



IFIP Task Force on ‘Sustaining relevant digital inclusive education for young people (5-18 years of age)’

Northern Ireland Case Study

Don Passey

Lead Researcher and Editor

Chair of the IFIP Task Force on Digital Education

Chair of IFIP TC3

Vice-chair of IFIP TA

Professor of Technology Enhanced Learning, Department of Educational Research, Lancaster University

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Key informants

John Anderson

Visiting Professor of Education, Ulster University, from 2020, and Independent Chair of the Education Network Innovation Forum, from 2021 (formerly Director, Microelectronics Education Programme, 1980-1985; Inspector, Northern Ireland (NI) Education and Training Inspectorate, 1985-1997; Northern Ireland Education Technology Strategy Coordinator, 1997-2004; Managing Inspector, NI Education and Training Inspectorate, 2004-2021)

Hugh Crossey

Partner PwC NI, Management Consultant and Public Sector Procurement Advisor, 1989-2001; and Chair of the European Education Research and Innovation Centre, 1989-2001

Cynthia Currie

Interim Director of Education, EA, from 2022 (formerly Head of History, 1996-2008; Senior Teacher for Teaching, Learning and Curriculum, 2000-2008; Post-primary School Vice Principal, Acting Principal and Principal, 2008-2018; Transformation Lead, Education Authority (EA), 2018-2020; Assistant Director of SEN Services, EA, 2020-2022)

Damian Harvey

Interim Head of C2k, EA, from 2020 (formerly Primary School Teacher and ICT Co-ordinator, 1996-2004; C2k Core and Curriculum Officer, EA, 2004-2012; C2k Locality Lead, EA, 2012 to 2020)

Tom McMullan

Member of the Board of the UK National Council for Educational Technology, latterly the British Educational Communications and Technology Agency (Becta), 1997-2003 (formerly Teacher, Orangefield Boys High School, Belfast, 1971-1983; Head of Educational Computer Unit, Northeastern ELB, 1983-1987; Information Technology Adviser, Southeastern ELB, 1987-1989; Chair, Ministerial Working Group on Development of Policy for Cross-curricular Integration of Information Technology, 1989; Director of CLASS and Classroom 2000, 1989-2001; Member of NI Educational Technology Strategy Group, 1997-2001; Chair of the NI Educational Technology Development Group, 1997-2001)

Frances Meehan

Interim Director, Education Information Solutions Programme, EA, from 2022 (formerly Site Finance Officer, Rupert Stanley College, 1990-1994; Senior Procurement Officer, Belfast Institute of Further and Higher Education, 1995-2003; Programme Manager, Belfast Metropolitan College, 2004-2008; Head of Procurement, Belfast Metropolitan College, 2009-2011; Senior Procurement Manager, HSC Business Services Organisation, 2012-2018; Assistant Director for Procurement and Programme Management, NIHE, 2018-2019; Head of Procurement, EA, 2019-2000; Assistant Director for Pupil Services and Procurement, EA, 2000-2022)

Averil Morrow

Acting Assistant Director of Education, EA, 2021-2022 (formerly Field Officer for Technology and Design (seconded), Southern ELB, 1989-1991; Assistant Advisory Officer for Technology and Design, Southern ELB, 1991-1997; Adviser for ICT and Technology and Design, Southern ELB, 1997-2017; Head of Service for Professional Learning and Development, EA, 2017-2021)

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Please accept that any errors or misconceptions arising in this document are entirely the responsibility of the lead researcher and editor rather than that of any individual contributor.

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1. Executive summary

The International Federation for Information Processing (IFIP) was founded in 1960 under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO), as a federation for societies working in information processing. Set up by the President of IFIP in 2022, the work of an IFIP Task Force has sought to gain an international perspective to support the UN, UNESCO, ITU, affiliated organisations, national societies, regional and local organisations in moving forward a focus on ‘Sustaining relevant digital inclusive education for young people (5-18 years of age)’.

Interim IFIP Task Force findings identified five key sustaining factors that the Task Force believed warranted specific and particular attention: aspiration; diversity, inclusion, the digital divide and the under-represented; computational thinking and its links to problem-solving; developing teacher practices; and short- and long-term plans and actions¹. Using these five key sustaining factors as a framework, the details of the associated case study reported in this document show how these relate strongly to specific UN Sustainability Development Goals (SDGs)².

As Northern Ireland (NI) can demonstrate how a long-term strategy and development has led to successes, and how challenges have been tackled over the period of the development of relevant digital inclusive education in NI over a sustained, long-term (in 2024) 35-year period from an initial start in 1989 with the Computerised Local Administration System for Schools (CLASS) project, a case study of how this has been done is reported here. Chapter 3 of this document offers a timeline of educational technology being implemented across Northern Ireland’s schools, to position the IFIP case study in the local context. Chapters 4 to 8 detail how the NI education technology development relates to the IFIP Task Force’s key sustaining factors. Chapter 9 provides an overview of resourcing involved, from a non-cost perspective, as costs need to be considered nationally and do not necessarily easily relate from one nation’s costs to another. The resources described in Chapter 9 are concerned with personnel involvement, personnel time, and physical and management resources. It should be noted that this case study is concerned with details that relate to the focus of the IFIP Task Force for 5-18-year-old young people, whilst, in NI, education concerns a wider 4-18-year-old age group.

A reader will note that the case study highlights, in this chapter following, what could be described and recognised as ‘design features’, which were identified from analysis of the case study details as critically important features. Across the period of this case study, these ‘design features’ were seen to lead to successes for the education technology development. These ‘design features’ are shown in the left-hand column in Table 1 that follows. These crucial factors have been drawn out so that another jurisdiction might review these ‘design features’ in terms of their own contexts, for review, monitoring or development purposes. For each ‘design feature’, in the right-hand column of Table 1, sections of the case study where each ‘design feature’ is described in more detail are highlighted, as is a key review or monitoring question that might support others seeking to take sustained implementation forwards in this developmental context.

¹ Passey, D., Soares Barbosa, L., Dalvean, J., Gwanzura, A., Lane, G., Hettihewa, D., Sodiya, A., & Min Tjoa, A. (2024). *Sustaining relevant digital inclusive education for young people (5-18 years of age): Final Report*. IFIP. ([hal-04736825](#))

² [THE 17 GOALS | Sustainable Development \(un.org\)](#)

Table 1: Key ‘design features’ elicited from the Northern Ireland case study

<p>1 The long-term purpose is set</p> <p>The challenge that Northern Ireland (NI) has continued to face (and address) during its (in 2024) 35-year development of educational technologies in schools is to gain understanding (and subsequent appropriate action) from all stakeholders about how the developments in the use of information and communication technologies (ICT) were and are not happening as a side-shoot of a curriculum element, but were and are driving curriculum development, whilst, at the same time, curriculum development was and is driving increased use of technology. Consequently, in NI, past and current educational technology programmes have not been recognised or governed as corporate information technology (IT) programmes, but as educational change programmes, sitting within the respective education directorates and authorities (initially within Education Library Boards (ELBs) that were replaced with a single Education Authority (EA) from 2015).</p>	<p><i>Further detail is shown in Sections 3, 4.4 and 4.7.</i></p> <p><i>A key question to consider: What is or are the long-term purpose or purposes of integrating digital technologies into education for 5-18-year-old young people?</i></p>
<p>2 Sufficient lengths of development phases are discussed and decided</p> <p>Following a preliminary development phase lasting 14 years, NI agreed three subsequent major phases of development initiative and activities lasting 9 years, 12 years, and 14 years respectively, and there is a current phase that is projected to last some 13 years. All phases have been linked, with each subsequent phase emerging from the previous phase.</p>	<p><i>Further detail is shown in Sections 3 and 4.3.</i></p> <p><i>A key question to consider: What are the lengths of development phases that have already been completed and those yet to be completed or planned?</i></p>
<p>3 Involving all stakeholders</p> <p>From small beginnings, all stakeholders have needed to be involved. For NI, this has involved a number of government departments, government agencies, support agencies, consultants, educational advisors and inspectors, local industries and businesses, and all principals and teachers, pupils in schools and, importantly, an increasing number of parents. All stakeholders have needed to understand the long-term intentions and how these could positively support more effective learning, teaching, administration, management and leadership. Keeping all stakeholders informed at the appropriate time has been a key to success, although it is recognised that this is not easy to do. Reassurance for schools has been important; reassuring about not imposing something and leaving a school with something that they are not comfortable with; reassuring about support until needs go away. Other stakeholders have different requirements and may be thinking about accountability, about finances, or about policy, so different techniques are needed, considering applicable metrics and what they each need and why. For parents, using online communications, sharing examples of children’s schoolwork, providing teaching resources and advice about learning online is changing and can enhance the dynamic of the parent/teacher partnership.</p>	<p><i>Further detail is shown in Section 4.2.</i></p> <p><i>A key question to consider: Who are the entire range of stakeholders who will need to be informed, and how will they be informed, agree to and continue to engage with long-term strategies proposed – for example, how are parents, especially those whose children are attending school for the first time, being engaged to support the education of their children?</i></p>

<p>4 A long-term funding model was essentially developed</p> <p>For each major phase, a long-term funding model was developed. For each phase, major changes were expected, influencing and improving education, teaching and learning, management and leadership. The concept of long-term support needed to be understood, appropriately resourced and accepted, especially by those who would provide the finance for the initiatives that would develop. Funding adequate long-term support had to become a ‘business as usual’ cost in the education budget. This understanding in NI was significantly facilitated by inputs from project advisors at PricewaterhouseCoopers and by findings from reports about solutions being developed and successfully implemented in schools.</p>	<p><i>Further detail is shown in Sections 4.8, 4.9, 4.13 and 4.14.</i></p> <p><i>A key question to consider: How can a long-term funding model be developed?</i></p>
<p>5 School principals and teachers were always supported</p> <p>Principals and teachers were not expected to take on board those elements that could be more effectively provided by professionals with specialist experience and expertise, such as solution design, development, procurement, regulatory and contractual requirements, implementation, support and safety, which could be provided through managed and support services.</p>	<p><i>Further detail is shown in Section 4.14.</i></p> <p><i>A key question to consider: Which digital technology elements can effectively be provided by professionals outside schools?</i></p>
<p>6 Equality was at the heart of all phase developments</p> <p>In NI, equality has always been carefully considered and has covered equality of provision, equality of risk sharing, and equality of professional responsibility.</p>	<p><i>Further detail is shown in Section 4.4.</i></p> <p><i>A key question to consider: What forms of equality are important and need to be considered and agreed across the stakeholder community?</i></p>
<p>7 Nation-wide scale and scope were considered to be feasible</p> <p>NI is a relatively small nation; it covers just over 14,000 km² with 1,079 schools in 2024. A lot of people know one another, across different sectors; so, it is possible to bring people together, to share, influence and spread messages.</p>	<p><i>Further detail is shown in Section 4.5.</i></p> <p><i>A key question to consider: What scale and scope can be feasibly managed for an effective long-term educational technology development, especially in a large nation?</i></p>
<p>8 Equality, irrespective of educational management, has always been accommodated</p> <p>Schools are currently managed via a complex educational management structure that includes separate non-departmental public bodies: the Education Authority; the Council for Catholic Maintained Schools; the Northern Ireland Council for Integrated Education; in respect of voluntary grammar schools, the Governing Bodies Association (GBA); and in respect of Irish medium schools, Comhairle na Gaelscolaíochta. Ensuring shared and complementary responsibilities has been important for stated outcomes to be achieved. Development has ensured that all schools are linked on the same IT system, so service-wide education initiatives can be taken forward in a systematic manner, with no single person, not one single child, left behind.</p>	<p><i>Further detail is shown in Section 4.6.</i></p> <p><i>A key question to consider: Does equality of provision apply to all forms of educational management, and how can this be achieved?</i></p>

<p>9 An initial central operational unit set a pattern and standards</p> <p>Recognising the complexity of supporting change across so many school functions, the initial CLASS project established a multi-disciplinary team in each of the five Education and Library Boards (ELBs), and a central development team to facilitate project wide coordination. Line management across the five ELB implementation teams was established and was critically important, ensuring that software being procured, and training and support being delivered, could be implemented across all types of schools in the five ELBs in a standard way, so that economies of scale could be achieved. This structure was supported initially in the ongoing development and delivery of the project by a range of consultants from PricewaterhouseCoopers.</p>	<p><i>Further detail is shown in Section 4.8.</i></p> <p><i>A key question to consider: Is there a single central operational unit in place, and how can this be either established or effectively improved?</i></p>
<p>10 Necessary standardisation was identified - and ways forward were explored</p> <p>Working across five ELBs was initially challenging, in that implementation of provision would be best accommodated by standardisation of equipment and specification. One action that supported a move towards standardisation was building what was a NI-wide team but with specific expertise in local implementation within each of the 5 ELBs – this created a centrally managed but locally delivered approach which involved all ELB teams in central concerns and decisions.</p>	<p><i>Further detail is shown in Sections 4.10 and 4.14.</i></p> <p><i>A key question to consider: Is standardisation in place, and is this an aspect that needs to be developed to better support all stakeholders?</i></p>
<p>11 The teams for central service provision were identified at an early stage</p> <p>Additional services to support schools more widely beyond an early programme were identified as: help desk facilities; remote diagnostics; training; configuration management; onsite support; software maintenance contract management; hardware maintenance contract management; customisation services; maintenance of interfaces; contingency services; consultancy services; and enhancement/development services. Central managed services removed issues and concerns for teachers and schools around security, networking and infrastructure.</p>	<p><i>Further detail is shown in Sections 4.11 and 4.14.</i></p> <p><i>A key question to consider: What essential services are there or are needed within a central service provision?</i></p>
<p>12 Experience and expertise were crucial for school support services</p> <p>Virtually all support service members have had experience of working in schools, be that at the administrative level, financial management level, or the curriculum planning and timetabling level. Teams have been led by individuals who have been senior leaders in schools with a track record of successfully delivering educational change. Educational expertise, technical expertise, financial expertise, and educational management expertise are four key areas that are currently considered to be essential. A communication strategy is also required to underpin the rollout and to provide a positivity and momentum. Strong dedication and commitment from everybody who works in the environment is likely to have a stakeholder at some stage in the school system, maybe a pupil of their own, or with somebody they know in a school, so they know that everything that they are doing is impacting on their sons, daughters, grandchildren or those of their neighbours.</p>	<p><i>Further detail is shown in Section 4.15 and 4.16.</i></p> <p><i>A key question to consider: Do central school support services have personnel with vital experience and expertise?</i></p>

<p>13 Solutions rather than products have always been sought</p> <p>Projects did not approach the ICT marketplace seeking identification of suitable products – they were clear from initial market research and engagement with stakeholders that no existing product would fully meet their needs. The approach, therefore, was to go to market with a comprehensive Output Based Specification (OBS) seeking a software supply and development partner who would be contractually bound to develop a solution which would meet the requirements of the OBS.</p>	<p><i>Further detail is shown in Section 4.8.</i></p> <p><i>A key question to consider: Is digital education technology development and implementation providing solutions rather than products?</i></p>
<p>14 A ‘test-bed’ co-design approach has been taken</p> <p>The size of NI has allowed a test bed approach, and the central services team has access to every single teacher and all schools, and every single pupil in all schools. The central support team can try things out, can handle them in a very controlled manner, and then roll out to all schools. They were keen to be actively involved in horizon gazing, monitoring possible future directions and actions during the period of an initiative, supported by a cross-stakeholder group, the NI Innovation Forum. One of the recognised successes of central services has been the fact that solutions are not imposed on users. Solutions or specifications are not created by the implementation team alone. They are co-designed, so for every single project that sits within the work of central services, solutions and specifications are designed in conjunction with schools.</p>	<p><i>Further detail is shown in Sections 4.14 and 4.19.</i></p> <p><i>A key question to consider: Do digital education technology developments use a ‘test-bed’ and co-design approach involving end-users?</i></p>
<p>15 Schools were not limited in terms of use or additionality</p> <p>Schools could move forward in their own ways in terms of how they used the systems provided, and they could consider what they might wish to individually and affordably add to the systems.</p>	<p><i>Further detail is shown in Section 4.14.</i></p> <p><i>A key question to consider: With central infrastructure and networking provision, can schools still develop their own uses and add to provision if appropriate?</i></p>

<p>16 Contracts with suppliers needed to be appropriately developed</p> <p>In the early stages of the CLASS project, suppliers were appointed using traditional government supply and support contracts. For later project phases, procurement of solutions was initially envisaged through a private finance initiative (PFI) - a procurement method using private sector investment to deliver infrastructure and services which were specified by the public sector, with the private sector partner carrying the financial risk associated with non-delivery. The project was assisted in this procurement approach by embedding into the procurement process a representative of HM Treasury. However, it became evident that, at that time, the marketplace was simply not able to provide cost effective risk transfer to an educational ICT project of the scale envisaged. This judgement was accepted by HM Treasury who accepted that an alternative approach would be necessary to ensure delivery of the project. Working with its advisors at PricewaterhouseCoopers, the project developed a robust internal 'Plan B' to ensure that the overall delivery of the wider NI Educational Technology Strategy would not be impacted by a PFI procurement failure. In the event, the 'Plan B' underpinned provision up to 2010. By 2010 there was a more mature understanding in the marketplace regarding how to deliver cost effective partnership-based educational ICT projects of the scale required and thus from 2010 to 2023 school-based provision moved to a more Public Private Partnership (PPP) model where risk sat with the organisation best placed to manage it.</p>	<p><i>Further detail is shown in Sections 4.8, 4.9, 4.13 and 4.14.</i></p> <p><i>A key question to consider: What form of contractual arrangements are in place or would best support engagement with suppliers for developing identified solutions?</i></p>
<p>17 Cost benefits of the long-term and nation-wide model needed to be demonstrated</p> <p>Various reports noted the much-reduced unit costs for equipment, software, connectivity and support services being delivered through a centralised supply and support arrangement, set against the financial implications for the wider educational system of having to meet the integration and support costs of having multiple poorly supported and incompatible solutions emerging in schools. Reports were also able to demonstrate the considerable administrative savings flowing from the use of effectively supported management information systems (MIS) systems, even when recognising that they needed to be regularly updated to take account of the frequently changing administrative and management demands being placed on schools. Showing economies of scale and value for money were important, but not that difficult to demonstrate when contracting at a level for the high number of users and locations. Procurers were in a very strong position to drive the market in a particular direction, not just when replacing a large complex infrastructure, but even when indicating the future direction of curriculum and management information solutions, for example.</p>	<p><i>Further detail is shown in Section 4.18.</i></p> <p><i>A key question to consider: What cost benefits have been achieved already or can be identified during any stage of initiative development and implementation, and, in this context, to what extent has the 'total cost of ownership' been considered?</i></p>

<p>18 A long-term curriculum was considered and developed</p> <p>A document created in 1989 via a nation-wide consultation demonstrated and illustrated how five key components of ICT could be integrated into subject areas across the 5-16-year-old curriculum: communication; information handling; modelling; measurement and control; and evaluating the impact of information technology on teaching and learning. This document set the foundation for sustaining relevant inclusive digital education to this current time.</p>	<p><i>Further detail is shown in Sections 4.10 and 7.3.</i></p> <p><i>A key question to consider: What is the relevant digital education technology focus of a curriculum for 5-18-year-olds?</i></p>
<p>19 Educational technologies strategies were closely linked to curriculum</p> <p>Revised vision and strategy have been closely aligned with the goals set out for the NI curriculum. These have highlighted that young people should learn with, through and about the uses of digital and online technologies, to develop competences as individuals, as contributors to society, as contributors to the economy, and as lifelong learners.</p>	<p><i>Further detail is shown in Section 4.14.</i></p> <p><i>A key question to consider: How are education technology strategies linked to the curriculum for 5-18-years?</i></p>
<p>20 Links to current and future industry and employment supports aspiration</p> <p>From 1990, links between industry and education were created through creative media arts centres, termed Creative Learning Centres (CLCs). The activities in the CLCs allowed teachers and pupils to explore areas of the curriculum that were using digital technologies in creative ways and exploring career paths and possible pipelines to employment.</p>	<p><i>Further detail is shown in Section 5.3.</i></p> <p><i>A key question to consider: How are current and future industry and employment linked to the provision and curriculum to support young people's long-term aspirations?</i></p>
<p>21 Qualifications and certification have been revised to match digital interest and concerns</p> <p>Qualifications for pupils have been revised and updated to accommodate shifts in interest, opportunities of using new digital facilities, and for engaging in future needs of society and employment. The Department of the Economy NI skills barometer, developed by Ulster University, supports messages from industry coming into schools about future skill needs.</p>	<p><i>Further detail is shown in Sections 5.4 and 5.7.</i></p> <p><i>A key question to consider: Are qualifications and certification aligned to current and future digital interests and concerns?</i></p>
<p>22 Aspiration from early ages has been developed</p> <p>A Department of Education (DE) careers pilot in primary schools has explored this avenue, and the challenge that this brings for some people in terms of aspiration. This is especially the case in rural primary schools, where it has been found in the past that some parents and pupils are not aware of many future career opportunities.</p>	<p><i>Further detail is shown in Sections 5.5 and 5.6.</i></p> <p><i>A key question to consider: Is aspiration from early years in place or in need of review?</i></p>
<p>23 Diversity, inclusion, the digital divide and the under-represented have always been a focus of concern</p> <p>It is recognised that continued development of ICT and computing arose out of the desire of a society emerging from conflict to move forward positively, developing the talents of young people. In terms of technology services, in 2024, it is 26 years since the peace agreement (the Belfast Good Friday Agreement) was signed in 1998 and 25 years since a nation-wide programme began. Equity of access has been central to uses of technology and its provision across that period of time.</p>	<p><i>Further detail is shown in Section 6.1.</i></p> <p><i>A key question to consider: Are diversity, inclusion, the digital divide and the under-represented of focal concern within long-term education technology initiatives and strategies?</i></p>

<p>24 Uses of digital education in special schools and for those young people not able to attend mainstream schools has been effectively considered</p> <p>Special schools and the service concerned with supporting young people not able to attend mainstream schools have been supported with digital technologies and indeed have developed digital technologies to enable educational improvement, achievement and long-term engagement of young people.</p>	<p><i>Further detail is shown in Section 6.2.</i></p> <p><i>A key question to consider: How are young people with special educational needs and those not able to attend mainstream schools supported with effective uses of digital technologies?</i></p>
<p>25 A cross-curricular approach has supported computational thinking and computing in school curricula</p> <p>A curricular approach was agreed at an early stage, requiring pupils to be involved in: designing, creating, composing; recording, presenting, communicating; calculating, measuring, controlling; and selecting, testing and evaluating. A number of curriculum changes accepted in 2003 included, importantly: more emphasis on developing children’s thinking skills and their ability to solve problems and handle information; and adding education about citizenship and employability to the curriculum - with three overall objectives: to develop as individuals; as contributors to society; and as contributors to the economy and the environment. Manufacturing, making things, making objects, and robotic manufacturing have been identified as important aspects to explore within a curriculum. The uses of peripheral devices have been found to be important for learning, rather than a focus always being on the use of the computer itself.</p>	<p><i>Further detail is shown in Sections 7.2 and 7.4.</i></p> <p><i>A key question to consider: What is the curricular approach to digital technology that is understood by schools and is identifiable in their practices?</i></p>
<p>26 Room layouts have been carefully considered</p> <p>Room layouts have accommodated children working in groups, learning from one another, which is recognised as an effective practice. Similarly, different room layouts have allowed teachers to move around and interact, seeing what was on screens, rather than copying the layout of a traditional classroom. Increased portability of mobile devices has facilitated distribution of technologies more widely across schools.</p>	<p><i>Further detail is shown in Section 7.3.</i></p> <p><i>A key question to consider: Do room layouts allow for digital technologies to be used effectively by pupils and teachers, and is there a wider distribution of mobile technologies?</i></p>
<p>27 Teacher professional development support has been crucial</p> <p>Supporting teachers in developing computational thinking has relied on their being able to consider computational thinking without using digital devices as well as with using devices. Teacher educators have related computational thinking to problem-solving thinking. By 2002, it was reported that 94% of NI teachers felt confident using ICT as a result of professional support at that time. Increasingly now, teachers are taking and gaining accreditation in industry qualifications. For example, Microsoft, Google, Apple and Adobe teacher certification schemes, awards and ‘badges’ are sometimes being gained by teachers and teaching assistants across a school, in the primary, special and post-primary sectors. Arising out of the procurement of 21,400 teacher devices in 2021, a flourishing teacher professional learning (TPL) community of around 100 teachers was established through the use of corporate social responsibility funding (CSR). This created an environment whereby teachers co-create TPL opportunities and content for their colleagues.</p>	<p><i>Further detail is shown in Sections 7.4, 8.5 and 8.8.</i></p> <p><i>A key question to consider: What forms of teacher professional development are in place, including in the initial teacher education stage, to support ongoing development leading to school improvement?</i></p>

<p>28 Curriculum and teacher approaches focus on long-term uses by young people</p> <p>A key revision of the NI curriculum framework through which teachers could consider uses of ICT was named the 5 'E's (Explore, Express, Exchange, Evaluate, Exhibit). This involved a significant move away from a content heavy curriculum to an increased focus on thinking skills, providing young people with opportunities to become independent, self-motivated and flexible learners. In 2024, this is still in place, and it has been recognised that teachers can understand how digital technologies might be used in lesson activities in these ways, so that they could take forward this approach in a cross-curricular way. However, review and monitoring are recognised as being important. In this context, the Minister has, in 2024, commissioned a Curriculum Review in NI, with a particular focus on the power of knowledge within the curriculum.</p>	<p><i>Further detail is shown in Section 8.2.</i></p> <p><i>A key question to consider: Does the curriculum and practices of a school and its teachers enable young people to have a long-term focus on uses and applications of computational thinking, computing and digital technologies?</i></p>
<p>29 Teachers sharing practice has been positively supported</p> <p>Sharing practice and expertise has been a focal concern of successive initiatives and strategies. Such sharing has been positively supported by the shared networking and communication infrastructure that is common to all schools. More recently, teachers have felt confident to let children take the lead more. Some schools have developed the practice of identifying children who are 'digital leaders'.</p>	<p><i>Further detail is shown in Sections 8.2, 8.5 and 8.6.</i></p> <p><i>A key question to consider: How are teachers and leaders in schools enabled to share their practice, and how are effective practices recognised for others?</i></p>

It should be noted that, whilst this case study focuses on the system-wide approaches that NI has taken to 'sustaining relevant digital inclusive education for 5-18-year-old young people', two additional case studies will exemplify the ways in which this has been enacted for the young people within selected schools (one primary and one post-primary).

2. Context of the case study

The International Federation for Information Processing (IFIP) was founded in 1960 under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO), as a federation for societies working in information processing. IFIP's aim is two-fold: to support information processing in the countries of its members; and to encourage technology transfer to developing nations. As its mission statement states: IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.

Set up by the President of IFIP in 2022, the work of an IFIP Task Force sought to gain an international perspective to support the UN, UNESCO, ITU, affiliated organisations, national societies, regional and local organisations in moving forward a focus on '**Sustaining relevant digital inclusive education for young people (5-18 years of age)**'. The reported work of the IFIP Task Force and the results of the findings from this associated case study relate to specific UN Sustainability Development Goals (SDGs)³:

- SDG1 – No Poverty. Relevant digital education has the potential to support educational practice widely and to offer future potential for employment and active engagement.
- SDG3 – Good Health and Well-being. Relevant digital education used appropriately can support health and well-being in positive ways.
- SDG4 – Quality Education. The case study example shows how a continuous focus has been on school improvement, through enhancing learning, teaching, administration, management and leadership.
- SDG5 – Gender Equality. Digital technology supports wide forms of inclusive education.
- SDG8 – Decent Work and Economic Growth. When digital education is linked to current and future employment and opportunity trends, then the potential for meeting work demands and economic growth is enhanced.
- SDG10 – Reduced Inequalities. Digital education can support a wide range of specific and special educational needs, and those who cannot easily attend mainstream schools.

Interim findings in the initial report of the IFIP Task Force identified five key sustaining factors that the IFIP Task Force believed warranted specific and particular attention:

1. aspiration;
2. diversity, inclusion, the digital divide and the under-represented;
3. computational thinking and its links to problem-solving;
4. developing teacher practices; and
5. short- and long-term plans and actions.

In the case study which follows, the fifth IFIP Task Force sustaining factor (short- and long-term plans and actions) is considered first, as this was found to be a key factor that provided the context for the remaining key areas. This case study success model gathers evidence to show how this jurisdiction has addressed the factors that the IFIP Task Force has shown to be of importance in such a development. It is anticipated that other countries might also provide case studies that will demonstrate different ways in which long-term successes have been achieved, leading to an overarching subsequent meta-analysis.

³ [THE 17 GOALS | Sustainable Development \(un.org\)](https://un.org/sustainabledevelopment)

3. The case study – Northern Ireland

As Northern Ireland (NI) can demonstrate how a long-term strategy and development has led to successes, and how challenges have been tackled over the period of the development of relevant digital inclusive education in NI over a long-term (in 2024) 35-year period from an initial start in 1989 with the Computerised Local Administration System for Schools (CLASS) project, a case study of how this has been done would seem to be entirely appropriate. In the ongoing development in NI, government policy now extends the initial reach, sustaining relevant inclusive digital education for 4-18-year-old young people from 2024 onwards, across the jurisdiction, from early years settings.

To position the IFIP case study in the local context, an outline of the development timeline of educational technology being implemented across Northern Ireland's schools follows. This development timeline shows a preliminary phase followed by four phases of major activity and initiatives. In each of those phases, key markers and focal concerns during certain years are highlighted. Aspects are considered in more detail and are more fully considered in the case study sections that follow in Chapters 4 to 8.

3.1 Timeline for the (in 2024) 35-year development of educational technology in Northern Ireland schools

3.1.1 Pre-CLASS activities (1975-1989)

Key markers

- Creation of the Microelectronic Education Programme (MEP) and latterly the Microelectronics Support Unit (MESU)
- Establishment of the Northern Ireland Regional Programme Committee (NIRPC)
- United Kingdom (UK) Department of Trade and Industry (DTI) Computer in Schools Schemes
- Creation of the British Educational Communications and Technology Agency (Becta) from the National Council for Educational Technology (NCET)
- Establishment of information and communication technologies (ICT) as a cross-curricular theme in the NI Curriculum
- Each Education and Library Board (ELB) made separate provision to support educational technology in their locality

1975 – The National Development Programme in Computer Assisted Learning: Computer Assisted Management of Learning Project⁴ was established. This was the first use of (mainframe-based) diagnostic assessment tests in advanced level science education teaching (for pupils 16-18 years of age) in Methodist College, Belfast⁵.

1977 - The first Northern Ireland (NI) Educational Computing Centre, innovating with Commodore Personal Electronic Transactor (PET) microcomputers, and introducing

⁴ Hooper, R. (1974). The National Development Programme in Computer Assisted Learning - Origins and Starting-Point. *Programmed Learning and Educational Technology*, 11(2), 59-73. DOI: [10.1080/1355800740110202](https://doi.org/10.1080/1355800740110202)

⁵ Brown, M. & McMahon, H. (1979). Computer managed independent learning in A-level physics. *Physics Education*, 14.

educational technology courses for student teachers and serving teachers, was established at the Education Centre of the (then New) University of Ulster (NUU).

1980-1985 - Northern Ireland was established as one of 14 regions of the Microelectronics Education Programme (MEP) for England, Wales and Northern Ireland⁶. The Educational Computing Centre at the NUU was converted into the MEP Regional Centre for NI, providing teacher education and curriculum development programmes in primary and special education, and across the secondary curriculum in computing, microelectronics, communication and information systems and in computer assisted learning in all subject areas. Six hundred short in-service education courses in 20 curriculum areas and topics engaged 12,000 NI teachers.⁷

1983 - The first Educational Computer Unit supporting schools in an Education and Library Board was established in the Northeastern Education and Library Board.

1986 - The 'Information Technology in Northern Ireland Education' strategy paper was published by the NI Regional Programme Committee, setting out a road map for regional development⁸ following MEP. The strategy comprised four cross-curricular areas of potential involvement of information technology (IT) in education: the 5-16 curriculum; examinations; teacher education; and administration. The NI Vocational Enhancement Programme (VEP) established in 1986 provided £18 million between 1986 and 1990, as a boost to existing expenditure, to support the integration of information technology (IT) across the curriculum, raising the ratio of computers to pupils in post-primary schools to 1:25 and financing IT advisory support services in all five Education and Library Boards⁹. Blended online/face-to-face contact through the European Studies Project (1986–2016) linked pupils in schools in Northern Ireland, the Republic of Ireland, Great Britain and mainland Europe for classroom projects.

3.1.2 Phase 1 – CLASS MIS provision (1989-1998)

Key markers

- 1989 – The Computerised Local Administration System for Schools (CLASS) was established as a 5-year regional initiative to facilitate management information services (MIS) provision in 241 post-primary schools
- 1990 – CLASS goes to market with a comprehensive Statement of User Requirement (SOUR)
- 1990 – CLASS MIS contracts were awarded using Central Computer and Telecommunications Agency (CCTA) standard supply and support contracts
- 1993 – The Department of Education Northern Ireland (DENI) Education and Training Inspectorate (ETI) conducted an inspection of the CLASS Project
- 1993 – A primary school sub-project, the Computerised Local Administration System for Primary Schools (CLASPS), was established for 900 schools – with provision based on primary SOUR and CCTA contracts

⁶ Fothergill, R. & Anderson, J.S.A. (1981). Strategy for the Microelectronics Education Programme (MEP). *Programmed Learning and Educational Technology*, 18(3), 120-129. DOI: [10.1080/0033039810180302](https://doi.org/10.1080/0033039810180302)

⁷ Austin, R. & Anderson, J. (2008). *E-schooling: Global Messages from a Small Island*. London: David Fulton Publishers.

⁸ NIRPC (MEP) & NICED. (1986). *Information Technology in Northern Ireland Education*. Belfast: NICED Centre.

⁹ Anderson, J. (1987). Implementing IT across the curriculum. In Moonen, J. & Plomp, T. *Proceedings of EURIT 1986*. Oxford: Pergamon Press.

- 1994 – Long-term support for CLASS was established, turning it from a project to an ongoing school support service
- 1996 – The Stevenson inquiry was established
- 1997 – The NI Educational Technology Strategy Management Group (ETSMG) was established
- 1998 – Education technology infrastructure in NI was to be delivered via Classroom 2000 (C2k)

1989 - A Ministerial working group ‘Information Technology: A Cross-Curricular Theme’, chaired by the then IT Advisor to the South Eastern Education and Library Board (who would later become the Project Director of CLASS), developed the policy for cross-curricular integration of information technology (IT) into the newly founded NI Curriculum¹⁰, which remains the statutory requirement, with some revision, thirty-five years later¹¹. The policy defined cross-curricular IT in five components: communication; information handling; modelling; measurement and control; and evaluating the impact of IT. The Department of Education in Northern Ireland adopted a policy for centrally supported provision of MIS in schools. The CLASS (Computerised Local Administration System for Schools) project was established to procure a managed IT service from private sector suppliers, RM Ltd., and the provision of MIS software from their subcontractor, SIMS Ltd., at a cost of £10 million, providing managed information systems on 1,696 desktop computers in all 241 secondary (post-primary schools) to support financial and administrative management autonomy as part of the Government’s ‘Local Management of Schools’ policy, which delegated school budgetary management to each school¹². Following the establishment of the Nerve Centre for creative media arts in Derry in 1990¹³, a Creative Learning Centre (CLC) was established in 1999 to provide support and professional development for teachers and young people in using creative digital technologies as a support to the curriculum. The Council for the Curriculum, Examinations and Assessment (CCEA) began a review of the NI curriculum in 1999, which culminated in a three-year phased introduction of a new statutory curriculum in 2007¹⁴. Two further CLCs were set up, one in Belfast, Studio ON in Crossnacreevy in 2004, and one by the Southern ELB - the AmmA Centre (Armagh multi-media Arts) in 2004¹⁵. The CLCs were supported by Northern Ireland Film and Television Commission (the agency tasked with developing the NI film, television, animation and computer gaming industries - renamed NI Screen in 2007) and funded initially by the Department of Culture, Arts and Leisure and later by the Department for Communities and the Department for the Economy.

1991 - The first online linking of pupils for language and cultural studies classes, initially using dial-up services, was established with schools in the Toyama Prefecture of Japan. The links endured to 2012.

¹⁰ The Education Reform (NI) Order, 1989, established IT as an element of statutory provision.

¹¹ Anderson, J.S.A. (1991). Information Technology – a cross-curricular competence for all pupils. *Computers & Education*, 16(1), 23-27.

¹² McMullan, T. & Gardner, J. (1992). Administrative informatics in schools: the Northern Ireland CLASS project. *Education and Computing*, 8(1–2), 89-95. [https://doi.org/10.1016/0167-9287\(92\)80016-5](https://doi.org/10.1016/0167-9287(92)80016-5).

¹³ <https://nervecentre.org/about-us>

¹⁴ https://www.bbc.co.uk/northernireland/schools/pdf/NIschools_curriculumOverview.pdf

¹⁵ <https://www.ammacentre.org/>

1992 - With new NI curriculum statutory legislation in place, discussions started on extending the CLASS project to provide managed ICT tools for curriculum support, statutory assessment and reporting requirements.

1993 - A report on the implementation of the CLASS project in post-primary schools by the NI Education and Training Inspectorate (ETI) concluded that it was 'an integrated management system of considerable value' to school leaders and to all teachers.

1994 - CLASPS (Computerised Local Administration System for Primary Schools) management information systems were provided through contract to ICL Ltd. and their subcontractor, SIMS Ltd., to include primary schools with 90 or more pupils. From 2004, the service was extended to include small primary schools and special schools.

1996 - Classroom 2000 (C2k), building on the foundation of CLASS and CLASPS, was funded through the European Union Building Sustainable Prosperity programme, and the Department of Education to procure centrally managed ICT classroom infrastructure and curriculum services for all schools. C2k was initially seen as a private finance initiative where up-front costs were spread over the lifetime, depending on government funding, of an extended timeframe (at least 10 years). Whilst it was initially envisaged that the service would cost each school some £6,000 per annum on average, such were the economies of scale delivered by the central approach that the service was provided to schools at no cost, although schools could use their own budgets to enhance or extend the service to meet their needs. The first contract, delivering from 1999-2000, provided online connectivity for 350,000 teachers and pupils through secure email, an online learning environment, and 290 curriculum software titles to augment the existing management information system. This initial technology investment provided a networked computer to pupil ratio of 1:15.

1997 - 'A Strategy for Education Technology in Northern Ireland' was produced to bring consistency to technology provision, teacher education, and curriculum development goals across the five ELB Advisory Services, which were supporting schools, each with their own approaches to implementation.¹⁶ The Strategy complemented C2k with curriculum and teacher education programmes to support the integration of ICT across the curriculum with the intention of ensuring that young people acquired the skills to use ICT effectively, confidently and safely. At the same time, in England, the Stevenson Report¹⁷ on the use of ICT in schools identified ICT as a priority area, and funds were allocated under the National Grid for Learning (NGfL) scheme,¹⁸ establishing Regional Broadband Consortia across England and Wales. C2k NI benefited from working with these groups, although NI took forward its own implementation in a specific way.

1998 - The Belfast Good Friday agreement brought 27 years of direct rule to an end and re-established the legislative assembly and devolved management of education through a locally elected Minister.

3.1.3 Phase 2 – CLASS expands to C2k (1999-2011)

Key markers

1999 – A New Opportunities Fund (NOF) ICT training scheme was run for all teachers

¹⁶ Department of Education. (1997). *Education Technology Strategy*. Bangor: Department of Education.

¹⁷ Stevenson, D. (1997). *Information and Communications Technology in UK Schools*. Independent ICT in Schools Commission.

¹⁸ https://en.wikipedia.org/wiki/National_Grid_for_Learning

1999 – An Inspection Report reviewed the CLASS implementation in primary schools
 1999 – A Private Finance Initiative (PFI) procurement launched an Education Technology managed service for all 1,300 primary, post-primary and special schools and 349,000 pupils
 2000 – A PFI approach to C2k ended with no award – subsequently, the project launched ‘Plan B’ procurement
 2001 – A range of non-PFI contracts was awarded to deliver ‘Plan B’
 2007 – A revision of the NI Curriculum was undertaken
 2008–2010 - Implementation of ‘Using ICT’ arose from the revision of the NI Curriculum
 2009 – A two-year extension was agreed to the existing C2k ‘Plan B’ contracts
 2010 – CCEA introduced ‘Using ICT’ Levels of Progression
 2010 – CCEA introduced the new ICT Accreditation Scheme

1999 - The Dissolving Boundaries Programme used online and face-to-face contact to address post-conflict mistrust between young people in NI and the Republic of Ireland and operated in 300 schools until 2016.¹⁹ Research showed that, together with the European Studies Project, blended contacts enhanced ICT skills, promoted better understanding of pupils from other schools and extended teachers’ professional development in ICT.

2000 - Classroom 2000 was renamed ‘C2k’. Through multi-supplier ‘Plan B’ procurements (replacing the envisaged PFI private finance initiative approach), all 1,200 NI schools were provided with infrastructure, connectivity, digital content and a regional learning platform. Contracts for the Local Area Services were 3-year renewable, and for the Wide Area Service the contract was for 5 years with the option for a 2-year extension followed by renewal.

2001 - Seventeen school educators from NI undertook a Masters’ programme in Educational Technology, taught jointly by Duquesne University, Pittsburgh and the University of Ulster, with a view to boosting support for ICT innovation in schools. Education Technology ‘Sharing Excellent Practice’ Awards²⁰ were established and ran over an eight-year period. Representatives from schools selected as winners were sponsored by the (then) Regional Training Unit to attend the Building Learning Communities summer institutions in Boston, USA.²¹

2003 - Based on an evaluation of progress, with the goals set in 1998, the ‘emPowering Schools Strategy’ revised and updated goals for transforming learning, teaching and leadership through education and technology change.²² It was estimated that by 2003, 70,000 devices on 1,245 local area networks, one in each school, had brought the computer to pupil ratio provided through the central managed service (originally 1:15 in 1997) to 1:5.²³ Broadband speeds in

¹⁹ Austin, R., Abbott, L., Mulkeen, A. & Metcalfe, N. (2003). Dissolving boundaries: cross-national co-operation through technology in education. *Curriculum Journal*, 14(1), 55 - 84. Austin, R. (2006). The role of ICT in bridge-building and social inclusion: theory, policy and practice issues. *European Journal of Teacher Education*, 29(2), 145-161. DOI: 10.1080/02619760600617284

²⁰ DENI. (2004). *emPowering Schools in Northern Ireland – Briefing Paper 7: What does ‘good practice’ look like?* Belfast: DENI.

²¹ <https://novemberlearning.com/educational-services/educational-consultants/alan-november/>

²² Department of Education. (2002). *Education Technology Strategy Management Group Education Technology Strategy Review Report*. Bangor: Department of Education. Anderson, J. (2003). *Empowering Schools Strategy*. Bangor: Department of Education for Northern Ireland.

²³ After 2003, it proved difficult to estimate total computer:pupil ratios, as schools, mainly through their own fund-raising, purchased additional desktop, laptop and other mobile devices to extend the managed service.

post-primary schools averaged 2 Mbps. The New Opportunities Fund (NOF) boosted the provision of ICT-related teacher education for all teachers - the single largest UK-wide rollout of teacher education with a focus on pedagogy, delivered on a regional basis. NOF complemented the leading role of a teacher in each NI school, designated through the Vocational Enhancement Programme (VEP) programme, as an 'ICT coordinator'. To support the emPowering Schools Strategy, the Regional Training Unit engaged four Duquesne Masters graduates to establish the Online Learning and Teaching for Educators (OLTE) Certificate accredited through the Open College Network (OCN Level 4) to build the capacity to design and teach online school and teacher courses. The certificate was achieved by some 450 teachers by 2008²⁴.

2004 - 'A Wider Literacy' was published by Northern Ireland Screen²⁵, making a case for digital education in schools, which led to the establishment of the (still unique) General Certificate of Secondary Education (GCSE) (for 16-year-old young people) and A (Advanced) Level (for 18-year-old young people) qualifications in Moving Image Arts.

2007 - A review and formal revision of the NI Curriculum refined the 1989 definition of 'using cross-curricular ICT' (UICIT) to focus on digital skills through a framework of 'explore, express, exchange, evaluate and exhibit'²⁶. 'Using ICT' is a statutory part of the curriculum, but schools are encouraged to embed 'Using ICT' across the curriculum rather than treating it as a standalone subject. There was development of Key Stage levels: 'Using ICT' was positioned as a cross-curricular skill alongside 'Communication' and 'Using Mathematics', with expectations outlined for pupils at Key Stages 1 to 4.

2008–2010 - A series of policies and guidelines was developed to standardise ICT teaching and assessment. Schools began planning for how best to assess pupils' 'Using ICT' skills. In terms of assessment focus, the emphasis was on the practical use of technology across subjects. Pupils were expected to use ICT to solve problems, manage information, and communicate effectively.

2009 - A second C2k contract upgraded 22,500 desktop computers in 265 post-primary and special schools and video conferencing services to high definition. By 2009-10, 37,800 further devices were deployed across primary, special and post-primary schools, yielding a total average computer to pupil ratio of 1:8.5. Curriculum content development was extended with a range of organisations such as the Ulster Museum, the Armagh Planetarium, the Stormont Legislative Assembly and the National Trust.

2010 - CCEA introduced the 'Using ICT' Levels of Progression, a framework designed to assess pupils' competencies in 'Using ICT'. This was the main assessment tool that schools used, and the framework was divided into five key requirements: *Explore*: Researching and investigating information using digital tools; *Express*: Creating, developing and presenting information using ICT; *Exchange*: Communicating and sharing information; *Evaluate*: Reflecting on the effectiveness of ICT solutions; and *Exhibit*: Showcasing how ICT has been used for a particular task or project.

²⁴ Regional Training Unit. (2007). Putting eLearning Policy into Practice – Online Learning and Teaching for Educators' Programme in Northern Ireland (OLTE). (unpublished)

²⁵ Moore, P. & Bazelgette, C. (2004). *A Wider Literacy*. Northern Ireland Screen.
<https://pure.ulster.ac.uk/en/publications/a-wider-literacy-3>

²⁶ <https://ccea.org.uk/key-stages-1-2/curriculum/using-ict>; <https://ccea.org.uk/downloads/docs/ccea-asset/Resource/Digital%20Skills%20Framework.pdf>

2010 - A voluntary scheme was set up where schools carried out ICT activities across the curriculum, based on CCEA's ICT 'tasks'. Schools submitted portfolios of pupil work and received certificates of accreditation for understanding the standards as set out in the draft Levels of Progression. The scheme was reported to be extremely successful (particularly in the primary sector) over the following few years, prior to the introduction of statutory assessment.

3.1.4 Phase 3 – C2k transitions to a PPP service model for a school-based service (2011-2025)

Key markers

2011 – A contract was advertised for a new Education Network Northern Ireland EN(ni) managed service provider based on a public-private partnership (PPP)

2012 - EN(NI) replaced C2k with revised consolidated contractual arrangements to deliver an integrated managed service

2013–2014 – there was a full rollout of 'Using ICT' Assessment

2015 – Five ELBs merged into a new Education Authority (EA)

2015–2017 – CCEA undertook assessment integration and review

2011-2012 - Full roll-out of two cross-curricular skills ('Communication' and 'UMaths') started in this school year.

2012 - DE reported that, by then, an investment of £632 million had been made over the 12 years since 2000.²⁷.

2012-13 - The third contract took the form of a public-private partnership (PPP). The 'Education Network Northern Ireland' (EN(ni)) managed service, provided by Capita Managed IT Solutions (formerly Northgate Managed Services) provided Europe's first superfast connectivity to an education cloud environment, along with: secure Wi-Fi Internet access in all schools; increased bandwidth; a help desk and user support; and a new 'My School' e-learning gateway personalised for each pupil and teacher. A wide area network (WAN) solution implemented by Hewlett Packard (HP) in 2010 increased bandwidth in primary schools, accommodating video-based applications and reducing the need for additional LAN devices in 900 schools.²⁸.

2013–2014 – The statutory assessment of 'Using ICT' ('UICT') was delayed from 2011-2012 for two years, to allow time for the other two cross-curricular skills to be embedded. After this time, industrial action meant that moderation was voluntary and only some schools submitted levels. Teachers were given additional training to ensure consistency in assessing pupils' 'UICT' skills across schools. They assessed pupils' skills against the Levels of Progression (from Level 1 to Level 7) in the five 'UICT' requirements and started to share assessment data with the Department of Education. This continued to 2019 and the Covid-pandemic period, when assessment arrangements were officially disappplied. The highest number of submitted levels for 'UICT' in those years was 16% of primary schools and 32% for post-primary schools.

2015 - The Education Authority for NI merged the five ELBs into a single authority, absorbing C2k and its staff as a unit, but significantly reducing the number of other teachers employed as school ICT advisory staff, including those (established in 1986 through the VEP) specifically supporting the development of teacher capacity in the use of ICT. In response, over time, IT and

²⁷ <https://www.education-ni.gov.uk/articles/ict-schools>

²⁸ <https://www.replify.com/wan-optimization-solution-education-case-study-c2k/>

software companies such as Capita, Microsoft, Apple, Google and Adobe, local software companies such as Kainos, and other organisations including the three CLCs, stepped up their provision of support through digital learning courses and micro-badge qualifications for teachers. Online social media teacher ‘communities of practice’ in the use of digital technologies also began to emerge. Mutual self-help by teachers grew through local clusters and area learning communities of schools. The EN(ni) contract contained ‘social value’ clauses which provided funding support for e-learning consultants, helping teachers to implement the use of digital technologies in teaching. The Innovation Forum was also established as part of the EN(ni) contract, comprising innovative practitioners to promote, through research, evaluation and information sharing, a culture of innovation in the creative uses of digital technology in classrooms. The Forum contributed to benefit realisation and return on investment in the use of digital services and responded to the need for the managed service to continue to evolve to meet changing needs of schools. It undertook and published twelve significant evaluations of innovative practice in the use of digital technologies. The practice of Excellence Awards, developed initially in 2001, led to the establishment of the NI Schools ICT Excellence Awards, sponsored by C2k and the managed service provider, Capita, now in its eighth year in 2024.²⁹

2015–2017 – There was a period of reflection and refinement for the ‘Using ICT’ assessment framework. Schools provided feedback, leading to adjustments in how ‘Using ICT’ assessments and moderation were conducted. There was increased focus on computational thinking. Across Key Stages 1, 2 and 3, there was a stronger emphasis on ensuring that pupils were equipped with 21st-century skills, including coding, computational thinking and digital creativity. Three new digital qualifications were developed in consultation with industry, made available for first teaching: GCSE Digital Technology (including Multimedia and Programming pathways); GCE Digital Technology; and GCE Software Systems Development. Teacher upskilling events to support these new initiatives were planned and run with industry, across primary and post-primary schools. There was a major focus on curriculum integration as well as support for the new qualifications.

2020 - The impact of school closures occasioned by the Coronavirus-19 pandemic from March 2020 to September 2021 led to a very rapid uptake of online teaching and learning across all schools, facilitated by the well-established managed ICT service, and in particular, by the integrated provision of Microsoft 365 Teams and Google Classroom environments in all schools. At this time, secure Internet connectivity of up to 1Gb and wide area network bandwidth had been improved. Where there were gaps in home online access for pupils, C2k responded, through service contracts, by distributing 30,000 additional devices and 500 local Wi-Fi connections, bringing the number of managed service user devices to 90,000 and the computer to pupil ratio centrally provided by the managed service to an estimated 1:5.

2021 - The Education Authority introduced the EdIS (**E**ducation **I**nformation **S**olutions) programme with a ten-year budget of £750 million.³⁰ to further facilitate the transformation of learning and teaching experiences, develop future skills, improve educational outcomes, develop data analytics, increase parental engagement, and facilitate professional learning for school staff through digital technologies, with school improvement at its core. EdIS procured

²⁹ <https://www.eani.org.uk/news/ni-schools-named-as-leaders-in-digital-excellence-at-the-2024-ict-excellence-awards-ceremony>

³⁰ <https://cypsp.hscni.net/education-authority-launches-750m-education-information-solutions-edis-digital-change-programme/>

the fourth managed C2k service contract by the end of 2023.³¹, as well as renewing and converging other corporate EA computing services for schools with ‘tell us once’ and ‘one source of truth’ design principles.³² In partnership with Capita Education and Microsoft Ireland, EdIS provided 20,400 Microsoft Surface Pro 7 devices, one to every teacher in 1,100 nursery, primary, special and post-primary schools and EOTAS centres - the single most significant simultaneous investment in teacher device provision. The Microsoft Dream Space in Dublin hosted cross-border curriculum development groups comprising teachers from NI and the Republic of Ireland and the LIFE (Learning Innovation for Everyone) Centre in the Odyssey complex in Belfast – Dream Space – stepped up to support teacher professional development experiences and hosted free pupil digital skills classes.

3.1.5 Phase 4 – C2k transitions to a PPP service model for a school-based service (from 2022)

Key markers

2022 – The EdIS Programme was announced, transitioning from EN(ni) and launching a procurement for a new PPP service provider encompassing schools and some school-facing EA services

2023 – The EA EdIS strategic partner and SMS contract was awarded for 2024-2037, which was planned to take the entire NI development to just over 49 years

2023 - ‘Inspiring Digital Learning: a synthesis of research related to digital learning in Northern Ireland’s schools’ report.³³ was produced for the Independent Review of Education by members of the Innovation Forum, recommending that, given the significant investment in ICT in schools, more speed should be accorded to advancing use of, for example, generative artificial intelligence in computer adaptive assessment, supporting learners with specific needs and remote learning to expand access to broader curriculum choice, especially in smaller schools.

2024 - Supported by Microsoft Ireland and the Odyssey Trust, LANTEC Digital, a cross-border micro-credential initiative at Masters’ degree level was piloted with 12 teachers from schools in NI and the Republic of Ireland. The programme, jointly provided by Ulster University, Maynooth University and Lasell University in Massachusetts, applied the pedagogic principles of Universal Design for Learning³⁴ to lever the application of digital technologies. The Minister of Education commissioned a Curriculum Review in NI, with a particular focus on the power of knowledge within the curriculum. Outworkings of that review will concern the future direction of travel. The Minister endorsed a recommendation.³⁵ of the Independent Review of Education to invest in an improved ‘intelligence’ function, to inform decision-making through research, evidence and

³¹ <https://www.eani.org.uk/services/education-information-solutions-edis-programme/edis-engagement-events/edis-roadshow>

³² <https://www.eani.org.uk/services/education-information-solutions-edis-programme/what-is-edis>

³³ Passey, D., Taggart, S., Anderson, J. & Campbell, A. (2023). *Inspiring Digital Learning: a synthesis of research related to digital learning in Northern Ireland’s schools*. Coleraine: Ulster University. <https://www.independentreviewofeducation.org.uk/key-documents/investing-better-future>

³⁴ UDL is a pedagogic framework, based in neurological research, explaining flexibilities in ways learners may be engaged to learn, in how information and content may be presented to them, and what actions they may take to show their learning. The intention is to help teachers overcome learners’ barriers to learning and promote inclusive practices. Applications of digital technologies through a UDL framework potentially contributes to more flexible means of optimising and enriching teaching and learning for the benefit of all learners. <https://tinyurl.com/33m65eyf>

³⁵ <https://www.education-ni.gov.uk/publications/ministerial-statement-independent-review-education>

insight to leverage emerging technologies in response to many challenges facing education that were identified in the Review report.

4. Sustaining Factor 1: Short- and long-term plans and actions

4.1 The rationale and challenge

Digital technologies develop over time. How these changes are managed in schools for young people depends on decisions that are taken at government, local, authority and agency, and school levels. Digital technologies will continue to be important for learning, teaching, administration, management and leadership in schools over at least the next 30 years. This case study shows how one jurisdiction has handled and is handling this challenge over the past, the current and the future.

As would be expected for any national development, there are numerous influences, factors and features that have been and are here recognised as being important, especially when a development is progressed over a considerable period of time. This is the case in Northern Ireland (NI). What is clear is that a considerable feature of the success of NI in sustaining relevant digital inclusive education for 5-18-year-old young people (prior to the latest EdIS initiative) has resulted from its approaches to earlier short- and long-term plans and actions.

4.2 Individuals and agencies

As is usual in situations where emerging concerns lead to widespread interactions, there are key individuals and agencies involved. Some of these key individuals and agencies lead ideas, some are responsible for engagement, others for planning, and yet others for implementation. In essence, the short- and long-term plans and actions in NI that led to sustaining relevant inclusive digital education arose from the interests and concerns of a small number of individuals initially, but led to uses and concerns across the entire educational establishment of NI, involving a number of government departments, government agencies, support agencies, consultants, educational advisors and inspectors, local industries and businesses, all principals and teachers, pupils in schools and an increasing number of parents.

4.3 The key long-term initiatives

The pattern of development in NI has tended to be progressed through a series of service-wide actions, plans and strategies. Three such policy actions within NI are significant in this respect – the Computerised Local Administration System for Schools (CLASS) from 1989, Classroom 2000 (C2k³⁶) that was planned from about 1997 (with first delivery of service in 1999-2000), and the Education Information Solutions (EdIS) Programme planned since 2021. These actions have been long-term – CLASS for six years; C2k (Classroom 2000) for twenty-nine years (progressing through three managed service contracts over that period); and EdIS, which is envisaged to run from 2024 for some 14 years.

In NI, it has been the short- and long-term plans and actions associated with these initiatives, each emerging from the previous one, that have always included relevant consideration of the other four factors identified by the IFIP Task Force: aspiration; diversity, inclusion, the digital divide and the under-represented; computational thinking and its links to problem-solving; and developing teacher practices.

4.4 How the initiatives have been conceived

The three nation-wide actions and plans have never been regarded as ‘projects’ – and they have never been simply considered as a means to provide digital technology on its own. The plans and actions have been much more holistic – based in education, and concerned with teaching

³⁶ Renamed to C2k in 2001.

and learning, with management and leadership. The digital technologies of the times have always been seen as a means to influence and improve educational outcomes, teaching and learning, management and leadership. Even at the outset of the first initiative (CLASS), the message for policy makers and all educators was that what was being enacted would result in a radical change to the administration and management of schools, accommodating implementation and monitoring, development and progression, supported by professionals for professionals. The financial implications of these changes needed to be addressed by incorporating costs into 'business as usual' central funding arrangements underpinning schools.

Principals and teachers were not expected to take on board those elements of ICT provision that could be more effectively provided by other professionals with appropriate specialist experience and expertise; their role as teachers and leaders should not be burdened with the need to constantly engage with elements such as solution design, development, procurement, regulatory and contractual requirements, implementation, support and security, which could be provided through centrally provided managed support services. In short, 'leaving schools free to concentrate on what they do best'.

In essence, the policy sought to ensure that schools had their provision of educational technology services underpinned by addressing three key equalities:

Equality of provision across schools, for example, to ensure that every school had at least the minimum provision and support to enable it to implement technology supported changes to teaching, learning, administration and institutional management.

Equality of risk sharing between the ICT industry and schools – meaning that it was not acceptable for industry to simply supply schools with a “kit of parts” leaving them to turn it into a functional safe and secure ICT system; the industry must take the risk of supplying and supporting working solutions.

Equality of professional responsibility, requiring an understanding that policy makers must accept their professional responsibility to accept risks and responsibility associated with creating and funding strategic and organisational structures necessary to ensure that reliable, cost effective and appropriately supported ICT provision would be made available to schools. For their part, educational leaders and practitioners must accept their professional responsibility to develop school-based approaches to ensure such provision would be used to improve the quality of teaching, learning and institutional management and raise standards.

Effective policy had to go beyond simply dividing up the available funds between schools; and by ensuring that these three equalities were effectively addressed, providing NI schools with the best opportunity to succeed in delivering educational change implicit in appropriate uses of educational technology and thus delivering benefits necessary to justify the significant financial investment in educational technology.

4.5 Scale and scope

From a planning point of view, and an implementation perspective, NI has been regarded by those key architects responsible for plans, strategies and actions as being ideal in terms of size and scale. NI is a relatively small nation (Figure 1 shows the county structure of NI); it covers just over 14,000 km² with 1,079 schools in 2024).

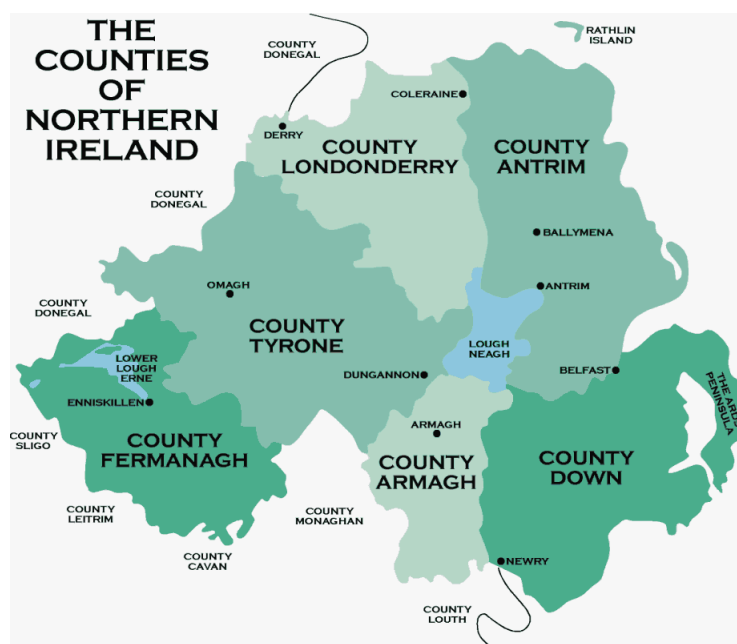


Figure 1: Counties of Northern Ireland (Source: Pinterest.³⁷)

It is felt that NI is small enough, so that a lot of people know one another, across different sectors; so, it is possible to bring people together and to influence and spread messages. The scale is felt to facilitate success, but it is also recognised that it may be a disadvantage if a dominant idea or challenge arises for any reason, without reasoned argument or concern, as messages can spread rapidly through a relatively small community. Total population, teacher and pupil numbers for 4-5-year periods between 1990 and 2024 are shown in Table 2.

Table 2: Total population, with teacher and pupil numbers for NI

Year	Total NI Population ^{38, 39}	Teachers (FTE)	Total Pupils in Primary, Post-Primary and Special Schools
1990/91	1,595,595	18,441.0	334,677
1995/96	1,649,131	20,345.0	347,011
2000/01	1,682,944	20,452.6	340,647
2005/06	1,727,733	19,507.2	326,329
2010/11	1,804,833	18,842.6	315,738
2015/16	1,854,943	18,377.5	324,507
2020/21	1,900,523	18,724.7	338,400
2023/24	1,920,382	19,702.5	343,016

³⁷ <https://tinyurl.com/3arp5cv7>

³⁸ <https://www.statista.com/statistics/383733/northern-ireland-population-timeline-uk/#:~:text=The%20population%20of%20Northern%20Ireland,increased%20by%20approximately%20370%2C000%20people>

³⁹ The population of NI comprises about 3% that of the United Kingdom (UK) and some 30% of the island of Ireland. The NI state was formed in 1921 as a part of the UK, with its own legislative assembly until 1972, when direct rule from London operated for 27 years until the signing of the ‘Belfast Good Friday’ Agreement in 1998.

4.6 Educational management structure in Northern Ireland

Whilst the overall number of schools in Northern Ireland is relatively small (see Table 3), those schools are managed via a complex educational management structure that includes a range of sectors that are managed by separate non-departmental public bodies including the Education Authority, the Council for Catholic Maintained Schools, the Northern Ireland Council for Integrated Education, and in respect of Irish medium schools, Comhairle na Gaelscolaíochta. In addition, there are a small number of voluntary grammar schools with a devolved governance model, whose interests were co-ordinated through the Governing Bodies Association (GBA).

The relationship between these managing bodies and their schools is shown in Figure 2. Table 3 shows the numbers of schools in each sector across 5-year intervals from 1990 to 2024. Figure 3 shows the proportion of pupils in each school sector, the phases (age ranges) covered, and provides a short overview of their individual school management structures.

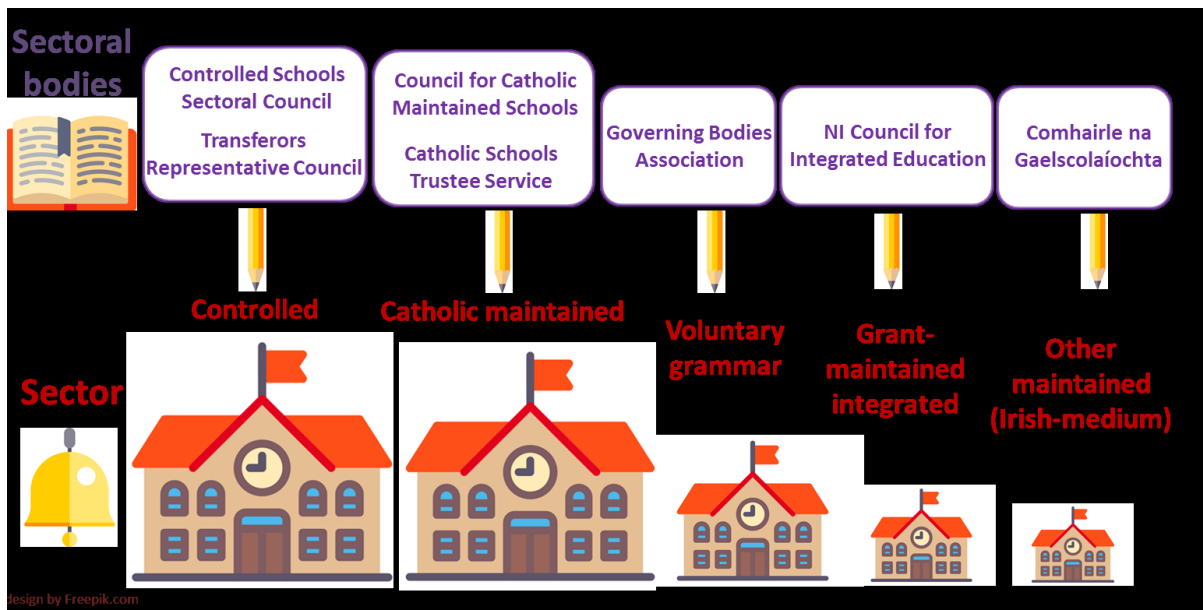


Figure 2: School sectors and their managing bodies.^{40, 41}

⁴⁰ <https://www.niassembly.gov.uk/globalassets/documents/raise/publications/2016-2021/2016/education/4416.pdf>

⁴¹ It should be noted that not all Irish Medium schools are Other Maintained. There were two Controlled and one Catholic Maintained Irish medium primary schools in 2023/24.

Table 3: Number of schools in NI by sector

Year	Controlled and Controlled Integrated Schools	Catholic Maintained Schools	Voluntary Grammar and Preparatory Schools	Grant Maintained Integrated Schools	Other Maintained Schools	Total Primary, Post-Primary and Special Schools
1990-91	648	539	72	9	16	1,284
1995-96	612	514	72	23	10	1,231
2000-01	599	500	71	30	13	1,213
2005-06	564	488	66	37	23	1,178
2010-11	523	468	65	38	27	1,121
2015-16	498	439	61	38	32	1,068
2020-21	489	416	61	38	31	1,035
2023-24	483	408	61	38	30	1,020

Sector	% of pupils	Phase	Overview
Controlled	39%	Nursery, primary, secondary, grammar and special	<ul style="list-style-type: none"> • Provided and managed by the EA through Boards of Governors • Primary and secondary Boards include transferor members (Protestant churches) • Some controlled integrated schools (further 2% of pupils)
Catholic maintained (voluntary maintained)	36%	Nursery, primary, secondary and special	<ul style="list-style-type: none"> • Roman Catholic ethos • Boards of Governors include trustees appointed by CCMS
Voluntary non-maintained	15%	Grammar	<ul style="list-style-type: none"> • Voluntary grammars • Self-governing: higher levels of autonomy • Boards include trustee/foundation governors
Grant-maintained integrated	5%	Nursery, primary and secondary	<ul style="list-style-type: none"> • Integrated ethos • Self-governing • DE has a duty to encourage and facilitate integrated education
'Other' maintained (voluntary maintained)	1%	Nursery, primary, secondary and special	<ul style="list-style-type: none"> • Mostly Irish-medium schools • DE has a duty to encourage and facilitate Irish-medium education

Figure 3: Proportion of pupils in 2015-2016 in each school sector, phases (age ranges) covered, and an overview of individual school management structures.⁴²

⁴² <https://www.niassembly.gov.uk/globalassets/documents/raise/publications/2016-2021/2016/education/4416.pdf>

In NI, all but 13 independent schools in 2024 were grant aided, and post-primary (secondary) schools are either academically selective, non-selective or all ability (i.e., comprehensive). Table 4 shows school numbers grouped between 1990 and 2024, but it should be noted that some grammar schools are not selective, and the vast majority of non-grammar schools are non-selective.

Table 4: Numbers of grant-aided schools in NI by age and special needs grouping⁴³

Year ⁴⁴	Primary Schools	Preparatory Schools	Total Primary Schools	Non-Grammar Post-Primary Schools	Grammar Post-Primary Schools	Total Post-Primary Schools	Special Schools	Total Primary, Post-Primary and Special Schools
1990-91	973	26	999	169	70	239	46	1,284
1995-96	923	25	948	165	71	236	47	1,231
2000-01	902	22	924	168	73	241	48	1,213
2005-06	886	17	903	161	69	230	45	1,178
2010-11	846	17	863	149	68	217	41	1,121
2015-16	814	13	827	135	67	202	39	1,068
2020-21	791	12	803	127	66	193	39	1,035
2023-24	777	12	789	126	66	192	39	1,020

Considering some aspects of diversity within schools, an overview of pupil enrolment by school setting, showing numbers of pupils with special education needs and entitled to free school meals (FSMs) for the school year 2022-2023, is shown in Figure 4.

⁴³ <https://www.education-ni.gov.uk/topics/statistics-and-research/statistics>

⁴⁴ Year dates refer to the school year (i.e., 2019 refers to the 2019-2020 school year).

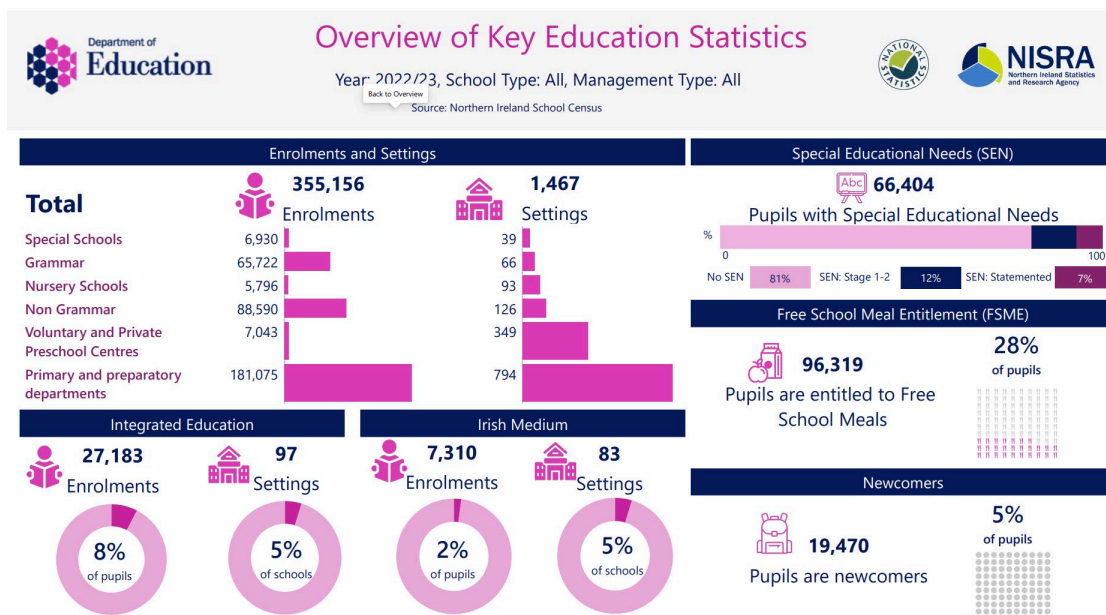


Figure 4: Pupil enrolment for the 2022-2023 school year by school setting, with numbers of pupils with special educational needs, entitled to FSMs, and registered as newcomers.⁴⁵

At the start of both the first and second ‘business as usual’ actions and plans (CLASS and C2k), education (including educational ICT provision) was managed through five geographically separate Education and Library Boards (ELBs). Whilst CLASS as the MIS service provided was always managed centrally and delivered locally, the educational ICT provision was for the most part managed and delivered via the individual ELBs and their educational ICT advisors. Whilst these advisors met regularly to share what each ELB was doing in respect of educational ICT provision and to plan approaches together, implementation did vary significantly at a local level. So, a move to the centrally provided C2k educational ICT solution clearly offered some challenges at different levels. Over time, and by agreement, C2k and the five ELBs took forward converging and increasingly shared and complementary responsibilities – an approach facilitated by the establishment of an Inter Board Educational Technology (IBET) coordinating committee comprising senior representatives of C2k ‘Using cross-curricular ICT’ and the IT Advisors and the creation of a single Education Technology Strategy setting out common goals. However, by 2015, the Department of Education merged the five ELBs into a single Education Authority (EA) for NI schools, and educational technology provision became more cohesive.

4.7 The initial external drive

In 1980, the Department of Education and Science (DES) in England, working closely with the Departments of Education in Wales and Northern Ireland,⁴⁶ encouraged all schools to take new technology forward, through a curriculum development programme, at the same time providing a microcomputer to each school, supported by a cross-nations agency, the Microelectronics Education Programme (MEP).⁴⁷ Organised regionally, NI comprised one of the 14 regions that constituted the MEP. At the time, in NI, the regional legislative assembly was suspended, and all public policy was governed by direct-rule ministers from Westminster for a 27-year period from

⁴⁵ <https://www.education-ni.gov.uk/publications/education-data-infographics-202223>

⁴⁶ Education policy is devolved to each of the four legislative assemblies across the United Kingdom. Scotland established its own separate, but parallel, programme to MEP, the Scottish Microelectronics Development Programme.

⁴⁷ https://en.wikipedia.org/wiki/Microelectronics_Education_Programme

1972 to 1989. Direct-rule afforded senior civil servants in NI a certain degree of latitude in advising ministers on policy making and a NI-focused series of actions were taken forward, by setting up an advisory group in 1984, which emerged from the activities of the Northern Ireland Regional Programme Committee (NIRPC), a part of the wider MEP. The role of advisory and discussion groups across NI, and across stakeholders, set a pattern which continued to play a key role in the developments that subsequently occurred. The NIRPC advisory group, wishing to involve stakeholders from across NI, had members from the government department, from initial teacher education, from the Northern Ireland Council for Educational Development (NICED), from the ELBs, and from schools.⁴⁸

4.8 Establishing an initial operational unit

From 1989, the CLASS Project was established, with the Western ELB acting as the lead Board for all five ELBS. That initial focus was on the development and implementation of IT systems to support a wide range of school administration and management functional areas including those necessary to support devolved budgetary management to each of the 241 post-primary schools locally.

The CLASS software solution was deployed on a standard ICT infrastructure, the scale of which was dependent on the size of the individual school (shown in Table 5).

Table 5: Software solution deployed according to school size

Initial Hardware Provision for MIS Systems in all 241 Post-primary Schools, 1990-1993				
	Number of Pupils	Number of Schools	Number of Networked Computers	Number of Networked Printers
Small Schools	<400	66	5	2
Medium Schools	400-800	128	7	2
Large Schools	>800	47	10	3

Recognising the complexity of supporting change across so many school functions and within the complex educational management structures pertaining in NI, the CLASS Project Director established a multi-disciplinary team in each of the five ELBs and was supported in establishing the teams and the ongoing development and delivery of the CLASS project by a range of consultants from PricewaterhouseCoopers. Line management across the five CLASS ELB implementation teams was established via the creation of a CLASS Senior Management Team (SMT) comprising team leaders from each regional ELB team and chaired by the Project Director. This was critically important, ensuring that software being procured, and training and support being delivered, could be implemented across all types of schools in the five ELBs in a standard way, ensuring that economies of scale and high-quality support could be achieved.

Within each of the five ELB teams, virtually all members had experience of working in schools, be that at the administrative level, financial management level, or the curriculum planning and timetabling level. The teams were all led by individuals who had been senior leaders in schools with a track record of successfully delivering educational change. This approach was adopted because whilst it was recognised that ultimately sustainable educational change needed to be

⁴⁸ NIRPC (MEP) and NICED. (1986). *Information Technology in Northern Ireland Education*. Belfast: NICED Centre.

delivered from within a school, it needed to be supported externally by those who themselves had a credible track record of delivering such change.

In addition to the 5 ELB-based implementation teams, project delivery was crucially supported by the existence of a central team. Initially described as a development team, it quickly became reconfigured to act as a central support team (CST). CST had both an outward facing and inward facing role. In its outward facing role, it was the interface between CLASS and its various external suppliers, ensuring that products and services procured and subsequently delivered to the project were as specified in the various requirements' documents and could be successfully integrated into a reliable and workable school solution. This team also led on the multiple interfaces (both technical and policy) between CLASS and the wide range of other key players in the NI educational system who would be impacted by the changes being facilitating in schools. A crucial contributor to the eventual success of CLASS and its subsequent iterations was the quality of the relationship between the project and its key suppliers. Both the original prime contractors (RM and ICL) recognised the strategic nature of the project they were supporting, and the interface between the project and the senior leadership of its prime contractors was effective in addressing the many challenges that delivering such a complex project presented.

This was particularly the case in respect of its MIS software supplier (SIMS Ltd., latterly Capita Ltd.). Whilst SIMS had a very large share of the UK MIS marketplace prior to being award the CLASS project MIS contract, there is no doubt that responding to the complex Output Based Specification that underpinned their contract with CLASS, whilst at the same time meeting the needs of their wider user base, was challenging. Again, it was the professionalism and pragmatism of the senior leadership in both organisations that ensured that quality MIS solutions were delivered and deployed to NI schools. This was reflected in a recent overall judgement of a senior director of SIMS at that time when he opined: "CLASS/C2K were incredibly demanding... but I truly believe the CLASS/C2K team helped us to become better".

In its inward project facing role, CST developed and delivered master tapes to the implementation teams that would be used to initialise and subsequently update the systems in individual schools. It also developed centralised training and support documentation and designed the training programmes used to introduce the solution to school users. In essence, the five ELB implementation teams and CST were integrated into a single nation-wide project acting under the direction of a Project Director reporting to a Project Board containing senior representatives of each of the key educational organisations in Northern Ireland. The Project Director was supported by his Senior Management Team comprising (as outlined earlier) the leaders of each of the ELB implementation teams and the head of the CST.

In its approach to procuring solutions, it is important to note that CLASS (and indeed all its successor projects) did not approach the ICT marketplace seeking the identification of suitable products – they were clear from initial market research and engagement with stakeholders that no existing product would meet their needs. The approach, therefore, was to go to market with a comprehensive Output Based Specification (OBS) seeking a software supply and development partner who would be contractually bound to developing a solution which would meet the requirements of the OBS. This meant that working with key stakeholders was critical. The key software partner initially identified (SIMS Ltd.) had considerable experience in developing school-based software solutions and their close partnership with the NI projects contributed significantly to the quality of the solution eventually deployed in NI schools and consequently taken up more widely across the UK.

It is also worth noting that whilst in later years CLASS/C2k would seek to appoint suppliers on a Public Private Partnership (PPP) model in its early configuration, it appointed contractors via traditional government supply and support contracts. It was the manner in which the interface with suppliers was managed by CST and the quality and scope of the support available to schools via the implementation teams that ensured the provision of MIS solutions in schools was to all intents and purposes, from the perception of schools, a managed service provision.

This is in line with the “three equalities” that were outlined earlier – policy makers took the risk of establishing central arrangements through which a solution could be defined, procured, implemented and supported, while the ICT industry took the risk of providing an integrated solution to meet the requirement so that schools (with support) were free to focus on how to implement the resulting administrative, organisational and educational change.

Whilst many stakeholders initially might have conceived the work of CLASS as being simply and exclusively a school administration project, it was, notwithstanding its acronym, seen by the CLASS team as a project concerned with not just improving the administration of schools but as an opportunity to improve the effectiveness of educational institutions. The journey from administration to effective educational management was articulated by CLASS in a schematic initially developed by a CLASS support manager in WELB (shown in Figure 5).

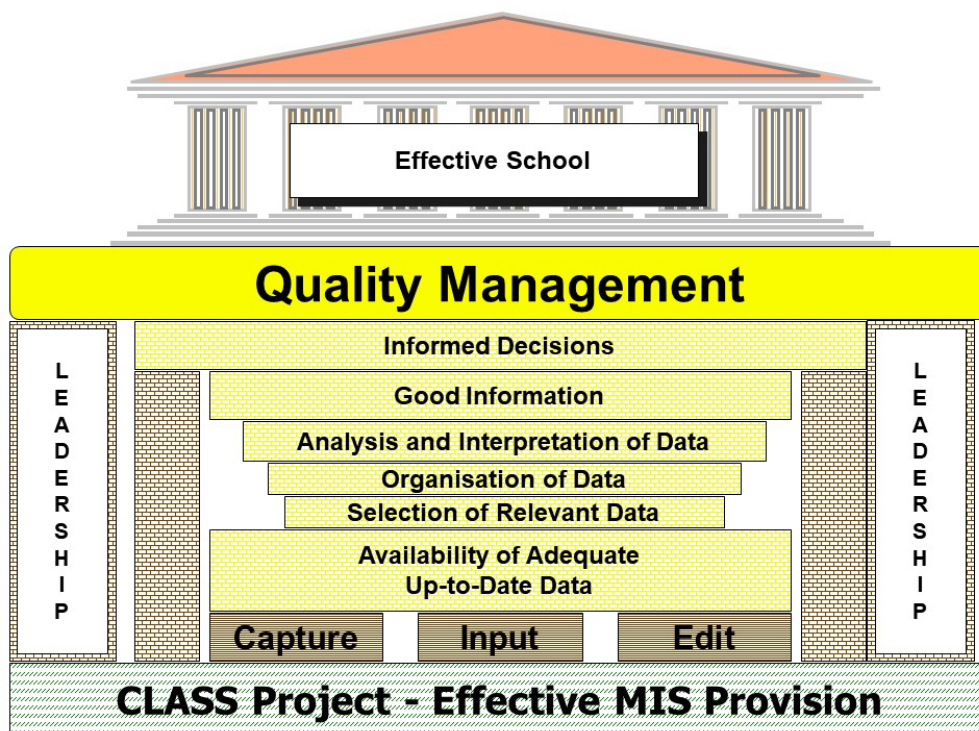


Figure 5: The CLASS project approach to supporting effective school management

4.9 *Generating awareness and acceptance of ‘business as usual’*

Recognising that CLASS was not just a project about computerised administration but about an opportunity to deliver institutional change, it was necessary for the concept of long-term support to be understood, appropriately resourced and accepted, especially by those who would provide the finance for the initiatives that would develop. Much of the funding for technology support in schools had historically been via ad hoc short-term funding streams, and the support was often delivered via staff on short-term secondments. This resulted from the fact that many of those responsible for funding such initiatives had limited background and

experience in understanding the requirement for long-term support to be available to schools implementing technology that facilitated change programmes. Funding adequate long-term support had to become a ‘business as usual’ cost in the education budget.

It was critically important that the vision of CLASS, which would be long-term and ‘business as usual’, could be explained so that government officials could see the benefits and would understand the ways in which the initiatives would operate, according to regulations that might need to be met. This understanding in NI was significantly facilitated by inputs from the project advisors at PricewaterhouseCoopers and by the findings of a 1993 report by the NI Education and Training Inspectorate, which reported on the solution being developed and implemented by CLASS in schools that it represented. The report concluded that CLASS was:

“an integrated management system of considerable value, which can be used to reshape management roles and responsibilities for school development planning, monitoring and self-evaluation, within senior management, and indeed for all teachers” (DENI Inspection Report, 1993).

The business case underpinning provision of some 50+ staff to meet the long-term support arrangements for CLASS recognised the value-for-money being achieved by ongoing sustainable central provision as opposed to the costs associated with a multiplicity of school-based approaches. It noted the much-reduced unit costs for equipment, software, connectivity and support services already being delivered through a centralised support arrangement. It also took account of the implications for the wider educational system of having to meet the integration and support costs of having multiple poorly supported and incompatible solutions emerging in schools. Finally, it was able to demonstrate the considerable administrative savings flowing from the use of effectively supported MIS systems recognising that they needed to be regularly updated to take account of the frequently changing administrative and management demands being placed on schools.

Thus, the need to ensure the costs of long-term support arrangements for CLASS became integrated into the ‘business as usual’ baseline costs of the Northern Ireland education system. CLASS thus transitioned from becoming what was initially envisaged as a 4-year project to becoming a long-term support service for schools, albeit at that time focused only on post-primary schools and on MIS provision.

Risk transfer to the owner best placed to manage each risk was a further issue that needed to be resolved within the contractual arrangements. Whilst a private sector partner involved could accept certain elements of risk transfer, eventually, accommodation was accomplished through working with an appropriate risk transfer model, recognising that some risks were more appropriately placed with the private sector partner and others in the public sector. In this way, the costs of inappropriate risk transfer, which might have caused escalating costs, could be managed in an affordable manner.

4.10 Standard approaches and underpinning educational focus

Working across the five ELBs was initially challenging, in that implementation of provision would be best accommodated by standardisation of equipment and specification. One action that supported a move towards standardisation was building what was a NI-wide team but with specific expertise in local implementation within each of the 5 ELBs. This created a centrally managed but locally delivered approach which involved all ELB teams in central concerns and decisions.

Taking forward the initial approaches of CLASS, advisory groups and wider discussions (importantly including representatives from each of the school groups) enabled key elements for policy and strategy to be identified that would support the needs of all stakeholder groups. The document produced by NIRPC and NICED set out four cross-curricular areas of potential involvement of information technology (IT) in education: the 5-16 curriculum; examinations; teacher education; and administration.

By 1989, and responding to moves across the United Kingdom (UK) to clarify and rationalise the school curriculum, discussions on the ways that IT could be considered for the 5-16 curriculum were reported in a key document⁴⁹, commissioned by and reporting to the direct-rule minister responsible for education policy at that time, showing how the long-term focus could be on cross-curricular IT. The document importantly demonstrated and illustrated how five key components of IT could be integrated into subject areas across the 5-16 curriculum: communication; information handling; modelling; measurement and control; and evaluating the impact of information technology on teaching and learning. This document set the foundation for sustaining relevant inclusive digital education to this current time (2024).

4.11 The first initiative

By 1990, the CLASS initiative was in place. The initiative was set up through a government department contract as a regional initiative led by the Western ELB (WELB) on behalf of the 5 ELBs. Working across the 5 ELBs, an organisational structure⁵⁰ was set up to co-ordinate and manage consultation and implementation. The organisational structure involved a project board, CLASS senior management team, team leader implementation, and six co-ordinating committees (focusing respectively on resources modules, curriculum modules, core modules, configuration management, office support systems, and one for consultation with the 52 voluntary grammar schools which had a devolved governance model). The original contract⁵¹ for the provision of hardware, software, and support services to 241 post-primary schools was awarded to RM Ltd., and the provision of MIS software was via RM's chosen subcontractor, SIMS Ltd.

By 1992, longer-term support for schools was highlighted within an internal report⁵². Having established computerised local administration and management, the additional services to support schools more widely beyond 1994 were identified as: help desk facilities; remote diagnostics; training; configuration management; onsite support; software maintenance contract management; hardware maintenance contract management; customisation services; maintenance of interfaces; contingency services; consultancy services; and enhancement/development services.

Support for primary schools across NI was established from 1993 through a 'sub-project' of CLASS known as the Computerised Local Administration in Primary Schools (CLASPS) initiative. The original contract for the provision of hardware, software, and support services to primary schools was awarded to ICL Ltd., and the provision of MIS software was via ICL's subcontractor, SIMS Ltd.

⁴⁹ Cross Curricular Working Group on Information Technology. (1989). *Information Technology: A Cross Curricular Theme*. Belfast: Northern Ireland Curriculum Council.

⁵⁰ Personal communication. (2024). *Subject Revised CLASS Project Organisation and Control Structures*.

⁵¹ Personal communication. (2024). *The Contractual Arrangements for the Provision of MIS software to Northern Ireland Schools*.

⁵² CLASS Project. (1992). *Long Term Support: Optional Evaluation – Interim Report*.

A major contributory factor that enabled further initiatives and development to be positively discussed was the widely recognised success of the CLASS initiative. As part of the initiative, all schools were provided with equipment, facilities and a managed service support based on pupil numbers. Part of the way through the initiative, an Inspectorate Report in 1994⁵³ recognised the success of the initiative at that time and recommended further support. The report stated that: “schools rated the training provided by the CLASS implementation teams generally as ‘first class’... those interviewed, without exception, considered the work of CLASS personnel to be excellent and hold their professionalism in the highest regard... Their practical experience and approaches inspired considerable confidence... All schools are concerned about their need for longer-term support”.

Software to support a wide range of student and staff systems, curriculum planning systems, financial management systems (LMS)⁵⁴ and tools to support reporting and analysis introduced by CLASS are summarised in Table 6.

Table 6: Software and systems available to schools from the CLASS project

Student and Staff Systems	Curriculum Systems
System Management	Curriculum Modelling
Student Records	Timetable Construction and Analysis
Personnel Records	Student Options
Exams Administration and Management	Class Cover
Pupil Attendance	Curriculum Planning
School Admissions	Student Assessment
Special Educational Needs	Reports and Profiles
Financial Management Systems	Reports and Analysis Tools
Purchase Order Processing	Report Generation
Accounts Payable	Management Information and Analysis
Accounts Receivable	Development Planning
Budget Planning	Management Alerts
General Ledger	Value Added Analysis
Equipment Management	Exam Analysis
Library Management	Links to ELB/DENI/Examination Boards

4.12 Moving towards the second initiative

By 1996, a single future development approach had been organised and agreed across the five ELBs, which would expand the central provision of MIS provision to encompass the use of ICT to support teaching and learning. The Western ELB was agreed to act again on behalf of all ELBs in terms of procurement of an education technology managed service (which would host the second, Classroom 2000 (C2k) initiative). The Northeastern ELB (NEELB) provided the complementary lead development concerned with chairing a group which would develop a comprehensive NI-wide Educational Technology Strategy.

The government Department of Education in NI (DENI) had established this education technology strategy group to bring some consistency to the different approaches being taken by the separate ELBs and to develop an NI response to the March 1997 Stevenson Report, which sought to produce in respect of England: “an objective analysis of the current usage of ICT in

⁵³ Personal communication. (2024). *Group Reviewing the Need for Long Term Support for CLASS 1994*.

⁵⁴ <https://www.niauditoffice.gov.uk/publications/local-management-schools>

schools; and to suggest on the basis of this analysis a desirable set of priorities for Government after the next election”⁵⁵.

The work of the NI group (the Education Technology Strategy Group) chaired by the NEELB Chief Executive led to a strategy document⁵⁶ being published and launched in late 1997. The strategy identified the stage reached at that time, and consideration was given to the long-term needs of learners, their information and communication technology (ICT) skills, teachers and education technology, schools and resources, implementation and support, further education institutions, and action points. It was stated in the document that success would be judged on the basis of: improved uptake and quality of uses of educational technologies across the curriculum; in teacher training and advisory and support services; improved levels and distribution, and access by teachers and learners; improved home-school links; improved process of learners ‘learning to learn’; exploitation of the diversity of new technologies; and identifying what worked well.

With the re-establishment of a legislative assembly for NI in 1998, responsibility for education in NI returned to a locally elected minister in the Executive of the Northern Ireland Assembly. This followed the signing of the Belfast Good Friday Agreement, which also influenced actions and plans from that time forward. During this same period, both the British Educational Communications and Technology Agency (Becta) and the National Grid for Learning⁵⁷ (NGfL) in England and associated grids for learning in Wales, Scotland and Northern Ireland were established in the UK, and NI benefited from working with these groups, although NI took forward its own implementation in a specific way. Coordination with the wider UK system was facilitated by the fact that the Chief Executive of Becta attended the NI Educational Technology Strategy Group, and the CLASS Project Director was a member of the board of Becta. The involvement from 2000 onwards of the Head of the C2k Central Support Team in the UK-wide Regional Broadband Consortium initiative was a further opportunity for shared learning and for mutual benefits to be derived.

4.13 The second initiative

Classroom 2000 (C2k) was established as a means to support the implementation of the Educational Technology Strategy⁵⁸. Procurement of solutions was initially envisaged as being through a private finance initiative (PFI) - a procurement method using private sector investment to deliver infrastructure and services which were specified by the public sector. PFI essentially envisaged a long-term contract between the public sector and private sector institutions, with private capital financing for infrastructure and services up-front, with usage-based revenues from the public sector repaying the initial investment over the course of the contract. Government policy at the time meant that this method of procurement was to be the preferred option for large-scale infrastructure projects and thus was the chosen procurement route for C2k.

However, the application of PFI to large IT projects was particularly challenging, compared to its use for projects such as new schools or hospitals. The fundamental difference was that in the

⁵⁵ Stevenson, D. (1997). *Information And Communications Technology in UK Schools - an Independent Inquiry*. London: Independent ICT in Schools Commission.

⁵⁶ DENI. (1997). *A Strategy for Educational Technology in Northern Ireland*. Belfast: DENI.

⁵⁷ https://en.wikipedia.org/wiki/National_Grid_for_Learning

⁵⁸ DENI. (2004). *empowering Schools in Northern Ireland – Briefing Paper 2: What does C2k provide for Northern Ireland schools?* Belfast: DENI.

case of schools and hospitals the asset has a longer life than the contract. This was often not the case with IT projects where the asset (the IT system) had a relatively short lifespan compared to the length of the contract. Thus, the concept of hardware and software refresh needed to be built into an IT-based PFI project significantly increasing the risk to the provider and public sector user.

Additionally, whilst many of the political arguments in favour of PFI as a procurement model at that time talked about its ability to transfer risk from the public to the private sector, the danger of inappropriate risk transfer could result in the public sector facing very significant charges before the private sector would accept the risk transfer. At its heart, it was the inability of the private sector to offer a PFI-based value for money solution that resulted in the private sector partner withdrawing from the PFI-based C2k project in December 1999.

During the complex PFI-based procurement, C2k had recognised the risks associated with being unable to agree a contract and for that reason had ensured that a representative of HM Treasury Task Force was embedded in the procurement team. This ensured that in the event of failure the integrity of the approach being taken by C2k could be validated. Additionally, working with its advisors at PricewaterhouseCoopers, C2k had developed a robust internal 'Plan B' to ensure that the overall delivery of the wider Educational Technology Strategy would not be impacted by a PFI procurement failure. In the event, 'Plan B' was implemented.

4.14 'Plan B' Provision

At its heart, the 'Plan B' provision was based on the delivery of 30 service elements via five key service categories which comprised school-based infrastructure services, connectivity services, educational content, help desk and user support services, and service development.

It was recognised that the revised approach carried more integration issues which would need to be resolved by the public sector; the 10-year funding was less secure, and resourcing would therefore be more dependent on annual or three-year government funding cycles. It was also recognised that whilst initial provision to schools was likely to be deployed quicker, the solution would be less elegant than the envisaged PFI approach. It was also accepted that the new approach would be more flexible going forward than the PFI model (and thus have a greater ability to respond to changing technology trends) and that the contractual model being used – standard government supply and support contracts - was legally more straightforward than the PFI contractual model but meant that C2k would have many more separate contractual relationships to manage. At that stage of its development, C2k in general, and its Central Support Team in particular, had considerable experience in the procurement and contract management of complex educational ICT solutions and it was considered that the additional integration risk inherent in 'Plan B' was therefore manageable.

Figure 6 shows the overall service delivery model for the initial C2k 'Plan B' service between 2000 and 2010.



Figure 6: 'Plan B' service delivery summary

Managed Service Provision for C2k is shown in Table 7, with solutions being procured from a range of suppliers under Becta Managed Service Contracts that offered a range of potential suppliers, thus maintaining competitive pressures and a high degree of fit with the Infrastructure Statement of Requirements. At that time, the ratio of government-funded computers to pupils in all schools reached 1:9.

Table 7: Provision to schools through the 'Plan B' contract commencing in the year 2000

Provision of 'Plan B' School-based Infrastructure			
School Type	Number of Schools	Average Number of Systems	Total Systems
Post Primary	238	90	21,600
Special	50	20	1,000
Primary >180	342	30	10,200
Primary <180	279	12	3,400
Very Small Primary	317	5	1,600
Totals	1226		37,800

Connectivity Services were procured by extending existing contracts for Wide Area Network (WAN) provision with 5-year termination options.

Educational Content – C2k had a range of contracts to provide laptops and content for teachers, and a review of procurement law confirmed they could be used to provide a source of content for the wider C2k initiative. Initially, some 40 educational titles would be provided to schools, rising to 200 over a two-year period. Support for educational content would be provided by the ELB Curriculum Advisory and Support Service (CASS), coordinated via the previously described coordinating group.

Help Desk and User Support – this would be provided by retaining, enhancing and extending the existing central help desk facility that was provided under the CLASS project.

Over the ensuing twenty-plus years, C2k would adopt an evolutionary approach to its procurement methodologies. From 1999 to 2010, its provision would be largely based on standard government supply and support contracts via the structure as set out previously. From 2010 to 2023, school-based provision would move to a more Public Private Partnership (PPP) model where risk sat with the organisation best placed to manage it. In December 2023, the Education Authority signed a new 13-year PPP-type contract for the provision of IT based educational solutions, based on a new PPP-type contract, but on this occasion encompassing

not just provision for schools but a number of key educational administration systems within the Education Authority itself.

Its aim was to deliver high quality, sustainable infrastructure, connectivity and resources. The services were provided at no cost to the schools, with entitlement based on pupil numbers alone. Across the CLASS and C2k projects, provision for managed ICT services was not included for nursery pre-schools. To deliver the services to its schools, C2k worked with both private and public sector partners, in order to install, maintain and upgrade the provision, using specialist providers. The technical components of the managed service were originally contracted to a local company, Northgate Managed Services, but from 2013 Capita acquired the company and took the contract forward until 2025.

Following a review of the 1997 strategy in 2002⁵⁹, a revised vision and strategy closely aligned with the goals set out for the NI curriculum⁶⁰ was published in 2004. The 2004 strategy highlighted that young people should learn with, through and about the uses of digital and online technologies, to develop competences as individuals, as contributors to society, as contributors to the economy, and as lifelong learners. The 2004 strategy indicated that the previous strategy (1998-2003) had achieved common infrastructure and networking, universal broadband connectivity, a reliable managed ICT service, a sustainable and affordable solution, common curriculum content, teachers' professional development, instances of excellent practice, and awareness of the need for change.

In terms of the educational ICT provision, the centrally managed service approach adopted in NI has removed issues and concerns for teachers and schools around a wide range of challenges traditionally associated with school-based provision of ICT including solution design, procurement, implementation, support, solution security, networking and infrastructure refresh. Beyond this, schools can move forward in their own ways in terms of how they use the system, and they may consider what they might wish to individually and affordably add to the system. Some schools might have desired for more input into individual allocation of devices to their school, to build on what they each had rather than what might have been seen as a 'one-size fits all'. Schools can add to their allocation, but this depends on their means and funds to do so. However, it is recognised that the managed system is a major resource for schools in NI, which also includes technology support rather than schools having to install equipment and maintain it themselves. So, although they might want to add additional technology to the system, it already provided a very strong foundation of security, infrastructure and connectivity. These different levels of infrastructure and how use in one classroom in one school was enabled is illustrated in Figure 7.⁶¹ All schools are linked on the same system, so service-wide education initiatives can be taken forward in a systematic manner so that no single person, not one single child, is left behind.

⁵⁹ DENI. (2002). *Review of The Strategy for Education Technology in Northern Ireland*. Belfast: DENI.

⁶⁰ DENI. (2004). *Transforming learning, teaching and leadership through education and technology change: Vision, Strategy, Action Planning and Milestones to 2008*. Belfast: DENI.

⁶¹ Passey, D. with Anderson, J. (2018). *School improvement and digital technologies: Using managed service/support in schools in Northern Ireland with case studies of success*. Lancaster University: Lancaster.

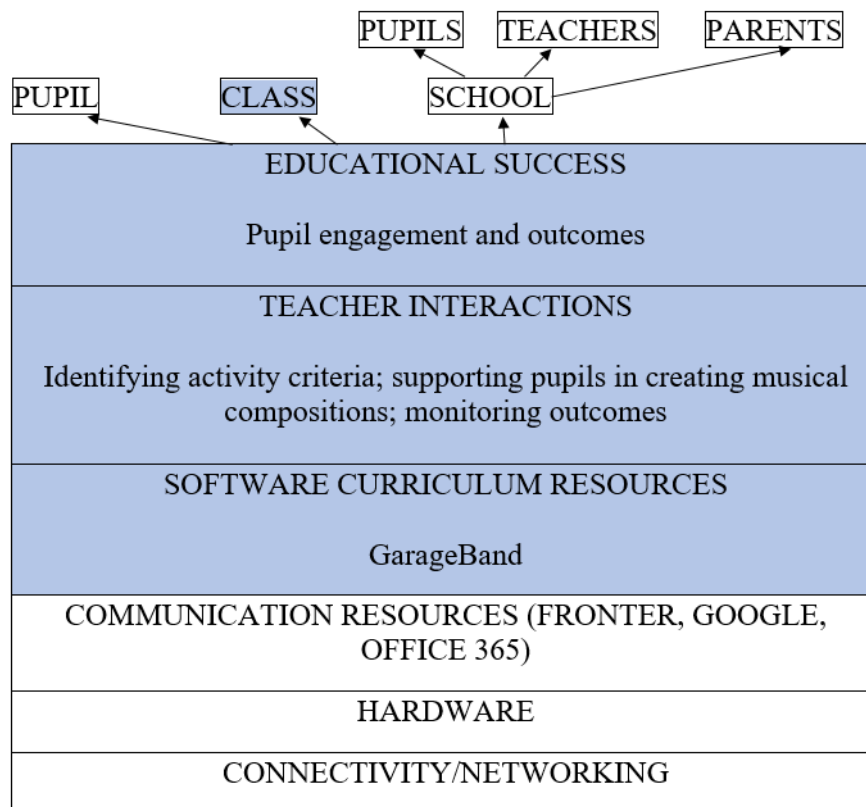


Figure 7: Levels of infrastructure and use in one classroom in one school

C2k has taken an entrepreneurial approach to innovation in educational technology. Individual projects run within the initiative seek to identify if a technology will fit into the environment and, if it does not fit, then a different direction is found and taken, so that the greatest fit arises. C2k has continued to be involved in a number of different ‘proofs of concept’. The size of NI allows a ‘test-bed’ approach, and C2k has access to every single teacher and all schools, and every single pupil in all schools. C2k can try things out, can handle them in a very controlled manner, and then roll out to all schools. C2k tests out new facilities with those in schools who are willing to try things out and will know of the limitations of what is being tested. However, whilst uses of digital technologies have been diversified and tested widely across subjects and age groups in schools, not all advisors and inspectors have been involved as actively as might have been the case.

C2k is keen to be actively involved in horizon gazing. Monitoring of possible future directions and actions during the period of the C2k initiative has been supported by a cross-stakeholder group, the NI Innovation Forum. The NI Innovation Forum looks out for what is currently in use, what is next and what is coming up. Over the past few years, the NI Innovation Forum has, for example, explored current and potential uses of digital technologies to support school improvement⁶², potential uses of an innovative educational software product Learning by

⁶² Passey, D. with Anderson, J. (2018). *School improvement and digital technologies: Using managed service/support in schools in Northern Ireland with case studies of success*. Lancaster University: Lancaster.

Questions.⁶³, and uses of the widely used and appreciated NewsDesk⁶⁴ that is accessible to all teachers, pupils and parents across NI.

When the C2k initiative was in place, each school had a minimum level of services, infrastructure and technology provision, managed by the ICT managed service strategic partner, Capita. For 2024, these levels are shown in Figure 8.⁶⁵

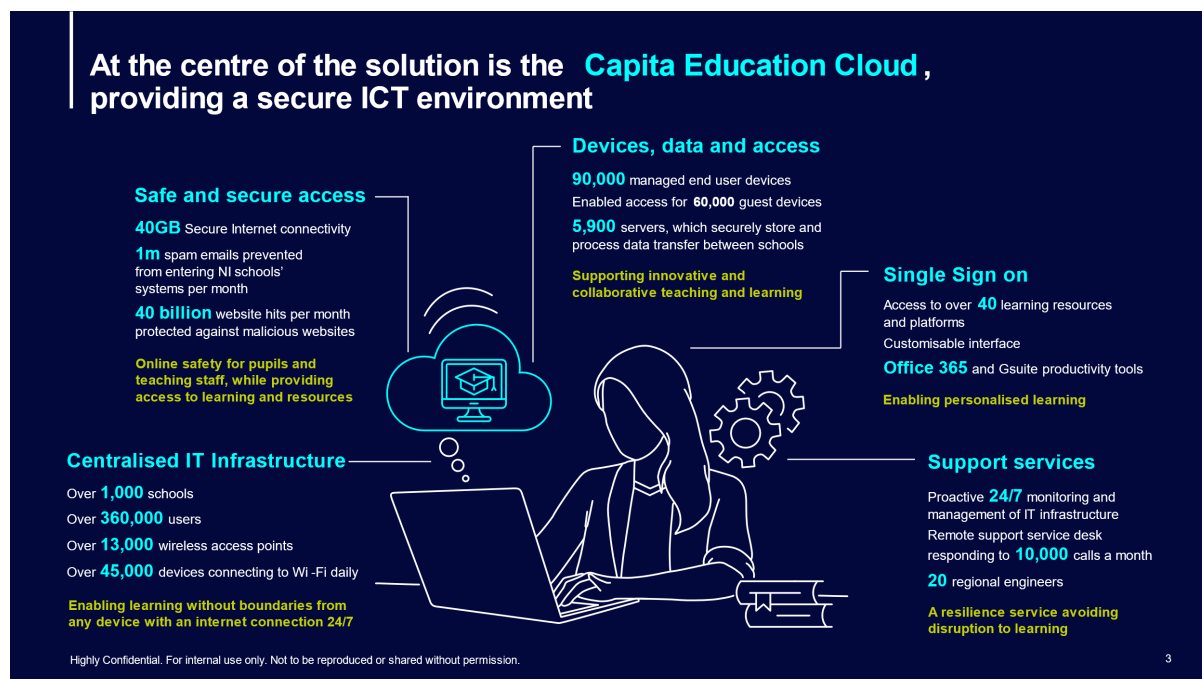


Figure 8: Level of services provided to all schools in 2024 by Capita (the managed ICT service strategic partner)

4.15 Working with key areas of expertise in initiatives

Working with people who have a range of appropriate expertise has long been recognised as a need for developing and implementing initiatives. Educational expertise, technical expertise, financial expertise, and educational management expertise are four key areas that are currently considered to be essential. A communication strategy is also required to underpin all of the rollout and to provide a positivity and momentum. A communication strategy in the NI education context is not regarded as a bolt on, as it is important that private partners maintain levels of contact, at both the government department and at ministerial level. For any type of policy or legislative change at that level, if key stakeholders are engaged, then this is seen to support implementation.

Having others on board who have been teachers and principals is also vitally important; having been a service user offers a valuable perspective that a user designer may not have. The mix of educators and technical personnel is important, where technical people that work in the services ensure technical services and devices are maintained and work, but that they work effectively in the classrooms rather than 'just work' is an important difference. Many teachers

⁶³ Passey, D. (2019). *Learning by Questions (LbQ): Outcomes from Uses in Schools in Northern Ireland – Working Paper*. Lancaster University: Lancaster.

⁶⁴ Passey, D. (2021). Digital technologies – and teacher wellbeing? *Education Sciences*, 11(3), 117. <https://doi.org/10.3390/educsci11030117s>

⁶⁵ Graphic reproduced with the explicit permission of Capita.

have a very low threshold of tolerance when faced with technical problems, and if the benefits of ICT are to be realised in the classroom, then a sophisticated support approach is required. Rather than just a remote type of support, C2k offers support on the ground. Link officers are those that link with the schools and are known to the schools; they almost feel part of the school staff as they are there every time they are needed. They advise and support and have and develop a wealth of school background understanding and knowledge. In the C2k team, there are those that have had senior leadership roles, which supports their involvement when they are in schools, as they have ‘walked the walk’. The support structure must be capable of engaging in the ‘hand-to-hand’ combat necessary to win over the reluctant adopter.

4.16 The third (and current) initiative

To enable ongoing ‘business as usual’ along with future service innovation, there are personnel who provide support services directly to schools and there are those who work on the future development of the programme, including procuring resources to enhance or replace those currently in use. This has included a number of innovative initiatives to achieve interconnection and integration across multiple systems supported by a data platform to facilitate reporting to be used to drive improvements from pupil level through to policy levels.

Currently, in 2024, there are roughly 120 members of staff who run the EdIS programme, which builds on the achievements of C2K. With something like 21 projects organised into five workstreams (see Figure 9 for an overview of the topic project areas), where one of those projects has, for example, 109 distinct projects sitting within it, then 120 people is not a huge complement. (Please note that this figure is not clearly visible in any format in this document, so a copy can be accessed via [this link](#).) This ‘To-Be Landscape’ illustrates the complexity of some 90 projects, building on existing C2k services, that are necessary to create interoperable services based on the design principles of ‘tell us once’ and ‘single source of truth’.

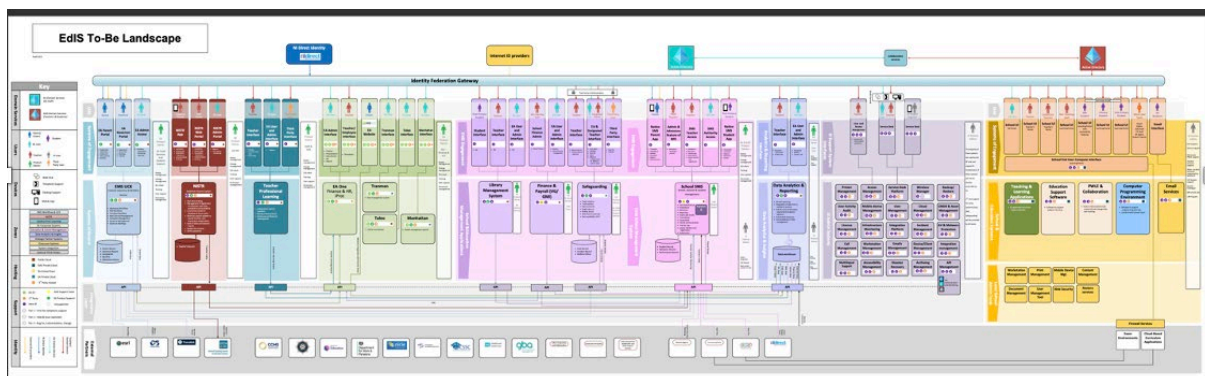


Figure 9: Overview of the EdIS ‘To-Be Landscape’

It is felt that the blend of people and their different areas of professionalism and expertise make this possible, but they are also dedicated and committed, often working long and unsocial hours. One of the reasons for this strong dedication and commitment is that everybody who works in the environment has a stakeholder at some stage in the school system, maybe a pupil of their own, or with somebody they know in a school, so they know that everything that they are doing is impacting on their sons, daughters, grandchildren or those of their neighbours.

In this third initiative, EdIS includes managed service provision for all grant-aided settings from 2024/25 onwards, which was expanded to include Department of Education-funded Early Years, Pre-School Providers and Nursery Schools (but excludes private or independent settings that

are not grant-aided⁶⁶). There are thus an additional 393 grant-aided Early Years settings, Pre-School Providers and Nursery Schools, involving 15,672 children in total, above and beyond the scope of prior provision.

4.17 Engaging with others across the educational sector

In the current EdIS programme (the third initiative planned from 2021 and led from within the Education Authority), the head of this initiative, whilst not having a background in digital education, does have a teaching qualification (but has never been a teacher), with a strong background in project and programme management and procurement. Being involved in meetings and sitting alongside other people who are leading other services connected to the Education Directorate of the EA has been found to be important for the programme overall. Bringing others on board, however, is recognised as needing hard work and being willing to turn up to and be involved in meetings. As an individual service team can work to their own goals, but they do not necessarily always look sideways to see what others are doing, cross-service integration needs to happen both formally and organically. But it also needs to be embedded into organisational structures that are designed to avoid the risk of the development of silo data solutions. Having physical presence in schools and having ways to be involved that are embedded into school-based processes are both important. At the outset, a programme needs to be embedded, but there is a need to work hard at making the necessary processes work. Essentially, it is recognised as being about relationship building.

Keeping the right people informed at the right time with the right messages has been a key to success, although it is recognised that this is not easy to do. Reassurance for schools has been important; reassuring about not imposing something and leaving a school with something that they are not comfortable with; reassuring about support until needs go away. But other stakeholders have different requirements and a different need; they may be thinking about accountability, about the finances, or about policy. So different techniques are needed, considering stakeholder metrics and what they each need and why.

4.18 Procurement and advantage

Procurement arrangements continue to be an important part of the plans and actions of this initiative. A recent procurement of 21,400 digital devices, one for every single teacher across every school, attracted a lot of interest from providers. Rather than select the cheapest device with a selection criterion of 100% on device price, it was decided that the selection criteria would be 50% on price, 30% on the impact that the device could have, and 20% on giving NI something back to the teacher professional learning environment. NI has always driven a hard bargain with the end supplier to give something back to NI education. As an example of a social value offering arising through a procurement contract, work is underway in W5⁶⁷, an interactive education science and technology discovery centre, on an immersive classroom with associated courses for teachers. This is a part of the social value offering from a contract with, in this case, BT. Similarly, from another contract with Microsoft, coding in Minecraft is being offered for 8-year-old children in schools across NI.

Showing economies of scale and value for money continue to be important, but it is found that this is not that difficult to demonstrate when contracting at this level for this number of users. Procurers continue to be in a very strong position to drive the market in a particular direction, not just when replacing very large systems, but even when talking about work on curriculum

⁶⁶ A further 349 private and independent settings serve 7,043 children.

⁶⁷ <https://w5online.co.uk/>

applications, for example. For licencing, very competitive deals are handled with companies such as Microsoft, as the level of users is so high that costs can be considerably lower than contracts negotiated by others, even within government departments themselves. The deal managed for security, for example, is known to be significant, leading to as much as a 90% saving across the systems, because there is a single point of security access, which is very different in costing terms compared to that for an individual security system for an individual school, even if individual school managers were in a position to specify, negotiate, evaluate, procure, afford and manage such a contract.

Outsourcing for certain services is also important. For example, managing data security in house, even within the Education Authority, would require employing individuals who would attract very significant salaries if they were recruited from industry. Rather than incur such high costs, outsourcing for such services clearly offers improved flexibility and value for money.

4.19 Co-design is crucial

One of the recognised successes of C2k and EdIS has been the fact that solutions are not imposed on users. Solutions or specifications are not created by the implementation team alone. They are co-designed, so for every single project that sits within the EdIS banner and is within the work of C2k, solutions and specifications are designed in conjunction with schools. Schools nominate specialists, so when, for example, creating a curriculum application or a timetabling application, the implementation team works with its suppliers and key specialists from schools – an approach established by the CLASS initiative in 1990 and maintained ever since. Schools know what they need, they know what they want, and they come in to help co-design what will eventually go out to all schools. For their part, suppliers are keen to build on this expertise to ensure market attractive enhancements to their products are developed. This partnership between those specifying solutions, those using solutions and those developing solutions has been considered to be a critical success mechanism, because if someone is involved in development, then that makes it a more acceptable product. In a similar way, parents were involved as co-designers when a new home-school portal was being created. Parents were able to say what they liked and what they did not, influencing the end-product and user acceptance testing. Similarly, knowing that most parents use mobile telephones as a first device option for online access, online access is now designed initially from a mobile perspective. Whilst some might argue that co-design would take too long, it is found in NI that co-design actually speeds up the process, because the developers know immediately that they can take forward ideas that have been shared; user trialling is minimised, but feedback can be maintained.

Discussion and engagement across stakeholder sectors have been in place for a number of years, but it is recognised that there is a difference between engagement and co-design, as people are directly involved in the latter. Those involved in education have sought in the last few years to go further than working at a level of engagement. When the EA was set up as a new organisation, to bring people on board, to develop trust in the new organisation and build the trust of stakeholders, co-design and engagement were involved at early stages when programmes were starting up and running (for example, setting up the EA Connect portal⁶⁸). This was found to a powerful way of moving forward and has been adopted during the latest EdIS programme.

⁶⁸ <https://www.eani.org.uk/services/ea-connect-transforming-service-delivery>

4.20 Important areas of current and future focus

An important part of the EdIS programme is the desire to make more of the data that are currently available. Integrating and having inter-operability across the organisation deliverables is seen as important, for a number of reasons. If it is possible to get a wider view of where you are, it is possible to use data to determine whether something is working or not. Having a data system can also inform decision making going forward, not only at a national or regional level, but also within a school. The EdIS programme seeks to include and provide data analytics that will give school leaders opportunities to manage their schools, with reporting at the child level, the teacher level and the school level. Sector level reporting will also allow improvements for children to be viewed, as well as improvements to policy, facilitating trend analysis which in turn will assist in school or sectoral improvements, including teacher professional learning (TPL). Having a sense of value added, being able to track a child's progress rather than only seeing the final outcome or summative assessment metrics, is planned to be advanced by this initiative.

The EdIS programme is not recognised or governed as a corporate IT programme, but an educational change programme, sitting within the EA's Education Directorate. The programme is envisaged to integrate with other fundamental work of the directorate - school improvement work, teacher professional learning, leadership development, and a shared education initiative for schools⁶⁹ emerging from a conflict transitional society. The new C2k team as a part of the EdIS initiative will be integrated with those other teams, all working under the banner of school improvement, improving outcomes for children and young people, whilst facilitating integration across systems to provide a holistic view of the child, and allowing for integration with third parties such as parents, and the health sector.

It is not possible for the EdIS initiative to predict an end point, but it is possible to predict a starting point. This is an important understanding that needs to be shared and taken on board. In this way, an initiative specification needs to accommodate change. There is need to budget for a change environment. For example, use of Artificial Intelligence (AI) has been factored into the EdIS initiative. A change environment should also be considered by any strategic partner contracted as a part of the initiative. To accommodate this, a strategic partner is required to ensure that there is an annual report on research into best practice and innovative practice in education internationally, evidencing what has been found, with recommendations.

Another important feature of EdIS is the digitisation of processes, e.g., admissions, free school meals applications, transport applications, appeals, and statutory assessment reviews. This not only makes it easier for parents and carers to engage with the EA and schools whilst streamlining and shortening timescales, but also significantly reduces time for school managers and leaders for administrative tasks, removes duplication, and prevents nugatory working. One such example is the digitisation of admissions processes; parents find the new digital system easy to use, navigate and understand. Schools no longer have to wade through high numbers of application forms and hold numerous Boards of Governors' meetings to undertake selection for schools; rather, the system runs a report which at a cursory glance provides the information they require to select children meeting the criteria for their schools. School leaders and Boards of Governors report time savings in the order of weeks; parents and children receive the outcome of the selection process 4 weeks earlier and appeals to schools when children have not been selected all now take place before the Summer Term recess. This

⁶⁹ The Shared Education Programme links pupils from different communities in shared study, including online, and was given legislative status in 2018. <https://www.education-ni.gov.uk/articles/shared-education-legislation-and-policy>

5. Sustaining Factor 2: Aspiration

5.1 *Conceptions of aspiration*

Aspiration can be considered in a number of different ways. For example, pupils can aspire to achieve in using ICT, or they can aspire to gain qualifications in ICT in order to enter higher education or employment. Curriculum, context, assessment and the future are all features that can, therefore, influence aspiration.

5.2 *Aspiration and the curriculum*

In the context of digital technology in education, the background to the initiatives that NI has taken forward arose in response to initiatives elsewhere in the UK linking the development of technology with links to industry and business, including links concerned with future employment. Initially, in the 1980s, schools had been given computers, although the numbers did not allow a great deal of access by pupils. In one school at that time, for example, there were two BBC Microcomputers, but only one of the teachers teaching computer science had access to the equipment. At that time, whilst computer science was available as a General Certificate of Secondary Education (GCSE) course and examination for 16-year-old young people, it is reported that some pupils may have taken these examinations having had limited access to computer equipment.

A government initiative in England from 1987 to 1997, the Technology and Vocational Education Initiative (TVEI), was to change this situation dramatically. Northern Ireland responded initially with a Vocational Enhancement Programme, providing £18 million between 1986 and 1990 to support the integration of IT across the curriculum. VEP continued into the early 2000s (VEP⁷⁰) to promote vocational education. The tenets of that programme have been seen to be taken forward in subsequent initiatives, and they have been a basis for future aspirations for pupils. VEP was funded by the then NI government departments for education and employment, focusing on science, technology and design, and ICT. Through this programme, a new subject in the NI curriculum, laying the groundwork for the future, was technology and design. This subject covered the topics of systems, design and manufacture, so rather than including textiles or home economics, it focused much more on computer control and electronics. At the same time, funding allowed for a considerable extension of technology education facilities in schools, including computer laboratories, through a capital programme, running in parallel with C2k, where science and technology and design environments were also equipped with up-to-date facilities, and computer science weeks supported awareness raising and more specific training for teachers.

As the subject created from the VEP covered systems, design and manufacture, this meant that teachers were using, and pupils were gaining experiences, in handling resistant materials as well as computers. Uses of computers regularly involved physical forms of learning, including computer control that used facilities such as alpha kits, which clicked together and provided an understanding of input, process and output. Whilst at that stage often a small group of teachers were interested and engaged in computing and skills, when the NI curriculum was developed from 1989, this further developed and widened the interests in the topic of computing. From that time, every school was enjoined to identify a technology coordinator and an ICT coordinator, developing, in the latter case, cross-curricular uses that would enable wider pupil access.

⁷⁰ <https://dera.ioe.ac.uk/id/eprint/17466/1/evaluation-of-the-vep-2005-08-final-version.pdf>

5.3 **Links with industry and business**

From 1990, links between industry and education were created through creative media arts centres, what were termed Creative Learning Centres (CLCs).⁷¹ The initial ‘Nerve Centre’ was created in Derry. Due to the focus of the activities and projects in the Nerve Centre, funding was supported over time by a number of different government agencies and departments – Northern Ireland Screen (established to build the film, gaming and television sector), the Department of Culture, Arts and Leisure (which became the Department for Communities), and the Department for the Economy. This and one other Nerve Centre that was created subsequently focused on pupil reach and on social inclusion, as well as on connecting with industry. The Southern ELB was the only ELB at that time to establish a similar CLC – the AmmA Centre. The second CLC, in Belfast, was established by the SEELB and was called Studio ON, but for financial reasons was later taken over by Nerve.

The three CLCs continue to be active in supporting future digital focus. As NI Screen states, it currently finances “the three Creative Learning Centres (Nerve Belfast, the EA AmmA Centre⁷² in Armagh and the Nerve Centre in Derry~Londonderry). These centres support schools to innovate with digital technologies, creative learning techniques and new approaches to learning; work with Into Film and Cinemagic to ensure that film has an important role to play in delivering a broad and balanced curriculum and is used by educators to bring subjects alive, develop key skills and broaden pupils’ access to culture; deliver year-round industry work experience through ScreenWorks and Screen Academies for young people aged 16–19 that provides visibility and understanding of better jobs available in screen industries” (p.3).⁷³

The activities in the CLCs have allowed teachers and pupils to explore areas of the curriculum that use digital technologies in creative ways and exploring career paths and possible pipelines to employment. This focus was further enhanced by ScreenWorks, the Into Film and NI Screen programme that provides workshops and career introductions to the wide range of creative and craft expertise needed in the screen industries. The workshops are delivered by industry professionals who provide hands-on sessions where young people create, for example, scripts, storyboards, costumes, animation characters, props, make-up and prosthetics for film. The screen industries, including the animation and gaming industries, have been growing rapidly in NI, and the vision from NI Screen, the Department for the Economy and the Department for Communities perspectives was to consider how to develop a pipeline of activity that would support long-term aspiration, from early years right through to people employed in those industries. The activities have focused on creativity, developing more critical consumers of content, looking at media in all its formats and exploring what might be interesting, what was happening in the field, and what might be problematic, for example. The message was to develop outcomes that would say to pupils that ‘we’re all creative’. In terms of reach that is achieved, one CLC reported working with 2,611 teachers and 8,640 pupils on extended creative digital technology sessions in the school year 2023-2024.

As mentioned earlier, the social value element of procurement has allowed the EA to include teacher professional learning (TPL) in its tenders. In one case, this has resulted in a major supplier appointing a seconded teacher from NI to work full-time on developing AI for use by NI schools and then providing dedicated training programmes open to all NI teachers. The

⁷¹ <https://nervecentre.org/>

⁷² www.ammacentre.org

⁷³ Northern Ireland Screen. (n.d.). *Enhancing Our Children’s Education*. Belfast: NI Screen.

dedicated training programme in AI and ICT, designed and developed by teachers in NI for teachers in NI (the group consisted of approximately 100 teachers) is currently (in 2024) being expanded further by the EA and the teachers involved, evolving into ‘Communities of Practice’. These Communities of Practice have hosted training sessions using the practice within their schools to support other teachers in their geographical area. This initiative has included further major ICT providers and developers developing bespoke training for educators at various levels of the curriculum and hosting the training across NI. In August 2024, 1,600 teachers attended the training over a period of one week.

The Department for the Economy (NI)⁷⁴ recognises that the development of digital skills by young people is relevant for the economic health of at least seven industry sectors: Agri-Tech; Life and Health Sciences; Advanced Manufacturing, Materials and Engineering; Fintech/Financial Services; Software; Screen Industries; and Low Carbon (Including Green Hydrogen). As a result, the Department has developed action plans⁷⁵ that set out seven ways in which these industries can support the education sector to respond.

5.4 Aspiration and digital technology achievements

From a digital technology perspective, in 2002, the Review of the Strategy for Education Technology in Northern Ireland⁷⁶ indicated that pupils were achieving increasingly higher levels of ICT competence (49% of 14-year-olds in 2000 were gaining levels 6 or 7 in cross-curricular ICT competence, whereas this had risen to 54% in 2001 and to 61% in 2002). Similarly, there was an increase in uptake for the Council for the Curriculum, Examinations and Assessment (CCEA) ICT accreditation for 14-year-old pupils, with some 10,000 entries in 2000, rising to some 14,000 in 2001 and to some 17,000 in 2002. The CCEA ICT Accreditation Scheme was created as a scheme for children to take at the end of Key Stage 1 (NI Primary 4), Key Stage 2 (NI Primary 7), and Key Stage 3 (NI Year 10). The ICT Accreditation Scheme was found to be very successful, in particular at primary level, evidenced by school take-up. In 2012, the final year of the scheme (which only ended due to the advent of statutory assessment of ‘Using ICT’), there were 678 primary schools registered for this voluntary scheme.

Qualifications for pupils have been regularly revised and updated by CCEA to accommodate shifts in interest, opportunities of using new digital facilities, and for engaging in the future needs of society and employment. Monitoring current and future employment and its needs has led CCEA to develop specific assessments. For example, in 2004⁷⁷, CCEA was already piloting new Moving Image Arts GCSE, A2 and AS courses (for 14-18-year-old young people), which extensively used the online environment, created a digital portfolio of work and where the final examination was also taken online. Moving Image Arts (MIA) is the only A-Level and GCSE in the UK in digital filmmaking. NI Screen has continued to work in partnership with CCEA and the CLCs on these qualifications.

During the period 2015-2019, CCEA, as the result of a review, increased the focus on computational thinking across the curriculum for children from 4-14-years-of-age, which strengthened the emphasis on equipping pupils with ‘21st-century’ skills, including coding,

⁷⁴ <https://www.economy-ni.gov.uk/sites/default/files/consultations/economy/10x-technologies-and-clusters-consultation.pdf>

⁷⁵ <https://www.economy-ni.gov.uk/publications/digital-skills-action-plan-2024-2034>

⁷⁶ DENI. (2002). *Review of The Strategy for Education Technology in Northern Ireland*. Belfast: DENI.

⁷⁷ DENI. (2004). *empowering Schools in Northern Ireland – Briefing Paper 3: What is the place of ICT in the revised curriculum?* Belfast: DENI.

computational thinking and digital creativity. For pupils 15-18-years-of-age, three new qualifications were developed, in close consultation with the software creative industries:

- GCSE Digital Technology, including a choice of Multimedia and Programming pathways.
- GCE Digital Technology, including a choice of Multimedia and Programming pathways.
- GCE Software Systems Development.

CCEA also set out a digital skills curriculum and qualifications framework describing expected progression through its schemes of qualifications from the early years through to tertiary education. In parallel, the DE funded the School of Electronics, Electrical Engineering and Computer Science at Queen’s University Belfast to provide upskilling in the current programming languages for all teachers of computing.

During the 2019–20 school year, 1,678 students participated in these qualifications⁷⁸. Data provided by CCEA on the uptake of the new qualifications from 2019 to 2024 are shown in Table 8. CCEA reports that the percentage of females taking up the qualifications in NI is higher than the proportion in other examination boards in the UK. Additionally, in 2024, 1,550 pupils took examinations in Moving Image Arts qualifications at GCSE and GCE A level, where, in contrast to examinations in Digital Technology and Software Systems Design, the balance of male and female entries was almost equal.

Table 8: Uptake of CCEA GCSE and GCE qualifications from 2019 to 2024.⁷⁹

	Year					
	2019	2020	2021	2022	2023	2024
CCEA GCSE in Digital Technology						
Male	2422	2308	2210	2154	2192	2206
Female	1454	1173	1024	1014	1084	1119
%Female	37.5%	33.7%	31.7%	32.0%	33.1%	33.7%
Total	3876	3481	3234	3168	3276	3325
CCEA GCE in Digital Technology						
Male	615	526	472	509	395	455
Female	363	297	233	197	201	197
%Female	37.1%	36.1%	33.0%	27.9%	33.7%	30.2%
Total	978	823	705	706	596	652
CCEA GCE in Software Systems Development						
Male	173	157	206	189	178	199
Female	54	58	37	32	40	46
%Female	23.8%	27.0%	15.2%	14.5%	18.3%	18.8%
Total	227	215	243	221	218	245

CCEA continues to monitor and review its provision and outcomes of ICT- and computer-related assessment and qualifications through its CCEA Digital Programme Board, including whether qualifications meet the needs of universities and industry, prepare young people for the world of work, and what support teachers need to prepare young people for digital-related qualifications. In 2024, CCEA reported that entries for the GCSE in Digital Technology (Programming) were steadily increasing, that the proportion of girls taking the GCSE qualifications was slowing

⁷⁸ Northern Ireland Screen. (n.d.). *Enhancing Our Children’s Education*. Belfast: NI Screen.

⁷⁹ Table details kindly provided by CCEA in November 2024.

increasing, that entries for GCE Software Systems Development were the highest they had ever been, and that entries for GCE Digital Technology had increased from previous years.

5.5 **Recent concerns and focus**

Recently, local businesses and large companies coming into NI have raised the need for education and society to consider the levels of computer graduates required for the future. The Department for the Economy NI skills barometer⁸⁰, developed by Ulster University, is supporting messages from industry coming into schools about future skill needs. Parents are also picking up on these messages from news reports, as they are increasingly concerned about the expansion of jobs and opportunities in the computing sector that may lead to well-paid jobs. Parents are becoming aware of apprenticeship opportunities where there may not be any student debt incurred by their children; so that route has an increasingly strong attractiveness. This has meant that recently there has been a greater focus on computing in both primary and post-primary schools. However, there is a clear need for specialist teachers to teach computing, and these teachers are in increasingly short supply. To ensure a pipeline, there are clearly implications for curriculum and examinations, as well as how specialist teachers are attracted to the profession. Indeed, the DE are currently working with the Department for the Economy on a 10X Strategy⁸¹, which would provide a more joined-up approach to support positively in this area. The Department for the Economy has also produced a 10-year Digital Skills Action Plan for 2024-2034, “to help create alternative pathways into the digital sector. Advanced digital skills and a digitally competent workforce are essential for the innovation potential and continued competitiveness of the sector”⁸².

Schools in NI continue to integrate computing and computational thinking across the curriculum, linked to problem-solving. At the same time, schools look at ways that pupil aspiration might be supported. How one school is tackling developing aspiration is discussed in Case Vignette 1.

Case Vignette 1: How one school is supporting aspiration

In a recent report from the NI ICT Awards,⁸³ there is a clear example of how one school is supporting aspiration. St Malachy’s College, Belfast is an all-boys’ Catholic grammar school, situated in a socially deprived area in North Belfast. Students come from a range of socio-economic backgrounds. The school has recognised the need to address the digital skills gap in the NI employment market in a radical way. It has raised the financial resource to create a pioneering creative digital skills development programme, allowing pupils to work together in a sustainably collaborative way, creating a partnership for pupils and teachers across the North Belfast Area Learning Community (NBALC) through a three-year ‘demonstration project’. The school successfully secured funding from two charities, which together with its own funds, created a Digital Hub for Creative Technologies and Learning. The Hub allows immersive, creative, and collaborative experiences for pupils, engaging them with the latest in technology, including Virtual and Augmented Reality (VR/AR) robotics, coding, animation, and game design. The VR headsets allow pupils to view immersive scenes when learning through a range of subject contexts. Animation, game design,⁸³ and virtual production skills are developed using gaming PCs running ‘Unreal Engine’, a 3D development platform. Lego Spike Prime kits

⁸⁰ <https://www.economy-ni.gov.uk/articles/skills-barometer-2021-update>

⁸¹ [10x Economy - an economic vision | Department for the Economy \(economy-ni.gov.uk\)](https://www.economy-ni.gov.uk/articles/10x-economy-an-economic-vision)

⁸² [Digital Skills Action Plan 2024 - 2034 | Department for the Economy](https://www.economy-ni.gov.uk/articles/digital-skills-action-plan-2024-2034)

⁸³ Smith, S. & Anderson, A. *Report on the 2023-24 ICT Excellence Awards: April 2024*. Belfast: Capita. <https://content.capita.com/ICTExcellenceAwards202324>

(buildable programmable robots), webcams, headsets, and digital drawing tablets and C2k's 'Coding in Minecraft' pilot programme ensure pupils have hardware and software to be creative. A class-set of Chromebooks provides for mobility and flexibility.

An appointed Creative Digital Technology Leader (CDTL) implements and evaluates the action plan annually. Three schools, Belfast Boys' Model, Dominican College and Belfast Royal Academy, work in partnership with the school. Team teaching enables highly skilled staff to support those who are initially less confident. During 2022-2023, a total 27 teachers and 845 pupils benefited from using the Hub programme, with an additional 22 teachers and 2,045 pupils in 2023/24. Feedback indicated that all teachers and 95% of pupils surveyed found the experience very worthwhile; 85% of pupils reported that the experience was very enjoyable, and relevant and said they were able to participate fully. All the teachers said that it was an excellent development in the KS3 curriculum. Staff reported that the content allowed for the development of thinking skills and personal capabilities, as specified by the NI curriculum, specifically communication, using ICT, working with others, self-management and thinking, and problem solving and decision making. All teachers strongly agreed that the work encouraged exploration of future digital subjects and careers. Eighty-five percent of students said they were confidently aware of careers that would employ these skills. One of the principals from a partner school stated: "For the first time in years we have two students going forward into medicine, that wouldn't have happened without the work that was done here". A vice-principal from another partner school said: "It is very difficult to get ICT teachers, so working onsite with the CDTL has been really useful for our teachers".

Across NI, aspiration is supported through a wide range of activities that raise awareness for pupils and for teachers. These events focus on critical, future and emerging technologies. Some are previously described in this chapter, but other activities are also in place. For example, in 2024, a working group of NI Cyber Skills ran a 'Girls Empower Event', for girls aged 11-12 years. The event was attended by 12 schools from across NI, with a keynote speaker who was a cyber security expert, followed by breakout sessions, and live cyber security demonstrations.

5.6 *Aspiration can start at an early age*

Research has shown that career choices can be considered, modelled and made by children in primary education⁸⁴. In this context, a Department of Education (DE) careers pilot in primary schools has explored this avenue, and the challenge that this brings for some people in terms of aspiration. This has been found to be especially the case in rural primary schools, where it has been found in the past that some parents and pupils are not aware of many future career opportunities. The DE-funded project has run awareness days in schools for parents and pupils, bringing people in from the local community to talk about their job, often one that had never been heard about or known about.

5.7 *Aspiration and examinations*

Aspiration can be fuelled by examination success, but this may only provide with what some would regard as a 'ticket'. Other skills are recognised to be important, and how those can be provided is also considered by educators in NI – skills to create, to be critical, to work together, and to engage. The work of the CLCs in NI has focused on those latter skills, integrating them

⁸⁴ <https://primaryplatform.careersandenterprise.co.uk/practice/research>

with statutory curriculum and examination success. This approach considers that education should enable young people to make connections, to develop skills, to be open, and to be curious.

6. Sustaining Factor 3: Diversity, inclusion, the digital divide and the under-represented

6.1 Rationale and focus

Diversity, inclusion, the digital divide and the under-represented have continued to be a focus for sustaining relevant inclusive digital education in NI. A central tenet of concern in NI has continued to be how to manage the equality of provision, equality of risk sharing, and equality of professional responsibility for schools and teachers.

It is recognised that the development of ICT and computing has arisen out of the desire of the post-conflict society to move forward positively. In terms of technology services, it is 26 years in 2024 since the peace agreement (the Belfast Good Friday Agreement) was signed in 1998 and 25 years since CLASS/C2k began. Equity of access has been central to uses of technology and its provision across that period of time. In Cookstown, there are two spires on either side of the Main Street, and a primary school sits beside each of those spires. But it did not matter which side of the street you were on; you had access to the same educational technology and to levels of technology, and you were afforded the same opportunity. NI looks for a true delivery of equity of access; what is provided for one is provided for all. C2k seeks to bring this provision and approach with all that is provided in terms of technology.

6.2 Equipment and equity

In the 1997 Strategy Report, the potential that ICT could offer to support pupils with special educational needs (SEN) was already being highlighted. Numbers of pupils with special educational needs continue to be identified so that means to support in mainstream and special schools can be adequately considered. For example, in 2023, 19% of all pupils (66,400) were assessed as having special educational needs, 90% of whom were being taught in mainstream schools⁸⁵. In the same period, 28% of pupils (96,319) were entitled to free school meals, of whom 30% (28,430) were also assessed as having special educational needs⁸⁶.

Equity of access was raised in the 1997 Strategy Report as a key concern and requirement, with advice being offered on how schools and teachers might support those with lower access at home to digital equipment and infrastructure. In the 2002 Review of the Strategy for Education Technology, it was stated that the C2k managed service had provided infrastructure and user support for all primary schools by the end of the autumn term 2002, and for all post-primary and special schools with integrated networking by the end of 2003. C2k had also supplied all schools with laptops, 12,000 in total, offering on average some two laptops for every three teachers. A Briefing Paper⁸⁷ accompanying the 2004 strategy document indicated that by April 2004, C2k had provided 40,000 networked computers with existing multi-media systems, 1,245 local area networks (LANs) with stations in most classrooms, filtered Internet access at all workstations, at least 512Kb connectivity in primary schools and at least 2Mb broadband in post-primary schools, and connectivity to a Data Centre providing protected access for all administrative and management purposes. Additionally, 200 nationally licenced curriculum

⁸⁵ <https://www.education-ni.gov.uk/sites/default/files/publications/education/Special%20Educational%20Needs%202022.23.pdf>

⁸⁶ <https://www.education-ni.gov.uk/sites/default/files/publications/education/Free%20School%20Meal%20Entitlement%202022.23.pdf>

⁸⁷ DENI. (2004). *empowering Schools in Northern Ireland – Briefing Paper 1: What’s been achieved so far with ICT in schools?* Bangor: DENI.

titles were provided in digital form, 400,000 school users including all pupils had been supplied with their own password, mailbox and protected area, and a fast link provided to all public libraries with free broadband access.

The three CLCs, through their core programme of in-centre support activities, film clubs and careers and work experience, stated that: “targets support on schools in disadvantaged areas. For example, in 2018-2019, 85% of all Creative Learning Centre activity was delivered in partnership schools with a large catchment of young people from disadvantaged areas. The programme also reaches out to rural schools... The Core Education Programme ensures the substantial work opportunities of the film/moving image/creative technologies sector are available across Northern Ireland instead of being limited to young people with privileged economic or cultural backgrounds. Equally importantly, the programme helps embed digital literacy in NI education, which has social and individual benefits as well as economic”⁸⁸. In terms of film clubs, “Between January 2019 and March 2020, Into Film ran 40 ScreenWorks placement courses⁸⁹ with a total of 556 participants. The number of participants varied from 10 to 24. Participants came from 123 schools plus two individuals who were home-educated and eight who were [not in education, employment or training] NEET”.

Schools have continued to apply the uses of digital technologies to support their pupils. How one school is supporting pupils with special education needs using digital technologies is discussed in Case Vignette 2.

Case Vignette 2: How one special school is supporting pupils with SEN using digital technologies

In the 2022 NI ICT Awards Report,⁹⁰ Clifton Special School is highlighted as a special school that uses digital technologies widely to support pupils with SEN. The school has 33 full-time teachers and 60-70 support staff, involving co-ordinators, learning support assistants, health professionals, therapists, and care assistants.

The school recognised deficiencies in its existing management information and behaviour management systems, as these did not fully meet their needs. An innovative solution adopted uses of MS Forms to auto-populate the tools to fill gaps in functionality. For example: a training schedule linked to data to review training needs; capturing feedback from parent workshops and relevant survey data; use of MS Teams and MS Word for planning annual review meetings, with links to data and creating auto-generated reports; collaborative uses of MS Forms and MS Excel with allied health personnel for medical needs, with links to data and creating auto-generated reports; and an online behaviour management system, based on MS Forms, with radio buttons and drop-down lists to simplify completion, allowing staff to populate a ‘major’ incident form that auto-updates a behaviour database and alerts the behaviour co-ordinator in real time via an email link if there is need for urgent in-class support. The form is also used to record any injury or information that needs to be sent to parents and to heads of department. This tool identifies trends, allowing appropriate interventions to be put in place as patterns emerge. With higher numbers of incidents occurring for one pupil in the middle of the week, the cause of the issue was identified, and a social story was created for the pupil to prepare them for tasks that were prompting the incidents. Later data were then reviewed to show whether the

⁸⁸ Annabel Jackson Associates Ltd. (2021). Evaluation of Core Education Activities: Report for Northern Ireland Screen. Bath: Annabel Jackson Associates Ltd.

⁸⁹ [ScreenWorks | Northern Ireland Film Industry Work Placements - Into Film](#)

⁹⁰ Smith, A. (2023). *Report on the 2022 ICT Excellence Awards: February 2023*. Belfast: Capita.

measures had been successful. Live forms made completion and action quicker and more collaborative, and teachers felt empowered as they were a clear part of the resolution process.

Staff have access to shared documents on MS OneDrive so that everyone can access a live version of all relevant documents, rather than different versions. The system limits access to those who need them, and redacted versions can be sent to governors and external support staff. Shared documents are used to plan spending, track funds available, and any time period in which they must be spent and ring-fenced.

Staff report that the online systems they use have been easier to use, they provide 'live accounts', they do not get lost and can be completed quickly (during or immediately after an incident, for example). Staff now routinely: create individual pupil reports that can be shared with other teachers; see reports from digital Mood Trackers that record pupil mood responses; support uses of apps for voice input by pupils; supporting older children with the option to select if there is an issue on the Internet, which are then collected and used to alert parents; gathering of views of the children; use of multiple user access devices and peripherals, such as switches to activate screens, iPad voice output, and eye-gaze; coding with various robots; and use of VR and AR with a 360° camera that has been used to record the layout of local areas, helping to remove concerns that pupils might have when going out to places such as local supermarkets.

Some parents' meetings are now held online. This has been found to reduce what otherwise can be an intimidating situation for parents. Parents report preferring to be on their PC at home rather than needing to be in a room with a team of professionals. Other meetings are also held online, which reduces travel needs.

In the school 'standard' productivity tools have been integrated into normal operating procedures, supporting identified gaps in teaching, learning and management, and automating complex and time-consuming processes.

Some young people may not, for a variety of reasons, be able to attend mainstream schools. In NI, nation-wide support has been set up through the Education Otherwise Than At School (EOTAS) service. How this service is supporting pupils with digital technologies is discussed in Case Vignette 3.

Case Vignette 3: How an NI-wide service is supporting pupils not attending mainstream schools

The Education Otherwise Than At School (EOTAS) service⁹¹ supports young people who do not attend mainstream streams, which might be for a number of reasons. Covering both primary and post-primary provision, the EOTAS service provides support through 27 centres across NI. A new vision has recently been created, focusing on transformation, to raise standards for the young people it serves and to make a real difference to their life-chances. Digital technologies were seen as key to transformation, but it was also recognised that there was a need to identify a standardised IT curriculum leading to appropriate ICT qualification. It was known that there would be need for staff development through collaboration, that the IT infrastructure would need refresh, providing adequate wi-fi and sufficient pupil devices.

⁹¹ <https://www.education-ni.gov.uk/articles/education-otherwise-school>

A plan was established, conducting an audit of staff knowledge, identifying IT subject specific staff for each centre, migrating IT practices to the Cloud, migrating centre activity to the C2k network, training one member of staff as a C2k manager in each centre, providing training in uses of C2k, SIMS and MS 365 apps; enhancing collaboration between centres in terms of IT teaching, introducing standardised baseline testing across the centres, creating groups on MS Teams to facilitate collaboration and creation of schemes of work; introducing a standardised ICT curriculum for all centres (with the IT Application level 2 through the Open College Network Northern Ireland (OCN NI)), training two staff in each centre as verifiers and assessors for the OCN NI, further developing occupational studies in creative and digital media involving Apple products and cameras, refreshing and increasing the number of access devices in centres including Chromebooks to ensure all pupils had access to a device whilst in a centre, replacing all 114 whiteboards and upgrading the wi-fi, and ensuring all outreach teachers had a Chromebook and Surface device.

Students' self-esteem was seen to be improved, with many speaking of feeling valued when trusted with a new device. Student aspirations have been seen to rise, they are seen to be more engaged and comfortable. Pupils will now go up to an interactive whiteboard in lessons to annotate diagrams and will now type their work; this would not have happened in the past when handwriting was the norm. Online BKSB online diagnostic assessments are used, which are recognised as being more interactive and relevant than previous hand-written assessments.

IT access is impacting areas beyond the curriculum. When the BBC news is opened each morning on the interactive whiteboard, pupils are becoming more aware of the world around them. The migration to the C2k network means that pupils have the same account and access the same software as they would in a mainstream school. Pupils do not lose work anymore as it is saved to the Cloud, which makes them more accountable. As IT is now standardised across all centres, pupils feel content in being part of a larger 'school'.

A device is provided for pupils at home if these are required to complete curriculum activities. Pupils are now using a variety of apps and undertaking coding, so that they have chance to use these skills in further education or employment. The number of pupils entered into level 2 IT and ITA qualifications is the highest that this been, and 54% of pupils were reported in 2022 to leave EOTAS with levels A* to C in mathematics and English.

All staff now have a provided digital device. MS Teams and Groups are regularly used to share effective practice within and between centres. Education meetings can be run via MS Teams, cutting down journey times. MS One Drive and MS Teams also used to share documents with other staff with no printing needed. Baseline testing for ICT competence is in place, as are schemes of work. The IT Application level 2 course is taught in all centres, with GCSE taught in 2 centres. Creative and digital music and occupational studies are now widely taught, and "Go Berserk" (HTML coding) has been introduced to one centre and is ratified by the OCN NI and adopted as a Level 2 qualification.

6.3 The current and future

Take-up for digital technology courses and programmes by girls continues to be a concern and focus for educators in NI. CCEA has explored this issue and has produced a working paper

investigating low participation of girls taking computing in NI schools, entitled ‘Why Don’t More Young Women Study Computing?’⁹².

Currently, the EdIS programme takes forward the previous C2k initiative, which was recognised for its successes, in terms of how well it operated across the entire jurisdiction of NI, and how every child had the same access to the same equipment and to the same resources. Any child, regardless of social background, had access and was provided for equally. Being on the cusp of technological change, the EdIS programme seeks to take advantage of the technologies that are available now and that are becoming accessible in the future. It is recognised that diversity, inclusion, the digital divide and the under-represented may be further supported in the future if government departments and agencies across NI are able to share and interrogate data in a more integrated manner and to greater extents. For example, there is currently discussion with the Department of Health and with further education providers that might enable future directions and solutions for the health, special education needs and vocational needs of learners respectively to be explored. Already, discussion with the Department for Communities is enabling easier communication of essential details between parents and schools, supporting and quickening outcomes where support for those in low socio-economic circumstances can be offered and provided. Whether these forms of outcomes could be paralleled or achieved when bringing together details that would support services for those with special educational needs, for example, is being actively explored. If this is feasible, then it is possible that, for example, statements of educational need might be more quickly agreed and acted upon.

⁹² [Why Don’t More Young Women Study Computing? | CCEA](#)

7. Sustaining Factor 4: Computational thinking and its links to problem-solving

7.1 Early engagement and outcomes

The ways that computational thinking – an educational concept wider than the teaching of coding and computing - links to problem-solving, and the integration of wider digital education, has been shaped in NI by external as well as internal factors. The UK government initiative in 1980 to introduce a computer into each school led to the provision by 1990 of computer studies in 97% of post-primary schools across NI for pupils aged 16 years⁹³. At that time, it was recognised that computer studies was the 12th most popular subject for examination at 16 years of age, but it was also recognised that IT resources and specialist teachers were accessible to a limited number of pupils. Provision in schools was largely through access in computer rooms, which meant that the opportunity for subject teachers to access the technology to use in their teaching required quite a lot of pre-planning and determination, as the rooms were predominantly used for computer studies by IT teachers. This led to the establishment of ICT courses in Key Stage 3 (11-14-years-of-age), but this sometimes covered content areas that the young people already knew how to do, such as how to switch on the computer and how to make a Microsoft (MS) PowerPoint slide. Consequently, the courses were criticised as inadequate by industry, by inspectors and by higher education providers at that time.

7.2 A cross-curricular approach

As described earlier, NI was under direct UK rule until 1998. Earlier, when the National Curriculum was introduced in 1989, the curriculum from England was considered as a curriculum that NI might copy directly. However, following discussion in NI, work was undertaken to develop a NI curriculum⁹⁴, which also introduced six cross-curricular themes⁹⁵. One of the six was information and communication technology. A Ministerial working group was set up to produce a specification of what that might look like.

The report of that 1989 working group defined how NI would take forward a cross-curricular approach to ICT, as a statutory requirement for all pupils from 4-16-years-of-age. This cross-curricular approach required pupils to be involved in key processes such as designing, creating, composing, recording, presenting, communicating, calculating, measuring, controlling, selecting, testing and evaluating. Taken together, these key processes constituted a framework describing the knowledge, skills and understanding which all students were expected to acquire during their compulsory education. These processes, of course, underpinned much of what can be described as traditional subject content. However, the report argued that it was the qualitative and quantitative benefits that technology brings to the application of these processes that made ICT such a powerful cross-curricular tool. The report also set out how each of these key cross-curricular processes could be mapped to traditional subjects and how they would also support learners who are living, learning and eventually working in an information-based society. Whilst this policy approach was taken to the integration of ICT across the curriculum, its cross-subject implementation was not necessarily advanced at that

⁹³ Anderson, J. S. A. (1991). Information Technology – A Cross-Curricular Competence for all Pupils. *Computers in Education*, 16(1), 23-27.

⁹⁴ The Education Reform (NI) Order, 1989.

⁹⁵ With, additionally, cross-curricular themes in education for health, careers, financial awareness, mutual understanding and cultural heritage. By 2007, these had been reviewed and formally resolved into three assessed cross-curricular skills of Communication, Using Mathematics, and Using ICT, and a further non-assessed specification of Thinking Skills and Personal Capabilities.

time by all subject advisors and inspectors but has been a basis for increasingly wider integration since its publication.

7.3 A revised curriculum and classroom implications

Following a review of the NI curriculum, CCEA proposed a number of curriculum changes that were accepted in 2003.⁹⁶ These included, importantly: more emphasis on developing children's thinking skills and their ability to solve problems and handle information; and adding education about citizenship and employability to the curriculum - with three overall objectives: to develop as individuals; as contributors to society; and as contributors to the economy and the environment.

'Using ICT' is a statutory cross-curricular skill in the NI Curriculum. The NI Curriculum prioritises computing (and computational thinking) as well as relating to the creative IT industries, including film and animation. A broad range of other ICT skills can fulfil the curriculum requirements of the 5 'E's (Explore, Express, Exchange, Evaluate, Exhibit), but pupils must be given the opportunity to develop the skills and knowledge outlined in the statutory 5 'E's throughout each year and each key stage as this is a statutory requirement. Schools are provided with non-statutory guidance to inform them of the knowledge, content and skills that are required for each type of ICT usage. Schools have the freedom to decide which purpose(s) or type(s) of ICT (i.e., more than one usually) to focus on each year while contributing to coverage of the 5 'E's and where to embed this across the rest of the curriculum. This works for schools, as a 'one size fits all approach' would neither be suitable, nor would it fit with the design of the rest of the NI Curriculum.

At the same time, the C2k initiative has been involved in providing increased access to devices and facilities. However, working with these in standard classrooms was an issue that needed to be carefully considered, as space for equipment and working space for pupils and teachers needed to be accommodated to support learning to best effect. The solution adopted in many instances was to ensure that on benches, surrounding a central space, screens, keyboards and the mouses would be on the bench, while the central processing units (CPUs) would sit underneath the benches. This meant that children could work on computers on the benches, and then in groups on the central space, where they could have paper, books and pens, for example. They could work together and then use devices when and as appropriate. Children working in groups, learning from one another, recognised as a best practice, could then be supported. Similarly, different room layouts allowed the teachers to move around and interact, seeing what was on the screens, rather than copying the layout of a traditional classroom. Figure 11 shows a current layout that is recognised as allowing forms of access that work for pupils and teachers.

⁹⁶ Balanskat, A., Blamire, R. & McCluskey, A. (2005). *Policy Peer Reviews ICT in Schools: Northern Ireland*. Brussels: European Schoolnet.



Figure 11: A current room layout to afford effective access and use.⁹⁷

7.4 Teachers and computational thinking

Supporting teachers in developing computational thinking relied on their being able to consider computational thinking without using digital devices as well as with using devices. Training and support for teachers was undertaken, and started with two days when teachers would not go near a device, as it was felt that it was important for them to understand that computational thinking could apply to other situations beyond computer devices. During these days, teacher trainers related computational thinking to problem-solving thinking.

From 2018 to 2020, CCEA provided training sessions on upskilling teachers in coding and computational thinking in venues around NI to over 1,000 primary school teachers. Some of these sessions were delivered alongside colleagues from local IT companies including Kainos, Citi, TotalMobile, and Liberty IT. It was found that demand for these sessions outstripped supply, due to the available and capacity of trainers and the cost of delivery and teacher release.

How one school is currently (in 2024) integrating computational thinking and computing across the curriculum and across the school is discussed in Case Vignette 4. (Please note that full school case studies are also provided as separate additions.)

Case Vignette 4: How one primary school integrates computational thinking and computing for all pupils

In the 2023 ICT Awards Report⁹⁸, Groggan Primary School was highlighted as having clear practice in place so that pupils across the school develop computational thinking skills, from the foundation stage, through each year group. The aim is to prepare young people for lifelong

⁹⁷ [St Malachy's College, Belfast | DigitalHub \(stmalachyscollege.com\)](https://www.stmalachyscollege.com) (Kind permission was granted by St Malachy's College for use of this image.)

⁹⁸ Smith, S. and Anderson, J. (2024). *Report on the 2023 ICT Excellence Awards: June 2024*. Belfast: Capita.

needs and for a workforce of tomorrow. Implementing computational thinking skills has been a key priority in the school action plan for the past ten years and is now an intrinsic element of teaching and learning through a cross-curricular approach.

A needs assessment was undertaken to identify levels of staff confidence, knowledge and understanding of computational thinking. To develop appropriate skills within their classes, subject leaders gained training in uses of Barefoot Computing, iTeach, Hive Hackers, Max Coding, and being introduced to the Hour of Code, Bee-Bots, Just2Easy and Micro:bits. Teachers agreed manageable and achievable half-termly targets to become adept at coding skills, relevant to the ages and needs of their pupils. The ICT coordinator and principal provided support, as did the school pupil digital leaders - chosen for their abilities to work independently, but also having 'soft' skills needed to support their peers. Through these roles, it was found that pupils with special educational needs developed social skills, and they valued their abilities to work with other children. Digital leaders were supported through the Dream Space Ambassadors programme, receiving virtual training on applications such as MakeCode, sharing what they had learned with others.

Unplugged activities (including desk-top and physical) were introduced so that the language associated with computational thinking could be made accessible to pupils from early ages. Pupils first encountered 'plugged-in' (screen-based and robotic) activities with uses of Bee-Bots, progressing to Scratch Junior in Key Stage 1 (5-7-years-of-age) and then block-based coding applications in KS2 (7-11-years-of-age) through Just2EasyCode, Micro:bits, MakeCode Arcade, Hour of Code, and Spheros, using appropriate activities recommended by CCEA. A clear progression was mapped out, across the age span.

Teachers reported on the pupil activities and outcomes through social media posts, assemblies, the school website, displays and governors' meetings. All teachers engaged, whether newly qualified or more established. Computational thinking was embedded across the curriculum in all year groups, pupils were immersed in activities which challenged their understanding. The need for 'debugging' was not seen as a failure but as a learning experience. Pupils were seen as developing more independence in their learning, taking risks, working collaboratively, using appropriate language, and applying skills learned in one context in others.

7.5 The future

A current concern, and potential opportunity, is what is recognised in some cases as a lower focus in schools on manufacturing using computers. It is felt that manufacturing, making things, making objects, and robotic manufacturing are important aspects to explore within a curriculum. For example, the growing focus on 3D-printing has the potential to support future career and employment directions. Schools are also concerned and focusing on the potential uses (and challenges) of other emerging digital technologies, including virtual and artificial reality (VR and AR), and generative artificial intelligence (GenAI).

In terms of the future direction of travel, in 2024, the Minister of Education commissioned a wide Curriculum Review in NI⁹⁹ and is keen that a particular focus is brought forward in terms of the power of knowledge within the curriculum.

⁹⁹ [Review of the Northern Ireland Curriculum announced | Department of Education](#)

8. Sustaining Factor 5: Developing teacher practices

8.1 *Diverse teacher practices at early stages*

Teacher professional learning (TPL) has paralleled the focus of long-term initiatives. From 1989 to 1998, professional development of teachers was supported by the five ELBs. A number of seconded teachers worked in each ELB to help other teachers learn how to use technologies and apply them to teaching and learning. But it was found that this did lead to fragmentation as each ELB took its own decisions about which computers to use. So, this led to diversity, with one ELB using BBC Microcomputers, another Research Machines, another Sinclair machines, and even some using Tandy computers. Across the ELBs, working was independent, with limited sharing of effort and practice, run through their own education committees and chief education officers, so it was found that at times they became more competitive than complementary. It was only after the establishment of C2k that more formalised efforts for a nation-wide approach to supporting educational technology was facilitated by the establishment of an Inter-Board IT Group (IBET) comprising the IT advisors from each ELB and chaired by the Project Director of C2k (who was a former ELB IT advisor).

During the 1980s and 1990s teachers using ICT were often those who were especially interested, rather than teacher use being universally wide. In the 1990s, advisors in each of the ELBs had responsibility to support teachers in schools. In one ELB the responsibility covered both primary and post-primary schools, whilst in the other ELBs the school sector responsibilities were separated.

8.2 *Developing NI-wide teacher practices*

Much wider teacher training and subsequent uses of ICT occurred from the 2000s onwards. A part of this shift arose from the publication of a revised NI Curriculum where using ICT was established as a cross-curricular theme, while the resourcing provided through C2k was also influential. In the revised curriculum,¹⁰⁰ a key revision of the framework through which teachers could consider uses of ICT was named the 5 'E's (Explore, Express, Exchange, Evaluate, Exhibit). This involved a significant move away from a content heavy curriculum to an increased focus on thinking skills, providing young people with opportunities to become independent, self-motivated and flexible learners. This was, in 2024, still in place, and it has been recognised that teachers can easily understand how ICT might be used in lesson activities in these ways, so that they could buy into this approach in a cross-curricular way. CCEA's guidance on what is termed 'Desirable Features'¹⁰¹, gives classroom contexts for different uses of ICT in practice. These features support computational thinking and coding, digital art and design, digital music and sound, digital film and animation, digital storytelling and managing data. If a teacher is choosing the 'Desirable Features' to support the 'coding and computational thinking' aspect of 'UIC' (which, with the 'managing data' aspect is one of two ways to cover the 5 'E's Explore 2 in primary school), they will be explicitly teaching children how to code and program, regardless of whether they are doing this linked to another part of the curriculum. The 'Desirable Features' guidance outlines brief particulars of the process to be taught, and, depending on the interface or tool being used, the pupils will learn about algorithms, loops, if-else-then, and creating variables, for example. However, teachers still have flexibility in the approach they adopt, and there is no 'tick-list' of criteria to be covered. This approach has been found to be key to

¹⁰⁰ <https://ccea.org.uk/key-stages-1-2/curriculum/using-ict>

¹⁰¹ <https://ccea.org.uk/learning-resources/using-ict-desirable-features>

successful uses in classrooms, and this focus is often reported to be seen in practice. However, technology developments mean that this approach needs to be reviewed in an ongoing way.

The investment in resources through the C2K initiative facilitated that focus on uses of digital tools. In some primary schools, teachers argued for computing equipment to be placed where they taught, in their classrooms. Primary school teachers were familiar with children working in groups and rotating around tasks, so from a teacher education perspective it was easier to show how the teacher could involve the use of the computer in rotation activities. This enabled many primary teachers to engage with uses of computers at a fairly early stage. But in post-primary schools, this was much more difficult to achieve. If a computing teacher taught ICT or computing, the devices would be most likely located in a computer room, but for a history teacher, for example, the teacher would need to try to timetable access to that room, which could mean having to negotiate time with other teachers who might also want access to the computer room.

In parallel at that time, the New Opportunities Fund (NOF) provided professional learning for all teachers across NI. This involved classroom-focused training, and by 2002 it was reported that 94% of NI teachers felt confident using ICT as a result of that training support. A similar proportion of teachers wanted to extend their uses of ICT as a result of the professional development. In total, 21,164 teachers and school librarians (virtually every teacher), had completed the programme.¹⁰² by the end of March 2003.

Following the NOF training support, subsequent support was provided by the ICT advisory services in ELBs until the ELBs were merged into the EA in 2015. The professional development provided in NI on software, hardware and the investment in infrastructure has been recognised as being particularly strong. Investment in curriculum-based professional development has been felt in some cases to be more limited, but it is recognised that it is required. Through C2k, funding was provided for long-term support, but funding for teacher professional learning in pedagogy, curriculum and assessment faced cutbacks at times and it was not always possible to sustain TPL at levels of previous years in some cases. Other forms of training support were additionally provided, however, through the social value added from involved industries in the PFI contracts (mainly Microsoft and Capita) from 2021. Currently, in 2024, the Software Alliance (now rebranded as Software NI) TeachTech supports computing teachers through a series of updating sessions, as well as providing a mentoring scheme¹⁰³, to inform teachers about the software industry, and the diversity of careers and opportunities within it. In September 2024, within a single month, 54 teachers had applied to be involved in this scheme.

From 2007, CCEA have provided guidance and support to schools, to assist with the integration of 'Using ICT' into the school curriculum through:

- **Desirable Features Guidance:** This sets out what it is desirable to see pupils doing in different types of ICT at different levels, setting out the progression expected across year groups and across key stages. This has been updated every few years to ensure it is up-to-date with emerging technology and their uses in education as well as focussing on types of ICT that are emphasised.

¹⁰² DENI. (2004). *emPowering Schools in Northern Ireland – Briefing Paper 4: What did we learn from the NOF training programme?* Belfast: DENI.

¹⁰³ <https://forms.office.com/e/UAbSxaETrU>

- **‘Using ICT’ Levels of Progression Framework:** This provides detailed expectations for each ‘Using ICT’ level and outlines the skills that pupils should demonstrate at different stages. This document acts as a blueprint for teachers to assess pupils consistently.
- **Case Studies and Exemplars:** Schools are provided with exemplar materials, including case studies and examples of best practice, to demonstrate how other schools have successfully integrated and assessed ‘Using ICT’.
- **Support for ICT Coordinators:** This is a full web area with case studies and ideas for whole school planning, as well as providing face-to-face training from ICT coordinators for all primary schools in NI.
- **Self-Evaluation Tools:** CCEA offers self-evaluation tools that allow teachers to assess their own ‘Using ICT’ teaching strategies and identify areas for improvement, helping to keep the ‘Using ICT’ teaching approach up to date with evolving technological trends.
- **Teacher Moderation Support:** To ensure consistency in ‘Using ICT’ assessments, schools receive guidance and training on how to moderate ‘Using ICT’ assessments across different classes and schools. Moderation processes have included workshops and external support to standardise how pupils have been assessed and provided with a level.
- **Cross-Curricular Support:** Schools are provided with resources to integrate ‘Using ICT’ across different subjects rather than confining it to discrete ICT classes. This has included lesson plans, activity ideas, and project templates that embed ‘Using ICT’ skills in areas such as mathematics, science, learning for life and work, and the arts.
- **STEM (Science, Technology, Engineering, and Mathematics) Initiatives:** ‘Using ICT’ has been integrated into broader STEM initiatives, with government support aimed at encouraging schools to embed ‘Using ICT’ in creative and technical subjects.

Similarly, the CLCs have continued to support teachers and their professional development (as shown for the school year 2023-24 in Table 9). The professional development from CLCs provide “workshops [that] are offered regionally for the benefit of schools, clusters of schools or individuals - in school, through EA out-centres including AmmA CLC, or online”, supporting “a creative focus area”, including: computational thinking and coding; digital storytelling - film; digital storytelling - animation; digital audio; digital art and design; digital music; and game based learning - Minecraft.¹⁰⁴ Support is provided for primary, post-primary and for young people in the community.

¹⁰⁴ AmmA Creative Learning. (2024). *Creative Learning Centre Programmes: Project Plan 2024-25*. NI Screen.

Table 9: Numbers of schools, teachers and young people provided for and supported by the three CLCs.¹⁰⁵

CLC Courses	Numbers provided for and supported ¹⁰⁶
Creative Digital Technology programmes and courses for teachers	345 introductory and follow-up course training units
Teacher participations - Extended Creative Digital Technology programmes and courses	600 teachers participating
Moving Image Arts courses for teachers	20 courses
Teacher participations – Moving Image Arts courses	150 teachers
Total teacher participation - all programmes	2,100 teachers
Young people participation - all programmes	4,950 young people
Total partnership and returning schools	90 schools
Young people participation - outside of schools	900 young people
CLC activity in areas of disadvantage – partnership schools	All CLCs - at least 70%

Teachers are supported with updated documentation that aligns with current NI-wide curriculum guidance. For example, in 2024, CCEA, in collaboration with primary school ICT coordinators, produced guidance for ICT coordinators and teachers to cover a range of key issues: digital wellbeing and online safety; digital etiquette and identity; digital security and privacy; digital consumer; digital law; and digital proficiency.

In terms of teachers new to the profession, it is clear that teachers have continued to join schools each year, some from initial teacher education institutions (ITEs) in NI, and others from those outside NI. Table 10 shows the numbers of teachers who have been newly registered in NI by the General Teaching Council Northern Ireland (GTCNI), annually, from 2019 to 2024.

Table 10: Numbers of teachers coming into the profession in NI from 2019 to 2024.¹⁰⁷

Calendar Year	Numbers of teachers*** and their originating locations who were added to the GTCNI Register				
	NI	GB	ROI	Other	Total
2019	495	310	0	0	805
2020	495	272	*	*	770
2021	483	268	0	0	751
2022	476	284	0	0	760
2023	486	311	0	0	797
2024**	524	165	0	0	689

Please note: * Figure not shown as less than 5 in cell; **2024 figures are as of 12/09/2024; ***Please note the figures are based on calendar year, as GTCNI frequently has applicants who first register after 1st September, but who have been awarded their teacher training qualification in the previous summer. Reporting on the figures based on school year from 1st September to 31st August, with a Date of Award from 1st September to 31st August of the same year, would not account for these teachers.

For the 2024-2025 academic year, new teachers being trained in NI have totalled 580, constituting 160 in Stranmillis University College, 65 in St Mary's University College, 138 in

¹⁰⁵ A recent report by NI Screen (KPI Report 2023-24).

¹⁰⁶ It should be noted that all outcomes are measured against key performance indicators that are identified in the previous planning sequence.

¹⁰⁷ Data kindly provided by DE from the GTCNI.

Queen’s University Belfast, and 117 in Ulster University. Given that some 500 teachers may be newly arriving each year, appropriate TPL is needed to ensure that they are aware of digital provision and its uses for curriculum purposes, school practices and anticipated outcomes for young people. But how teachers new to schools gain digital awareness and practices is reported to vary. Research suggests that new teachers need to be prepared in terms of attitude rather than specific content knowledge (what has been referred to as ‘inquisitiveness’¹⁰⁸. Some schools provide their own in-school support mechanisms, sometimes linked to them being Apple (7 regional training schools)¹⁰⁹, Google (5 reference schools)¹¹⁰, or MS (1 showcase school)¹¹¹, for example.

Data also indicate that the number of teachers leaving the profession in NI (as shown by those who leave the GTCNI register), is higher than the number entering the profession (see Table 11).

Table 11: Numbers of teachers leaving the profession in NI from 2019 to 2024.¹¹²

Calendar Year	Numbers of teachers* leaving** the GTCNI Register
2019	2,040
2020	2,930
2021	95***
2022	3,300
2023	1,525
2024	1,620

Please note: * The figures have been rounded to the nearest 5. ** It is estimated that approximately 18-31% of those that leave the register in a year, re-join the register in the same year. It is possible that this might be due to those who enter retirement and return, and those who leave to pursue an alternative career and then return at a later date. Please note these figures are based on calculations for two registration years only. *** The GTCNI Annual Renewal process normally occurs in July and August each year; however, due to COVID, the 2021 Annual Renewal process did not occur until February 2022.

8.3 Effects of non-successful projects

Non-successful projects have been identified, and lessons have been learned from these. The most significant non-successful project since the establishment of CLASS in 1989 was the attempt in 1999/2000 to deliver education technology infrastructure to schools using a PFI-based procurement approach. Ultimately, this project failed as a result of the bidder being unable to demonstrate that it could deliver appropriate risk transfer on a value-for-money basis and deliver an affordable quality solution to NI schools. This could have had a catastrophic impact on the overall delivery of the entire NI Education Technology Strategy. As discussed previously, this outcome was averted as a result of the project developing a comprehensive ‘Plan B’, which could immediately be mobilised to fill the void left by the lack of the PFI solution during the PFI procurement. The extent to which key policy influencers and funding departments such as HM Treasury were ‘at the table’ during the key evaluations that led to abandoning the PFI project, significantly facilitated the myriad of approvals necessary to permit the switch to the ‘Plan B’ approach.

¹⁰⁸ Passey, D., & Lee, A.S.H. (2020). Blending learning provision for higher education: Planning future professional development. In N.V. Varghese and S. Mandal (Eds.) *Teaching Learning and New Technologies in Higher Education*. (pp.101-116). Singapore: Springer.

¹⁰⁹ [Northern Ireland — Apple Regional Training Centres](#)

¹¹⁰ [GEG Northern Ireland - Google Reference Schools](#)

¹¹¹ <https://www.facebook.com/stmarysderry/videos/3481210911942242/>

¹¹² Data kindly provided by DE from the GTCNI.

Additionally, some specific projects run within the wider initiatives have not always been seen to be successful. For example, a learning management environment, Learning NI (LNI) was developed in 2004 as an online digital content and services provision. However, it was not used widely and was not found to be fit for purpose. Teachers who experienced the challenges of using this facility were often set back because of how awkward it was to use it, a problem not uncommon to learning management systems at that time. This was found to have a negative effect, and wider uptake and uses of a virtual learning environment were unfortunately set back, until it was independently evaluated by the Education and Training Inspectorate.¹¹³, which found that “the usability, performance and technical support issues with LNI” needed to be urgently addressed leading to a “new online learning service which provides users with some choice of learning environment without loss of the advantage of a single, secure regional solution” being specified and procured.

8.4 Developing uses of computer peripherals

When the C2k initiative supported increased numbers of devices in schools, there was an increasing shift in locations of devices in post-primary schools. This enabled more teachers to have access to computers in departmental clusters and from any classroom. In primary schools, teachers were engaging pupils in using peripheral devices widely, with cameras and microphones, for example. The uses of peripheral devices were found to be important for learning, rather than a focus always needing to be on the use of the computer itself.

8.5 Developing teacher practice and sharing mechanisms

Sharing practice and expertise has been a focal concern of successive initiatives and strategies. Such sharing has been positively supported by the shared networking and communication infrastructure that is common to all schools. NI is recognised as being small enough for people to meet and share ideas with individuals, such as some of those, for example, who undertook the joint Masters’ programme in Educational Technology, taught by Duquesne University, Pittsburgh and the University of Ulster in 2001, becoming influential in posts of responsibility. There are opportunities for people to meet and share ideas, and it is felt that this has increased, with more sharing now happening in self-help groups online, via WhatsApp, Facebook, X (Twitter) or Instagram, for example. Teachers are now found to be sharing a lot more virtually in an ad hoc way.

By 2004, a Regional Training Unit (RTU) had already been set up and was piloting a Virtual College for School Leadership.¹¹⁴ Training was provided online through this route. The RTU also established the Online Learning and Teaching for Educators (OLTE) Certificate accredited through the Open College Network (OCN Level 4) to build the capacity to design and teach online school and teacher courses. The certificate was achieved by some 450 teachers by 2008.¹¹⁵

Teachers who had previously volunteered to co-design materials, perhaps with Microsoft, for example, often then went on to run sessions themselves, in their own schools, where they invited cluster groups of schools in their local area to come in and explore some of the things

¹¹³ Education and Training Inspectorate. (2008). *An Evaluation of the Use and Impact of Learning Environments in Schools and in the Wider Education Service*. Bangor: DENI.

¹¹⁴ DENI. (2004). *emPowering Schools in Northern Ireland – Briefing Paper 6: How are school leaders supported by technology?* Belfast: DENI.

¹¹⁵ Regional Training Unit. (2007). *Putting eLearning Policy into Practice – Online Learning and Teaching for Educators’ Programme in Northern Ireland (OLTE)*. (unpublished).

that they themselves had designed. Through Area Learning Communities, teachers have invited people into their school, have coached them, and have provided development opportunities.

In terms of sharing ‘best practice’, from 2001, ET Sharing Excellent Practice Awards¹¹⁶ were established, which enabled all schools to submit an application for an award. The winners were declared as ‘Laureates’ and the runners-up as ‘Distinguished Finalists’. This practice was developed from 2015 into the NI Schools ICT Excellence Awards¹¹⁷, subsequently sponsored by C2k and the managed service provider, Capita.

8.6 Digital leaders in schools

More recently, teachers have felt confident to let children take the lead more. Some schools have developed the practice of identifying children who are ‘digital leaders’. This practice supports the teachers, as they do not have to be the ‘font of all knowledge’. Teachers are comfortable with this practice, and they are showing that they value their children and their competences.

8.7 Just-in-time professional learning

Professional learning prior to and during the Covid-19 pandemic shows a successful example of how just-in-time learning was put in place. Just prior to the Covid-19 pandemic and lockdowns, professional learning for EA officers supporting schools was provided, focusing on technology and its disruptive effects. The professional learning sessions showed school support staff the potential of the available technology. After the Covid-19 lockdowns, teachers received Microsoft Surface Pro devices as part of the C2k provision. Advisors showed the potential of the devices in an engaging and fun way, which was particularly timely due to the major role that they had played supporting schools during the Covid-19 pandemic. C2k logins were all checked, so that these were up to date. This professional learning came at a fortunate time, as many teachers were then well prepared when it came to remote learning needs during the Covid-19 pandemic period. Prior to the Covid-19 lockdowns, there were some 5-6,000 Google classrooms set up, whilst only 3 weeks after the start of the first lockdown there were some 200,000 set up. The work that went into producing the materials that were required for teachers to go out and set up a Google Classroom or an MS Teams meeting was able to be used extensively, quickly and was provided online.

8.8 Industry-standard professional qualifications

Increasingly now, teachers are taking and gaining accreditation in industry qualifications. For example, Microsoft, Google, Apple and Adobe teacher certification schemes, awards and ‘badges’ are sometimes being gained by teachers and teaching assistants across a school, in the primary, special and post-primary sectors.

8.9 Areas of future focus

Links across the EA, with regard to professional learning and training, are now felt to be particularly important. The potential of strong links between support services and school improvement and development, for example, are being discussed. Links with industry are also regarded as increasingly important, as it is recognised that not many teachers have industrial experience and that is a gap that could be considered more, perhaps as a part of teacher professional learning. The link between the EA and the CCEA and the curriculum is also critical,

¹¹⁶ DENI. (2004). *emPowering Schools in Northern Ireland – Briefing Paper 7: What does ‘good practice’ look like?* Belfast: DENI.

¹¹⁷ <https://content.capita.com/ICTExcellenceAwards202324>

to ensure complementarity. It is felt that further development of this link could be a focus for the future.

The provision of ICT development support for teachers by the private sector C2k partners is growing in significance. Already it is reported that providing opportunities for teachers to undertake development work at the Microsoft¹¹⁸ and the Google Head Offices in Dublin, in cooperation with teachers from the Republic of Ireland, for example, is not only welcomed by the teachers, but provides them with experiences and resources that they then share with colleagues and that they can use to support aspects of learning with their children. Apple's ten regional training centres in NI¹¹⁹, seven based in NI schools, provide similar support and the Odyssey Trust in Belfast also facilitates a cross-border teacher development initiative with a transatlantic dimension. Additionally, there are five Google Reference Schools in NI¹²⁰, and two Microsoft Ireland Showcase Schools in NI¹²¹.

In terms of an age-related focus, it is felt that opportunities for Key Stage 3 pupils (aged 11-14 years) could be enhanced more than is happening in some schools. A part of limitations in this respect are felt to be due to the traditional timetabling of curriculum subjects, as these can present challenges when moving to more flexible and creative learning approaches.

Similarly, enhancing links with parents¹²² and other groups is being actively considered and explored. Links with those involved in initial teacher education, for example, are seen to be increasingly important in terms of the pipeline of incoming teachers to continue to support digital education.

¹¹⁸ <https://dreamspace.microsoft.com/en-us/dreamspace/ireland>

¹¹⁹ [Northern Ireland — Apple Regional Training Centres \(rteducationevents.com\)](https://www.rteducationevents.com/northern-ireland-apple-regional-training-centres)

¹²⁰ [GEG Northern Ireland - Google Reference Schools](https://www.gogoogle.com/education/reference-schools/northern-ireland)

¹²¹ <https://www.facebook.com/stmarysderry/videos/3481210911942242/>

¹²² Woodhouse, H., Passey, D. & Anderson, J. (2024). Using digital technologies to build connections between families and schools as children transition to school. *Education Sciences*, 14, 520. <https://doi.org/10.3390/educsci14050520>.

9. Resourcing overview

This chapter considers resourcing, but from a time involvement and physical requirements perspective rather than from a direct financial perspective. This approach is taken as finance needs to be considered at a national level; finances do not necessarily easily relate from one nation's financial costs to another. The resourcing relates to the 29 'design features' identified in Chapter 1 as those features that are important for successful sustained related digital inclusive education for 5-18-year-old young people (4-18-year-old in NI) identified from this case study.

In NI, the current government-funded computer to pupil ratio is broadly at a level of some 1:5 but with variations across primary, post-primary and special schools (and lower in schools which have added to the central service provision). Additionally, with at least one personal device for each teacher, the digital technology provision currently in place in 2024, as shown in Figure 8, covers, for some 1,000 schools:

- 380,000 users (330,000 pupils, 20,000 teachers and 30,000 non-teachers) connected through a centralised IT infrastructure
- 90,000 managed end-user devices
- 45,000 devices connected to Wi-Fi on a daily basis
- 17-18,000 wireless access points installed through the latest BT contract
- 5,900 servers to securely store and process data transfer between schools
- Over 40 learning resources and platforms
- Office 365 and G Suite access
- Up to 1Gb dedicated lines with secure Internet connectivity and options to extend
- 24/7 monitoring and management of the IT infrastructure
- A protected website supporting 40 billion hits per month
- Email with protection against 1 million spam emails per month
- A remote support service desk

This level of digital technology provision is supported by some:

- 20 regional engineers
- 100 managed service personnel
- 162 Education Authority support staff
- Consultants (approximating to one full-time consultant for one year)
- Department of Education personnel (approximating to one full-time person for one year)

To take forward sustainable relevant digital inclusive education for 5-18-year-old young people, the NI case study indicates that the 29 design features (shown in the left-hand column of Table 12) should be adequately considered and addressed, according to context. Table 12 shows ideas of personnel involvement, approximated on the basis of the reported experience from the NI case study, with some additional comments that relate to major periods of implementation – a contractual phase that overlaps a continuous implementation phase. Implementation is a continuous concern; a contractual phase arises when new contracts for implementation are under review, but implementation must still continue. Please note that details are all estimated; they are offered as possible guidelines when moving forward with this form of endeavour. But an outcome that is highlighted by this form of analysis is - ensuring all stakeholders are on board is a primary concern; the technology is important but secondary.

Table 12: Resources related to design features for sustainable development

Design feature	Personnel involvement	Comments
Nation-wide scale and scope are considered to be feasible	Review meeting(s) with key personnel – government department, curriculum and assessment, education authority, education management, school representatives.	Experience has shown that working towards agreed involvement for all stakeholders, developing awareness, agreeing decisions on scale, scope and procurement can take up to eighteen months of time. The design features in the left-hand column are shown to be crucial elements during contractual review and decision stages for moving forwards successfully with future implementation and practices for sustained relevant digital inclusive education.
The long-term purpose is set	Review meetings with key personnel – government department, curriculum and assessment, education authority, education management, school representatives.	
Sufficient lengths of development phases are discussed and decided	Meetings with key personnel – government department, government finance, procurement, education management, curriculum and assessment, education authority, school representatives, consultants.	
Involving all stakeholders	Creation of communications from key personnel, communicated by support personnel within each key stakeholder area.	
A long-term funding model is essentially developed	Meetings with key personnel – government department, government finance, procurement, education management, curriculum and assessment, education authority, school representatives, consultants.	
Cost benefits of the long-term and nation-wide model need to be demonstrated	Collation of evidence and creation of documentation to show cost benefits of the model.	
Educational technology strategies are closely linked to curriculum	Meetings with key personnel – government department, education management, curriculum and assessment, education authority, school representatives.	
Contracts with suppliers need to be appropriately developed	Meetings with key personnel – government department, government finance, procurement, education management, curriculum and assessment, education authority, school representatives, consultants.	
Solutions rather than products are sought	Meetings with key personnel - education management, curriculum and assessment, education authority, service providers – to explore solution requirements and details.	
An initial central operational unit sets a pattern and standards	Meetings with key personnel – government department, education management, curriculum and assessment, education authority, school representatives - to explore and agree management structure.	
Necessary standardisation is identified - and ways forward were explored	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to explore and agree standardisation.	
The teams for central service provision are identified at an early stage	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to explore and agree central service provision.	
Experience and expertise are crucial for school support services	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to explore and agree desirable expertise and experience.	

Design feature	Personnel involvement	Comments
Equality is at the heart of all phase developments	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to ensure equality is accommodated.	
Diversity, inclusion, the digital divide and the under-represented are always a focus of concern	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to review and explore ways to support diversity and inclusion.	
Uses of digital education in special schools and for those young people not able to attend mainstream schools are effectively considered	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to review and explore ways to support special needs and young people not in mainstream schools.	
Room layouts are carefully considered	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to explore room layouts.	
Teacher professional development support is crucial	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives, service providers - to explore forms and provision of teacher professional development.	
A long-term curriculum is considered and developed	Meetings with key personnel – government department, education management, curriculum and assessment, education authority, school representatives.	Whilst the crucial design features shown in the left-hand column need to be considered at the same time and alongside the times when a contractual focus is under way and in review, these design features also require ongoing monitoring and review to ensure continued implementation and outcomes.
A ‘test-bed’ co-design approach is taken	Meetings with key personnel - education management, curriculum and assessment, education authority, school representatives – to explore pilot requirements and details.	
Links to current and future industry and employment supports aspiration	Collation of likely industry contacts and meetings with key personnel – government department, education management, curriculum and assessment, education authority - to gather evidence and discuss forms of involvement.	
Equality, irrespective of educational management, are always accommodated	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to review how equality has been accommodated post-phase implementation.	
Schools are not limited in terms of use or additionality	Meetings with key personnel – education management, school representatives, service providers - to discuss additionality.	
School principals and teachers are always supported	Meetings with key personnel - education management, curriculum and assessment, education authority, school representatives - to explore forms and ways to provide support. Creation of a timeline of forms of support and ways to provide this.	

Design feature	Personnel involvement	Comments
Qualifications and certification are revised to match digital interest and concerns	Meetings with key personnel - education management, curriculum and assessment, education authority, school representatives, industry representatives - to explore future qualification options. Creation and distribution of draft and final documentation.	
Aspiration from early ages is developed	Meetings with key personnel – government department, education management, curriculum and assessment, education authority, school representatives, industry representatives - to explore ways to support early age awareness and aspiration. Creation and provision of sessions or events.	
A cross-curricular approach supports computational thinking and computing in school curricula	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to explore ways to support computational thinking and computing in the curriculum.	
Curriculum and teacher approaches focus on long-term uses by young people	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to explore ways to support long-term uses of technologies in the curriculum.	
Teachers sharing practice are positively supported	Meetings with key personnel – education management, curriculum and assessment, education authority, school representatives - to explore ways to support teachers sharing practice.	