has the policies, supports, partnerships and training in place to give young people the skills they need to fully access a digital society.

This report is a vital step in comparing NI digital education policy and implementation against its local counterparts.

3.2 Digital Education Policies and Strategies

Programme for Government

All the countries who have a PfG mention the importance of developing their digital infrastructure and two of the countries specifically mention 'digital skills' (Scotland and Wales).

The Scottish PfG 2017-18 presents a range of improvements for Scotland's digital infrastructure and strategies to promote digital skills.

The Welsh PfG 'Taking Wales Forward 2016-2021' sets out the objective to help 95% of people gain at least basic digital skills by 2021. Moreover, the document 'Prosperity for All: The national strategy (2017)' seeks the inclusion of coding and other aspects of digital literacy into a new curriculum. It notes expanding the network of code clubs and working with regional skills partnerships is required to meet the current needs of the economy.

The RoI PfG details a range of plans to improve digital infrastructure, including new technology in classrooms to ensure a wider range of subject choices for students. These

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[11] https://www.information-age.com/tech-nation-2018-report-uk-tech-faster-economy-123471982/
[12] House of Commons Science and Technology Committee (2016) Digital Skills Crisis

include a computing course for junior cycle students and an ICT / computer science course as a leaving certificate subject.

The draft NI PfG 2016-2021 mentions digital and the need to improve internet connectivity. However, in contrast to the Welsh, Scottish and RoI programmes, it does not mention digital skills.

Digital Strategy and link to Economic / Social Outcomes

3.2.1.1 England

The UK Digital Strategy (2017) emphasises the need to promote and invest in digital skills. It consists of the following seven strands:

- Connectivity - building world-class digital infrastructure for the UK;
- Skills and inclusion - giving everyone access to the digital skills they need;
- The digital sectors - making the UK the best place to start and grow a digital business;
- The wider economy - helping every British business become a digital business;
- Cyberspace - making the UK the safest place in the world to live and work online;
- Digital government - maintaining the UK government as a world leader in serving its citizens online; and
- The data economy - unlocking the power of data in the UK economy and improving public confidence in its use.

3.2.1.2 Scotland

The Scottish Digital Strategy (2017) seeks to ensure digital skills sit alongside literacy, numeracy and health and wellbeing as essential platforms for lifelong learning.

The Scottish Skills Investment Plan for the ICT and Digital Technologies sector[13] outlines a skills ambition for digital technologies in which 'there is close collaboration between industry, Government agencies and the education sector to meet the skills needs of the sector'.

3.2.1.3 Wales

The Welsh Digital Inclusion Strategic Framework (2016) recognises the importance of ICT and the digital economy for producing high value-added jobs. Digital literacy is recognised as an essential skill and the strategy seeks digital learning to be embedded throughout schools.

3.2.1.4 Republic of Ireland

The RoI digital strategy 'Doing more with Digital: National Digital Strategy for Ireland' (2013) outlines several initiatives relevant to digital skills in schools. A key strand of this document

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[13] Skills Development Scotland (2014) 'Skills Investment Plan for Scotland's ICT and Digital Technologies Sector'

is Education & e-Learning, which includes all forms of educational technology in learning and teaching. The strategy recognises that gains from e-Learning can include 'higher level skills such as problem-solving, critical and collaborative thinking, team working, creativity and innovation'.

3.2.1.5 Northern Ireland

The Invest NI digital strategy 'Digital Northern Ireland 2020' places emphasis on developing education and skills. It also highlights the opportunity to exploit content developed under the auspices of the UK e-Skills programme[14] to ensure all school leavers have attained a certain level of e-skill capability on the E-Passport scheme to equip them to better exploit digital technology in their work and personal lives.

Digital Education Strategy

3.2.1.6 England

England does not have a national Digital Education Strategy.

3.2.1.7 Scotland

The teaching strategy for Scotland 'Enhancing Learning and Teaching through the use of Digital Technology' (2016) envisions an education system utilising digital technology to enhance learning and teaching, improve educational outcomes and build digital skills.

The following tables outlines the strategy's suggested indicators of success.

Table 3:1: 'Enhancing Learning and Teaching through the use of Digital Technology' – Indicators of Success

Indicator	How it will help measure success
Glow usage	Glow provides access to a range of digital tools and services that can enrich learning and teaching. An increase in the usage of Glow will indicate that more learners and educators are incorporating digital technology into education (see section 7.2).
Qualitative data from school inspection reports	When undertaking inspections, HM Inspectorate at Education Scotland look for the effective and appropriate use of digital technology. If inspection reports show an increase in the effective and appropriate use of digital technology, then it will indicate that this strategy is having an impact.
Number of schools in Scotland undertaking and	Awards and programmes such as Digital Schools Award Scotland and Microsoft's Showcase School status indicate that education establishments are embedding the use of digital technology within their learning and teaching.

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[14] e-skills UK is the Sector Skills Council for Business and Information Technology

Indicator	How it will help measure success
completing appropriate digital awards	
Statistical publications	Statistical publications such as the OECD's ICT familiarity questionnaire (which forms part of PISA) and the Behaviour in Scottish Schools Research can provide a picture of the uptake and impact of digital technology on education.

Source: Scottish Government (2016) Enhancing Learning and Teaching through the use of Digital Technology

3.2.1.8 Wales

Wales does not have a national Digital Education Strategy.

3.2.1.9 Republic of Ireland

The Irish Digital Strategy for Schools 2015-2020 aims to realise the potential of digital technologies to enhance teaching, learning and assessment to help students become 'engaged thinkers, active learners, knowledge constructors and global citizens to participate fully in society and the economy'. It provides a rationale and Government action plan for integrating ICT into teaching, learning and assessment practices in schools.

3.2.1.10 Northern Ireland

There is currently no digital education strategy or action plan in NI. However, the 2016 Matrix report[15] highlighted the need for such strategic direction to support the development and delivery of digital skills and computing in schools. Specifically, it states the need to build capacity for delivery via:

- introductory and accredited pathways for teacher professional development;
- a framework to support sharing of good practice within the education sector;
- development of innovative approaches, taking into account good practice in other regions with growing knowledge economies; and
- a framework of support for the teaching profession to ensure that high-quality teaching and learning is available to young people to progress and to develop an interest in ICT that can be applied not only to this sector but to the industry sector of their choice.

Interviewee feedback noted there is a need for a digital education strategy / skills investment plan similar to that in other countries to detail digital skills / computing pathways for pupils, digital skill development for teachers and key success outcomes for both.

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[15] Matrix Digital ICT Panel: Matrix Digital ICT Report 2016

3.3 Conclusion

While the NI PfG states the need to improve digital infrastructure there is no reference to digital skills or digital education. NI has completed some work on digital education policy however design and implementation of a strategy would provide more direction and focus to this work than currently exists. It should also include other departments outside of DENI to ensure interdepartmental collaboration.

1. Recommendation: we recommend NI develop a Digital Education Strategy / Skills Investment Plan with joint ownership by DENI and Department for the Economy. It should set out the education outcomes and the actions needed from DENI, the GTCNI, CCEA, ETI, the EA, teaching training colleges, teachers, businesses, pupils and parents to develop the digital economy.

Examples of the issues to be covered are set out in the rest of this report.

4 DIGITAL SKILLS LEADERSHIP AND SUPPORTS

This section examines leadership of digital education across the UK and RoI. It demonstrates that all countries see the need for partnership between business, education and government. It also recognises the need for local implementation.

4.1 England

The Digital Skills Partnership (DSP) aims to:[16]

- Increase the digital capability needed to build thriving local digital economies by sharing and incentivising best practice at a local level and supporting the creation of Local DSPs; and
- Create a more coherent framework that enables people and organisations to identify and access good digital skills training opportunities and enables providers to collaborate to upscale and innovate.

> In England, a Digital Skills Partnership was established in 2017 bringing together public, private and charity sector organisations to facilitate coordination between digital skills programmes, including the sharing of knowledge and best practice.

The DSP Board provides strategic support and challenges to ensure the desired outcomes of the DSP are delivered. It is co-chaired by the Minister of State for Digital and Creative Industries and the Chair of the Tech Partnership. It meets three to four times a year unless the co-chairs decide otherwise.[17]

It aims to improve coherence of digital skills provision at a national level and has prioritised four initial specific work streams, setting up delivery groups for each:

- National Coherence - to improve the coherence of what a fragmented landscape of digital skills provision;
- Local DPSs - established in 2017 to identify digital skills needs and develop local implementation plans (see section 11.1);
- Digital Enterprise - to collaborate with a range of partners to motivate smaller businesses and charities to become more digitally mature and to increase their digital capability; and
- Computing in Schools – to support teachers to gain the knowledge and skills to teach the new computing curriculum effectively (see section 7.1). The Computing in Schools Delivery Group brings together industry and non-profit organisations to support the teaching of computing in schools. This Delivery Group is in the process of mapping and assessing industry interventions and identifying examples of good practice. This work will

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[16] https://www.gov.uk/government/publications/the-digital-skills-partnership/the-digital-skills-partnership-board-board-members-and-terms-of-reference
[17] https://www.gov.uk/government/publications/the-digital-skills-partnership/the-digital-skills-partnership-board-board-members-and-terms-of-reference

lead to a guide that will help industry develop new and effective interventions to support the teaching of the computing curriculum. By doing so, this Delivery Group is aiming to inspire further industry support for teachers and improve the efficacy of these interventions.

The chairs of each delivery group will report to the DSP Board on progress.

4.2 Scotland

Digital schools address issues related to connectivity, infrastructure, teacher continuing professional development (CPD) and leadership. It has four workstreams:

1. Information gathering / baseline research – undertaking research to understand the baseline position of computing science and digital education delivery across schools;
2. Pathfinder digital schools development - developing a plan of regional and national pathfinder projects which will support schools in making changes and improvements and test the framework;
3. Digital schools framework - utilising the research and pathfinders to make recommendations about a digital school framework which will provide guidance on what is required for effective development of digital skills in schools; and
4. Pathfinder digital schools delivery - implementation of regional and national activities.

In Scotland Digital Schools is a partnership project which is being led by Skills Development Scotland and Education Scotland, with support from the Scottish Government and other public sector and industry partners. It focuses on ensuring that schools are fully equipped to support young people with computing science and wider digital skills experiences.

It aims to develop an ambitious, coherent and robust programme of work through regional and national pathfinders, which has the capacity to deliver transformational change, and which generates the evidence base to lever future support from public sector and industry partners.

A Digital Technologies Skills group is responsible for advising on the Digital Technologies Skills Investment Plan.

4.3 Wales

The National Digital Learning Council[18] includes representation from Welsh Government; academia; local authorities; teachers, Estyn and Jisc Wales. It supported the development of the Welsh learning platform Hwb, including the iTunes U site for Wales and national digital content repository measures to improve the teaching of ICT and computing in addition to measures to promote responsible digital citizenship.

> The National Digital Learning Council was established in September 2012 to provide expert guidance, external to Welsh Government, and to promote and support the use of digital resources and technologies by learners and teachers.

4.4 Republic of Ireland

The Irish digital skills and jobs coalition aims to transform teaching and learning of digital skills in a lifelong learning perspective, including the training of teachers. Partners of the Irish Digital Coalition include Government Departments, business, education and several small and large enterprises.

> The Irish digital skills and jobs coalition is a multi-stakeholder partnership launched in April 2017 focused on tackling the digital skills shortage, with government ministers clearly highlighting the importance of digital skills and education to the Irish economy.

Ireland also has a Steering Committee and an Advisory Group in place to manage implementation of the Digital Strategy for Schools. The Steering Committee includes business and other Government Departments and reports to the ICT Policy Unit of the Department of Education and Skills. The Steering Committee is responsible for:

- Approving an Implementation Plan which sets out roles, responsibilities, implementation milestones and timeframes;
- Monitoring and reviewing progress towards achieving the targets in the Strategy and providing regular reports to senior management;
- Providing direction and guidance for the effective implementation of the Strategy including the relationship with Department policies and programmes and other partners;
- Approving and monitoring project plans and identifying any interdependencies;
- Considering feedback and be the escalation point in respect of all policy and implementation issues arising and provide direction where necessary;
- Providing guidance on the communication and consultative arrangements necessary for consistent messaging under the Strategy and its effective implementation; and
- Advising on an appropriate evaluation for the Strategy.

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[18] https://hwb.gov.wales/community-ndlc Includes representation from Welsh Government; academia; local authorities; teachers, Estyn and Jisc Wales

The Consultative Advisory Group has also been established which provides a consultative forum for the Education Partners, students, industry and other stakeholders to advise on and support the implementation of the Digital Strategy for Schools. The group:

- Advises on strategies for the promotion of digital technology in teaching, learning and assessment in schools to ensure consistent messaging on the strategy;
- Provides a forum whereby Department, schools and industry can explore and develop collaborative models of engagement and partnership including the sharing of knowledge, expertise and resources;
- Identifies and disseminates examples of good practice in the use of ICT and of innovative approaches to using ICT in teaching, learning and assessment;
- Explores and encourages the development of links and partnerships between schools and the ICT industry at both student and teacher levels;
- Provides advice on the ICT infrastructural development needs of schools and how these can be best met having regard to value for money, procurement and other public-sector policies; and
- Identifies opportunities for the promotion of learning experiences which foster positive student attitudes towards STEM subjects through the use of digital technologies in teaching, learning and assessment. The Consultative Advisory Group meets twice yearly (up to 2020).

4.5 Northern Ireland

A business case was developed by NI in 2016 to establish a Digiskills Programme Board comprising cross-departmental representation[19], industry, academia, education agencies and key stakeholder organisations.[20] It was also proposed that a Digiskills Digital Foundation Programme be established to '*ensure that young people in Northern Ireland have the essential skills to create digital services and businesses and use their digital skills, creativity and innovation to best effect in the workforce, regardless of sector*'. The programme was to include[21]:

- Development of a framework for teacher education to address digital skills and computing. This would work across departments, agencies, academia and industry to proactively address the issues that have led to a digital skills gap;
- A specialist team of experienced digital educators to develop the pilot programme working towards a regional programme to be rolled out in 2018;
- Creation of an innovative, long-term, strategic partnership between industry, education and communities;

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[19] Department for Communities; Department of Education; Department for the Economy; Department of Finance; and the Executive Office
[20] NI Screen; Invest NI; Strategic Investment Board; Urban Villages; Digital Catapult Centre; Business in the Community; NI Direct; Go On NI; Bring It On; and Belfast City Council
[21] NI Screen (no date / internal document) 'Digiskills Digital Foundation Programme'

- Building capacity for digital and creative skills to enhance the future social and economic growth of the region in contributing to PfG outcomes;
- Increasing self-confidence of teachers and students and in supporting a more confident and creative society;
- Maximize sustainable development in building capacity and empowering education to be agile in a digital world;
- Develop the skills pipeline for generations of young people; and
- Contribute to creating a dynamic, inclusive, confident society and developing synergies between social, education and economic outcomes.

However, in the absence of devolved government and ministerial approval it did not proceed. Feedback from NI interviewees highlighted that inter-departmental cooperation in this area has not advanced since 2016 and while DENI submitted a proposal to deliver a digital skills programme at the end of 2017, this has not yet been progressed.

The DENI strategy 'Learning Leaders: A Strategy for Teacher Professional Learning'[22] does not specifically refer to digital competency however it emphasises the need for career-long teacher professional learning. It suggests this includes:

- Clear pathways for progression in professional learning that will help teachers to identify and celebrate success;
- Access to appropriate support and development at all stages of teachers' careers;
- Tools to help teachers, as professionals and reflective practitioners, to determine their continuing learning needs;
- Planned opportunities for teachers to work collaboratively to share best practice through learning networks; and
- Opportunities for nurturing and building leadership capacity at all levels, starting at initial teacher education.

At a local level, in April 2017 the EA published 'Providing Pathways - Strategic Area Plan for Schools 2017-2020'. The plan identifies the challenges for the education system throughout each Local Government District (LGD) area.

In addition, school-level feedback from ETI notes that use of digital technology and ICT should be included in individual school development plans and each school should have a digital policy. It is important that within each school the principal and Board of Governors are exposed to best practice in this area to inform individual plans.

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[22] DENI (2016) 'Learning Leaders: A Strategy for Teacher Professional Learning'

4.6 Conclusion

Evidence from other countries demonstrate leadership at a national / regional and local level is key to ensuring digital skills are understood and actions are being taken to deliver on strategic objectives.

Partnership working is needed across departments as well as with industry, academic and education stakeholders to ensure all systems are aligned.

2. Recommendation: we recommend any Digital Education Strategy / Skills Investment Plan recognise that regional leadership is key to maximising effective teacher education investment. It should also incorporate collaboration with industry and the third sector to ensure different programmes and sources of funding are easily accessible to teachers / school governors to plan teacher education investment.

3. Recommendation: we recommend a cross-departmental group with representatives from education and business is established, focused on delivery of a Digital Education / Skills Investment Strategy. The group should have resources to monitor and support it in its delivery**.**

4. Recommendation: local government also have a role to play in recognising the importance of digital skills to their local economies and ensuring local primary / secondary schools have pathways in place to meet these needs. We recommend that local authorities should be encouraged to include digital skills in their local economic development strategies.

5. Recommendation: we recommend there should be school level leadership to ensure teachers have the digital skills needed to deliver on their subject areas and in line with the DENI strategy Learning Leaders strategy.

5 FUNDING

Funding for digital education is difficult to compare across the UK and RoI as it is not always separated from overall education monies. However, the review highlights a growing emphasis on increased investment in digital skills as well as computing elements of the curriculum. This includes for teachers, pupil development and educational infrastructure. It also shows that public monies are being used increasingly alongside private organisations and third sector bodies to develop local skills and to tackle skills shortages.

The following tables illustrate examples of funding provided in each country.

5.1 England

Table 5:1: Funding Overview – England

Element	Funding
Teacher Education	The 2017 Autumn Budget announced the Government would[23]: • Commit £84 million to upskill 8,000 computer science teachers by the end of [the] current Parliament; • Work with industry to set up a new National Centre for Computing to produce training material and support schools; • Invest £42 million to pilot a Teacher Development Premium. This will test the impact of a £1,000 budget for high-quality professional development for teachers working in areas that have fallen behind. This will support the government's ambition to address regional productivity disparities through reducing the regional skills gap (not specific to digital); and • Continue to encourage computing graduates into teaching, by providing bursaries of up to £25,000, and, in partnership with the British Computing Society, scholarships worth £27,500 for those training to be a teacher in 2017/18. In addition, the DSP is supporting the formation of Local DSPs in regions across England (see section 11).
Pupil Development	The UK Digital Strategy states that to ensure that the UK has a pipeline of cyber skills that meets its current and future needs a national after-school programme will be made available for the most talented students including cyber clubs, apprenticeships and adult retraining. Funding amount not available.
Educational Infrastructure	An action in the UK Digital Strategy is to support schools 'to be more cost-effective purchasers of technology through a series of aggregated procurement opportunities for tablet, desktop and laptop devices'. It also notes the UK government will work to understand the needs of schools and address the barriers they face in accessing modern digital infrastructure.

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[23] https://www.gov.uk/government/publications/autumn-budget-2017-documents/autumn-budget-2017

5.2 Scotland

Table 5:2: Funding Overview – Scotland

Element	Funding
Teacher Education	Skills Development Scotland provide funding to support work in building capacity in digital skills within Scottish Education. In the 2018/19 budget the Scottish Government has allocated £5.1m to technologies for learning.
Pupil Development	The Digital Xtra Fund[24] was launched in May 2016, and as at 1st April 2017 had distributed £400,000 to organisations delivering extracurricular activities, with funding provided by the partners of the Digital Scotland Business Excellence Partnership. Funding has also been provided by the Digital Scotland Business Excellence Partnership, whose partners include Scottish Government, Skills Development Scotland, Scottish Enterprise, Highlands and Islands Enterprise, Scottish Funding Council, Education Scotland, ScotlandIS, and industry representatives.
Educational Infrastructure	An action in the Scottish Digital Strategy[25] is to ensure there is effective co-ordination of work on delivering broadband to schools as well as the wider public sector.
	In addition, Pupil Equity Funding[26] can be used to procure digital technologies, including hardware and software, when its allocation and use is particularly focused on supporting children and young people affected by poverty to achieve their full potential.

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[24] Digital Xtra Fund is a Scottish Charitable Incorporated Organisation (SCIO) that supports the delivery of extra-curricular computing and digital activities to young people, aged 16 and under, across Scotland. It specifically seeks to improve participation of girls and underrepresented groups in digital, dispel negative perceptions about computing science and promote digital as an attractive career path

[25] Scottish Government (2011) 'Scotland's Digital Future A Strategy for Scotland'

[26] The Pupil Equity Fund is being provided as part of the £750 million Attainment Scotland Fund which will be invested over the current parliamentary term (2016 to 2021). The Pupil Equity Fund is allocated directly to schools and targeted at closing the poverty related attainment gap. In 2017 to 2018, £120 million will be distributed. This funding is to be spent at the discretion of the head-teacher working in partnership with each other and their local authority. Schools will now have their plans in place for using their funding and will be implementing those plans

5.3 Wales

Table 5:3: Funding Overview – Wales

Element	Funding
Teacher Education	The Learning in Digital Wales (LiDW) programme received £750k across all four regions to March 2016.[27] This was aimed at: • promoting the use of Hwb+ as part of effective teaching and learning; • ensuring Hwb+ was measurably contributing to the core education objectives of improving literacy and numeracy and breaking the link between poverty and attainment; • helping schools embed Hwb+ to support high-impact interventions; • helping teachers develop their own digital literacy skills; and • promoting 'e-Safety' in relation to the safe and responsible use of Hwb+ tools including Office 365 and in relation to the digital technology more widely used. Further information on the LiDW is provided in section 7.3. Wales, as with the rest of the UK, has a shortage of Computer Science teachers and at the end of 2017 Computer Science was added as a priority subject eligible for the highest level of incentive to teach (Graduates with a 1st (or a PhD / Masters) undertaking secondary postgraduate Initial Teacher Education (ITE) programmes in Mathematics, Welsh, Computer Science, physics and chemistry would receive the £20,000 incentive).[28]
Pupil Development	£1.3m was provided by the Welsh government in 2017 for the 'Cracking the Code' programme and a further £1.2m in 2018. The funding will pay for computers and associated equipment for Technocamps labs which provide hands-on experience for teachers and learners on a range of coding activities and tools. It will also fund schools / business liaison officers, and the establishment of community engagement code clubs run by the National Software Academy.[29]
Educational Infrastructure	All schools in Wales have minimum broadband connections of 10Mbps for primary schools and 100Mbps for secondary schools. In November 2016 an investment of £5 million was made available to cover the installation of new broadband services.[30] In November further funding was provided under the LiDW Investment in Broadband programme. This aims to provide connectivity to all schools where future speed upgrades are limited by technology, or where circuits are provided by non-PSBA solutions, for example, Satellite or 4G.[31]

[27] Welsh Government (2015) 'Learning in Digital Wales Overview'
[28] https://gov.wales/newsroom/educationandskills/2017/new-incentives-to-teach-in-wales-kirsty-williams/?lang=en
[29] https://gov.wales/newsroom/educationandskills/2018/1-2m-for-welsh-universities-to-crack-the-code/?lang=en
[30] https://gov.wales/newsroom/educationandskills/2017/341-schools-set-to-get-superfast-broadband-thanks-to-5m-of-funding/?lang=en
[31] https://beta.gov.wales/sites/default/files/publications/2018-03/frequently-asked-questions-lidw.pdf

5.4 Republic of Ireland

Table 5:4: Funding Overview – RoI

Element	Funding
Teacher Education	The Digital Strategy for Schools 2015-2020 indicates that €5.5 million was allocated in the 2018 budget to provide schools with support for a range of new policy measures including the digital learning strategy. This will promote the existence of digital clusters, seeking to encourage schools to work together and promote innovation. A grant of €30,000 on average per cluster is available for software, hardware, training and other needs.[32]
Pupil Development	No information on funding available
Educational Infrastructure	A High speed 100Mbit/sec broadband programme was delivered during 2010 – 2014 which provided broadband to all Post-Primary schools and in addition to some Special Schools with post-primary students. This programme was jointly funded by the Department of Education and Skills (DES) and Department of Communications, Energy and Natural Resources (DCENR). As part of the implementation of the Digital Strategy for Schools 2015-2020 Enhancing Teaching Learning and Assessment, funding of €210m for ICT Infrastructure will be distributed to schools over five years.

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[32] https://www.education.ie/en/Press-Events/Press-Releases/2017-Press-Releases/PR2017-10-10.html

5.5 Northern Ireland

Table 5:5: Funding Overview – NI

Element	Funding
Teacher Education	The largest funded programme to support teacher education in relation to digital skills is NI Screen's Creative Learning Centres (CLC) which receive an annual budget of £550k from the Department for Communities (DfC). While there are several other small-scale initiatives, these are not strategically led and in many cases are supported by schools out of their own budgets. For example, Computing at School (CAS) and CCEA provide information on training and industry has designed / delivered courses (e.g. Kainos python training). However, it is not clear which schools have accessed individual training programmes.
Pupil Development	Similar to teacher education, there is no government supported, strategically led programme focused on developing the digital skills of pupils. While the DfC funded CLCs to deliver digital skill development programmes, it is not clear which schools have accessed this.
Educational Infrastructure	The C2k project provides the infrastructure and services to support the use of ICT in schools in NI. C2k is managed by the EA on behalf DENI. Since 2000, DE has invested over £632 million in providing the ICT infrastructure in schools through the Classroom 2000 project making NI a recognised leader in the use of ICT in education.[33] Interviewee feedback has highlighted proposed plans for further investment in infrastructure 2018/19.

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[33] https://www.education-ni.gov.uk/articles/ict-schools

5.6 Conclusion

All countries reviewed have invested in ICT infrastructure. NI started investing in digital infrastructure from 2000 and was once recognised by stakeholders as a leader in this field. However, there is evidence that some countries provide national funding to support the digital skill development of both teachers and pupils as well as incentivising computing graduates to become teachers. In NI the largest government programme is CLCs, however it is not clear which schools have accessed individual training programmes. Moreover, generally schools are expected to fund training from their own budgets, which limits provision at local levels.

6. Recommendation: we recommend any Digital Education Strategy / Skills Investment Plan consider strategic developments and funding allocated to teacher and pupil digital skill development in other parts of the UK / RoI in comparison with NI.

7. Recommendation: we recommend any Digital Education Strategy / Skills Investment Plan review existing funding for teacher CPD and consider if further funding is needed.

8. Recommendation: we recommend any monies spent are evaluated to ensure they are delivering on the required digital education outcomes.

6 TEACHING STANDARDS / COMPETENCES

This section examines the incorporation of digital skills within teaching standards across the UK and RoI.

6.1 England

Teaching standards issued by the Department for Education (DfE) require that teachers are competent in digital technologies regardless of their subject area.

Furthermore, specialist subject teachers are needed to deliver on the new computer curriculum. However, research by the Royal Society 'After the Reboot: Computing education in UK schools'[34] has highlighted there are insufficient teachers of computing studies. Specifically, only 68% of Computing vacancies were filled for the 2016/2017 academic year in schools in England and Wales. Moreover, it states 30% of GCSE-level pupils in England were at schools where the subject is not taught and highlights that teacher recruitment targets have not been met.

6.2 Scotland

GTCS standards for registration require that student teachers have a knowledge and understanding of using digital technology and how it can be used in learning. Specifically: teachers are required to[35]:

- Have secure knowledge and understanding of current guidance on the use of digital technologies in schools and know how to use digital technologies competently to enhance teaching and learning;
- Skillfully deploy a wide variety of innovative resources and teaching approaches, including digital technologies and, where appropriate, actively seeking outdoor learning opportunities; and
- Enable learners to make full use of well-chosen resources, including digital technologies to support teaching and learning.

Digital competence is also referenced in standards for career-long professional learning[36] which states that teachers need to 'demonstrate a critical understanding of digital technologies and how these can be used to support learning'. GTCS Standards for Leadership and Management[37] also requires leaders to 'keep abreast of, and apply, their enhanced knowledge and understanding of contemporary developments in society, digital

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[34] The Royal Society (2017) 'After the Reboot: Computing education in UK schools'
[35] General Teaching Council Scotland (2012) 'The Standards for Registration: mandatory requirements for Registration with the General Teaching Council for Scotland'
[36] General Teaching Council Scotland (2012) 'The Standard for Career-Long Professional Learning: supporting the development of teacher professional learning'
[37] General Teaching Council Scotland (2012) 'The Standards for Leadership and Management: supporting leadership and management development'

technologies, the environment and the wider global community (including trends and changes in family patterns, work patterns, the media, leisure and politics) and consider the implications for their leadership'.

6.3 Wales

The EWC Code of Professional Conduct for Teachers details the standards of professional knowledge, skill, competence and conduct which are expected of registered teachers. The Welsh Government Standards for teaching and leadership[38] focus on literacy, numeracy and digital competence.[39]

6.4 Republic of Ireland

The Teaching Council Code of Professional Conduct for Teachers[40] does not have a standard for digital literacy however digital is built into each of the standards below:

- Professional values and relationships;
- Professional Integrity;
- Professional Conduct;
- Professional Practice;
- Professional Development; and
- Professional Collegiality and Collaboration.

6.5 EU

The European Commission has developed and published a Digital Competence Framework for Educators[41] that describes what it means for educators to be digitally competent.[42] It details 22 elementary competences organised in the following six areas:

1. Professional engagement;
2. Digital Resources;
3. Teaching and Learning;
4. Assessment;
5. Empowering Learners; and
6. Facilitating Learners' Digital Competence.

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[38] http://learning.gov.wales/docs/learningwales/publications/170901-professional-standards-for-teaching-and-leadership-en.pdf
[39] http://learning.gov.wales/docs/learningwales/publications/170901-professional-standards-for-teaching-and-leadership-en.pdf
[40] The Teaching Council (2016) 'Code of Professional Conduct for Teachers'
[41] European Commission (2017) 'European Framework for the Digital Competence of Educators (DigCompEdu)'
[42] https://ec.europa.eu/jrc/en/digcompedu

Area three relates to managing and using digital technologies in teaching and learning which includes competences relating to teaching[43]; guidance[44]; collaborative learning[45]; and self-regulated learning.[46] For each competency the framework details the activities involved and the proficiency expected at each progression level (from 'newcomer' to 'pioneer').

6.6 Northern Ireland

The GTCNI is responsible for enhancement of teaching as a profession and promoting competence-based approaches. Their document 'Teaching: The Reflective Profession' (2011) details teaching standards and includes that 'teachers will have developed a knowledge and understanding of how to use technology effectively, both to aid pupil learning and to support their professional role'. It also indicates that teachers need continuous training to maintain their ability to use technology in the classroom. However, it does not provide sufficient detail on what 'knowledge and understanding' means or how it can be assessed.

6.7 Conclusion

All areas have teaching standards however only Scotland and Wales incorporate specific standards in relation to digital skills and / or competences. While GTCNI have developed competences for the teaching profession that refer to using technology, the generality of the statement means what is required is open to interpretation. In NI there is no requirement for existing teachers to reach and / or maintain a specified level of competency in digital skills.

9. Recommendation: we recommend the NI teaching competences incorporate additional detail to ensure teachers are aware what is expected from them in relation to digital competence.

10. Recommendation: we recommend that given the changing pace of digital and ICT development GTCNI consider how they can ensure teachers have the necessary digital skills and competences to support teaching and learning on an ongoing basis.

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[43] To plan for and implement digital devices and resources in the teaching process, to enhance the effectiveness of teaching interventions. To appropriately manage and orchestrate digital teaching strategies. To experiment with and develop new formats and pedagogical methods for instruction.

[44] To use digital technologies and services to enhance the interaction with learners, individually and collectively, within and outside the learning session. To use digital technologies to offer timely and targeted guidance and assistance. To experiment with and develop new forms and formats for offering guidance and support.

[45] To use digital technologies to foster and enhance learner collaboration. To enable learners to use digital technologies as part of collaborative assignments, as a means of enhancing communication, collaboration and collaborative knowledge creation.

[46] To use digital technologies to support learners' self-regulated learning, i.e. to enable learners to plan, monitor and reflect on their own learning, provide evidence of progress, share insights and come up with creative solutions.

7 INITIAL TEACHER EDUCATION AND PROFESSIONAL DEVELOPMENT

This section examines the accreditation of digital skills and competences across the UK and RoI. A 2018 research report by Fujitsu[47] found that digital literacy is low among teachers, noting that only 46% of teachers rated their levels of digital literacy as excellent or good and 79% - 82% of teachers learn best from teacher leaders and peer support. In addition, the British Computer Society recently reported that only 25% of computing teachers felt confident delivering the curriculum.[48]

7.1 England

Initial Teacher Education

In England the DfE accredits ITE (also referred to as Initial Teacher Training (ITT)). To become accredited, courses must meet the Secretary of State for Education's ITT criteria however the statutory guidance on ITT[49] does not reference digital skills.

Continuing Professional Development

The standard for teachers produced by DfE sets out several expectations regarding professional development, namely that teachers should[50]:

- Keep their knowledge and skills as teachers up-to-date and be self-critical;
- Take responsibility for improving teaching through appropriate professional development, responding to advice and feedback from colleagues;
- Demonstrate knowledge and understanding of how pupils learn and how this has an impact on teaching;
- Have a secure knowledge of the relevant subject(s) and curriculum areas;
- Reflect systematically on the effectiveness of lessons and approaches to teaching; and
- Know and understand how to assess the relevant subject and curriculum areas.

Sources of CPD for the existing teaching workforce that incorporate digital skills include:

- **Computing at School (CAS)** – funded by the DfE and provides access to a range of CPD opportunities that are available to all teachers locally, regionally and nationally (with a regional centre in NI). CAS reports highlight a 33% increase in teacher confidence as a

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[47] Fujitsu (2018) 'Research Report: UK: The Road to Digital'

[48] University Alliance and CaSE roundtable (March 2016) 'Standing Out from the IT Crowd: How do we make Britain a world leader in digital skills'

[49] Department for Education / National College for Teaching and Leadership (2018) 'Statutory Guidance on Initial teacher training (ITT): criteria and supporting advice'

[50] DE (2016) 'Standard for teachers' professional development: implementation guidance'

direct result of Master Teacher training and 98% reported that courses attended would have a direct impact on their practice.[51]

- **Network of Teaching Excellence in Computer Science (NoE)** – a partnership between schools, universities, IT employers and professional bodies. Funded through a DfE grant to BCS[52], NoE provides teachers with opportunities for CPD through formal training events, Hub meetings, coaching, mentoring, peer observation and partnering, conferences and remote support. The NoE includes CAS Master Teachers[53], Hub Leaders / Lead Schools, and ten CRCs (CAS Regional Centres) based at ten English universities.[54] In 2016 the NoE provided support to over 3000 schools.[55] The NoE support model involves:

  - Stage 1 – support from the NoE increases the teacher's subject knowledge and confidence;
  - Stage 2 – the teacher implements increased subject knowledge and confidence in their teaching; and
  - Stage 3 – improved teaching leads to higher levels of achievement for young people.

7.2 Scotland

Initial Teacher Education

In Scotland the GTCS accredits ITE. To become accredited courses must meet standards set by the GTCS.

GTCS recently revised ITE accreditation standards and they now include digital education and digital skills. The 'Enhancing Learning and Teaching Through the Use of Digital Technology' strategy states that by strengthening references to the use of digital technology and digital skills in the Standards for Registration and the Standards for Career-Long Professional Learning it is anticipated that:

- There will be a change in the delivery and uptake of career-long professional learning (CLPL) opportunities related to the use of digital technology;
- More teachers will use digital technology across all curriculum areas to enrich both learning and teaching; and

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[51] http://community.computingatschool.org.uk/resources/802/single
[52] The Chartered Institute for IT
[53] CAS Master Teachers are the NoE's 'Practitioner Champions' – experienced, high-performing classroom teachers with a passion for the subject and a desire to support others. They are part of the local community of practice and will work alongside their CAS Regional Centres and the local hubs to support teachers of computing in their local area, enable their professional development, and support curriculum change. This support may take the form of low-cost training sessions and other mentoring and coaching opportunities. Such support forms an essential part of developing a community of professional practice, alongside the other activities initiated by local CAS Hubs and University partners in the Network of Excellence
[54] Plymouth, Southampton, King's College London / Queen Mary University of London, Hertfordshire, Nottingham Trent, Birmingham City, York, Manchester, Lancaster and Newcastle
[55] BCS (2017) 'Education Review'

- New teachers will understand how to use digital technology for learning and teaching.[56]

Continuing Professional Development

The Professional Update was launched by GTCS in August 2014 for all fully registered teachers. Teachers in Scotland are required to engage in professional learning, self-evaluate this learning using the GTCS Professional Standards, and maintain a record of this learning using their online profile on MyGTCS (or another system agreed by their local authority). A Professional Review and Development (PRD) discussion is part of the process. Every five years confirmation of this engagement is required from the teacher and their line manager to maintain full registration with the GTCS.

Feedback from a GTCS interviewee noted revised GTCS standards to be published in 2020 will require an understanding of digital technologies and how these can be used to support learning to be demonstrated via CPD for teachers to remain registered.

CPD opportunities for the existing teaching workforce that incorporate digital skills include:

- **Education Scotland digital development officers** - offering support in the use of technology and development of digital skills in primary schools across Scotland; and
- **Glow** - funded by the Scottish Government and managed by Education Scotland, Glow provides digital tools and services at no cost to educators and can be used to share information, opportunities and support career-long professional learning. For example:[57]
  - **Yammer** - an online discussion and collaboration tool that allows educators to make connections and share resources in a secure social network. Users can connect with a range of others to share knowledge and advice as well as joining or creating groups for people that share a common interest;
  - **Glow TV** - can provide national interactive broadcasts allowing professional dialogue between the host and the participants. These sessions can be recorded and are made available in the Watch Again blog to allow educators to view these again at any time;
  - **Glow Meet** - an online meeting tool to allow educators to easily engage in professional dialogue, share documents and deliver presentations; and
  - **Glow Blogs** - can be used by schools and local authorities to share information and facilitate professional working and interaction.

In addition to digital tools and services, Glow also allows educators to access a range of professional learning communities. These nationally available online spaces allow educators to share resources, work collaboratively and take part in online discussions across a range of curriculum areas and educational topics.

At the end of 2017 it was announced that schools across Scotland would be able to draw on a range of expertise through six newly established Regional Improvement Collaboratives. These bring together a range of professionals focused on supporting teachers and other school staff working with children and young people to improve their wellbeing, attainment

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[56] http://www.gov.scot/Publications/2016/09/9494/4
[57] http://www.gov.scot/Publications/2016/09/9494/4

and outcomes. The Scottish Government will work with regional improvement collaboratives to support the growth and development of digital skills for staff in all schools.[58]

GTCS signs off teacher professional learning every five years (unlike NI) which confirms teachers have engaged in ongoing professional learning against the appropriate GTCS Professional Standards, this includes digital skills and competencies.

7.3 Wales

Initial Teacher Education

In Wales the EWC received new powers to accredit ITE programmes in March 2017 and new accreditation criteria was published in September 2017. In relation to digital competences, Welsh Government ITE accreditation criteria[59] states that:

- Programme providers need to ensure high standards in student teachers' own literacy, numeracy and digital competence[60], all of which are core elements of the new Welsh curriculum. Therefore, those applying for ITE are required to have appropriate skills in numeracy, literacy and digital competency;
- In presenting programmes for accreditation, Partnerships[61] are required to present, amongst other elements, professional and pedagogical studies. This is required to develop knowledge, understanding and practical skills in relation to the use of digital technologies; and
- ITE courses should support student teachers to develop the values, knowledge, skills and attitudes to meet national priorities such as literacy, numeracy, digital competency and social inclusion and to work collaboratively with colleagues, co-professionals and parents.

Feedback from EWC interviewees highlighted it will take five years of monitoring and compliance to know the impact of applying these standards; with a 2016 – 17 Estyn[62] inspection report[63] stating 'currently, initial teacher training centres do not equip trainee teachers with the skills needed to deliver the breadth and range of ICT required by schools'.

Continuing Professional Development

The Digital Competence Framework (DCF) (see section 8.3) sets out the digital skills which can be applied to a wide range of subjects and scenarios. Materials have been developed

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[58] http://www.gov.scot/Publications/2017/12/2207/3

[59] Welsh Government (2017) 'Criteria for accreditation of initial teacher education programmes in Wales'

[60] Digital competence is defined as the set of skills, knowledge and attitudes that enables the confident, creative and critical use of technologies and systems. It refers to the student teacher's knowledge and understanding of technology and to the skills used in its application as a medium for teaching and learning.

[61] It is anticipated that in the future all ITE programmes will be led by a 'Partnership', that is an HEI working in close collaboration with a number of 'lead partnership schools'.

[62] Estyn is the education and training inspectorate for Wales

[63] Estyn: The Annual Report of Her Majesty's Chief Inspector of Education and Training in Wales (2016 – 2017)

to support schools and teachers / practitioners to use the DCF. This includes a Professional Learning Needs Tool which enables:

- Teachers to assess their skills and confidence by giving phase-specific summaries of Framework skill elements;
- Framework coordinators the opportunity to view collated, anonymised data to help develop professional support for their staff; and
- Collated anonymised data to be used at local, regional and national level to inform the development of professional learning support to practitioners and schools.

CPD opportunities managed by the EWC include:

- A Professional Learning Passport (PLP) - available as a single online portfolio record of teachers' professional learning. Individuals holding Qualified Teacher Status (QTS) who register with the EWC are automatically given a PLP and are encouraged to use it to reflect on and improve their practice; and
- Learning Exchange[64] - provides practitioners with access to a searchable database of regional, national and international learning opportunities for the STEM, ICT and Computing subjects. The Learning Exchange is designed to support practitioners by supporting, refreshing and enhancing their subject expertise.

The main form of CPD for the existing teaching workforce that incorporates digital skills is the Learning in Digital Wales (LiDW) programme. It is the Welsh Government programme of actions for improving the use of digital technology for teaching and learning and comprises the delivery of digital learning tools and resources including:

- Hwb, the National Digital Content Repository;
- A virtual learning environment (VLE) ('Hwb+, the all-Wales learning platform') (*no longer funded by Welsh Government*);
- Third-party resources for all schools in Wales. For example, some teachers are provided with a two-day training programme to become 'Digital Champions' (DCs) who can then cascade training to other teachers at their school; and
- Investments to ensure that all schools are connected to high-speed broadband internet and have access to Wi-Fi.

The programme aims to:

- Promote the use of Hwb+[65] as part of effective teaching and learning;
- Ensure Hwb+ is measurably contributing to the core education objectives of improving literacy, numeracy and breaking the link between poverty and attainment;
- Help schools embed Hwb+ to support high-impact interventions;
- Help teachers develop their own digital skills; and

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[64] http://www.ewc.wales/learningexchange/index.php/en/
[65] A virtual learning environment enabling teachers to access online resources and digital learning tools

- Promote 'e-Safety' in relation to the safe and responsible use of Hwb+ tools including Office 365 and in relation to the digital technology more widely.

The LiDW programme evaluation report (2016)[66] states the programme:

- Provided training to approximately 7,000 teachers (as at November 2015), with at least one teacher trained in all schools that received provision; and
- Has contributed to increased awareness, knowledge and competences of teachers and reduced infrastructure barriers.

However, the report also found that while successful in raising awareness of digital resources among schools and improving the digital skills of some teachers, this had not progressed to whole school take-up of Hwb+ and adoption or regular use of digital resources by most teachers. It suggested that effective implementation requires a mix of ingredients, including the existence of an action plan, support from leadership, dedication and commitment by teachers, appropriate time / resources, external support and external pressure (e.g. from Estyn and parents). The report notes this mix must be recognised in communication, training and support by the Welsh Government and be understood by Regional Educational Consortiums[67] /Local Authorities (LAs).

In addition, the report found cascading training through Digital Champions was not effective in training most teachers in Wales or helping all schools to adopt Hwb+. It concluded that Digital Champions and schools which appear to have made most progress were early adopters or enthusiasts of technologies or have received additional support from Digital Leaders or others.

7.4 Republic of Ireland

Theme 2 of the Digital Strategy for Schools specifically targets Teacher Professional Learning, from ITE through to CPD.

Initial Teacher Education

The Teaching Council accredits ITE provision in RoI. Criteria and guidelines for ITE programme providers[68] states that ICT in teaching and learning is a mandatory element of ITE programmes with specific credits and hours allocated.

Continuing Professional Development

The Cosán national framework for teachers' learning (2016)[69] outlines six key learning areas that includes developing a teachers' capacity for using ICT to enhance teaching and

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[66] ICFI Consulting (2016) 'Evaluation of the implementation of the Learning in Digital Wales Programme'
[67] The four regional education consortia in Wales work with schools to raise standards, providing a range of support which includes professional development and intervention programmes.
[68] Teaching Council (2017) 'Initial Teacher Education: Criteria and Guidelines for Programme Providers'
[69] http://www.teachingcouncil.ie/en/Publications/Teacher-Education/Cosan-Framework-for-Teachers-Learning.pdf

learning. For example, using ICT to develop learners' key skills, as a tool across the curriculum, and as a tool for accessing and engaging in research.

CPD opportunities for the existing teaching workforce that incorporate digital skills includes:

- **Digital Learning Framework for Schools** - provides Statements of Practice which describe 'effective' and 'highly effective' school practices for each of the 32 standards which allows teachers to identify improvements when embedding digital technologies to support teaching, learning and assessment in their own context. This resource will also support schools and school leaders in the embedding of ICT into teaching learning and assessment at a whole-school level. The framework was piloted with 50 schools in 2017/18 and a national rollout is planned from September 2018.
- **Professional Development Service for Teachers (PDST) / PDST Technology in Education** - operates under the Department of Education and Skills and provides a suite of materials that support teachers and schools in assessing their digital competence and progress in this regard. This includes a set of resources to support teachers and schools in assessing their progress in five key areas: leadership and planning, ICT in the curriculum, professional development, digital learning culture and ICT infrastructure.
- **Peer to peer teacher supports** – these include 'Switch on' exemplar workshops and case studies. PDST Technology in Education produce good practice videos. For example, dealing with the use of tablet devices and Scoilnet maps in schools. The National Council for Curriculum and Assessment (NCCA) junior cycle network of schools[70] also share experiences in the use of technology for learning.

7.5 Northern Ireland

Initial Teacher Education

The GTCNI accredits ITE provision in NI. The requirements that underpin approval, accreditation and inspection of ITE programmes does not specify requirements in relation to digital competences. It notes the content, structure, methodology, assessment and range of suitable resources should be designed to enable students to develop the teacher competences appropriate to the ITE phase as set out in the GTCNI publication Teaching: the reflective profession.[71]

Continuing Professional Development

The largest government funded programme to support teacher CPD in relation to digital skills in NI are the CLCs funded by DfC (see section 5.5). NI Screen provides support for three CLCs to deliver skills development programmes for teachers and young people in digital literacy, understanding and deploying creative technologies and new approaches to

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[70] Schools across the country chosen for the rollout of the new junior cycle
[71] https://www.education-ni.gov.uk/sites/default/files/publications/de/2010-03-initial-teacher-education-approval-of-programmes.pdf

learning in the classroom. In total, almost 5,000 teachers and 8,000 young people participated in CLC programmes in 2015-16.[72] While there are several other small-scale initiatives these are not strategically led, and research completed by S. Fleming for NI Screen demonstrated that a high percentage of teachers in NI do not feel confident regarding their digital skills.

7.6 Conclusion

In the rest of the UK and RoI there is a focus on upskilling existing teachers as well as training new teachers in digital skills.

Feedback from NI interviewees indicates that while ITE training and ensuring there is digital / ICT content within this is important, teachers also require ongoing support to implement this training. It was suggested an important element of this is sharing good practice case studies.

Moreover, research completed by NI Screen highlights that teachers in NI lack the confidence to use ICT to support teaching and a robust support structure is needed for the future.

11. Recommendation: we recommend further work / research is completed to provide a detailed review and action plan reference all teachers' training needs in relation to digital skills to support teaching and learning.

12. Recommendation: we recommend GTCNI review their resources in-house and at board level to ensure they have access to the expertise to accredit the digital skill elements of ITE programmes for teachers.

13. Recommendation: we recommend that GTCNI also quality assure digital skills CPD for existing teachers.

14. Recommendation: we recommend GTCNI consider how teachers can be supported and encouraged to use online assessment tools to understand their strengths and any areas for development against the digital competences required.

15. Recommendation: we recommend that NI consider the support provided by Glow in Scotland for teacher professional development, assess what information / support is provided by CAS, CCEA and the CLCs in NI and identify any gaps to be addressed. Existing supports should be linked to allow teachers access to a 'one stop shop' for professional development resources.

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[72] http://www.northernirelandscreen.co.uk/education/creative-learning-centres/

8 CURRICULUM

This section reviews how digital education is incorporated into the national curriculum across the UK and RoI.

8.1 England

In 2008 the National Curriculum for secondary schools in England, Wales and NI was reformed to give schools more local flexibility in planning and managing their own curriculum. It also places increased significance on the teaching of ICT across the curriculum, with ICT skills forming one of three core sets of skills to be developed across all subject teaching.[73]

In 2014 computing replaced ICT and a new GCSE in computer science was introduced covering fundamental principles and concepts of computer science, including logical and creative thinking as well as the practical skills of designing and testing computer programs.

8.2 Scotland

The Scottish Curriculum for Excellence was introduced in 2010 and has two stages: broad general education (from the early years to the end of stage 3) and the senior phase (stage 4 to stage 6).[74] There are eight curriculum areas, one of which is technologies. In 2016 those relating to Computing Science and Digital Literacy (formerly ICT to enhance learning) were refreshed.

8.3 Wales

A new curriculum is being developed for settings and schools in Wales. The curriculum will be available by April 2019 for feedback. A final version will be available in January 2020 and used throughout Wales by 2022.[75] It will have three cross-curricular responsibilities: literacy, numeracy and digital competence. The Digital Competence Framework (DCF) is the first element of the new curriculum for Wales to be made available. The framework has four strands of equal importance, these are:

- Citizenship – which includes the elements of 'Identity, image and reputation', 'Health and well-being', 'Digital rights, licensing and ownership', and 'Online behaviour and cyberbullying';
- Interacting and collaborating – which includes the elements of 'Communication', 'Collaboration', and 'Storing and sharing';

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[73] Future Lab (2010) 'Digital Literacy Across the Curriculum'

[74] The broad general education has five levels (early, first, second, third and fourth). The senior phase is designed to build on the experiences and outcomes of the broad general education, and to allow young people to take qualifications and courses that suit their abilities and interests

[75] https://gov.wales/topics/educationandskills/schoolshome/curriculuminwales/curriculum-for-wales-curriculum-for-life/?lang=en

- Producing – which includes the elements of 'Planning, sourcing and searching', 'Creating', and 'Evaluating and improving'; and
- Data and computational thinking – which includes the elements of 'Problem-solving and modelling', and 'Data and information literacy'.

Literacy, numeracy and digital skills have equal weighting in the new curriculum however feedback from EWC highlighted it is still in the early stages of development with content to be added in the coming years.

8.4 Republic of Ireland

Computer Science as a Leaving Certificate subject was introduced to the curriculum in 2018 as part of the Government's overall commitment to embed digital technology in teaching and learning. It complements other planned changes to the curriculum such as, for example, the introduction of coding and computational thinking as part of the new maths curriculum for primary schools. Full implementation of the new primary mathematics curriculum is planned to be complete by September 2021.[76]

8.5 Northern Ireland

CCEA developed a Digital Skills Curriculum and Qualifications Framework in 2014. This shows progression of digital skills for learners from foundation stage to A-level.

Three broad tiers of digital skills have been applied to the context of a learner within a school setting:

- Digital Citizens - skills that will enable them to take part in digital aspects of society, safely and without hindrance;
- Digital Workers - who can use their digital skills to further their learning or in a work-related setting; and
- Digital Makers - who are starting to build their own digital technology.

The CCEA digital skills curriculum and qualifications framework is illustrated in the following figure.

[76] Department of Education and Skills: Circular 0039/2018 - Update on Primary Language Curriculum, Primary Mathematics Curriculum and Notice of Additional School Closure 2018/19

Figure 8:1: CCEA Digital Skills Curriculum and Qualifications Framework (2014)
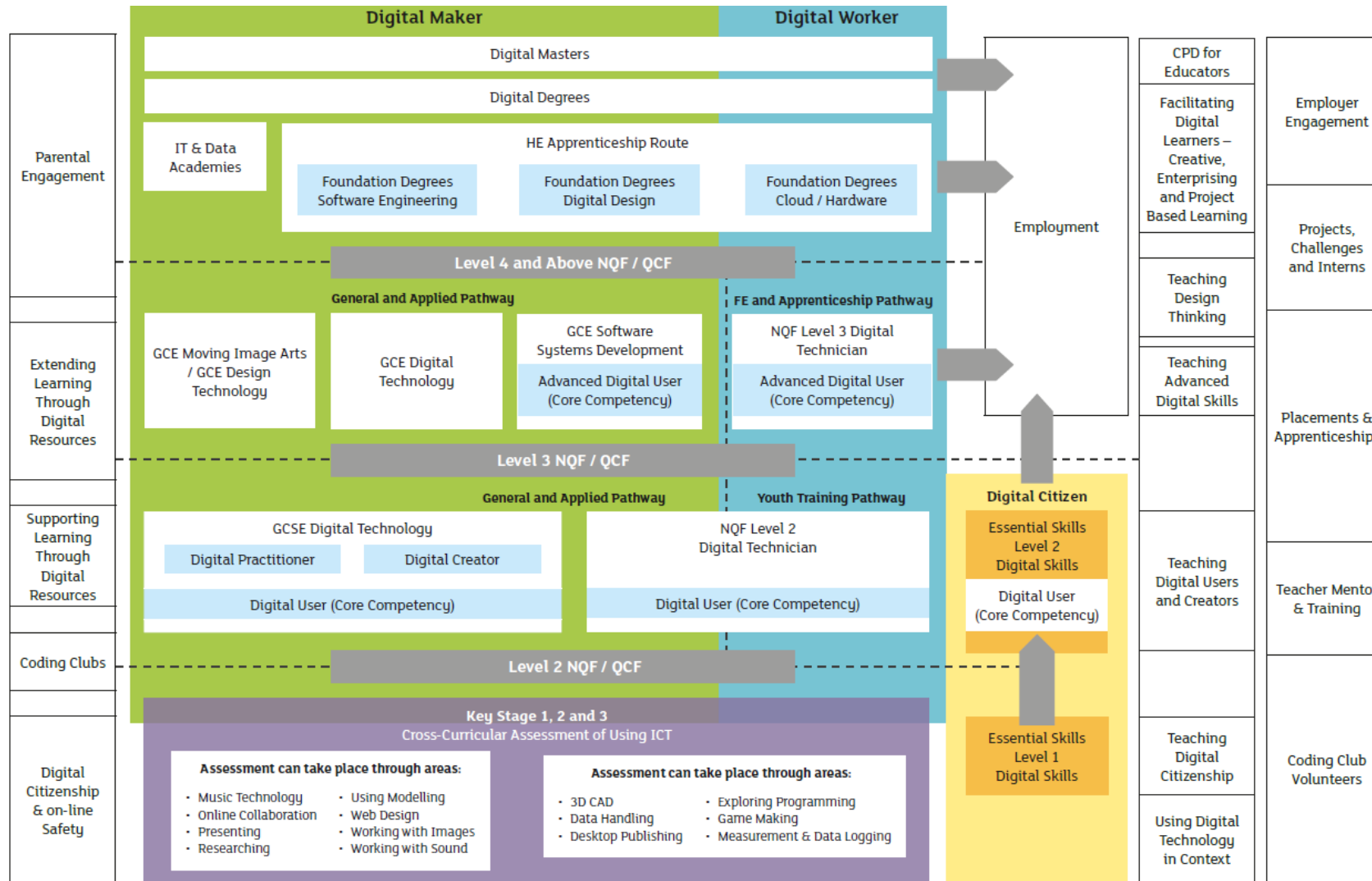
Source: http://ccea.org.uk/sites/default/files/docs/subsites/digitalskills/digitalskills_framework.pdf

New additions to the curriculum are:

- GCSE in Digital Technology;
- GCE Moving Image Arts;
- GCE Digital Technology;
- GCE Environmental Technology; and
- GCE Software Systems Development.

CCEA have advised that digital skills have equitable status with literacy and numeracy at key stages 1, 2 and 3 in the NI curriculum. In addition, feedback from education and industry stakeholders in NI suggests the current curriculum and qualifications framework includes the key components required for a range of levels / abilities and compares well to the curriculum in other parts of the UK and RoI. Moreover, while it was noted there is a potential gap in the framework at key stage 3, CCEA is working with Kainos to deliver Python training to teachers to address this.

Interviewees also highlighted that implementation of the framework varies, with some schools taking the lead while others requiring further development. Such variation reflects the flexibility schools have to choose how they teach the curriculum providing the minimum standards are met. This approach is similar to other parts of the UK, for example the Curriculum for Excellence in Scotland which promotes 'flexibility and space so that teachers can use their professional judgement creatively to meet children's needs' (within parameters).[77] NI stakeholder feedback suggested this is the most appropriate approach for a skills-based curriculum and for schools operating in different contexts.

In addition, it was suggested that the number of pupils choosing not to participate in the digital skills pathway after years 9 and 10 may be due to factors other than a lack of adequate provision within the curriculum. Other factors suggested includes:

- Gender differences – most young people competing the GCSE / A-Levels relating to digital / computational skills are male;
- Lack of skills in problem-solving mathematics – to improve confidence with ICT and coding there is a need to develop mathematical skills first; and
- Perceptions of pupils / parents - for example while a school may be able to develop programming content, have pupil demand to learn it and the required teacher skillset to deliver it, the perception of digital skills amongst parents in terms of future prospects can hinder progression.

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[77] Scottish Executive (2006) 'A Curriculum for Excellence: Progress and Proposals'

8.6 Conclusion

The NI curriculum incorporates digital literacy and computer science elements and is in line with good practice in other areas of the UK / RoI. However, interviewees suggested pupils may choose not to participate in the digital skills pathway after years 9 and 10 due to factors other than a lack of adequate provision within the curriculum.

The NI curriculum incorporates digital skills and computer science elements and is in line with good practice in other areas of the UK / RoI. However, interviewees suggested pupils may choose not to participate in the digital skills pathway after years 9 and 10 due to factors other than a lack of adequate provision within the curriculum.

16. Recommendation: we recommend the Digital Education Strategy / Skills Investment Plan include an objective to raise parents' awareness of the need for digital skills regardless of the career path being chosen by their child.

17. Recommendation: the next revision of the NI curriculum will provide an opportunity to integrate digital skills across the phases. We recommend the curriculum ensures there is effective progression across all stages regarding digital skills.

9 DIGITAL PRACTICE AWARDS IN THE CLASSROOM

This section reviews the digital awards available to schools across the UK and RoI.

9.1 England

Microsoft Showcase Schools - recognises leaders in personalised learning amplified by devices for each student. Schools awarded this status successfully integrate a variety of Microsoft solutions such as Windows, Office 365, OneNote and Skype etc. to enable anywhere, anytime learning for students.

9.2 Scotland

Digital Schools Awards - schools that successfully complete the 3-step programme receive a nationally recognised Digital Schools Award. Digital Schools also receive ongoing practical support and resources as part of the community of digital schools. It operates in Scotland, NI and RoI. The programme was established in Scotland in 2016, is accredited by Education Scotland and is recognised by the Department of Education and Lifelong Learning Scotland.

The Digital Awards Programme provides a clear framework to support schools to embed digital technology in learning and teaching. There are five criteria to becoming a Digital School:

1. Leadership and Vision: Digital Schools will have a digital technology strategy, and a positive attitude towards digital technology;

2. Digital technology integration in the curriculum: schools will integrate digital technology across the curriculum. Staff will demonstrate a clear understanding of how digital technology can be used to improve learning;

3. School digital technology culture: schools will demonstrate an awareness that digital technology affects the quality of learning and teaching, pupil attitudes and behaviour, and the school community;

4. Continuing professional development: schools will demonstrate a commitment to ongoing professional development in ICT, informing teachers of courses in professional development, as well as offering general support; and

5. Resources and infrastructure: schools will have appropriate ICT resources, including hardware, software and infrastructure to support particular learning environments, and reflect plans for ICT development as outlined in the school's policy.

Microsoft Showcase Schools – also available to schools in Scotland (see section 9.1).

9.3 Wales

National Digital Learning Awards[78] - the National Digital Learning Awards are part of the National Digital Learning Event[79] and provide maintained schools and colleges in Wales with an opportunity to be recognised for their innovative use of digital tools in a learning environment. There are four award categories:

- Digital Project Award - enables judges to consider a vast range of digital projects from across all phases and sectors. Within this category, judges will have complete flexibility to offer several awards in recognition of outstanding applications;
- Online Safety Award - rewards excellent practice that impacts on a school / college's ICT provision within the context of online safety;
- Hwb Community Resource Award - rewards the best example of resources created and shared by the Hwb Community; and
- National Digital Learning Council's Pupil Award - rewards the achievements of a learner or a group of learners who have either used technology in an innovative way or have created excellent original digital material.

Microsoft Showcase Schools – also available to schools in Wales (see section 9.1).

9.4 Republic of Ireland

- **The Digital Schools of Distinction Award** – this programme was established in 2013 and is accredited by the Department of Education in Ireland. The programme is supported by HP, Microsoft and Intel in partnership with the Department of Education, the Professional Development Service for Teachers, Technology in Education, the Computer Education Society of Ireland (CESI), the Irish National Teacher's Organisation (INTO), the Irish Primary Principals' Network (IPPN) and Dublin West Education Centre (DWEC).
- **The Schools Digital Champion programme** - developed by the Department of Communications, Climate Action and Environment in collaboration with Department of Education and Skills. This programme provides the opportunity for second level students to take part in a programme that involves learning across subjects. Teachers and students are provided with training which includes workshops on video editing, web design, coding, and App design, as well as on communications and presentation skills, marketing and research.
- **Microsoft Showcase Schools** – also available to schools in Ireland (see section 9.1).

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[78] http://learning.gov.wales/news/sitenews/national-digital-learning-awards-2017/?lang=en

[79] National Digital Learning Event and Awards (NDLE) - a national conference aimed at raising the profile of digital learning and celebrating schools' best practice in using technology in the classroom

9.5 Northern Ireland

- **The Digital Schools Award** – the programme was established in 2015 and is recognised by DENI. The programme is led by Hewlett Packard Enterprise, Microsoft and Intel.
- **Microsoft Showcase Schools** – also available to schools in NI (see section 9.1).

9.6 Conclusion

There are areas of excellent practice in NI (for example Seaview primary school in Belfast won the TES award for best in the UK at using technology[80]). However interviewee feedback highlighted there is no central system for monitoring which schools have received awards or the digital skills standards this means they have.

> **18. Recommendation:** DENI should monitor the number of schools undertaking and completing appropriate digital awards, the value of these awards in raising standards and if the standards for each award is consistent.

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[80] https://www.bbc.co.uk/news/uk-northern-ireland-44589816

10 INSPECTION

This section reviews the extent to which the school inspection process in each country reviews the quality of digital education.

10.1 England

In England maintained schools are inspected by Ofsted or School Inspection Service who use a common inspection framework.

This includes the criteria 'development of… competence in information and communication technology and its application to other areas of learning' to assess individual pupil achievements. Additionally, pupils' achievements are measured against a number of other indicators, one of which is the development of knowledge, understanding and skills across different areas of learning such as mathematical, scientific and technological education.

10.2 Scotland

Inspections are carried out by Education Scotland against quality frameworks[81] and inspectors use quality indicators (QIs) outlined in How good is our school?[82] (4th edition) during inspections. They can include following quality indicators relating to digital:

- Leadership and management (features of highly effective practice):

  - All staff make effective use of digital communication and balance this well with opportunities for face-to-face discussions and collegiate time;
  - All available resources, including digital technologies are used effectively to create and sustain effective learning environments; and
  - Teachers make effective use of a range of resources, including digital technologies, to provide appropriate support and challenge for learners.

- Learning Provision (features of highly effective practice):

  - There is a clear focus on developing skills of literacy, numeracy, health and wellbeing, creativity, digital and employability skills in a progressive way across the curriculum.

- Successes and achievements (features of highly effective practice):

  - Learners can challenge the status quo constructively and generate ideas including, if appropriate, digital solutions to improve it;
  - Young people make informed choices about the way digital technology can and should be used;
  - The development of digital skills enables children and young people to be creative and use digital technologies to meet a personal or social need; and

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[81] https://education.gov.scot/what-we-do/inspection-and-review/standards-and-evaluation-framework/05-our-inspection-frameworks
[82] Education Scotland (2015) 'How good is our school?' (4th edition)

- Young people understand the importance of developing their own digital skills for learning, life and work.

10.3 Wales

Prior to 2016 Estyn required inspection teams to evaluate pupils' skills in ICT 'by exception' (i.e. if they were particularly strong or weak). However, from September 2016 all teams are required to evaluate ICT standards in the same way as they do for literacy and numeracy.

Guidance on the inspection of ICT in schools[83] states that inspectors should:

- Verify the accuracy of the school self-evaluation report which includes a section on ICT across the curriculum;
- Look for evidence of ICT in other curriculum areas while observing lessons in both classroom and whole-school displays;
- Observing and discussing ICT work with the learners themselves by meeting with a group of learners (not necessarily all 'digital leaders' within the school) similar to listening to readers as part of inspecting literacy. This will allow inspectors to view and to discuss the work with pupils in front of a computer so that learners can access, show and discuss their work; and
- meet with the teacher responsible for ICT across the curriculum to discuss how they plan and monitor the use of ICT across the curriculum.

10.4 Republic of Ireland

Whole School Evaluations (WSEs) are carried out in primary and post-primary schools however the way in which a school is inspected can vary. For example, different processes are used in primary and post-primary schools and the inspection can have a subject / curriculum focus or concentrate on a range of different lessons across a wide range of subjects. The primary and post-primary quality frameworks are used to inform the work of the inspectors when reporting on quality in schools, specifically:

- Teaching and learning; and
- Leadership and management.

The assessment of the Quality of Teaching and Learning includes use of ICT as a tool for the delivery and support of learning programmes. Within the Quality of Leadership and Management assessment criteria, there is an examination of the physical resources available and how these support teaching and learning. For example, ICT infrastructure would constitute a resource that can facilitate the interaction of teachers with pupils, as well improve the efficiency of inter-departmental communications.

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[83] Estyn (2017) 'The inspection of information and communication technology (ICT) in schools'

10.5 Northern Ireland

The ETI is responsible for providing independent inspection services and policy advice for DENI. All inspections assess the quality of literacy and numeracy plus one other area which could be ICT. Inspectors follow an inspection and self-evaluation framework.[84]

The ETI team use the inspection framework to evaluate the quality of the work delivered and indicators of effective practice include:

- Children attain the highest possible standards in language and literacy, mathematics and numeracy, including the use of mathematics and ICT skills across the curriculum (outcomes for learners - primary);
- Through high quality learning and teaching pupils can achieve and apply very good standards in literacy, numeracy and ICT within and across the curriculum (outcomes for learners - post primary);
- The cross-curricular skills of literacy, numeracy and information and ICT are integrated to good effect across the curriculum (quality of provision – post primary); and
- Medium-term planning meets the requirements of the Northern Ireland Curriculum / subject specifications and includes: clear learning intentions; appropriate pedagogy to develop the pupils' wider skills, dispositions and capabilities; effective differentiation which addresses the needs of the range of ability within classes; and connected learning across and between areas of learning, including ICT, literacy and numeracy (quality of provision – post primary).

Self-evaluation questions to be completed by schools in relation to digital skills / ICT include:

- Are the children's core skills in literacy, numeracy and ICT as high as possible or is there room for improvement? (outcomes for learners - primary);
- How do we ensure that we develop pupils' cross-curricular skills including ICT, literacy and numeracy; and their thinking skills and personal capabilities (TSCP), including their independence, creativity and ability to manage risks in their learning? (quality of provision – post primary); and
- To what extent are the priorities for improvement appropriate and aligned to the priorities in the school development plan, including whole-school strategies for improving literacy, numeracy and ICT skills? (leadership and management – post primary)

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[84] https://www.etini.gov.uk/articles/inspection-and-self-evaluation-framework-isef

10.6 Conclusion

The current NI school inspection process does not include an assessment of digital education or ICT standards as part of every inspection, this contrasts with Wales where the Estyn evaluate standards in ICT in the same way as they do for literacy and numeracy. NI should consider adopting a similar approach to fully understand the consistency of digital skills / ICT provision across schools and the extent to which digital technology is used to deliver subjects across the curriculum.

19. Recommendation: we recommend NI consider adopting an inspection approach that includes digital skill provision / ICT standards as part of every inspection, reflecting equitable status with literacy and numeracy.

11 COLLABORATION AND PARTNERSHIP WORKING

This section reviews how digital education is incorporated into regional planning.[85]

11.1 England

Local Digital Skills Partnerships

The Digital Strategy states that 'for the UK to be a world-leading digital economy that works for everyone, it is crucial that everyone has the digital capabilities they need to fully participate in society.' The Digital Skills and Inclusion Team in the Department for Digital, Culture, Media and Sport (DCMS) supports this vision by implementing the Digital Skills and Inclusion Chapter of the Digital Strategy. This includes establishing a new DSP and its delivery groups (see section 4.1).

The DSP is supporting the formation of Local DSPs in regions across England. While it is envisaged that most Local DSPs will be convened and / or led by Local Enterprise Partnerships (LEPs), in some places Combined Authorities, County Councils or other organisations may be best placed to convene and / or lead local partnerships.

Local DSPs are cross-sector partnerships consisting of regional businesses, academia, universities, further and higher education colleges, schools, local public sector and third sector organisations. They aim to work together to design, develop and deliver innovative digital skills programmes that advance digital inclusion and upskill the current workforce in every region.

Local DSPs will develop and coordinate digital skills initiatives to meet the needs of individuals, businesses and charities in their area. Local DSPs will analyse local digital skills gaps, work with local and national partners to develop a pipeline of new provisions and build upon existing examples of good practice by supporting effective provisions to 'scale up'. Local DSPs will also build upon existing networks and infrastructure to promote, encourage and support more individuals and organisations to take-up training.
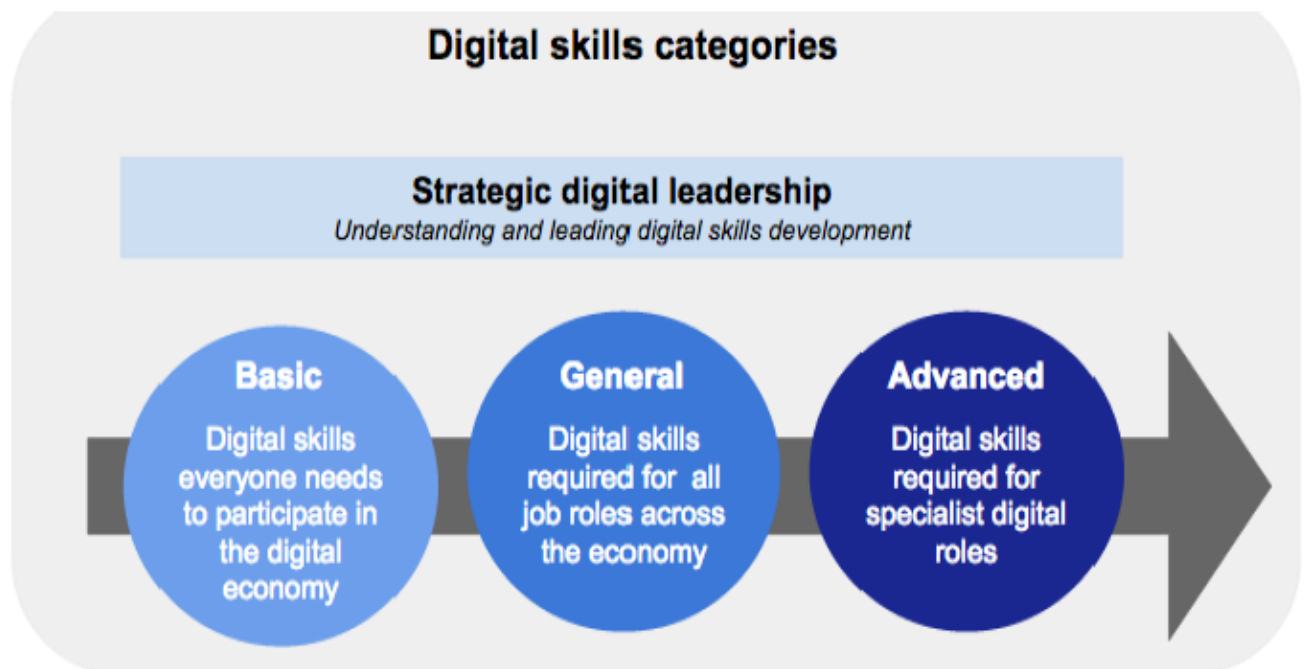
Two Local DSPs launched in Spring 2018 in the LEP regions of Lancashire and Heart of the South West. A further four regions will be supported by DCMS to join this pilot cohort before the end of the financial year 2018/19. DCMS is supporting the Local DSPs with a Catalyst Fund, which is being used to fund Local DSP Coordinators who will facilitate and project-manage each partnership.

Guidance states that for the DSP to be successful, it needs to have an impact at a local level. Local communities and regional stakeholders need to consider their local digital skills

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[85] Digital skills and inclusion policy is devolved to the nations

needs and draw up action plans to provide the skills and support needed locally. There is currently little consistency between regional initiatives, and efforts to increase digital skills for the benefit of local economies and communities are disjointed. Although there are some examples of local good practice, very few look at digital skills across the spectrum, as outlined below.

Figure 11:1: Digital Skills Categories

Source: https://www.hertfordshirelep.com/media/6443/item-4-digital-skills-partnership-lep-information-doc-final-version.pdf

The indicative outcomes and metrics of the DSP are outlined in the following table:

Table 11:1: Indicative outcomes and metrics of the DSP (Draft)

Indicative Metrics	Sources
Increased digital skills across the digital capabilities spectrum	**Organisations** • Businesses & Charities • Lloyds Business Digital Index • British Chamber of Commerce Digital Survey: Cyber Security • Digital Skills for the UK Economy - ECORYS report • Tech Partnership Employer Insights Skills Survey • Geek Talent • Eurostats Digital Skills indicator • Tech Nation Report 2018

	Individuals
	
	• Basic/Essential Digital Skills / Digital Inclusion
	   o Lloyds Consumer Digital Index
	   o Oxford Internet Survey
	   o Ofcom Adults' Media Use & Attitudes Report
	   o Ofcom Nations & Regions Technology Tracker
	   o Good Things Foundation: Widening Digital Participation
	   o Eurostats Digital skills index
	• General Workforce
	   o Lloyds Consumer Digital Index
	   o Oxford Internet Survey
	   o OECD Problem Solving in Technology Rich Environments
	   o UKCES Employer Skills Survey
	• Advanced / Specialist Digital Skills
	   o Pye Tait IT Skills Survey (not published)
	   o IT jobs watch
	
	NB: These digital outcomes will be measured against the number of people completing digital skills courses
	
	NB II: Several of these surveys use the Basic Digital Skills Framework to identify the basic skills that individuals and organisations have and lack. Tech Partnership and Lloyds Banking Group have developed an Essential Digital Skills Framework[86] (replacing the BDS Framework) which identifies the basic level of skills required for both life and work. The EU Digital Competence Framework

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[86] https://www.thetechpartnership.com/basic-digital-skills/basic-digital-skills-framework/

Indicative Metrics	Sources
	provides another structure by which digital skills can be identified (and thereby measured) NB III: These digital outcomes will also be compared to demographic data, to see if the uptake of digital skills training is even across gender, age and ethnicity.

Economic	**National / Regional**
	
	- Growth
	    o GVA of the Digital Sector based on DCMS Economic Sector Estimates
	    o GVA at LEP level
	    o Tech Partnership, Tech Insights: The Digital Economy
	    o Evaluation of the European Regional Development Fund
	    o Tech Nation Report 2018
	- Productivity
	    o OECD Productivity Statistics
	- Employment
	    o ONS Labour Market Data
	    o ONS Vacancy Survey
	    o ONS Workforce Jobs
	    o OECD Employment and Labour market statistics
	    o Burning Glass Labour market data (not published yet)
	    o Geek Talent
	- Businesses & Charities (for example from the National Council for Voluntary Organisations Almanac)
	    o Revenue
	    o Productivity
	    o Growth
	
	Individual
	
	- Higher wages
	    o HMRC earnings data (facilitated by DCMS)
	    o Real national income data
	    o ONS Annual Survey of Hours and Earnings
	- Increased employment opportunities
	- Reduced costs
	- Entrepreneurialism

Health & Social	**National / Regional**
	
	- Health
	    o Decreased NHS costs
	- Social
	    o Decreased number of Universal Credit claimants.

Indicative Metrics	Sources
	Community • Community-Led Local Government Reports

	Individual
	
	• Health Outcomes
	   ○ Increased access to NHS Digital
	   ○ Decreased GP cancellations
	   ○ Improved health incl. reduced isolation
	• Social Outcomes
	   ○ Increased subjective well-being, using the ONS 4 Office for National Statistics personal well-being questions
	   ○ Increased access to Government services e.g. Universal Credit
	   ○ Communicating and Connecting
	   ○ Leisure and Entertainment
	       1. Ofcom Adults' Media Use & Attitudes Report
	       2. Taking Part Survey
	• Democratic and Civic Participation
	• General Social Metrics
	   ○ BT Valuing Digital Inclusion
	   ○ Human Development Index
	   ○ Human Poverty Index
	
	NB: Need to consider counterfactuals for these outcomes

Source: DSP evaluation framework and baseline ITT 03.07.18

This is a comprehensive framework which links digital skills to the economy; the local DSP will measure progress at baseline and thereafter.

11.2 Scotland

Digital Office for Scottish Local Government

The Digital Office for Scottish Local Government includes 30 Councils in Scotland[87] and was established following the development of a digital transformation strategy for local government in late 2015 / early 2016. This was approved by the Society of Local Authority Chief Executives (SOLACE) and the Local Government Digital Transformation Board.

The Digital Office is supporting six projects focused on transforming services to 'digital first'.[88] The digital classroom and education project aims to help Local Authorities work towards a more joined up approach and foster collaboration between the Digital Office,

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[87] The group of 30 councils will fund the digital office for the next three years and the new team will be shared by all the participating councils.
[88] https://www.digitaloffice.scot/digital-services/

Local Government, SEEMiS[89], Education Scotland, Scottish Government and other stakeholders. Key deliverables are[90]:

- ROI Model – Collab tools - ROI model on using Online Collaboration tools to aid with learning and how this reduces cost;
- Blueprint and gold standard for collaboration tools - step by step guide in options and how to deploy to aid with learning through Virtual Classroom that is rolled out across all schools in Scotland;
- 100% adoption of school payments system - across all schools by end of 2018;
- Clear Guidance - fee structure for online school payments;
- Gold Standard and Roadmap for Connectivity in Schools – set a minimum standard for now, identify capacity gaps for in the future and develop a roadmap of how to technically achieve the future;
- Gold Standard for Bring your own device (BYOD) Policy across all schools - one interpretation of Public Services Network (PSN) compliance and rollout one policy for BYOD across the whole of Scotland;
- School Registration Solution - lift and shift solution created in concept at SOCITM[91] with the help of SEEMiS; and
- Common Data Sets Guidance – creation of common data sets from GLOW and SEEMiS to help with SEEMiS v2 as well as 'digital place'.

Regional Skills Assessments (RSAs)

The aim of the RSAs is to provide a coherent evidence base on which to base future investment in skills, built up from existing datasets. RSAs are produced for 14 regions and some include support for digital skills development in schools. They are developed and used by Skills Development Scotland (SDS) and its partners including Highlands and Islands Enterprise, Scottish Enterprise, the Scottish Funding Council and the Scottish Local Authorities Economic Development Group.

11.3 Wales

Regional Skills Partnerships (RSPs)

There are three RSPs in Wales to drive investment in skills by developing responses based upon local and regional need. They produce Regional Employment and Skills Plans to analyse and influence the provision of skills based on regional economic need, to support growth and key infrastructure projects in each region.

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[89] SEEMiS Group is an Education Management Information System (MIS) provider. As the standard MIS within Scottish Education, all local student data is processed and managed by SEEMiS software offering interfaces with external agencies such as ScotXed and SQA.
[90] https://www.digitaloffice.scot/digital-services/digital-classroom-education-13
[91] Society for IT practitioners in the public sector

The plans provide recommendations to Welsh Government to influence the prioritisation and deployment of skills funding. Within their regions, RSPs are also involved in ongoing research, Labour Market Intelligence, developing and delivering European Social Fund projects, region-proofing of European funding proposals to ensure regional strategic fit and working with anchor and other regionally important companies.

11.4 Republic of Ireland

Regional Skills Fora

A network of Regional Skills Fora was created in 2017 by the Department of Education and Skills as part of the National Skills Strategy to facilitate employers and the education and training system to work together to meet the emerging skills needs of their regions.[92]

The Fora will provide:

- A single contact point in each region to help employers connect with the range of services and supports available across the education and training system;
- More robust labour market information and analysis of employer needs to inform programme development;
- Greater collaboration and utilisation of resources across the education and training system and enhancement of progression routes for learners; and
- A structure for employers to become more involved in promoting employment roles and opportunities for career progression in their sectors.

The network of nine Regional Skills Fora aims to[93]:

- Provide a cohesive structure for employers and the further and higher education system to work together in building the skills needs of their regions;
- Help employers better understand and access the full range of services available across the education and training system; and
- Enhance links between education and training providers in planning and delivering programmes, reduce duplication and inform national funding decisions.

A dedicated team of nine Regional Skills Forum Managers have been put in place to be the key contact points and lead the work of the Forum in each Region

Bridge21

Bridge21[94] is an education programme based in Trinity College Dublin. Services provided by Bridge21 include:

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[92] http://www.regionalskills.ie/

[93] https://www.digitalcoalition.ie/resources/

[94] http://bridge21.ie/about-us/about-bridge-21/

- Young people:

  - Computer Science Transition Year Workshops: a dedicated Computer Science programme for transition year students. Topics range from Computational Thinking through programming with Scratch and Python to hacking and hardware projects with games consoles and the Raspberry Pi. Over 100 students take part in this programme each year; and
  - CodePlus: this initiative, supported by ICS Skills, is aimed at addressing the lack of female participation in Computer Science. Bridge21 created a specialised version of the Computer Science Transition Year workshops and it is open to girls from secondary schools around Dublin. Approximately 300 girls take part in CodePlus each year.

- Teachers CPD:

  - Teacher Workshops in Bridge21 Schools: assists schools to move towards using the model of 21st century teaching and learning to deliver the mainstream curriculum; and
  - Professional Masters in Education (PME): all Trinity PME students receive their core ICT module in Bridge21 as part of their course work, providing first-hand experience of the Bridge21 model.

11.5 Northern Ireland

NI does not have a detailed assessment of the digital / computer skills needed to support the economy. This information should exist at a NI level however, local government economic strategies should also assess what digital / computer skills are needed against local supply.

11.6 Conclusion

NI needs to develop information on the digital skills of the existing population against the needs of business and use this to inform the Digital Education Strategy / Skills Investment Plan. For example, the Belfast Region City Deal currently at the planning phase has a focus on employability and skills and innovation / digital. The partners are developing a vision for digital infrastructure and skills for the region. This is in line with work across England to develop Local DSPs at local authority levels.

20. Recommendation: we recommend NI develop information on the digital skills of the existing population against the needs of business and use this to inform the digital education strategy / skills investment plan for NI and relevant local authority plans. The metrics used for the DSP in England are an example of the information and data to be collected.