



Swansea University
Prifysgol Abertawe



Cronfa - Swansea University Open Access Repository

This is an author produced version of a paper published in:

Cronfa URL for this paper:

<http://cronfa.swan.ac.uk/Record/cronfa47925>

Research report for external body :

Crick, T. (2018). *The Information and Communication Technology Sector in Context*. Newport, Wales, UK: Qualifications Wales.

Needs publisher permission to publish in Cronfa. As a link to full text is available this is not needed - kept here for archive purposes. SG 28/1/19

This item is brought to you by Swansea University. Any person downloading material is agreeing to abide by the terms of the repository licence. Copies of full text items may be used or reproduced in any format or medium, without prior permission for personal research or study, educational or non-commercial purposes only. The copyright for any work remains with the original author unless otherwise specified. The full-text must not be sold in any format or medium without the formal permission of the copyright holder.

Permission for multiple reproductions should be obtained from the original author.

Authors are personally responsible for adhering to copyright and publisher restrictions when uploading content to the repository.

<http://www.swansea.ac.uk/library/researchsupport/ris-support/>



DELIVERING DIGITAL

Sector Review of Qualifications
and the Qualifications System
in Information and Communication
Technology

DECEMBER 2018



Contents

Foreword	5
Chapter 1: Introduction and Executive Summary	7
Our response to the findings of the Review	9
Chapter 2: The Information and Communication Technology sector in context	11
The challenge of defining the sector	11
The role of education and qualifications	12
Chapter 3: Review methodology	17
Scope and organisation	17
Stakeholder engagement	17
Learner engagement	18
Technical review	18
International comparison study	19
Online questionnaire	19
Data quality	20
The findings	21
Chapter 4: The overall qualification offer	21
The range of qualifications	21
Digital Competency Framework and Digital Literacy in the Welsh Baccalaureate	23
The name ICT	24
The availability of Welsh-medium ICT qualifications	24
Progression routes	24
Apprenticeships	26
Chapter 5: The content and currency of qualifications	29
The fast pace of change in the sector	29
Outdated content	30
The content and currency of GCSE ICT	31
The content and currency of GCSE AS/A level ICT and Applied ICT	32
Vocational and technical qualifications	33
Chapter 6: Assessment	37
The relevance of written evidence for practical tasks	37
Inconsistent and inaccurate assessment	39
Controlled assessments in GCSE ICT	39
Moderation and external quality assurance	40
Welsh-medium assessment	41
Chapter 7: Teaching resources – staff and equipment	43
Non-specialist ICT teachers	43
Range of learner skills, abilities and experience	44
Training and continuing professional development	44
Outdated hardware and software in learning providers	45
Chapter 8: International comparison study	47
Chapter 9: Action we will take	51
Phase 1 actions	51
Phase 2 actions	53
Conclusion	60
Acknowledgements	61
Reference List	62
Appendix 1	65
Appendix 2	66



Foreword

It is difficult to imagine a world without digital technology. A powerful presence in people's lives, it evolves continually and rapidly. It is a fascinating challenge through the lens of qualifications. This report on our review of qualifications, and the qualifications system, in the Information and Communication sector is the third in our series of sector reviews. It was extensive, taking over 18 months, and involving a wide range of stakeholders. We conducted 150 interviews, including with almost 60 employers, and we listened to, or read, the views of over 1000 learners. We have considered all these views alongside a range of other evidence to inform the findings that we present in this report.

The digital sector is a priority area for Wales and is a driving force in both economic development and wider social change¹. It is a large sector that employs over 30,000 people in almost 4000 businesses across Wales². The sector is fast-moving, with technological change happening seemingly overnight. This rapid pace of change, with the UK digital sector moving 2.6 times faster than the rest of the economy³, poses many challenges for qualifications and the qualifications system. The reported digital skills shortage in the UK⁴ highlights the importance of qualifications in developing the digital skills of young people. With almost 20,000 qualification certificates awarded to learners in Wales in this sector in 2016-17⁵, it is vital that learners are effectively prepared for working in the fast-moving digital world.

Our Review has identified areas where improvements are needed. We have developed a range of responses to the concerns raised by learners, employers and learning providers and have set out an action plan for the short and longer term. These responses differ from those taken to address our earlier sector reviews and demonstrate the unique approach that we take to sector reviews and the need for different solutions for different sectors. We believe that our proposals could make a real and positive difference to the digital sector in Wales.

We would like to thank everyone who has been part of this Review. Our panel of experts and stakeholders provided valuable advice and challenged our thinking throughout the Review. Sector reviews represent a huge commitment of time and resources and this Review has also involved many of our colleagues in Qualifications Wales. Finally, this report would not have come to fruition without the contributions of the employers, teachers, specialists and learners who participated in the Review.

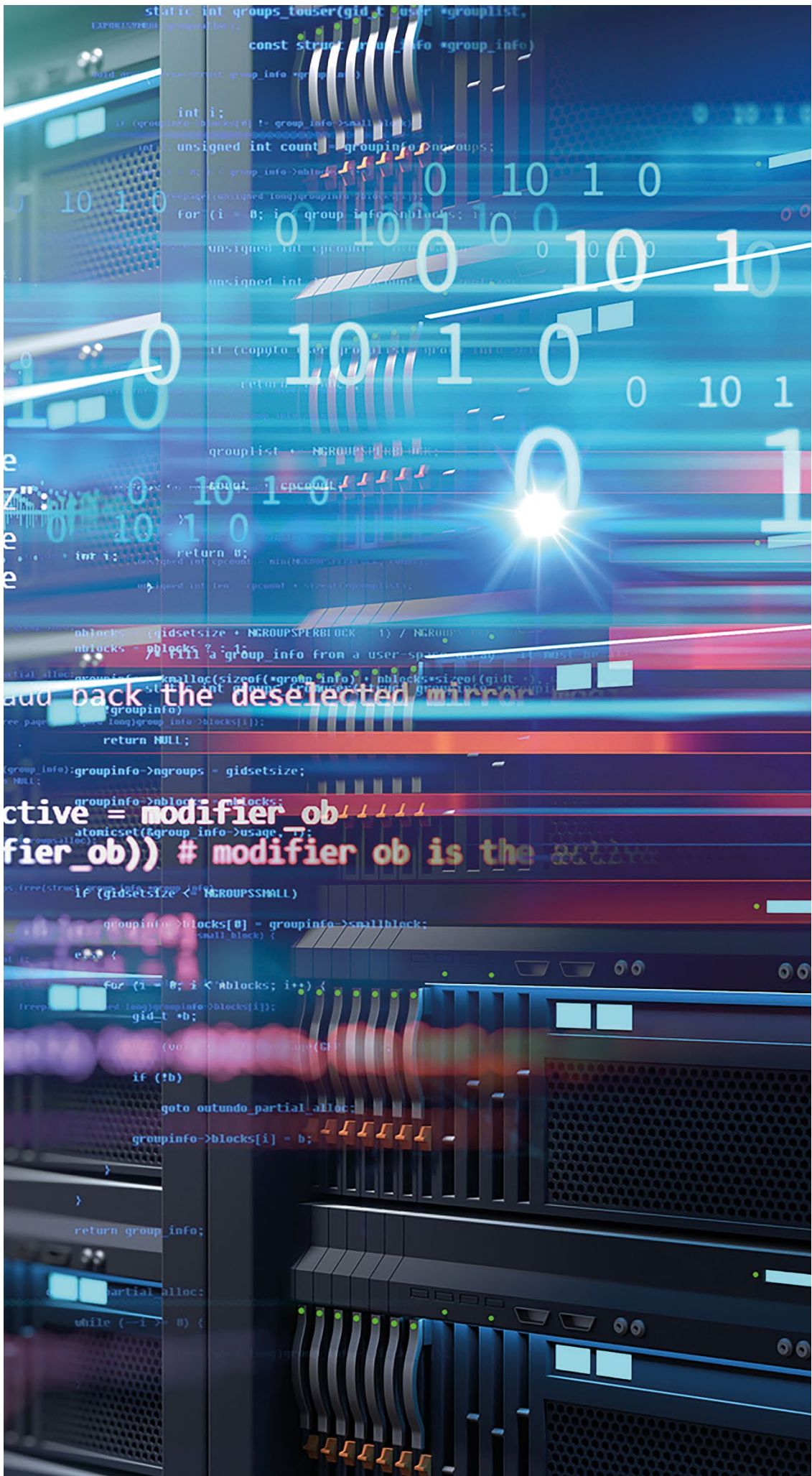
We hope you find your views reflected in this report.



Cassy Taylor
*Associate Director
Vocational Qualifications*



Gareth Downey
*Senior Manager
Vocational Qualifications*



Chapter 1: Introduction and Executive Summary

In this chapter, we introduce the sector review and summarise its findings.

- 1.** This is the third in a series of sector reviews carried out by Qualifications Wales, the regulator of qualifications, other than degrees, in Wales. In sector reviews we take a cross-cutting look at the qualifications in a particular employment sector, to see if the needs of employers and learners in that sector are being met. We also look at the underpinning qualifications system, including the way that different organisations work together to deliver those qualifications. We focus primarily on publicly funded qualifications – those taken in schools and colleges, and as part of apprenticeship programmes. However, if we discover issues with other relevant qualifications, we take those into account too.
- 2.** The remainder of the report is structured as follows:
 - **Sector context** – Professor Tom Crick MBE, a key adviser to the Review, outlines features of the sector that are particularly relevant to the Review.
 - **Methodology** – we outline the methodology of the Review.
 - **Findings** – we outline the findings of the Review in relation to:
 - the overall qualifications system;
 - the content and currency of qualifications;
 - the assessment of qualifications;
 - teaching resources – staff and equipment; and
 - our international comparison study.
 - **Action we will take** – we outline the actions that we will be taking in the short term to address some of the issues identified in the Review, and the longer-term actions to reform and monitor qualifications in the sector.
- 3.** In sector reviews we consider whether:
 - the **range and nature** of qualifications available in the sector is sufficient;
 - the requirements of **employers, higher education and the professions** are being met, and are likely to be met, in the foreseeable future;
 - the **knowledge, skills and understanding** requirements of qualifications reflect current knowledge and best practice;
 - the **assessment** arrangements of qualifications are effective;
 - the provision of **Welsh-medium** assessment is sufficient;
 - the qualifications are **comparable** with similar qualifications in Europe and elsewhere; and
 - the qualifications in the sector are provided **efficiently** and represent **value for money**.
- 4.** In relation to the **overall qualification offer** for the Information and Communication Technology (ICT) sector, the Review identified that:
 - employers knew little about the qualifications available in the sector, apart from degrees, GCSE and AS/A level ICT qualifications;
 - learners taking qualifications at Level 3 tend to do so with a view to progressing into higher education rather than directly into employment;
 - employers in the sector often recruit those with degrees, and place significant value on soft skills such as effective communication, team-working and problem-solving skills;

- the terms IT and ICT, as used in many qualifications in the sector, are outdated, used infrequently in industry and higher education, and have some negative connotations;
- secondary school teachers were concerned that Wales may follow England by removing GCSE and GCE AS/A level ICT qualifications, and were very keen to retain the GCSE and GCE AS/A level brands;
- secondary school teachers were supportive of the Digital Competence Framework, but they believed that it does not currently go far enough to replace ICT as a distinct subject;
- the digital literacy element of the Skills Challenge Certificate within the Welsh Baccalaureate could be more effectively assessed;
- the continuation of older, legacy vocational and technical qualifications, alongside the introduction of new versions of the qualifications, is confusing and does not create a level playing field for learners;
- a limited number of vocational qualifications are available through the medium of Welsh, which is a concern for some Welsh medium secondary schools; and
- the limited number of digital/ICT apprenticeship frameworks has led some employers and work-based learning providers to direct apprentices towards business administration apprenticeships.

5. In relation to the **content and currency of qualifications** in the sector, the Review identified that:

- the ICT sector and the digital industry are very fast-moving, leading to qualifications becoming outdated more quickly than in other sectors;
- many qualifications in the sector are outdated, do not include emerging digital topics, and have not kept up-to-date with developments in technology;
- despite being strengthened in 2017, GCSE ICT and GCE AS/A level ICT qualifications still include outdated content and do not cover some important topics relevant to the digital industry;
- GCE AS/A level Applied ICT is more relevant and current than the AS/A level ICT qualification;
- learning providers valued vocational qualifications that offered learners flexible choices of units and topics;
- the content of the older vocational and technical qualifications, developed several years ago, is outdated in some cases, significantly so; and
- newer vocational and technical qualifications, developed over the past three years, are more up-to-date and relevant to the digital industry.

6. In relation to the **assessment of qualifications** in the sector, the Review identified that:

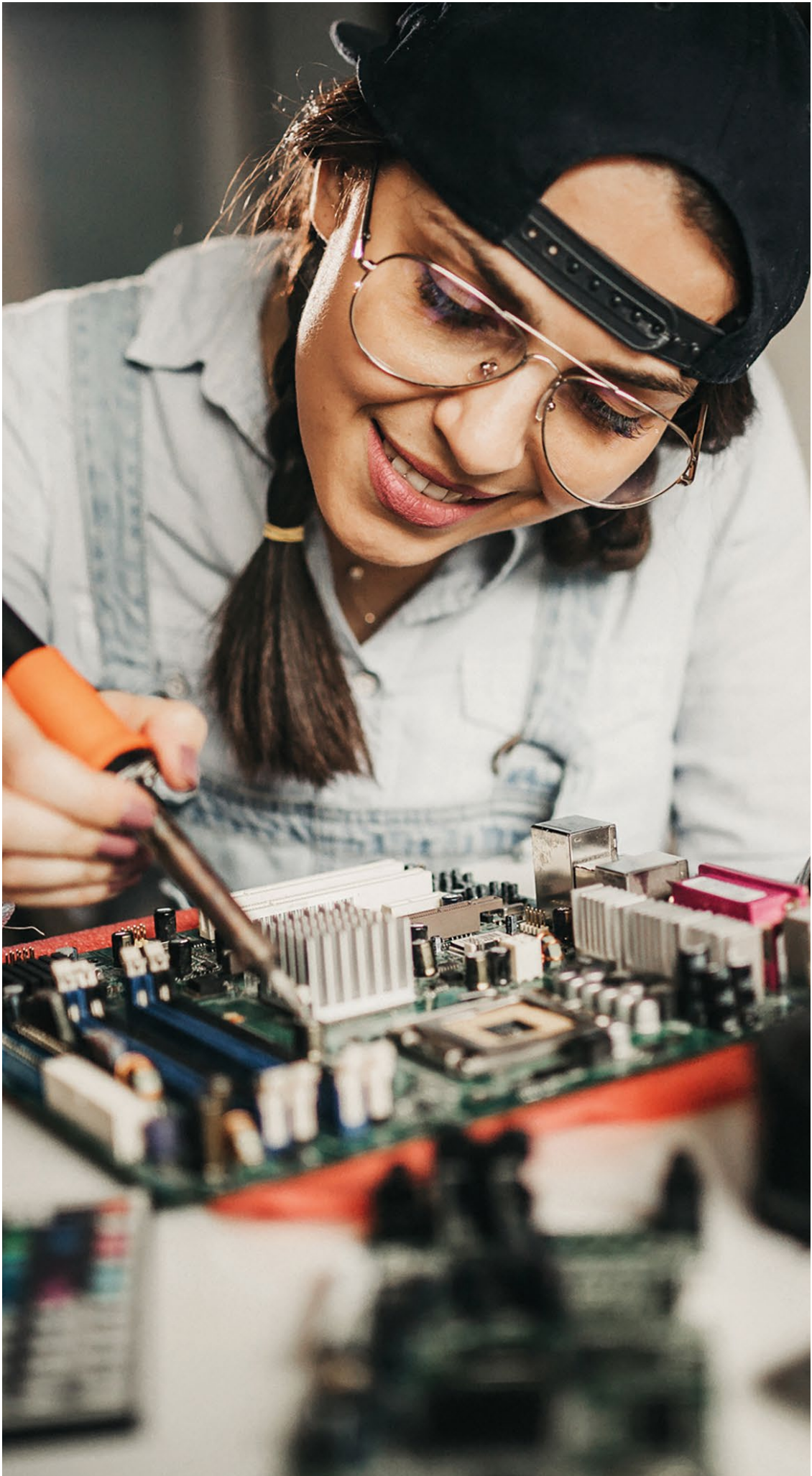
- requirements for learners to collect written evidence and screenshots as evidence for practical tasks are time-consuming and disengaging;
- across the qualifications we reviewed, a few examples of assessment evidence provided by awarding bodies were inaccurately and/or inconsistently assessed;
- the controlled assessments used in the GCSE ICT qualification are challenging to administer, and can be demotivating and disengaging for learners;
- learning providers cited examples of inconsistent moderation and external quality assurance; and
- Welsh-medium secondary schools reported that there were insufficient Welsh-medium resources available.

7. In relation to **teacher expertise, continuing professional development, and equipment**, the Review identified that:

- ICT is often taught by non-specialists who do not necessarily have the technical knowledge, skills and experience to effectively teach the subject;
- the range of skills and abilities of learners embarking on ICT and digital qualifications makes teaching the subject challenging, particularly for non-specialists;
- teachers were concerned that they do not have access to the training and continuing professional development (CPD) needed to keep up-to-date with developments in technology, and there is a perception that the amount of training and CPD offered by awarding bodies has reduced in recent years; and
- outdated hardware and software within learning providers, compounded by limited finances to invest in these resources, is a significant challenge when teaching and assessing ICT and digital qualifications.

Our response to the findings of the Review

- 8.** In Chapter 9 of this report, we set out the actions we will be taking in the short term to address the issues raised by the Review. These include asking awarding bodies to consider the findings of the Review and take action to address concerns about the content and currency of qualifications, assessment, and CPD.
- 9.** We then explain that we believe that the short-term actions, alone, will be insufficient to address all of the issues and concerns identified. This is because many of the qualifications in the sector are outdated and, given the fast pace of change in the sector, qualifications need to be updated and strengthened to reflect developments in technology.
- 10.** We outline that we will invite awarding bodies to develop a new broad-based GCSE Digital Technology qualification and a GCE AS/A level Digital Technology qualification.
- 11.** We explain that we will continue to liaise with the Department for Education in England, the Institute for Apprenticeships and Welsh Government with the aim of ensuring that the new technical qualifications, developed for use in the Digital Route T Levels in England, are made available to be taken by learners in Wales.
- 12.** We set out that we will review any ICT-related qualifications submitted by awarding bodies for new or extended designation (as being eligible for use on funded programmes of learning for under-19s) to ensure that the qualifications are up-to-date and include current digital content.
- 13.** We also outline that we will monitor the new vocational qualifications, developed recently to meet the requirements of the Tech Partnership for use in new apprenticeship frameworks, to determine their effectiveness in meeting the needs of learners and employers in Wales.



Chapter 2: The Information and Communication Technology sector in context



In this chapter, Professor Tom Crick MBE, who was a key sector adviser to us throughout the Review, describes the sector and the challenges it presents to the qualifications system.

The challenge of defining the sector

- 14.** Providing a comprehensive definition of the ‘ICT’ or ‘digital’ sector is increasingly difficult, primarily because we have seen such disruption to every economic sector due to the wide application and exploitation of data and technology, from financial and professional services, through to manufacturing, tourism and the creative industries.
- 15.** The importance of ICT/digital to an innovation-led knowledge economy is clear: from the grand challenge areas identified in the 2017 UK Industry Strategy⁶; from driverless cars, smart cities, creative industries clusters and next generation services, through to precision medicine, manufacturing and future materials; to the four cross-cutting themes of ‘*Prosperity For All*’⁷, the Welsh Government’s 2017 economic action plan. Formal sector classifications aside, it is clear that while we may still have a traditional vertical ‘IT and Telecoms’ sector, we also have a crucial enabling and facilitative horizontal digital sector. In essence, there is no such thing as the ‘digital economy’ – our economy is digital.
- 16.** With “software eating the world”⁸, the impact of digital on all of our lives is clear. From entertainment and communication, via the power and reach of a small number of social media platforms; to education, health and social care, and innovation in public services⁹; to the opportunities and challenges presented by big/open/personal data; or the potential future disruption on our economy from artificial intelligence and automation – digital impacts almost all aspects of modern life. Also, it has fundamentally shifted our consumer purchasing behaviour, with 89% of adults in Great Britain using the internet at least weekly in 2018, up from 88% in 2017 and 51% in 2006¹⁰. This has led to e-commerce sales by businesses in the UK non-financial sector rising to £511 billion in 2016, up from £503 billion in 2015¹¹.
- 17.** However, the OECD’s 2002 definition of the ICT sector does not provide much insight: “...a combination of manufacturing and services industries that capture, transmit and display data and information electronically.¹²” According to the 2007 UK Standard Industrial Classification of Economic Activities¹³, the “*Information and Communication*” sector includes telecommunications, computer programming, information services, as well as a wide range of creative, publishing and broadcasting activities. Only by scraping unofficial datasets from the web and social media, as evidenced in the 2018 Tech Nation report¹⁴, do we start to capture the strength, depth and diversity of the UK tech sector; especially the importance of collaboration, connectivity and culture, and the rise of digital suburbs, not just cities.

18. In 2017, the UK digital sector comprised 1.5 million jobs (4.6% of the total number of jobs in the UK), the highest number for the sector (and a 16.1% increase) since 2011¹⁵. Its workers are more productive, on average, by £10,000 per worker and jobs requiring digital tech skills command higher salaries, at £42,578 compared to £32,477 for those that do not. Despite the stereotype that digital tech jobs are for millennials, 72% of workers are aged over 35. However, only 19% of the digital tech workforce is female¹⁶. In Wales, the traditionally-defined ICT sector generated £1.667 billion Gross Value Added (GVA) in 2017, 2.8% of Wales' total GVA¹⁷. It has the highest levels of productivity amongst the sectors in Wales, with the second-highest GVA per hour worked, behind financial and professional services¹⁸.

The role of education and qualifications

19. Rapid technological change makes it harder to anticipate which job-specific skills will thrive and which will become obsolete in the near future. Shifts in skill requirements prompted by technological progress took decades or even centuries to manifest in the past¹⁹. In the digital era, the advances in technology demand new skills seemingly overnight. As part of these shifts, we have seen significant scrutiny and reform of ICT education, both in the UK²⁰ and internationally over the past ten years, largely predicated on the increasing economic demand for digital skills. But what do we mean by digital skills? In recent years, we have seen a multitude of policy reviews and reports from across government, academia, think tanks, learned societies and charities that have attempted to encapsulate some of the issues, as well as identifying potential solutions.

20. Further to a selection of these reports from the Royal Society²¹, BCS - The Chartered Institute for IT²², Nesta²³, Demos²⁴, CBI²⁵, Ofcom²⁶, UK Digital Skills Taskforce²⁷ and a number of UK Government departments, at least three recent House of Commons and House of Lords Select Committee inquiries^{28,29,30} have, wholly or in part, focused on the 'digital skills crisis'. They make a number of specific recommendations, from curriculum and qualifications reform, improving professional learning for practitioners, investment in infrastructure, developing effective pedagogies and the wider educational research base in the UK, through to terminology and changing wider public perceptions of the discipline.



21. Alongside England adopting a new computing curriculum³¹ in September 2014, we have also seen significant changes to the available qualifications, based on perceived rigour, content, distinctiveness and modes of assessment. The publication last year of a follow-up report on computing education in the UK from the Royal Society³² framed some of these national challenges in the context of computing for all, calling for a coherent strategy so that all learners are equipped and empowered with the necessary skills to be effective in our digital world.

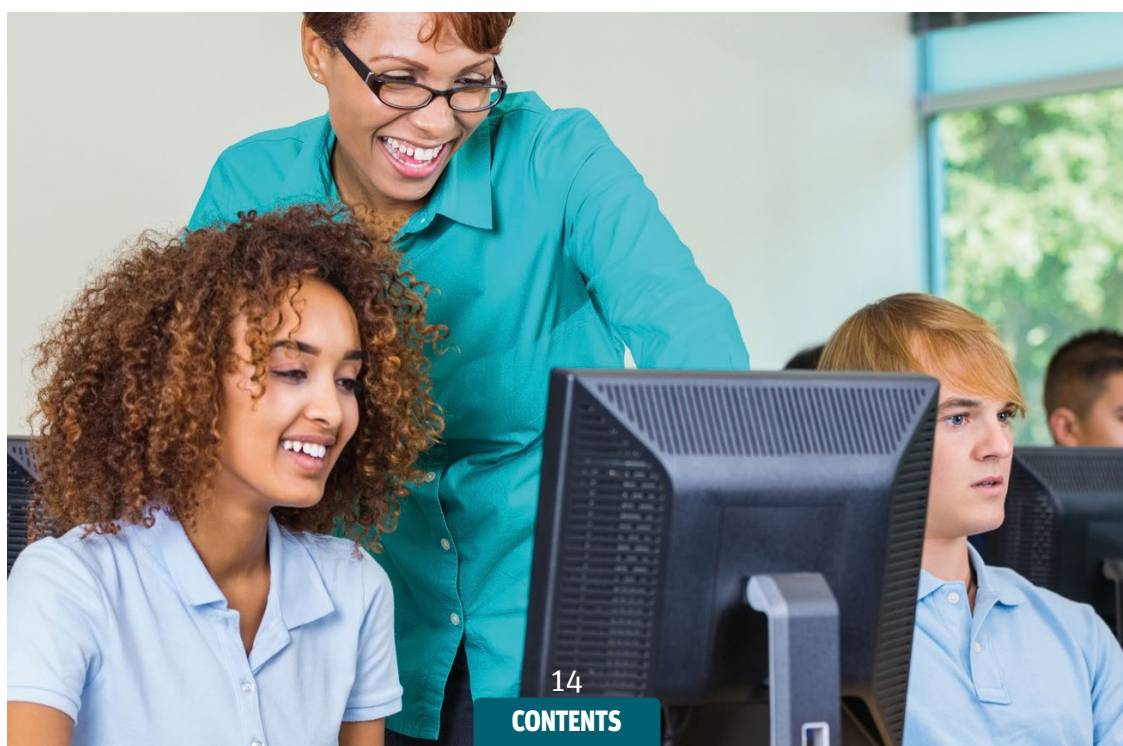
22. Qualifications play a key role in equipping learners with the necessary skills for living and working in the digital world. The variety, complexity and adaptability required of occupations in the ICT/digital sector has a bearing on the number and variety of qualifications in the sector. In 2016-17, over 19,000 certificates were awarded to learners in Wales, who chose qualifications from more than 200 available in the sector across schools, further education colleges, work-based learning and adult community learning (Table 1).

Table 1: The number of approved/designated qualifications and of certifications across provider types in 2016-17.

	Number of approved/designated qualifications	Certifications in further education	Certifications in work-based learning	Certifications in adult community learning	Certifications in schools	Total combined certifications
Entry Level	16	20	35	20	155	225
Level 1	27	525	50	50	135	755
Level 1/2	13	275	0	0	10,525	10,800
Level 2	49	360	110	55	2,100	2,630
Level 3	84	2,195	260	*	2,550	5,005
Level 4	13	0	30	0	0	30
Level 5	1	0	0	0	0	0
Total	203	3,370	480	130	15,465	19,445

*Source: QiW (for numbers of approved and designated qualifications as of 23 October 2018) and Qualifications Wales' analysis of Welsh Government WED and LLWR data for 2016-17 certifications (certification numbers have been rounded to the nearest 5 and any figures less than 5 but greater than 0 have been suppressed with *).*

- 23.** However, the high number of qualifications available, and the number of certificates awarded, does not guarantee that the qualifications are addressing the needs of the sector effectively, or that learners, learning providers and employers are satisfied with the qualifications available.
- 24.** For Wales, the socio-economic drivers are abundantly clear: from the aspirations presented in the Welsh Government’s economic action plan; a recent report from the National Assembly for Wales Economy, Infrastructure and Skills Committee on Industry 4.0 – the future of Wales³³; an ongoing Review of Digital Innovation and the Future of Work in Wales³⁴; investment in digital infrastructure, such as superfast broadband³⁵ and a 5G testbed in Monmouthshire³⁶; a £31 million investment in the Computational Foundry at Swansea University to build a world-class centre for interdisciplinary computational research³⁷; reducing digital exclusion and addressing the rural/urban divide; the significant investments for both the Cardiff Capital Region and Swansea Bay City Deals; as well as the longer-term strategic thinking required to address the requirements of the Well-being of Future Generations Act³⁸. But it should not just be about jobs. We want, and need, a digitally competent, capable and engaged citizenry.
- 25.** We are in the midst of the most substantial curriculum reform journey ever seen in Wales, providing transformational change to the structure, progression and assessment in our educational system³⁹. Addressing the digital skills gap has been a priority in this purpose-led, learner-centred curriculum reform process, building upon the recommendations of the 2013 review of the ICT curriculum⁴⁰, with the development of a new Digital Competence Framework⁴¹ made available to all schools in September 2016, as well as a clear strand of computer science in the new *Science & Technology Area of Learning and Experience*. We have also seen recent funding announcements for impactful digital skills initiatives, such as a further £5.3 million through the European Social Fund for the Technocamps programme⁴², as well as £1.2 million from HEFCW to support the involvement of Swansea University and Cardiff University in the UK-wide Institute of Coding project⁴³.



- 26.** However, the challenges surrounding repositioning ICT as a recognised and valued subject and embedding cross-curricular digital competencies cannot be underestimated, as identified in Estyn’s annual report⁴⁴ published in January 2018, as well as a report on preparing for the Digital Competence Framework⁴⁵ in July 2018. The new approach to learning and teaching in Wales will thus require high-quality and flexible digital technology qualifications to address some of the perceived issues with previous qualifications in this space, distinct but complementary to the existing suite of computer science qualifications. They should provide all learners with the opportunity to understand how technologies can be applied to solve real-world problems in a variety of business contexts, developing interdisciplinary skills that are not transient and dependent on knowledge of specific tools and technologies, to provide the foundation for future study and diverse careers. For example, they should develop broader socio-technical knowledge and skills, encompassing human factors, systems architecture, technical project management, legal/social/ethical/professional issues, as well as bridging to emerging priority areas such as software development, data analytics and cyber security.
- 27.** This timely review of qualifications in the ICT sector by Qualifications Wales, which I have taken an active role in over the past two years, presents a significant opportunity to develop something truly innovative and unique in this key area for Wales, recognising the societal, cultural and economic importance of developing digitally confident, capable and creative young people, preparing them for living, studying and working in a data-driven and computational world.





Chapter 3: Review methodology

In this chapter, we outline how we conducted this sector review.

Scope and organisation

- 28.** In conducting this Review, we focused our attention on qualifications, and the system that underpins the qualifications, in sector subject area 6 (ICT).
- 29.** We did not focus on GCSE or GCE AS/A level Computer Science qualifications because these qualifications had only recently been developed but, where relevant views were shared with us about these qualifications, we report them in our findings. Similarly, we did not focus on the Digital Competence Framework or digital literacy within the Skills Challenge Certificate component of the Welsh Baccalaureate but, where relevant views were shared about these, we report them in our findings.
- 30.** As with our earlier sector reviews, given the scale and complexity of the work, we addressed the aims of the Review through a series of workstreams that were either commissioned or conducted internally. The findings of each workstream were then drawn together and reflected in this report.
- 31.** The Review workstreams were:
- stakeholder engagement;
 - learner engagement;
 - technical review;
 - international comparison study; and
 - an online questionnaire.

Stakeholder engagement

- 32.** We engaged with employers, learning providers (further education colleges, schools, and work-based learning providers) and university representatives through semi-structured interviews and discussion groups. The interviews were undertaken by 16 members of staff from Qualifications Wales between January 2017 and June 2018.
- 33.** The stakeholders interviewed were:
- employers (usually senior managers/directors, training or human resources managers);
 - representatives from further education colleges (tutors and heads of the relevant departments);
 - teachers and heads of ICT in secondary schoolsⁱⁱ;
 - provision managers, delivery managers and assessors from work-based learning providers; and
 - representatives from universities.

In total, we interviewed 150 stakeholders, including almost 60 employers.

ⁱ In the direct quotes throughout the report we refer to both as ICT teachers in further education college.

ⁱⁱ In the direct quotes throughout the report we refer to both as ICT teachers in secondary schools.

- 34.** To recruit participants, we used a combination of purposive and convenience sampling strategies but we were open to speak to whoever wanted to express their opinion. We strived to ensure that participants had characteristics which would enable detailed exploration of the research objectives. For example, while identifying employers to interview, we aimed to have a good representation of sub-sectors and different employment sizes, and further stratified the participants by regional spread (companies active in parts of Wales, the whole of Wales or the whole of UK) and the use of sub-contracted work.
- 35.** Most participants were recruited via an email invitation. The email contained detailed information about the research and the participant's role. Following agreement by participants, confirmation letters were sent via email. As a rule, the interviews were conducted face-to-face. In a few cases, when it was more convenient for the respondent, we carried out telephone interviews. The participants gave informed consent verbally. Each interview, where the participant agreed, was recorded to aid note-taking.
- 36.** As well as conducting interviews and discussion groups, we also convened a stakeholder reference panel with representatives from employers, learning providers and other interested bodies. These panels met four times between April 2017 and June 2018 to provide a steer for the lines of inquiry. We tested our initial understanding of the findings with them as well as the options we could take.

Learner engagement

- 37.** This component of the Review was commissioned to a research company – Cognition Associates. They held focused discussion workshops across the country with 749 learners studying Level 1 to Level 3 ICT/digital qualifications. These workshops were conducted between February and March 2017.

Technical review

- 38.** Technical reviewers – a combination of subject/industry experts and assessment experts conducted a technical review of a sample of 16 qualifications (a list of the qualifications that were reviewed is included in Appendix 1). We selected the sample to include ICT and digital qualifications that were awarded in the greatest numbers in Wales in 2015-16⁴⁶. The sample included qualifications at Levels 1, 2 and 3 that were all regulated by Qualifications Wales. Where available, we selected the same qualifications at different levels to compare the content of the qualifications and to review the progression between the qualifications at different levels.

- 39.** The reviewers examined specifications, sample assessment materials, examination papers and learner assessment evidence provided by the selected awarding bodies via their centres. The reviewers attended a half-day workshop to prepare for the technical review. Each reviewer spent three days (remotely) reviewing a sample of qualification specifications, quality-assurance documentation and sample assessment materials before attending a two-day workshop at our offices, where they reviewed a sample of learner assessment evidence. Reviewers then attended a one-day workshop to compare and share their findings with other reviewers before submitting a summative report to us outlining their conclusions.
- 40.** The reviewers also looked at the specifications for a selection of newer ICT/digital qualifications that were introduced between 2015 and 2017 (a list of these qualifications is included in Appendix 2). These qualifications were not included in the full technical review, as they had only recently been introduced and learner assessment evidence was not available.

International comparison study

- 41.** We conducted a small-scale international comparison study in-house. This part of the Review aimed to explore relevant qualifications in selected countries with the purpose of identifying practices that could be considered for Wales.
- 42.** The countries included in the review were Estonia, France, New Zealand, Canada (Province Alberta), Republic of Ireland, Romania, Norway, Scotland, Australia, United States of America (New York State) and Singapore. These countries were selected because they had a relatively similar qualifications system to the system in the UK, in terms of qualification level approach or because features of their education systems were judged as good by the OECD. In addition, the selection was based on availability of information in online sources.
- 43.** The international comparison study included online research of publicly-available materials on qualifications and the education systems of each country as well as email exchanges with experts from qualification regulators and similar bodies.

Online questionnaire

- 44.** A questionnaire was made available via the Smart Survey platform for 15 weeks between September and December 2017. Separate versions of the survey were available to learners, learning providers and employers. The intention was to reach out to anyone who wanted to contribute to the Review, but who had not had the opportunity to do so. In particular, we wanted to solicit the views of learners in schools who had not been reached by the earlier programme of learner engagement. The questionnaires asked a series of open-response questions that focused on the lines of inquiry of the Review. We received 637 responses, the majority of which came from learners who were studying for GCSE ICT.

Data quality

45. We undertook different measures to ensure the quality of our data for each workstream. We paid special attention to stakeholder engagement because it was our main vehicle to answer the research questions, along with externally commissioned pieces of research.
46. Those members of staff who had limited experience of conducting qualitative interviews attended an in-house one-day training session. We designed interview guides with a reporting template for each group of stakeholders to help interviewers address the research questions. We held regular meetings to discuss interviewers' experiences and to standardise our approach.
47. Interviewers took detailed notes of each interview. The notes were coded and analysed (using thematic analysis) in 'NVivo 11' software for Windows. Initially, one researcher coded data systematically across the entire data set. The codes were then collated into potential themes. The core project team met afterwards to check the themes against the coded extracts and to refine them. Each theme was reviewed by at least two team members. Emerging themes were discussed with the core team in an open process where assumptions could be challenged.
48. Although it was not possible to engage with everyone in the sector, we believe that we have captured the views of the sector. As with previous reviews, it has been encouraging that there has been a high level of consistency between the findings emerging from the different workstreams.
49. Despite the high level of consistency between different workstream findings, we are aware that we could have introduced some personal or organisational bias into the process of interpreting the data. To counter this, we held four stakeholder panel meetings, as well as three meetings in north, mid and south Wales with representatives from schools, further education colleges, work-based learning providers and universities. In these meetings, we tested lines of inquiry, emerging findings and potential solutions. We also engaged with Welsh Government, Tech Partnership (at the time, the sector body for Digital) and employer groups on emerging findings and potential solutions. We were encouraged that this programme of engagement elicited strong recognition of the issues we had identified and clear support for our proposed actions.



Sector review team

The findings

In Chapters 4 to 8, we provide information on the findings of the Review relating to:

- Chapter 4: The overall qualification offer
- Chapter 5: The content and currency of qualifications
- Chapter 6: Assessment
- Chapter 7: Teaching resources – staff and equipment
- Chapter 8: The international comparison study

Chapter 4: The overall qualification offer

In this chapter, we report on those findings which relate to the qualification offer as a whole, including:

- the range of qualifications;
- the Digital Competence Framework and digital literacy in the Welsh Baccalaureate;
- the name ICT;
- the availability of Welsh-medium qualifications;
- the progression routes available to learners; and
- apprenticeships.

The range of qualifications

50. When discussing with stakeholders about the range of qualifications available, it became clear that the use of – and the need for – qualifications was different in this sector compared with the other sectors we have reviewed. In contrast with other sectors that we have reviewed, qualifications in the ICT sector were not, in most cases, required to progress into employment and do not provide a ‘licence to practise’ in the digital industry. Indeed, many employers knew very little about the qualifications available in the sector below degree level. Most were aware of GCSE and AS/A level ICT qualifications, but knew little about their content. They reported to us that they usually recruit employees with degrees, a finding that we explore in more detail later in this chapter. Therefore, their primary concern was that qualifications allow learners to progress to higher education.

51. Some employers and learning providers told us that they were uncertain, and sometimes confused, about the range of vocational qualifications available in the sector. Some suggested that the titles of different vocational qualifications makes it challenging to navigate the range of qualifications. A few learning providers told us that, within some vocational qualifications, the wide range of units can also be confusing and complicated.

- 52.** In recent years, the introduction of new technical and applied general ICT qualifications (such as BTEC Nationals and Cambridge Technicals), alongside legacy versions of the qualifications, was confusing for some learning providers. Learning providers told us that they were unsure whether, or when, the legacy qualifications would be withdrawn, and this created uncertainty when planning their curricula. We were told that continuing with the legacy qualifications while also introducing the new qualifications, which include a greater proportion of external assessment, was confusing and potentially unfair to different groups of learners who may find it harder to achieve higher grades in one version of the qualification than the other. In the light of this potential inequality, some learning providers were opting for the older qualifications, despite reservations about their currency, because they believed that the nature of the assessment provided learners with a greater chance of success.
- 53.** Many secondary schools shared with us their strong views about the importance of both ICT and Computer Science qualifications, the difference between the two distinct subjects, and how they complement each other in the Welsh curriculum. Many secondary schools spoke to us about the removal of GCSE and AS/A level ICT qualifications in England and cautioned us against similar action in Wales. ICT teachers and heads of department in secondary schools gave a variety of examples how ICT qualifications, if strengthened, could continue to complement Computer Science qualifications in the Welsh curriculum.

“Having a choice of both ICT and Computer Science as two separate disciplines is crucial. It allows students to study both areas if required or one or the other to suit their future career or studying needs”.

ICT teacher responding to the online survey

- 54.** ICT teachers in secondary schools were very keen to retain the GCSE and AS/A level ICT qualifications, despite their weaknesses, which we explore in Chapter 5. They told us that the GCSE and AS/A level brands are understood and valued by secondary schools, learners and parents.

“I feel very strongly that we should be redeveloping and keeping GCSE ICT and A level ICT. I think that there would be a massive gap in the curriculum if we were to lose those subjects. I think that we would all agree that those subjects do need to be redeveloped, as they stand now the content is a little out of date and the skills that are expected are perhaps not equipping learners properly for the digital world that they live in. But, nevertheless, I think both are vital qualifications.”

ICT teacher in secondary school

“For us, ICT and Computer Science have to be separate and in the current climate they have to be GCSEs and A levels. They have to have that branding.”

ICT teacher in secondary school

Digital Competence Framework and Digital Literacy in the Welsh Baccalaureate

55. This Review did not focus on the Digital Competence Framework or digital literacy within the Skills Challenge Certificate component of the Welsh Baccalaureate. Nonetheless, secondary schools shared with us their views about the role of both the Digital Competence Framework and the Skills Challenge Certificate in supporting the development of digital skills. Teachers in secondary schools acknowledged the importance of the Digital Competence Framework but told us that, at present, it does not go far enough to adequately prepare learners with the digital skills required for progression in education and/or employment. These teachers told us that, as the Digital Competence Framework is in its infancy, and is not assessed or measured in a formal manner, there are variable approaches taken by secondary schools to embed it across the curriculum.

“What we want is a balance and the Digital Competence Framework, I think, will level it [Digital Competence] across the board but there still has to be ICT and Computer Science to teach the skills discretely.”

ICT teacher in secondary school

56. Secondary schools and further education colleges also referred to the Skills Challenge Certificate qualification that sits within the Welsh Baccalaureate, which has a digital literacy element. There was a view from some secondary schools and further education colleges that this element is not always effectively delivered or assessed, and this limits the potential for the Welsh Baccalaureate to be a driver for digital skills. Similar findings were reported in the review of the Skills Challenge Certificate, that we published in April 2018, that recommended increasing the opportunities to assess digital literacy skills within the Skills Challenge Certificate.

“We can’t guarantee that the ICT element is going to be substantial enough in the Welsh Baccalaureate. You can’t be assured that they’ve met those skills, and it’s not measured as a strict subject.”

ICT teacher in secondary school

The name ICT

57. A few learning providers told us that the terms ICT and IT, as used in many qualifications in the sector, are outdated, rarely used in industry and higher education, and have some negative connotations. This was supported by employers, who told us that the terms IT and ICT are becoming outdated in the digital industry. Some suggested that more appropriate terms such as ‘digital’ and ‘technology’ should be used in modern qualifications to reflect the current terminology used in the sector.

“I think that we need to change the name ICT to something that reflects where we now are.”

ICT teacher in further education college

The availability of Welsh-medium ICT qualifications

58. Some Welsh-medium secondary schools raised concerns about the limited availability of vocational and technical qualifications through the medium of Welsh. They reported that some vocational and technical qualifications, which were previously available in Welsh, are no longer available. They gave examples of vocational and technical qualifications offered by awarding bodies based outside Wales, as those that are no longer available for learners to undertake through the medium of Welsh.

“I don’t think that the needs of learners wanting to be assessed through the medium of Welsh [are] being met at all. Specifically, with [awarding body] refusing to offer their qualifications through the medium of Welsh.”

ICT teacher in secondary school

Progression routes

59. The majority of learning providers told us that the ICT qualifications taken in further education were viewed as stepping stones not directly into employment, but as qualifications that could be taken instead of, or as well as, A levels to provide a progression route to higher education. This is a marked difference from the other sectors that we have reviewed, where qualifications at Level 2 and/or 3 are a direct requirement for employment in those sectors. Teachers in secondary schools and further education colleges told us that the most common progression route for Level 3 learners was higher education. They told us that some learners progress to study ICT related degrees in higher education, whilst others use their Level 3 ICT qualification to support their progression to other relevant courses in higher education.

“I’d say that probably about 95% of our [ICT] students go on to higher education.”

ICT teacher in further education college

60. Employers shared a range of information about their experiences of recruiting employees in the sector. Most employers that we spoke to told us that they primarily recruit employees with degrees. This was particularly evident with small employers.

“Every time we’ve recruited, they’re degree holders or people who would be in a position to hold degrees.”

Employer

61. Several employers reported that they use degrees as a benchmark for recruiting employees, but that they are not always looking for an ICT or Computer Science degree. They told us that degrees in relevant subjects such as mathematics, engineering and physics are appropriate alternatives that are valued when recruiting employees.

“Typically, people who join us from a junior entry point are coming in after a degree so typically they’ll have a Computer Science degree or a STEM related degree and typically the classifications is a 2:1.”

Employer

62. Many employers acknowledged that, despite often recruiting those with degrees, they were more concerned with applicants having the softer skills to function in their organisations. In our online survey, we asked employers what the most critical skills were for entry into the digital industry. Soft skills such as communication, problem-solving and team-working skills, alongside relevant digital skills and an ability to adapt to changes in technology, were identified as the most important.

“We have a theme of person over qualifications. Personality and team working skills are ranked higher than most other skills in my book.”

Employer

“It is important to us that employees demonstrate good employability skills, attitude, team-working, timekeeping, etc, as well as technical skills.”

Employer



- 63.** Many employers told us that, alongside relevant skills, they seek to recruit employees with an interest in the subject, a passion for technology, a positive attitude, enthusiasm and a willingness to learn. Where potential employees can demonstrate the right attitude and a willingness to learn, employers frequently indicated that they can upskill and train them to meet the needs of their business.

“If I’ve interviewed someone with qualifications and I’ve got someone who comes in who has got no qualifications but shows a passion for the technology, they would get it over the person who has just done the exams for the sake of getting a job.”

Employer

Apprenticeships

- 64.** Compared with other sectors that we have reviewed, there were far fewer learners embarking upon apprenticeships in the ICT sector, with ICT apprentices accounting for approximately 2% of starts on apprenticeships in Wales in 2016-17⁴⁷.

- 65.** We outlined above that, in many cases, employers recruit those with degrees. Despite this, there was a sense from the employers that we spoke with that they are supportive of ICT apprenticeships and several employers were keen to discuss with us the value that they see in apprenticeships in Wales.

“Apprenticeships for us are a brilliant route through because you are training people in real things that we need, and the industry needs too. We have employed every single apprentice we have had. That is 15/16 IT apprentices and every single one of them so far has been offered full employment by us. That is over 20% of our workforce now since 2013.”

Employer

- 66.** Most employers that we spoke to have not yet employed ICT apprentices, but were open to employing them in the future. The primary reason given by employers for not employing apprentices was the significant time and resources required to support and train them.

“We only hire people with degrees as we are a small business. Only large businesses can afford to have an apprentice.”

Employer

67. A few employers also cited the complexity and time involved in managing the recruitment and monitoring paperwork for apprentices as a reason for not recruiting them.

“We were thinking of bringing one [apprentice] on board anyway but the part that we had issues with regarding the apprenticeship programme is, when we were looking to do it for our marketing team, the amount of paperwork and visits and various other things was just painful.”

Employer

68. A few employers and work-based learning providers told us that the limited range of ICT/digital apprenticeship frameworks available in Wales has led them to direct employees towards business administration apprenticeships.

“The last time I looked for an apprenticeship in Wales to do web design and web development, there wasn’t an apprenticeship for that and hence we have had to put people through on a business administration apprenticeship instead which obviously ticks the boxes to what they do here anyway. But it would have been better to have been a web design apprenticeship.”

Employer

69. At the beginning of this Review, six ICT/digital apprenticeship frameworks were available in Wales. This has since increased to 11 frameworks. During the period of the Review, new vocational qualifications were developed to meet the requirements of the Tech Partnership for use in new apprenticeship frameworks. These qualifications, which cover topics such as digital telecommunications, information security, and IT infrastructure, were accepted into five new apprenticeship frameworks for use in Wales. These qualifications have not yet been certificated. Therefore, we do not have any evidence of their effectiveness in meeting the needs of learners and employers in Wales.





Chapter 5: The content and currency of qualifications

In this chapter, we outline concerns about the content and currency of qualifications in the sector relating to:

- the fast pace of change in the sector;
- outdated content;
- GCSE ICT;
- GCE AS/A level ICT and Applied ICT; and
- vocational and technical qualifications.

70. For qualifications to be effective, the subject matter that is assessed must be current and awarding bodies must take all reasonable steps to ensure that the content of their qualifications remains so. Across our stakeholder interviews, learner engagement, online survey and technical review, the topic about which we received the most consistent feedback, and about which the most concerns were raised, was the content and currency of qualifications in the sector. These concerns are explored throughout this chapter.

The fast pace of change in the sector

71. The ICT sector and the digital industry are fast-moving and evolving and the impact that the fast pace of change has on qualifications in the sector became clear to us throughout the Review. This impact was far more pronounced in this sector than other sectors that we have reviewed.

“Awarding bodies and whoever sets the spec need to adapt quickly to IT and amend the functionality and the learning. It’s a highly evolving beast. IT is rapidly moving, there’s just so much coming out and qualifications need to change with this and change at speed.”

Employer

72. This fast pace of change means that qualifications can quickly become outdated. There was a strong view from employers and learning providers that ICT and digital qualifications, given the rapid and frequently evolving nature of the sector, often become outdated much quicker than qualifications in other sectors.

“By the time you complete a three-year course, which has spent three years being created, approved and modelled, what you’re taught is out of date, and not just a little bit out of date but half a decade behind. The speed at which ICT moves means that it’s really tough.”

Employer

- 73.** There was a strong view from learning providers that while the fundamental concepts of the subject have remained relatively consistent over time, it is the software, programmes, resources and terminology that have evolved.

“The basics of IT are never going to change, it’s the software, the hardware, everything that changes. So, basically, you should be teaching the things that will never change.”

ICT teacher in further education college

- 74.** Learning providers told us that qualifications need to be assessing the fundamental concepts of the subject and be flexible to adapt to changes in technology.

“The qualifications have to be quite generic because it takes three to four years to develop, then it takes two years to start teaching it. Once its embedded in, it’s seven years old, particularly IT and Computer Science.”

ICT teacher in secondary school

Outdated content

- 75.** Overall, there was a very strong view from learning providers that many qualifications in the sector are outdated and have not kept up to date with changes in technology. They identified topics such as cloud computing, cyber security, data analytics and wireless technology that are not included within many qualifications.

“The current qualifications don’t reflect industry needs, we are still assessing on standards and categories that have not been used in industry for five years.”

ICT teacher in further education college

- 76.** In our online survey, we asked learning providers about their views on how comprehensive, relevant and current they feel qualifications in the sector are. Most responses from learning providers were negative, with many stating that they feel qualifications have become outdated. Our technical reviewers also identified that many qualifications they reviewed included outdated content, which we explore throughout this section.

“We have old specifications and as technology is changing rapidly it needs to be updated.”

ICT teacher responding to the online survey

- 77.** This view was supported by learners during our focus group workshops. Learners told us that they were acutely aware that often what they were being taught, and assessed against, is outdated.

“There is stuff that was current in 2007 and we can’t find examples of it anywhere. The tutors have to teach it even though they know it’s outdated and pointless.”

Level 3 learner attending focus group

The content and currency of GCSE ICT

- 78.** The GCSE qualification that we received most feedback about from secondary schools was the GCSE ICT qualification offered by WJEC. This was not surprising, given that almost all learners (97%)⁴⁸ who completed GCSE ICT in 2016-17 completed the qualification with WJEC.
- 79.** The WJEC GCSE ICT qualification was updated for first teaching in 2017. The changes were not substantial, as they were intended as a short-term measure pending the findings of this Review. There was an acknowledgement from secondary schools that the updated version was an improvement upon the previous version. However, there was a strong view from secondary schools that the content of the qualification has become outdated and has not kept up-to-date with developments and changes in technology.

“I think in regard to ICT [WJEC GCSE and A level], they seem to be getting better but still old-fashioned. Questions are still on things that people don’t use anymore. You want to see stuff about voice recognition, cloud storage, it still seems a bit old-fashioned.”

ICT teacher in secondary school

- 80.** During the technical review, our reviewers also identified shortcomings with the content and currency of the WJEC GCSE ICT qualification, including:
- some of the content covers outdated concepts, technology and/or practices;
 - several topics covered in the qualifications, such as home entertainment packages, presentation software, web software, instant messaging and email, are so prevalent in modern everyday life that most young people are likely to understand these topics before embarking on the qualification. Where these topics are included in the qualification, they are unlikely to be demanding or engaging, and risk being considered trivial and repetitive;
 - emerging technologies, such as cloud computing, mobile and wireless technologies, internet services, app technology, cyber security, gamification, big data, analytics, blockchain, have little or no inclusion within the qualification;
 - there is a heavy focus on traditional desktop computers within the qualification, and limited attention is given to more modern devices such as tablets, smartphones, and other internet connected devices and sensors such as smartwatches that are used widely in modern day life; and
 - the contexts of some topics are limited. For example, three of the examples listed in Unit 1 are based in schools, which limits knowledge of how ICT systems can be deployed in different contexts.

- 81.** Our technical reviewers concluded that some of the qualification content is outdated and the content that is currently appropriate and up-to-date is likely to become outdated within the lifetime of the qualification. Some topics are very prescriptive and identify specific hardware and software. These are likely to become outdated sooner than the more generic topics, which can adapt to developments and changes in technology.

The content and currency of GCE AS/A level ICT and Applied ICT

- 82.** During our discussions with secondary schools, further education colleges and universities, we received a significant amount of feedback about the GCE AS/A level ICT qualification offered by WJEC. Again, this was not surprising given that most (93%)⁴⁹ learners who completed GCE AS/A level ICT in 2016-17, completed the qualification with WJEC. The qualification was updated for first teaching in September 2017 and there was an acknowledgement that the updated qualification was an improvement upon the legacy version. However, there was a strong view that the content of the GCE AS/A level ICT qualification has become outdated.

“If you compare what pupils do outside of school and what they do in school as part of the course [GCE AS/A level ICT], it’s miles apart. Quite frustrating as a teacher.”

ICT teacher responding to the online survey

- 83.** During our technical review, we identified shortcomings with the WJEC GCE AS/A level ICT qualification, which included:

- some of the content covers outdated concepts, technology and/or practices;
- the qualification covers a breadth of ICT topics, but is very limited in depth with limited specialist topics;
- some of the content is not sufficiently challenging at Level 3 and does not show clear progression from the GCSE ICT qualification; and
- some of the content covers knowledge and skills that learners are likely to have acquired before embarking on the GCE AS/A level ICT qualification.

- 84.** Several teachers in secondary schools told us that the GCE AS/A level Applied ICT qualification offered by WJEC is more relevant and up-to-date than the GCE AS/A level ICT qualification.

“The [WJEC] A level Applied ICT, I quite like that course, the skills that the learners obtain through the spreadsheet and the database tasks are quite good. They’re giving you quite up to date topics, so I think for someone wanting to go into digital marketing it’s a brilliant course.”

ICT teacher in secondary school

85. This was supported by our technical reviewers, who also reported that the content of the GCE AS/A level Applied ICT qualification is more up-to-date and relevant than the GCE AS/A level ICT qualification. The inclusion of ICT topics such as big data and cyber security within the qualification are likely to be more demanding and engaging for learners.

Vocational and technical qualifications

86. Throughout the Review, we received a significant amount of feedback from stakeholders about vocational and technical qualifications. We also reviewed a range of vocational and technical qualifications during our technical review. This included a selection of qualifications that were developed several years ago (listed in Appendix 1) and some newer qualifications that were developed over the past three years (listed in Appendix 2).

87. The vocational and technical qualifications that learning providers spoke most about were the BTEC ICT qualifications. Some learning providers spoke positively about these qualifications and reported that the wide range of units available in BTEC ICT qualifications allowed them to select units to meet the needs of learners and their preferred career path. They also told us that the wide range of units within BTEC ICT qualifications allowed them to select units that were more current and relevant.

“The BTEC seems a bit more realistic as to what’s actually going to come at you when you’ve finished. The 11 modules that you get in the BTEC opens up quite a lot of areas. We do things from spreadsheet design right through to animation and stuff like that.”

ICT teacher in secondary school



88. The most common criticism from learning providers about vocational and technical ICT qualifications (including BTEC qualifications) was that some units within the qualifications are outdated. This feedback was far more pronounced for the vocational and technical qualifications which were developed several years ago. Technology has moved on significantly since then and there was a strong view that the qualifications have not kept up with these developments. Some learning providers also told us that the qualifications do not include current digital topics, such as cyber security, cloud computing and app technology, that are widely used in the digital industry.

“I think the big problem is that stuff is out of date. In Wales we’re still running the older version of the [vocational and technical] qualifications and they’re out of date.”

ICT teacher in further education college

89. Our technical reviewers looked at a selection of vocational and technical qualifications and reported several shortcomings, including:

- outdated content was included in several qualifications;
- modern ICT topics, such as cyber security, cloud computing, big data, business analytics and app technology, have little or no inclusion in several of the qualifications;
- many of the qualifications focus on traditional desktop computers, with little or no inclusion of modern devices such as tablets and smartphones;
- the content of some qualifications was not sufficiently challenging and there were examples of duplication between qualifications at different levels; and
- there were examples of very basic assessment criteria, for example, at Level 2 we identified assessment criteria linked to starting and shutting down an ICT system, accessing information on the internet and sending emails. Young people are likely to be able to complete these tasks before embarking on their qualifications.

90. There were some concerns raised by learning providers about the amount of external assessment included in new versions of the Level 3 technical and applied general qualifications.

“With the [Level 3 technical qualifications] changing with the exams I’m worried because the old qualifications essentially filled the gap for people who weren’t quite so academic but practical.”

ICT teacher in further education college

- 91.** The learning providers who are offering the newer technical and applied general qualifications reported that they were more up-to-date and relevant to the digital industry. This was supported by our technical reviewers, who reported that the content of the newer qualifications that they reviewed was considerably more up-to-date and covered topics that would likely engage learners and adequately prepare them for the demands of the digital industry. Our reviewers reported that the addition of topics such as cyber security, cloud computing, big data, business analytics and mobile apps, which were not included in many of the older qualifications that they reviewed, was a significant improvement.

“On the whole the new [technical] ICT qualifications are pretty good. They are relevant for the industry. There are lots of new units coming in like mobile apps, and social media.”

ICT teacher in further education college

“The [new technical Level 3 ICT qualification] is adapting, it’s changed, and it’s got an exam in it now, but I think that the content is so varied, it’s great.”

ICT teacher in secondary school

- 92.** A few learning providers raised concerns about the approach to awarding the new versions of the Level 3 technical and applied general qualifications, whereby a learner is expected to pass every externally assessed unit to pass the qualification. They told us that the approach to awarding these qualifications may disadvantage some learners.

“They [learners] have to pass everything to gain the qualification, there’s no allowance for them failing. Whereas at A level 40% is the pass mark and it doesn’t matter where that 40% comes from, they cannot know some things. Students [on the new technical qualifications] have to know everything. Not enough compensation in the new qualifications. This is very harsh, new rules are not well thought through.”

ICT teacher in further education college

- 93.** During the drafting of this report, awarding bodies who offer Level 3 technical and applied general qualifications issued guidance to learning providers about the introduction of a ‘near pass’ grade for learners who narrowly miss a pass on one or more externally assessed unit. This change (which is intended to provide a ‘safety net’ for learners to limit any negative effect during the awarding process) should begin to address the concerns about the awarding process that were raised during this Review.



Chapter 6: Assessment

In this chapter, we outline the issues that the Review identified in relation to assessment of qualifications in the sector.

94. Even where the content of a qualification is appropriate, the qualification will not be effective unless it is appropriately assessed. When an awarding body awards a qualification to a learner, it is indicating that the learner has been found to have the appropriate level of knowledge, skills and understanding. Across our stakeholder interviews, learner engagement, online survey and technical review, we received a significant amount of feedback, including several concerns, about assessment.

95. Concerns were raised about assessment relating to:

- the relevance of written evidence for practical tasks;
- inconsistent and inaccurate assessment;
- the controlled assessments used in GCSE ICT;
- moderation and external quality assurance; and
- Welsh-medium assessment.

The relevance of written evidence for practical tasks

96. Learning providers expressed frustration about the need for learners to collect written evidence and screenshots to demonstrate the completion of practical tasks across the range of qualifications that we reviewed. This was perceived as burdensome and irrelevant to the skills being assessed. We were frequently told about the disengaging and demotivating effect that this has on learners.

“Assessment opportunities for the practical tasks take a lot of time and a lot of time is taken up evidencing this with screenshots and documenting this evidence.”

ICT teacher in further education college

“The assessment is very heavy in the evidence collection side of things. Loads of screen shots showing basic things, lot of tick boxes. It’s very off putting for learners and I have to somehow justify to them the reason for doing it (I feel I lose credibility doing this).”

ICT teacher responding to the online survey

97. In our online survey we asked learners which aspects of their course are irrelevant and/or not useful. The second most frequently identified aspect was ‘evidencing’. Learners were very critical of the need to take screenshots and produce written evidence to demonstrate that they had completed practical tasks. This was also widely reported during our focus group workshops with learners.

“Most of it is having to do the same thing again and again – cut and paste, screenshot, describing in detail exactly what steps you’ve gone through to print a document. Silly easy stuff like that. It’s annoying.”

Level 3 learner attending focus group

“I would prefer to not have to waste my time screenshotting everything and use that time to go deeper into the subject.”

Level 2 learner responding to the online survey

98. Learners told us that they are often assessed on practical tasks by producing written evidence. They reported that this approach to assessing practical skills favours learners with strong literacy skills, rather than those with strong digital skills. Learners also told us that this approach to capturing assessment evidence is very disengaging and demotivating.

“You could be really good at the practical element and not so good at the write-up and you will get penalised for that.”

Level 3 learner attending focus group

“It was slightly surprising that the writing up of the process was more important than learning the new skill or topic.”

Level 3 learner attending focus group

99. Several stakeholders suggested that more innovative, relevant, and engaging methods could be used to demonstrate practical skills and evidence the completion of practical tasks. They suggested that it would be more appropriate and effective to use online assessments, contextualised projects, and apps to record the completion of practical tasks.



Inconsistent and inaccurate assessment

100. Our technical reviewers reported a few concerns about inaccurate and inconsistent assessment design and delivery across the range of qualifications that we reviewed. These concerns included:

- a few examples of assessment evidence provided by awarding bodies were inaccurately and/or inconsistently assessed;
- inconsistencies between some assessments and corresponding mark schemes;
- a number of vague assessment questions that could have multiple answers; and
- some assessments did not offer the appropriate level of challenge and in some cases, there was little difference in the level of challenge between assessments at different levels.

Controlled assessments in GCSE ICT

101. Several secondary school teachers were critical of the length of time allocated to the controlled assessments used in the GCSE ICT qualifications offered in Wales. Teachers told us that these take up valuable teaching time, thereby limiting learners' preparation for the examination element of the qualification.

“The length of time for the controlled assessment eats into the teaching time a lot and the controlled assessment tends to take over. Then you find that you’ve got a limited amount of hours left to teach the theory. Then they don’t do as well in the theory because there’s a lot of theory to cover, as well as the controlled assessment.”

ICT teacher in secondary school

102. Several secondary school teachers told us that the controlled assessments are very demotivating and disengaging for learners. Also, they were very critical of the need to take screenshots as evidence of having completed the controlled assessments which, in their view, is very disengaging for learners.

“Year 11 controlled assessment is very tedious and demotivating. It was very much a case of taking screenshots and describing what they’d done. This took the enjoyment out of it for them.”

ICT teacher in secondary school

103. A few secondary school teachers identified the burden of managing the administration for the controlled assessments. They told us that assessment evidence needs to be printed and sent to their awarding body for moderation which, in their view, is cumbersome and costly. Some indicated that this is beginning to change, but is not consistently applied across secondary schools.

“Unit 4 is posted off on a USB, it’s fantastic. Unit 2 however needs to be printed off and there’s a lot of printing to be done. It’s too cumbersome. We can waste two or more lessons printing and it’s costly.”

ICT teacher in secondary school

Moderation and external quality assurance

- 104.** There were mixed views from learning providers about the effectiveness of moderation and external quality assurance conducted by awarding bodies. While several learning providers reported that they have not encountered any problems with moderation and external quality assurance, others expressed the view that the moderation and external quality assurance processes in place at awarding bodies could be improved.
- 105.** For example, several secondary schools and further education colleges identified inconsistencies with moderation and external quality assurance. They gave examples such as moderators giving conflicting feedback and coursework marks being reduced by moderators without a clear reason given.

“Consistency is not always there between moderators. It depends on who you get allocated as an external moderator.”

ICT teacher in further education college

- 106.** Secondary schools also shared with us their concerns about the difference in the level of difficulty between the coursework and the examinations in the GCE AS/A level ICT qualification. We were told that learners often achieved very high marks in the coursework element, which meant that grade boundaries were very high for the examinations.

“I thought that they were being much too harsh on the written exam... the reason that they do that is because they do so well in the coursework that they’d have to be harsh on the theory exams. I think this was really unfair on those good kids as well because it made it virtually impossible to get As.”

ICT teacher in secondary school

“In the past for the coursework the average mark for AS coursework has been reasonably high, something like 73 or 74 out of 80. As a result, the exams had to be marked unreasonably.”

ICT teacher in secondary school



Welsh-medium assessment

107. In our interviews with learning providers, our online survey, and our focus-group workshops with learners, we asked whether learners had been given the opportunity to be assessed through the medium of Welsh. Apart from Welsh-medium secondary schools, only a few further education colleges and work-based learning providers reported a demand from learners to be assessed through the medium of Welsh. However, despite this demand, almost all further education colleges and work-based learning providers reported that Welsh-speaking learners usually opted to complete their assessments through the medium of English.

“It [assessment in Welsh] is available for students and a few over the years have accessed the qualification through the medium of Welsh but generally even when students speak Welsh they choose not to train through the medium of Welsh.”

ICT teacher in work-based learning provider

108. Fewer Welsh-language materials, the complexity of the terminology used in the subject and the wide availability of English resources on the internet were cited as reasons for Welsh-speaking learners opting to complete their assessments through the medium of English.

109. Welsh-medium secondary schools provided detailed feedback on both the importance of having, and the challenges of accessing, digital resources through the medium of Welsh. Some Welsh-medium secondary schools told us that there are limited Welsh-language resources available on the internet and in the wider digital literature, which makes it challenging to teach the subject when technology develops so quickly.





Chapter 7: Teaching resources - staff and equipment

In this chapter, we summarise the concerns that we identified in relation to teacher expertise, the training and CPD available to teachers, and outdated hardware and software.

Non-specialist ICT teachers

110. There was a very strong view from learning providers that a significant weakness of the sector is that ICT is often taught by non-specialists who do not necessarily have the technical knowledge, skills and experience to effectively teach the subject. We spoke with some teachers who were open with us about their own shortcomings, and who told us that they were self-trained and struggled to keep up with the developments in technology.

“I’m not [an ICT specialist] so I’m learning as I go along and I’m struggling really. I think that it’s unfair for the students that I’m a page ahead of them in the book and they’re asking me questions that I don’t know.”

ICT teacher in secondary school

“A lot of the people coming through now are very, very much not specialists and they are teaching materials that are at the fringe of their understanding. If you go to most schools, it’s non-specialists teaching ICT.”

ICT teacher in secondary school

111. There was a very strong view from learning providers that the teaching workforce in the sector should be better qualified and specialised to effectively deliver ICT qualifications. Secondary schools and further education colleges told us that often ICT is taught by non-specialists and is used to fill teacher timetables as a second subject. They expressed the view that the use of non-specialist teachers had the potential to devalue the subject and impact on learners’ enjoyment, engagement and perception of ICT and digital.

“There are a lot of schools where the teachers are under immense pressure. The teachers aren’t even qualified in IT or Computer Science necessarily because they’ve come across as business studies teachers and the school has gone, well you’re the closest thing we’ve got for teaching IT. It happens all the time.”

ICT teacher in secondary school

112. Employers and learning providers told us that teaching was not an attractive option for those graduating from university with ICT and/or Computer Science degrees. They told us that careers outside of teaching were more financially attractive and this creates a challenge for recruiting and retaining suitable ICT teachers. We were told that this issue is compounded when recruiting appropriately qualified Welsh-language ICT teachers.

Range of learner skills, abilities and experience

113. Several learning providers told us about the challenges of teaching and assessing the wide range of learner skills and abilities on ICT courses. We were given examples of some learners embarking on Level 2 ICT courses who were unable to complete basic tasks such as sending an email, whilst other learners were very capable of using a range of digital devices, programs and software. Several teachers told us that differentiating lessons and assessments to meet this wide range of learner abilities, skills and experience, was very challenging, particularly for non-specialists.

Training and CPD

114. Many learning providers told us about the importance of teachers accessing appropriate training and continuing professional development (CPD). There was a very strong view that, if the quality of ICT teaching is to improve, effective training and CPD needs to be available. We were told about the training and CPD opportunities that were available for ICT teachers such as the workshops delivered by Technocamps that are led by Swansea University. However, there was a very strong view that more needs to be done to upskill the teaching workforce. There was also an acknowledgement that, if new qualifications are introduced, teachers need appropriate training and CPD to effectively deliver and assess these qualifications.

“How, as teachers teaching this for 15 years, can we suddenly know about the latest software that industry is using when people in industry are being sent on courses that cost thousands of pounds to be trained up and we don’t have that opportunity.”

ICT teacher in secondary school

115. Several secondary schools and further education colleges told us that the amount of CPD offered by awarding bodies has reduced over the past few years, and some awarding bodies now offer very few CPD opportunities.

“There are so many new and emerging technologies out there, the CPD aspect would help in the delivery in schools. There is no CPD and there hasn’t been for at least three years.”

ICT teacher in secondary school

- 116.** Learning providers explained to us the challenges of releasing staff to attend CPD events alongside the cost of attending the events and providing teaching cover. Some suggested that training and CPD could be delivered more flexibly to meet the demands of the teaching workforce, such as delivering training and CPD using webcasts and online platforms.

Outdated hardware and software in learning providers

- 117.** When discussing qualifications with learning providers, some told us about the challenges of delivering and assessing ICT qualifications using outdated hardware and software. Some told us that limited financial resources were a primary reason for using outdated hardware and software. We spoke to some ICT heads of department in secondary schools. They told us that they have only a few hundred pounds in their annual departmental budgets, and this was identified as a significant barrier to the successful teaching and assessment of ICT qualifications. They reported that this budget was used to maintain basic hardware, but was insufficient to cover moderate maintenance costs, or to invest in new hardware and software.

“From the point of us delivering what industry would be using, resources would be a huge issue, with hardware and software we just couldn’t afford it.”

ICT teacher in secondary school

- 118.** This was not the case for all learning providers. We spoke to some learning providers who have invested in a wide range of modern hardware and software, which allowed them to effectively, and innovatively, deliver ICT qualifications. However, most learning providers who spoke to us about resources told us that the hardware and software used in their learning provider was outdated and this impacts on the relevance of the subject for learners.

- 119.** During our focus group workshops, learners were very critical of the outdated hardware and software used by learning providers. They told us that this impacted on their enjoyment of the subject and made their experience far less relevant to the real world.

“I was expecting a lot more tech. I mean these computers are barely adequate for the job.”

Level 1 learner attending focus group

“The systems are out of date – they’re behind what I have at home.”

Level 3 learner attending focus group



Chapter 8: International comparison study

In this chapter, we summarise the findings of a small international comparison study that we conducted to supplement the Review.

- 120.** As part of the Review, we conducted a small-scale international comparison study. We used a case-study approach to review the ICT routes and qualifications offered in different countries. The study included online research of publicly-available material on the qualifications and the education systems, as well as email exchanges with experts from qualification regulators and similar bodies in the 11 countries. The countries included in the study were Estonia, France, New Zealand, Canada (Province Alberta), Republic of Ireland, Romania, Norway, Scotland, Australia, United States of America (New York State), and Singapore.
- 121.** The most striking difference that we found between the countries that we compared was the differences in their approaches to the inclusion of ICT within their education curricula. In most countries that we looked at (such as France, Estonia, Romania, Norway, Scotland and New Zealand), ICT is taught as a distinct subject in secondary education. It does not always lead to a recognised qualification, but it is a core - sometimes mandatory - element of the education curricula in these countries.
- 122.** For example, in Estonia, ICT (termed informatics) is delivered as a compulsory subject up to the age of 16. It is intended as a ‘user’ qualification to equip young people with the basic skills of learning and working with a computer. After the age of 16, ICT qualifications are developed by recognised awarding bodies and offered by vocational education institutions that are regulated by Kutsekoda, the Estonian qualifications regulator, as part of a qualifications system similar to the system in place in Wales and the wider UK.



123. Similarly, in Norway, ICT is a mandatory subject. Digital literacy is defined as a basic skill in the national curriculum and is taught from primary school through to the end of compulsory education, whilst ICT is taught as a separate subject throughout secondary education.

124. We also found that many of the countries who offer ICT as a distinct subject also offer qualifications either in computer science or in more specific aspects of ICT, such as computer programming. Countries such as Estonia, Romania, Norway, and Scotland offer both ICT and computer science as distinct qualifications, which is similar to the approach currently in place in Wales.

125. In contrast, we found that other countries, such as Canada (Province Alberta), Republic of Ireland, Australia and the United States of America (New York State), take a different approach and ICT is not taught in secondary education as a distinct subject. Rather, ICT is embedded, and assessed, throughout the curriculum. For example, Canada (Province Alberta) state that “the ICT curriculum is not intended to stand alone, but rather to be infused within core courses and programs”⁵⁰. The approach taken by the provincial government is that ICT is a ‘way of doing things’ that is best learned through application, rather than being a subject area that requires theoretical knowledge taught through distinct classes.



126. Similarly, in the Republic of Ireland, the National Council for Curriculum and Assessment (NCCA) and the government have taken the approach that ICT is to be taught transversally across the curriculum. They introduced a framework for the development of ICT skills, similar to the Digital Competence Framework introduced in Wales, to support teachers of all subjects to incorporate ICT into their teaching across primary and secondary education. The NCCA describe this framework as an ‘invisible’ plan⁵¹ that removes the need for ICT being viewed as a separate, stand-alone, subject.

127. In those countries where ICT is taught across the curriculum in secondary schools, learners are presented with options for vocational programmes that specialise in ICT at ages 16-19. For example, in the Republic of Ireland, a compulsory ICT unit is included in all post-16 vocational leavers certificates, as well as learners having the option to choose an ICT specialism.





Chapter 9: Action we will take

In this chapter, we outline the short and longer-term actions that we will take to address the issues identified by the Review.

128. Having analysed the evidence from the Review, we have considered the options that are available to us to address, as far as reasonably possible, the issues that we have identified. We have discussed and developed the options with employers, learning providers, sector experts, and with our stakeholder reference panel through a combination of in-depth discussions and full-day workshops. Having considered the options, and their relative strengths and weaknesses, we have developed an action plan which comprises:

- **Phase 1 actions** that we will take in the short term to begin to address issues identified in relation to the existing qualifications and qualifications system.
- **Phase 2 actions** that we will take in the longer term to reform qualifications, and monitor the effectiveness of qualifications, to better meet the needs of learners and employers. For each action, we outline our considerations when deciding on each course of action.

Phase 1 actions

129. We will take the following actions in the short term with the aim of addressing, as far as reasonably possible, the issues identified by the Review within the constraints of the existing qualifications.

Action 1

We will write to the **awarding bodies** offering qualifications in the sector, urging them to consider the findings of the Review in Chapters 5, 6 and 7 relating to the content and currency of qualifications, the assessment of qualifications, and CPD, to identify whether the findings apply to them and, if they do apply, to propose how they will respond to them.

In particular, we will draw attention to:

- the concerns raised about the content and currency of qualifications in the sector;
- the findings relating to inaccurate and inconsistent assessment;
- the shortcomings of producing written evidence and screenshots as evidence of completing practical tasks; and
- the concerns raised about the perceived reduction in CPD opportunities offered by awarding bodies.

Action 2

We will share our findings with **WJEC**, urging them to consider the findings relating to the GCSE ICT and GCE AS/A level ICT qualifications and requesting that they propose how they will respond to them.

In particular, we will draw attention to:

- the concerns raised about the content and currency of the GCSE ICT and GCE AS/A level ICT qualifications;
- the findings relating to the controlled assessments used in GCSE ICT;
- the findings relating to assessment; and
- the concerns raised about the perceived reduction in CPD opportunities offered by awarding bodies.

Action 3

We will share the evidence of the Review with **Welsh Government**, and bring to their attention the findings of the Review in Chapter 7, relating to the use of non-specialist ICT teachers and outdated hardware and software.

In particular, we will draw attention to:

- the widespread use of non-specialist ICT teachers and the need for effective training and CPD to support the teaching workforce;
- the challenges faced by learning providers when using outdated hardware and software to deliver and assess ICT qualifications; and
- the financial constraints cited by some learning providers as reasons for them using outdated hardware and software.

Action 4

We will consider the findings of this Review when reviewing the design and assessment of the **Skills Challenge Certificate** to ensure that digital literacy can be effectively assessed within the qualification.

Phase 2 actions

- 130.** While we are committed to taking the actions outlined above, we are of the view that, alone, they will be insufficient to address the issues identified by the Review.
- 131.** Over several months, we have considered the possible options for reform. We have weighed up the benefits of relying on developments in England, waiting for the developments of curriculum reform in Wales, or taking control of immediate reform in Wales. In all our thinking, we have considered the need for portability. We have also considered aspects of manageability, validity and reliability as well as the importance of assessment being engaging for learners.
- 132.** The actions that we will take for each area of learning are set out in the table overleaf. In the following pages, we have outlined our considerations when deciding on each course of action.



Area of learning	Phase 2 actions	
14-16 in secondary schools and 16-19 in secondary schools primarily for progression to higher education	Action 5	We will invite awarding bodies to develop a new broad-based GCSE Digital Technology qualification with the aim of first teaching in September 2021.
	Action 6	We will invite awarding bodies to develop a new GCE AS/A level Digital Technology qualification with the aim of first teaching in September 2022.
16-19 in further education for progression into higher education, apprenticeships or employment	Action 7	We will continue to liaise with the Department for Education in England, the Institute for Apprenticeships and Welsh Government with the aim of ensuring that the new technical qualifications, developed for use in the Digital Route T Levels in England, are available to be taken by learners in Wales.
	Action 8	We will review any ICT-related qualifications which awarding bodies submit for new or extended designation (to be eligible for use on funded programmes of learning for under-19s) to ensure that qualifications are up-to-date and include current and relevant digital content.
	Action 9	We will monitor the new vocational ICT qualifications , developed to meet the requirements of the Tech Partnership for use in new apprenticeship frameworks, to determine their effectiveness in meeting the needs of learners and employers in Wales.
Apprenticeships		

Action 5

We will invite awarding bodies to develop a new **broad-based GCSE Digital Technology** qualification with the aim of first teaching in September 2021.

Considerations when deciding on this course of action

- The Review identified concerns about the content and assessment of the GCSE ICT qualification, and there was a strong view that the GCSE ICT qualification needs to be strengthened to include current and relevant digital content. Over the period of the Review, we have considered the importance of ICT qualifications in secondary schools and what form these qualifications should take. The Review identified that GCSE ICT is offered widely, and is highly valued, in secondary schools.
- However, we are of the view that the qualification needs to reflect considerable changes to technology and to include more relevant, manageable and engaging assessments. Therefore, we will invite awarding bodies to develop a new GCSE Digital Technology qualification for use in Wales. Developing a broad-based GCSE Digital Technology qualification will allow learners to access a wide range of relevant digital topics to equip them with the skills needed for progression in the digital world.
- We have considered the need for immediate reform whilst, at all times, considering the impending developments of curriculum reform. Despite our desire for immediate reform, we have balanced our decisions with the need to effectively manage the implementation of the new qualification, alongside supporting the teaching workforce during a significant period of change. Introducing the new qualification in 2021 should allow sufficient time for awarding bodies to work with stakeholders in the sector to develop a fit-for-purpose qualification with rigorous, manageable and engaging assessments. It will also allow sufficient time for specifications and teaching resources to be made available to schools, with enough notice to allow teachers to effectively prepare for the delivery of the new qualification.



Action 6

We will invite awarding bodies to develop a new **GCE AS/A level Digital Technology** qualification with the aim of first teaching in September 2022.

Considerations when deciding on this course of action

- The Review identified concerns about the content and assessment of the GCE AS/A level ICT qualification. There was a strong view that the qualification needs to be strengthened to include current and relevant digital content. Over the period of the Review, we have considered the importance of ICT qualifications for 16 to 19-year-olds in secondary schools and further education colleges, and what form these qualifications should take. The Review identified that GCE AS/A level ICT, despite its weaknesses, is valued in secondary schools and further education colleges. The qualification is portable and supports progression to higher education.
- However, we are of the view that the qualification needs to be reformed to reflect considerable changes to technology and to include more relevant, manageable and engaging assessments. The development of a GCE AS/A level Digital Technology qualification, that builds on the GCSE Digital Technology qualification, will allow learners to specialise in a digital pathway to equip them with the knowledge and skills to progress to higher education and/or employment.
- We have considered the need for immediate reform alongside the need to ensure that the qualification is developed and implemented effectively. Introducing the new qualification in 2022 should allow sufficient time for awarding bodies to work with stakeholders in the sector to develop a fit-for-purpose qualification with rigorous, manageable and engaging assessments. Introducing the qualification in 2022 (a year later than the GCSE) will give the teaching workforce time to embed the GCSE Digital Technology qualification before the GCE AS/A level qualification is introduced. It will also allow time for specifications and teaching resources to be made available to secondary schools and further education colleges, with enough notice to allow teachers to effectively prepare for the delivery of the new qualification.

Action 7

We will continue to liaise with the Department for Education in England, the Institute for Apprenticeships and Welsh Government with the aim of ensuring that the **new technical qualifications, developed for use in the Digital Route T Levels** in England, are available to be taken by learners in Wales.

Considerations when deciding on this course of action

- Over the course of this Review, we have considered the role of ICT and digital qualifications in further education in Wales. In England, significant reform is taking place to qualifications used primarily in further education, with the introduction of T Levels. We have been in regular discussions with the Department for Education in England, the Institute for Apprenticeships and Welsh Government to explore making available the new technical qualifications, developed for use in T Levels in England, for use in Wales. The Digital Route T Levels will be one of the first routes available in England and are scheduled to be available from September 2020.
- Making the new technical qualifications available is not a straightforward task, given that permission would be required from the Institute for Apprenticeships in England. However, we will continue to work with the Department for Education in England, the Institute for Apprenticeships and Welsh Government to take all reasonable steps towards ensuring that the new technical qualifications are made available to be taken by learners in Wales.



Action 8

We will **review any ICT-related qualifications** that awarding bodies submit for new or extended designation (to be eligible for use on funded programmes of learning for under-19s) to ensure that qualifications are up-to-date and include relevant digital content.

Considerations when deciding on this course of action

- Over the course of this Review, we have considered the role of ICT and digital qualifications in further education and apprenticeships. We received some positive feedback from learning providers and universities about the flexibility of some vocational qualifications used in further education and apprenticeships. However, the Review identified several concerns about the content and currency of the older vocational and technical qualifications. These were developed several years ago, and are widely used in further education and apprenticeships in Wales. We identified that these qualifications have become outdated and do not reflect the current digital world.
- The Review identified that the newer vocational and technical qualifications, which have been developed over the past few years, are more current and relevant to the digital sector. We believe that learners in Wales should be accessing qualifications that include up-to-date and relevant digital content which should adequately prepare them for the digital industry. Therefore, we will review any ICT-related qualifications that awarding bodies submit for new or extended designation (to be eligible for use on funded programmes of learning for under-19s) to ensure that qualifications are up-to-date and include relevant digital content.



Action 9

We will **monitor the new vocational ICT/digital qualifications**, developed to meet the requirements of the Tech Partnership for use in new apprenticeship frameworks, to determine their effectiveness in meeting the needs of learners and employers in Wales.

Considerations when deciding on this course of action

- Over the course of this Review, we have considered the role of ICT and digital qualifications in Welsh apprenticeships. We have considered the appropriateness of the current qualification offer, the progression opportunities available to learners and the needs of employers. We have considered these factors in the context of the relatively low numbers (<450)⁵² of learners embarking on ICT/digital apprenticeships in Wales.
- Within the last 18 months, the Tech Partnership has worked with stakeholders in the sector and an awarding body to develop new vocational ICT/digital qualifications for use in new apprenticeship frameworks. As they have not yet been certificated, we do not have any evidence of their effectiveness in meeting the needs of learners and employers in Wales. Therefore, we will monitor the new vocational qualifications to determine their effectiveness in meeting the needs of learners in Wales.



Conclusion

- 133.** Having tested the different options with our stakeholder reference panel over the past few months, we believe that the actions that we set out in this report would appropriately address, as far as reasonably possible, the issues identified by the Review.
- 134.** We are confident that the development of new Digital Technology qualifications, alongside our approach to reviewing new and amended qualifications submitted for designation, and monitoring the new vocational ICT/digital qualifications used in apprenticeships, would strengthen significantly the effectiveness of qualifications in the sector.



Acknowledgements

We would like to thank all those who gave their time willingly and generously to participate in the Review, and to provide us with the extensive body of evidence on which this report is based. We value every contribution, and we could not have managed without them. Particular thanks are due to our stakeholder reference panel (listed below), who provided advice and guidance and constructively challenged our thinking.

- Simon Brown, Estyn
- Professor Tom Crick MBE, Swansea University
- Jason Davies, Cardiff Metropolitan University
- Jason Davies, North Wales Cyber Security Cluster
- John Davies, South Wales Cyber Security Cluster
- Nia Davies, BBC
- Wendy Dearing, NHS Informatics Service
- Julia Denyer, NHS Wales
- Nick Gelstharp, ACT Training
- Richard George, Central South Consortium Joint Education Service
- Derek Hobbs, DWP Chair of Digital Leaders Wales
- Sam Holland, ACT Training
- Nigel Holloway, Coleg Cambria
- Victoria Howe, ALS Training
- Sarah John, ALS Training
- Carl Jones, Software Academy Cardiff University
- Richard Lester, Chartered Institute of IT
- Avril Lewis MBE, EST Network
- Ben Lidgley, Companies House
- Gareth Mathias, ACT Training
- Professor Faron Moller, Swansea University
- Vanessa Morgan, Estyn
- Paul Newbury, Yard Digital
- Darren Oakley, Cardiff and Vale College
- John Pontin, Welsh Government
- Maldwyn Pryse, Estyn
- Damon Rands, Wolfberry
- Wayne Scoberg, Welsh Government
- Richard Staniforth, WLGA
- Sonia Unsted, Office of National Statistics
- Iwan Thomas, Data Unit Wales
- Dr Tony Venus, Tech Partnership

Reference List

- ¹ Welsh Government (2018) *Information and Communication Technology*. [Online]. Available from: <https://gov.wales/topics/businessandconomy/our-priority-sectors/information-and-communication-technology/?lang=en>. [Accessed 24 October 2018].
- ² Welsh Government (2018), *Tables - Priority Sector Statistics, 2018 - Revised*. [Online]. Available from: <https://gov.wales/docs/statistics/2018/180912-priority-sector-statistics-2018-tables-revised-en.ods> [Accessed 24 October 2018].
- ³ Tech Nation (2018) *Tech Nation Report 2018*. [Online], Available from: <https://technation.io/insights/report-2018/> [Accessed 17 August 2018].
- ⁴ Tech Nation (2018) *Tech Nation Report 2018*. [Online], Available from: <https://technation.io/insights/report-2018/> [Accessed 17 August 2018].
- ⁵ Qualifications Wales' analysis of Welsh Government WED and LLWR data for 2016-17 certifications.
- ⁶ UK Government, Department for Business, Energy and Industrial Strategy (2017) *Industrial Strategy: building a Britain fit for the future (White paper)*. London: HM Government.
- ⁷ Welsh Government (2017) *Prosperity for All: the national strategy – Taking Wales Forward*. Cardiff: Welsh Government.
- ⁸ Anderson, M. (2011) Why Software Is Eating the World [online] *The Wall Street Journal*, 20 August. Available from: <https://www.wsj.com/articles/SB10001424053111903480904576512250915629460> [Accessed 15 August 2018].
- ⁹ European Commission (2018) *Digital Single Market Scoreboard: United Kingdom*. [Online] Available from: <https://ec.europa.eu/digital-single-market/en/scoreboard/united-kingdom> Accessed 17 August 2018].
- ¹⁰ Office for National Statistics (2018) Internet access – households and individuals, Great Britain: 2018. Newport: Office for National Statistics [Online]. Available from: <https://www.ons.gov.uk/releases/internetaccessanduseingreatbritain2018> [Accessed 15 August 2018].
- ¹¹ Office for National Statistics (2017) E-commerce and ICT activity: 2016 [Online]. Available from <https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/ecommerceandictactivity/2016> [Accessed 15 August 2018].
- ¹² Organisation for Economic Co-operation and Development (2002) *Measuring the Information Economy*. Paris: OECD publications.
- ¹³ The Office for National Statistics (2009) *UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007)* Hampshire: Palgrave Macmillan. [Online] Available from <https://www.ons.gov.uk/methodology/classificationsandstandards/ukstandardindustrialclassificationofeconomicactivities/uksic2007> [Accessed 17 August 2018].
- ¹⁴ Tech Nation (2018) *Tech Nation Report 2018*. [Online] Available from: <https://technation.io/insights/report-2018/> [Accessed 17 August 2018].
- ¹⁵ Welsh Government, Department for Digital, Culture, Media & Sport (2017) *DCMS Sectors Economic Estimates 2017: Employment*. Cardiff: Welsh Government. [Online], Available from: <https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2017-employment> [Accessed 17 August 2018].
- ¹⁶ Tech Nation (2018) *Tech Nation Report 2018*. [Online] Available from: <https://technation.io/insights/report-2018/> [Accessed 17 August 2018].
- ¹⁷ StatsWales (2017) *Gross Value Added in Wales by industry*. [Online] Available from: <https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/Regional-Accounts/Gross-Value-Added-GDP/gvainwales-by-industry> [Accessed 17 August 2018].
- ¹⁸ Welsh Government (2018) *Priority Sector Statistics 2018: (SB 40/2018)*. Cardiff: Welsh Government. [Online]. Available from: <https://gov.wales/docs/statistics/2018/180628-priority-sector-statistics-2018-en.pdf> [Accessed 17 August 2018].
- ¹⁹ World Bank Group (2018) *World Development Report 2019: The Changing Nature of Work*. Washington DC: The World Bank. [Online]. Available from: <https://www.worldbank.org/en/publication/wdr2019>. [Accessed 16 August 2018].
- ²⁰ Brown, N.C.C. Sentance, S. Crick, T. and Humphreys, S. (2014) Restart: The Resurgence of Computer Science in UK Schools. *ACM Transactions on Computer Science Education*, 14 (2), 1–22.

- ²¹ The Royal Society (2012) *Shut down or restart? The way forward for computing in UK schools*. London: The Royal Society. [Online]. Available from: <https://royalsociety.org/topics-policy/projects/computing-in-schools/report/> [Accessed 16 August 2018].
- ²² BCS, The Chartered Institute for IT (2017) *Diversity in IT 2017 – Shaping our future together*. Swindon: BCS. [Online]. Available from: <https://www.bcs.org/category/19217> [Accessed 16 August 2018].
- ²³ Livingstone, I. and Hope, A.S. (2011) *Next Gen. Transforming the UK into the world's leading talent hub for the video games and visual effects industries*. London: Nesta. [Online] Available from: <https://www.nesta.org.uk/report/next-gen/> [Accessed 16 August 2018].
- ²⁴ Bartlett, J. and Miller, C. (2011) *Truth, lies and the internet a report into young people's digital fluency*. London: Demos. [Online]. Available from: https://www.demos.co.uk/files/Truth_-_web.pdf [Accessed 16 August 2018].
- ²⁵ CBI (2016) *Embracing Digital in Every Sector: CBI Survey*. London: CBI. [Online]. Available from: <http://www.cbi.org.uk/cbi-prod/assets/File/pdf/Embracing-digital-in-every-sector-CBI-Survey-Findings.pdf> [Accessed 16 August 2018].
- ²⁶ Ofcom (2018) *Communications Market Report*. London: Ofcom. [Online]. Available from: <https://www.ofcom.org.uk/research-and-data/multi-sector-research/cmr/cmr-2018> [Accessed 16 August 2018].
- ²⁷ UK Digital Skills Taskforce (2014) *Digital Skills for Tomorrow's World*: [s.l.]: UK Digital Skills Taskforce. [Online]. Available from: <https://www.techuk.org/insights/news/item/1929-uk-digital-skills-taskforce-launch-interim-report> [Accessed 16 August 2018].
- ²⁸ UK Parliament, House of Lords Select Committee on Digital Skills (2015) *Make or Break: The UK's Digital Future: Report of Session 2014-15*. London: The Stationary Office. HL 111 (2014-15). [Online]. Available from: <https://www.parliament.uk/digital-skills-committee> [Accessed 16 August 2018].
- ²⁹ UK Parliament, House of Commons Science and Technology Committee (2016) *Digital skills crisis: 2nd Report of Session 2016-17*. London: The Stationary Office. HC 270 (2016-17). [Online]. Available from: <https://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/inquiries/parliament-2015/digital-skills-inquiry-15-16/> [Accessed 16 August 2018].
- ³⁰ UK Parliament, House of Lords Select Committee on Communications (2017) *Growing up with the internet: 2nd Report of Session 2016-17*. London: The Stationary Office. HL 130 (2016-17). [Online] Available from: <https://www.parliament.uk/children-and-the-internet>. [Accessed 16 August 2018].
- ³¹ UK Government, Department for Education (2013) *National curriculum in England: computing programmes of study* London: Department for Education. [Online]. Available from: <https://www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study>. [Accessed 16 August 2018].
- ³² The Royal Society (2017) *After the reboot: computing education in UK schools*. London; The Royal Society. [Online]. Available from: <https://royalsociety.org/topics-policy/projects/computing-education/> [Accessed 16 August 2018].
- ³³ National Assembly for Wales Economy, Infrastructure and Skills Committee (2018) *Industry 4.0 – the future of Wales. Cardiff: National Assembly for Wales*. [Online]. Available from: <https://www.assembly.wales/laid%20documents/cr-ld11717/cr-ld11717-e.pdf> [Accessed 17 August 2018].
- ³⁴ Welsh Government (2018) *Review of Digital Innovation for the Economy and the Future of Work in Wales*. [Online]. Available from: <https://beta.gov.wales/review-digital-innovation-economy-and-future-work-wales> [Accessed 17 August 2018].
- ³⁵ Welsh Government (2018) *Superfast Broadband* [Online]. Available from: <https://beta.gov.wales/go-superfast>
- ³⁶ Welsh Government (2018) *Monmouthshire chosen as 5G Testbed site to improve rural connectivity* [Press release]. 10 March 2018. Available at: <https://www.gov.uk/government/news/monmouthshire-chosen-as-5g-testbed-site-to-improve-rural-connectivity> (Accessed: 16 August 2018).
- ³⁷ Swansea University (2018) *Computational Foundry*. [Online]. Available from: <http://www.swansea.ac.uk/campus-development/current-projects/keyprojects/computationalfoundry/> [Accessed 16 August 2018].
- ³⁸ National Assembly for Wales (2015) *Well-being of Future Generations (Wales) Act 2015*. London: The Stationary Office.
- ³⁹ Successful Futures: Independent Review of Curriculum and Assessment Arrangements in Wales (2015) Professor Graham Donaldson <https://gov.wales/docs/dcells/publications/150225-successful-futures-en.pdf>
- ⁴⁰ Arthur, S., Crick, T., and Hayward, J. (2013) *The ICT Steering Group's Report to the Welsh Government*. [Online]. Cardiff: ICT Steering Group. Available from: <http://learning.gov.wales/resources/browse-all/ict-steering-groups-report/?lang=en> [Accessed 16 August 2018].

- ⁴¹ Welsh Government (2018) *Digital Competence Framework*. [Online]. Available from: <http://learning.gov.wales/resources/browse-all/digital-competence-framework/?lang=en> [Accessed 17 August 2018].
- ⁴² Technocamps (2018) *Funding Announced for Programme Helping Youngsters Improve Computer Science Skills*. [Online]. Available from: <http://www.technocamps.com/en/news/funding-announced-for-programme-helping-youngsters-improve-computer-science-skills> [Accessed 16 August 2018].
- ⁴³ Welsh Government (2018) *£1.2m for Welsh Universities to crack the code* [Online]. Available from: <https://gov.wales/newsroom/educationandskills/2018/1-2m-for-welsh-universities-to-crack-the-code/?lang=en> [Accessed 16 August 2018].
- ⁴⁴ Estyn (2017) *The Annual Report of Her Majesty's Chief Inspector of Education and Training in Wales, 2016-2017*. Cardiff: Estyn. [Online]. Available from: [https://www.estyn.gov.wales/sites/default/files/documents/Estyn Annual%20Report 2018 English Accessible.pdf](https://www.estyn.gov.wales/sites/default/files/documents/Estyn%20Report%202018%20English%20Accessible.pdf) [Accessed 16 August 2018].
- ⁴⁵ Estyn (2018) *Preparing for the Digital Competence Framework (DCF)*. Cardiff: Estyn [online]. Available from: <https://www.estyn.gov.wales/thematic-reports/preparing-digital-competence-framework-dcf> [Accessed 16 August 2018].
- ⁴⁶ Based on Qualifications Wales' analysis of Welsh Government WED and LLWR data for 2015-16.
- ⁴⁷ Stats Wales (2018) *Learning programme starts in work-based learning provision*. [Online] Available at: <https://statswales.gov.wales/Catalogue/Education-and-Skills/Post-16-Education-and-Training/Further-Education-and-Work-Based-Learning/Learners/Work-Based-Learning/learningprogrammestarts-in-workbasedlearning>. [Accessed 24 August 2018]. There were 440 (rounded to 5) starts on ICT/digital apprenticeships in 2016-17, which accounts for 1.8% of all starts on apprenticeships in Wales.
- ⁴⁸ Ofqual (2018) *Annual Qualifications Market Report 2016 to 2017: Wales data tables*. [Online]. Available from: <https://www.gov.uk/government/statistics/annual-qualifications-market-report-academic-year-2016-to-2017> [Accessed 16 August 2018]. There were 6,580 (rounded to 5) certificates entries for WJEC GCSE ICT in 2016-17.
- ⁴⁹ Ofqual (2018) *Annual Qualifications Market Report 2016 to 2017: Wales data tables*. [Online]. Available from: <https://www.gov.uk/government/statistics/annual-qualifications-market-report-academic-year-2016-to-2017> [Accessed 16 August 2018].
- ⁵⁰ Alberta Learning (2016) *Information and Communication Technology*. Alberta Education [online] Available from: <https://education.alberta.ca/information-communication-technology/program-of-studies/> [Accessed 16 August 2018].
- ⁵¹ National Council for Curriculum and Assessment (2007) *ICT Framework: A structured approach to ICT in Curriculum and Assessment*. NCCA [online] Available from: https://www.ncca.ie/media/2093/ict_framework_a_structured_approach_to_ict_in_curriculum_and_assessment_-_revised_framework.pdf [Accessed 16 August 2018].
- ⁵² Stats Wales (2018) *Learning programme starts in work-based learning provision*. [Online] Available at: <https://statswales.gov.wales/Catalogue/Education-and-Skills/Post-16-Education-and-Training/Further-Education-and-Work-Based-Learning/Learners/Work-Based-Learning/learningprogrammestarts-in-workbasedlearning>. [Accessed 24 August 2018]. There were 440 (rounded to 5) starts on ICT/digital apprenticeships in 2016-17 which accounts for 1.8% of all starts on apprenticeships in Wales.

Appendix 1

List of qualifications included in the technical review sample.

QW number	Qualification title
COO/0116/6	BCS Level 2 Certificate in IT User Skills (ECDL Extra) (ITQ)
COO/0182/5	City & Guilds Level 1 Diploma for IT Users (ITQ)
COO/0335/8	City & Guilds Level 2 Diploma in IT User Skills
COO/0335/9	City & Guilds Level 3 Diploma in IT User Skills
COO/0093/4	OCR Level 1 Diploma in IT User Skills (ITQ)
COO/0491/4	OCR Level 1/2 Cambridge National Diploma in ICT
COO/0355/8	OCR Level 2 Diploma in IT User Skills (ITQ)
COO/0490/4	OCR Level 3 Cambridge Technical Diploma in IT
COO/0578/2	Pearson BTEC Level 1/2 First Diploma in Information and Creative Technology
COO/0194/0	Pearson BTEC Level 2 Certificate for IT Users (ITQ)
COO/0252/8	Pearson BTEC Level 3 Diploma in IT
COO/0477/3	WJEC Level 1/Level 2 GCSE in Information and Communication Technology
COO/1189/4	WJEC Level 3 Advanced Subsidiary GCE in ICT
COO/1177/9	WJEC Level 3 Advanced GCE in ICT
COO/1189/3	WJEC Level 3 Advanced Subsidiary GCE in Applied ICT
COO/1177/8	WJEC Level 3 Advanced GCE in Applied ICT


Appendix 2

List of the new vocational and technical qualifications reviewed by our technical reviewers.

QW number	Qualification title
COO/0742/0	City & Guilds Level 2 Technical Certificate in Digital Technologies
COO/1214/1	OCR Level 2 Cambridge Technical Diploma in IT
COO/1139/2	OCR Level 3 Cambridge Technical Diploma in IT
COO/1193/4	Pearson BTEC Level 2 Technical Diploma in Digital Technology
COO/1142/4	Pearson BTEC Level 3 National Foundation Diploma in Computing
COO/1206/2	Pearson BTEC Level 3 National Extended Diploma in Information Technology



Q2 Building,
Pencarn Lane,
Imperial Park,
Newport
NP10 8AR

 01633 373 222



qualificationswales.org

© 2018 Qualifications Wales

CONTENTS