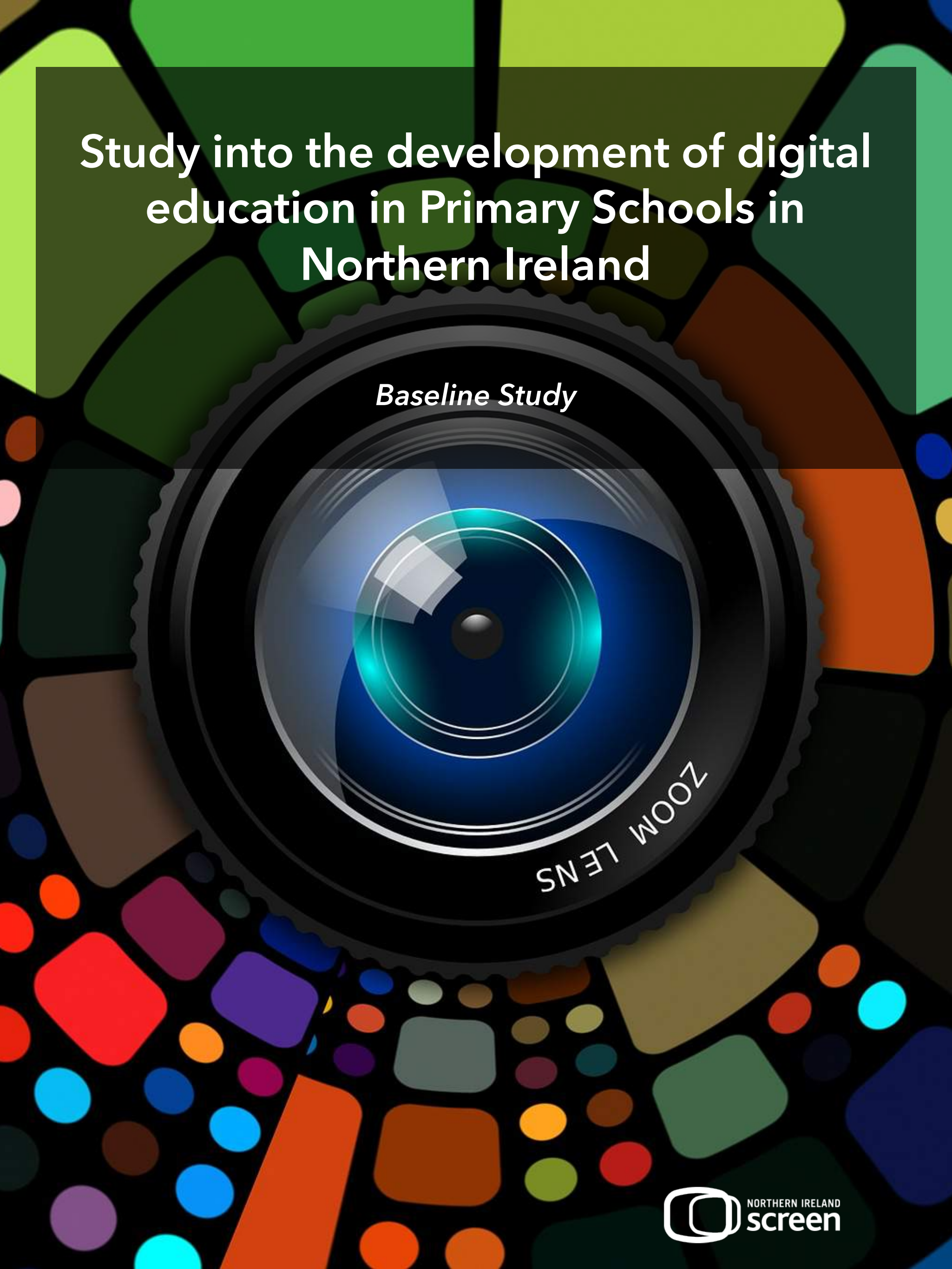
Study into the development of digital education in Primary Schools in Northern Ireland

Baseline Study



NORTHERN IRELAND screen

ISBN 978-1-85923-285-9

STUDY INTO THE DEVELOPMENT OF DIGITAL EDUCATION IN PRIMARY SCHOOLS IN NORTHERN IRELAND

FINAL REPORT

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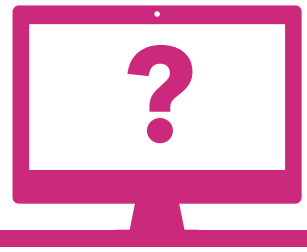


ACKNOWLEDGMENTS

We would like to express our appreciation of cooperation of the staff and management in the 31 primary schools that participated in this work. Special thanks are due to James Noble-Rogers, Executive Director of The Universities' Council for the Education of Teachers (UCET) for his support and to also acknowledge that this study was convened under the auspices of UCETNI with the steering group of the project nominated by the members of the UCETNI Committee (St Mary's University College, Stranmillis University College, Queen's University Belfast, Open University and Ulster University).

We would also like to thank the Steering Group of this project for their guidance and contribution to the planning of the research activities. In particular, Ms Meabh McCaffrey-Lau, both as a member of this Steering Group and as a representative of Northern Ireland Screen, for identifying the gap in recent research as well as sharing her insights regarding digital education in the primary school sector and for practical advice during the planning of the training events and input to the content design of the online survey.

Belfast, February 2019

Funded by:

This study is funded by Northern Ireland Screen and the Department for Communities.

Executive summary 6

1. Background.....6

2 Recommendations for stakeholders based on the study's findings.....7

2.1 Pedagogy and assessment in relation to digital skills.....7

2.2 Teacher continuing professional development in digital skills 8

2.3 Recommendations for School Leadership 9

2.4 Equality of access and the learner experience.....9

2.5 Parental engagement.....10

3. Conclusion 10

Study into the Development of Digital Education in Primary Schools in Northern Ireland 12

1Introduction 12

2 Digital Education in Primary Schools Baseline Study Background 13

3. Digital Education in Primary Schools Baseline Study Findings.....14

3.1 Leadership in school 14

3.2 Teacher Professional Development in ICT 17

3.3 Aspects of ICT-related pedagogy and assessment. 21

3.4 Equality of access and the learner experience.....31

3.5 Parental Engagement.....35

3.6 Teacher Attitudes to ICT and Computers.....37

.7 Digiskills and Teachers as Researchers.....41

4. Conclusion 42

References 44

EXECUTIVE SUMMARY

1. BACKGROUND

1.1 Over the last few decades, rapid technological change has taken place which has had significant effect on society, economy, skills and employment. Although there is no reliable local research data on Northern Ireland's digital development, research by Citizens Online (UK) in 2017 suggests that Northern Ireland has the worst rates in the UK regarding digital skills, with 32.2% of those aged 16-65 (representing over 378,000 people) having low or no digital skills. This research also suggests 38% of small businesses in Northern Ireland lack basic digital skills.

1.2 The Review of Digital Education Policy and Implementation in UK and Ireland (2018), funded by Northern Ireland Screen, found that Northern Ireland is the only region within the UK without a Digital Strategy. The last long-term development plan and ICT framework for ICT policy was set out by the government over two decades ago, namely the 'Strategy for Education Technology in Northern Ireland' (DENI, 1997). This lack of direction is reflected in the level and quality of skills development on the ground.

1.3 To address the above concerns, the Department for Communities confirmed support for Digiskills NI in November 2016, a collaborative, long-term structured programme, designed to build capacity within formal education for digital skills and computing. Initiated in 2015 by industry leaders, Digiskills NI has brought industry, government, statutory agencies and higher education institutions together with local schools to inform strategic policy making.

1.4 Due to the political uncertainty in Northern Ireland, in particular the absence of the Northern Ireland Assembly[1], funding intended for this programme has not yet been secured; however Northern Ireland Screen continues to contribute significant resources for the ongoing development of digital education and has secured funding from the Department of Communities to fund research in the development of digital skills in education.

Digital Education in Primary Schools Study

1.5 This report outlines the findings of the Digital Education in Primary Schools Baseline Study which aimed to gather baseline data on the following areas of digital education in primary schools: (a) Leadership in school, (b) Teacher Professional Development, (c) Pedagogy and assessment, (d) Equality of access and the learner experience and finally (e) Parental engagement.

1.6 The Digital Education in Primary Schools Baseline Study was developed and overseen by representatives from all the Initial Teacher Education providers in Northern Ireland, under the auspices of UCETNI (The Universities Council for the Education of Teachers NI).

1.7 A 'teacher as researcher' model was employed for this study's methodology in line with 'Learning Leaders: Strategy for Teacher Professional Learning in Northern Ireland' (DE,

[1] *Stormont collapsed on 9th January 2017 with the resignation of Martin McGuinness as Deputy First Minister.*

2016) and the findings of the BERA/RSA inquiry into the role of research in teacher education (BERA, 2014).

1.8 Funding for staff cover was provided and the school principals and ICT coordinators attended a ‘Teachers as Researchers’ workshop which aimed to provide basic research training and practical experience to the ICT coordinators.

1.9 Thirty-one schools participated in the study - selected from a randomised sample provided by the Department of Education (DE) - and a bursary for their participation was offered at the end of the data collection stage. Five sources of data (from principals, primary school teachers and primary school ICT coordinators) were identified to ensure triangulation.

2 RECOMMENDATIONS FOR STAKEHOLDERS BASED ON THE STUDY’S FINDINGS

2.1 Pedagogy and assessment in relation to digital skills

- **Linking ICT skills to pedagogy needs considerable attention and a fresh strategic approach to understanding how teaching using ICT can benefit from new pedagogical approaches. Therefore:**

- **DE and education agencies, including ETI, EA, GTCNI and CCEA should review their roles, guidance and actions in providing teachers with information, advice, direction and training in the teaching and assessing of digital skills.**

- **CCEA should consider tailoring a programme of ongoing and dynamic face-to-face curriculum support training in relation to the five 'E's for non-specialist teachers in the primary sector.**

- **Professional development and training should be provided, and focus should be on software and hardware available in school but also specifically in relation to the creative technologies' element of the curriculum. Creative Learning Centres may be best placed to provide this.**

- **The Department should consider how the ten days that are currently set aside for professional development (DE, 2016a) should be directed towards high priority training activities in promotion of digital skills education.**

- **Schools should be encouraged and facilitated to participate in the wider dissemination of good practice. Communities of practice are an important means of sharing approaches to digital skills education challenges (DE, 2016b). Greater support is required to encourage effective communities of practice for ICT between schools and at different levels of competence.**

- **Continuity with regards to digital skills development between primary and post-primary education should be explored; skills gained by pupils while at primary school should be further developed at post-primary level.**

2.2 Teacher continuing professional development in digital skills

- Given that teachers feel that they are being left behind, with limited time and opportunities to upskill themselves and keep up-to-date with the advances in digital education, the following recommendations are made:

- The ETI and DE must ensure sufficient clarification and support are provided regarding expectations in ICT in education in order to reduce confusion among teachers.

- New, differentiated and tailored training programmes should be provided to suit a variety of backgrounds and levels and to ensure equality of opportunity across Northern Ireland. The EA/HEIs/Creative Learning Centres should play a more focused role in supporting these types of teacher CPD in ICT.

- The dissolution of the Curriculum Advisory and Support Service (CASS) is widely perceived to have left a void in the area of teachers' CPD support. It seems clear that some form of strategically devised and delivered service must be provided under EA's developing functions.

- Training providers should meet a high standard set by the DE/EA and that a range of accreditation should be available to teachers to ensure that their time in training receives professional recognition.

- ITE providers should review their provision regarding both ICT skills and ICT-based pedagogy and engage in strategic consultation with all main stakeholders to plan the way forward and ensure newly qualified teachers enter the profession with the required level of ICT skills.

- This research shows that teachers are willing and keen to take up ICT training in their own time. Therefore, there should be appropriate support mechanisms in place for these teachers to pursue a flexible range of training in their own time and out-of-school.

2.3 Recommendations for School Leadership

- The Department of Education acknowledges that 'Leadership is second only to teaching as the factor most likely to influence outcomes for pupils' (DE, 2016b). This study's findings highlight the positive impact leadership can have in developing digital education but also the gaps evident in the support for leadership and the support necessary:

- School principals have indicated that all aspects of digital education in primary, including guidelines for leadership, training, equipment, connectivity and technical support should be reviewed in order to identify an effective strategy for the development of digital education in schools.

- Senior school management and staff should be supported to become self-improving by developing evidence-based and reflective practice in the area of digital education.

2.4 Equality of access and the learner experience

- The findings from this study suggest that there are significant and widening gaps regarding equality of access to digital education across Northern Ireland. This is despite investment in C2K which aimed to ensure equality of access to IT in education. With the much-cited digital skills gaps evident in Northern Ireland this inequality needs urgently addressed as follows:

- A comprehensive strategy to tackle inequality in access to a digital education should be drawn up urgently including a plan for all stages of teacher education.

- EA to examine and report why award-winning schools are able to build capacity and improve.

- C2K should review and ensure that all schools have access to sufficient equipment for all pupils to be able to develop digital skills.

- Training providers (e.g. EA and CCEA) should ensure the provision of training designed to promote teacher ICT competence. To ensure that teachers become successful leaders in

this part of the curriculum, mentoring and peer support to boost ICT confidence must become available and readily accessible.

2.5 Parental engagement

- Parental engagement is essential to support pupils' learning in all areas of education. Therefore, we need to understand how parents' engagement in this area of the curriculum can be improved. To this end we recommend that:

- Further ICT training is necessary for teachers to feel better equipped to engage with parents who are experts in the area of ICT and to help these parents who need support.

- Parents' Curriculum Support events and communications should also include information on the digital elements of the curriculum in school and advice on how to support pupils.

- A research study designed to understand parents' roles in supporting digital skills development for pupils would contribute to better parent/teacher partnerships when supporting pupil ICT skills development.

3. CONCLUSION

The small sample of 31 Northern Ireland primary schools which participated in this survey includes schools that have excelled in the area of digital technology, while others from the same sample do not have access to enough computers or other digital devices to carry out an ICT enriched lesson. This sample also includes teachers who are expert ICT users and others who still feel intimidated if a conversation turns to computers or ICT. In conclusion, based on the findings of this study, the following would contribute in addressing this inequality in the experiences of primary school pupils in digital education:

- DE urgently need a comprehensive strategic plan to build capacity for digital education, addressing inequality in access to digital education, including a plan for teacher professional development in ICT and also ITE provision.

- ITE providers should review their provision regarding both ICT skills and ICT-based pedagogy and engage in consultation with all main stakeholders to plan the way forward and to ensure newly qualified teachers enter the profession with the required level of ICT skills and confidence.

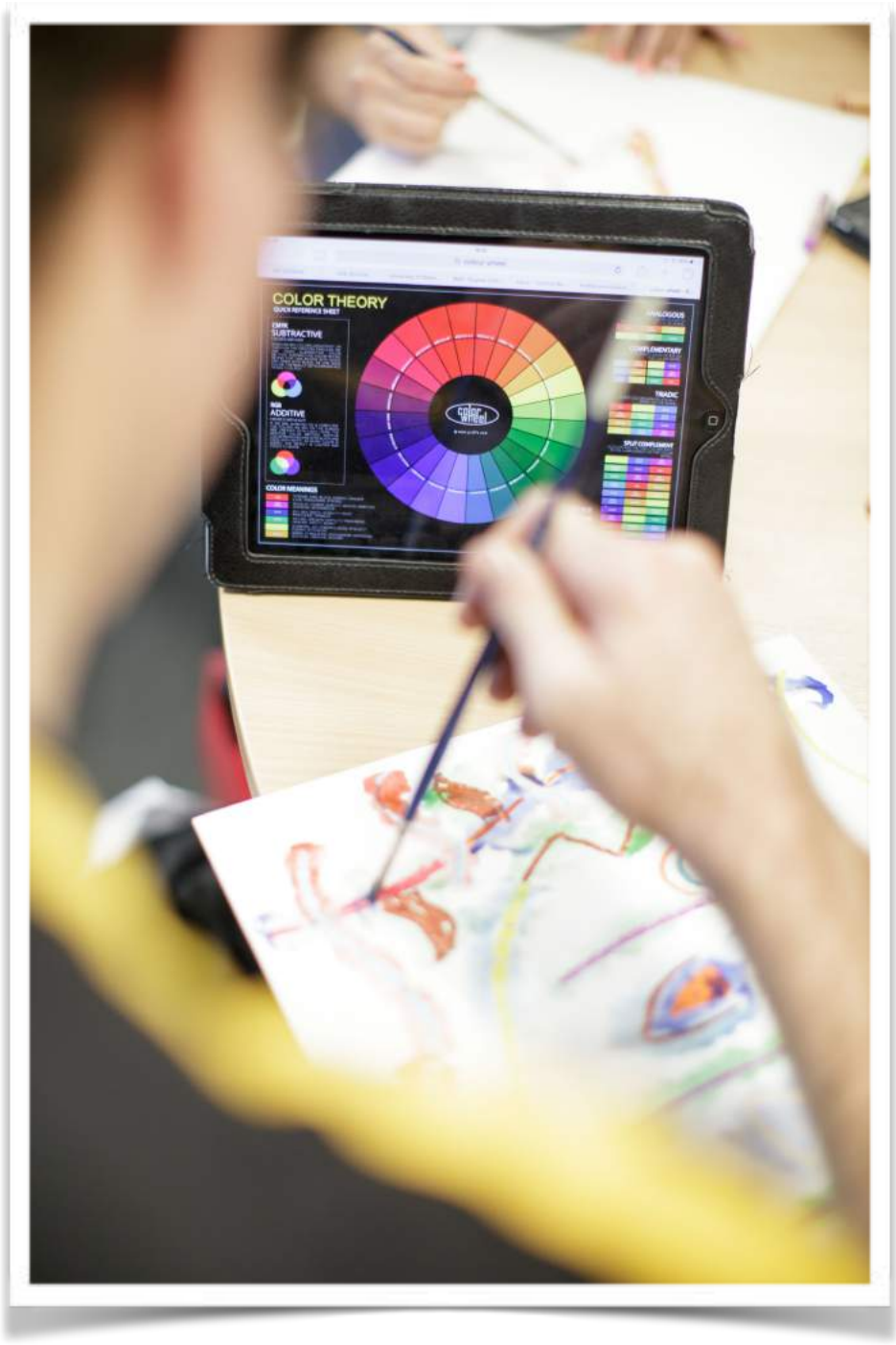
- The ETI, EA, GTCNI and CCEA should review their roles, guidance and actions in ensuring teachers have ready access to quality advice, direction and training in the teaching and assessing of digital skills.

- DE should consider how the ten days that are currently set aside for professional development (DE, 2016a) should be directed towards high priority training activities in promotion of digital skills education. Teachers willing to take up ICT training in their own time should be professionally acknowledged and these teachers should be supported by their school to pursue such quality assured training in their own time and out-of-school.

Further research recommended to support parental engagement and transition from primary to post-primary education:

- A research study designed to understand parents' role and how they can support digital skills development for pupils would contribute to better parent/teacher partnerships when supporting pupil ICT skills development.

- A research study to explore continuity with regards to digitals skills development between primary and post-primary education; skills gained by pupils while at primary school should be further developed at post-primary level.



STUDY INTO THE DEVELOPMENT OF DIGITAL EDUCATION IN PRIMARY SCHOOLS IN NORTHERN IRELAND

1INTRODUCTION

1.1 Over the last few decades, rapid technological change has taken place having significant effect on society, economy, skills and employment. Development of digital skills has become a priority and it has been argued that pupils' ICT skills should receive the same attention and investment as literacy and numeracy (Selwyn, 2011).

1.2 However, Northern Ireland is the only region within the UK without a Digital Strategy (Northern Ireland Screen/RSM Consulting, 2018). The last long-term development plan and ICT framework for ICT policy was set out by the government over two decades ago, namely: the 'Strategy for Education Technology in Northern Ireland' (DENI, 1997). This lack of direction is reflected in the rate and quality of skills development on the ground. Although there is no reliable local research data on NI's digital development, research by Citizens Online (UK) in 2017 suggests that Northern Ireland has the worst rates in the UK regarding digital skills, with 32.2% of those aged 16-65 (representing over 378,000 people) having low or no digital skills. This research also suggests 38% of small Northern Ireland businesses lack basic digital skills (Citizens Online, 2017).

1.3 Future generations will have to take their place in the global economy making it imperative that we manage and prepare for the significant skills and competency shift required in this digital age. Developing digital capacity across our society is a priority if we want to take advantage of opportunities offered by changing technologies.

1.4 To address the above concerns, the Department for Communities confirmed support for Digiskills NI in November 2016, a collaborative, long-term structured programme, designed to build capacity within formal education for digital skills and computing. Initiated in 2015 by industry leaders, Digiskills NI has brought industry, government, statutory agencies and higher education institutions together with local schools to inform strategic policy making. It represents industry professionals, educators and key stakeholders across government who have pledged to understand and work together to overcome the challenges of developing Northern Ireland's digital skills capacity.

1.5 Due to the political uncertainty in NI, in particular the absence of the Northern Ireland Assembly[2], funding intended for this programme has not yet been secured, however Northern Ireland Screen continues to contribute significant resources for the ongoing development of digital education and has secured funding from the Department of Communities to fund two research studies (the Digital Education in Primary Schools Baseline Study and the Review of Digital Education Policy and Implementation in UK and Ireland) with the aim to inform any future developments in policy and practice. This report focuses on one

[2] *Stormont collapsed on 9th January 2017 with the resignation of Martin McGuinness as Deputy First Minister.*

of these two studies, namely the Study into the Development of Digital Education in Primary Schools. This study's aim was to gather baseline data on the following areas relating to ICT: (a) Leadership in school, (b) Teacher Professional Development, (c) Pedagogy and assessment, (d) Equality of access and the learner experience and finally (e) Parental engagement.

2 DIGITAL EDUCATION IN PRIMARY SCHOOLS BASELINE STUDY BACKGROUND

2.1 The Digital Education in Primary Schools Baseline Study was developed and overseen by representatives from all the Initial Teacher Education providers in Northern Ireland, under the auspices of UCETNI (The Universities Council for the Education of Teachers) with a Research Fellow based at the University of Ulster. Ethical approval for the research was granted by the Ulster University's School of Education Ethics Filter Committee in May 2018.

2.2 A 'teacher as researcher' model was employed for this study's methodology in line with 'Learning Leaders: Strategy for Teacher Professional Learning in Northern Ireland' (DE, 2016) and the findings of the BERA/RSA inquiry into the role of research in teacher education (BERA, 2014). Most of the data collection, therefore, was carried out by teachers (ICT coordinators) with support from the project's Research Fellow.

2.3 Funding for staff cover was provided and the school principals and ICT coordinators attended a 'Teachers as Researchers' workshop which aimed to provide basic research training and practical experience to the ICT coordinators.

2.4 Recruitment of primary schools for the study took place over two stages with 31 schools – selected from a randomised sample provided by DE - agreeing to participate in the research. A bursary for their participation was offered at the end of the data collection stage.

2.5 Five sources of data (from principals, primary school teachers and primary school ICT coordinators) were identified to ensure triangulation. These sources of data are as follows:

(a) A paper-based questionnaire completed by the principals of the participating primary schools.

(b) ICT co-ordinators' interviews - the ICT coordinators interviewed one another in order to develop interviewing experience and to collect the views of ICT coordinators regarding issues surrounding digital education in their schools.

(c) Teacher interviews - each of the ICT coordinators then interviewed two randomly selected teachers from their own schools (the ICT coordinators' and teachers' interviews were transcribed).

(d) An on-line survey - all teachers in all participating schools were invited to complete an 85-item on-line survey.

(e) A 6-item online survey on the experience of ICT coordinators as 'teacher researchers'.

3. DIGITAL EDUCATION IN PRIMARY SCHOOLS BASELINE STUDY FINDINGS

The aim of the study was to better understand how the development of digital education has been progressing in primary schools in Northern Ireland. More specifically the data collection focused on the following areas: (a) Leadership in school, (b) Teacher Professional Development, (c) Pedagogy and assessment, (d) Equality of access and the learner experience and finally (e) Parental engagement.

3.1 Leadership in school

3.1.1 Appropriate and effective school leadership is crucial for successful initiatives in education (OECD, 2007; PWC, 2009; Ottestad, 2013). School management teams are faced with many challenges daily and must constantly prioritise physical and human resources as well as funding which has been recognised in the latest Education and Training Inspectorate (ETI) Report:

> The past two years have been a period of unprecedented challenge for our education and training system. In the absence of political leadership for a significant part of that time, schools and providers are working in a climate of severe financial challenge, while endeavouring to continue to provide high quality learning experiences. (ETI, 2018; page 3)

Considering the importance of digital education when preparing young people for employment, teaching of ICT skills should be a high priority in any School Development's Plan (SDP) (DE, 2010) and it appears in the Department of Education's Circular 2010/22 which focuses on the requirements for the Board of Governors of schools to prepare and periodically revise an SDP:

> 'The Department's key priorities in revising the regulations and guidance materials have been to ensure that: the focus of school development planning is on raising standards, particularly standards of pupils' achievements in literacy, numeracy and ICT.' (DE, 2011)

However, the Education and Training Inspectorate (ETI), in their evaluation of the Northern Ireland Creative Learning Centres[3], concluded that:

> "… not all schools are planning effectively for the inclusion of technology-enhanced learning across the curriculum. References to technology-enhanced learning are not embedded sufficiently in the development planning of all schools, and there are too few targets set for the development of innovative, technology-based strategies to support, monitor and evaluate pupils' learning and progression." (ETI, 2014, page 5)

[3] *Creative Learning Centres (funded by Department of Communities through Northern Ireland Screen) support the creative use of technology across the curriculum*

3.1.2 The same concerns are echoed in the Matrix (the Northern Ireland Science Industry Panel) Creative Technology Report 2018, which expressed concerns that digital skills development has not been supported sufficiently in primary schools, “to ensure that primary school teachers are confident in developing children’s digital literacy skills and that children have the right resources to learn”. (MATRIX, 2018, page 7)

3.1.3 The important role school leadership can play in encouraging and supporting teachers to further develop their digital skills and attempt innovation in the classroom is also evidenced in the teachers’ open comments from the Digital Education in Primary School teacher survey:

> “School Leadership is very encouraging.” (Male teacher, 5-10 years teaching)

> “The leadership of the school gives time for staff to develop innovative activities using ICT.” (Male teacher, 11-20 years teaching)

> “Our principal leads the way with innovation and encourages everyone to take on challenges and learn new skills. He provides support and makes training possible.” (Female, teacher, 11-20 years teaching)

3.1.4 As mentioned above, the Digital Education in Primary School Baseline Study also surveyed the participating schools’ principals. The data collected show that the concerns expressed about training etc. above are recognised as 27 of the 29 principals who offered their views (93%) identified Using ICT as the top curricular area needing extra staff training or support in their school. Furthermore, one third indicated that they did not have clear guidance on what they are required to deliver regarding digital education in their school. Twenty-three out of the 29 principals stated that development in the digital education area was expressly outlined in their school development plan.

3.1.5 The narrative comments principals provided shed further light on the issues schools must deal with daily relating to ICT:

> “I think that […] developments in ICT are moving faster than schools and their outdated equipment and resources… We have parents who have had vast ICT experience try to help but school hadn’t capacity. Also, the lack of tech support is an issue. In my school the ICT coordinator is also the SENCO so time is an issue as dealing with technical issues eats up a lot of time.” (Female principal, Rural, Maintained)

> “In the absence of any real training provided by the Education Authority it is becoming increasingly difficult for schools to provide training in digital education either for their coordinators or teaching staff. Given how digital technology is always developing this is becoming increasingly difficult to manage.” (Male principal, Rural, Maintained)

> “Access to a consistent network must be addressed – we are often ‘let down’ by our Internet. High quality training for all staff must happen. It is difficult when only the coordinator attends training – all staff need to participate.” (Female principal, Rural, Maintained)

These comments, as expressed by the schools’ principals, indicate that there are several factors affecting the quality of digital education in schools including equipment, connectivity and most importantly training, time and technical support.

3.1.6 As principals have pointed out, equipment, connectivity, training etc. are all important factors for successful and efficient use of ICT in the classroom, however, it is equally important that teachers are given the opportunity to reflect and to have access to examples of good practice. Classroom practice must be informed by both reflective practice and evidence-based practice and this is a key element in the recent school improvement DE strategy ‘Learning Leaders’ (2016).

3.1.7 The principals of the participating schools were asked whether their school had a culture of reflective practice but also if they access evidence-based practice research when considering developments in digital education as both these concepts are very important when considering classroom practice. Although 65% responded that they did have a culture of reflective practice when considering digital education development, further probing revealed that not all of them who responded positively had a good understanding of the term ‘reflective practice’. Fifty-five percent also indicated that they do not access evidence-based practice research when considering developments in digital education.

3.1.8 Teachers, as reflective practitioners, are individually responsible for developing their teaching practice but it is also important that school management promotes a culture of reflective and evidence-based practice (Pollard, 2008). The findings of this small-scale survey indicate that this may not be the case in many schools. Arguably, further support may be needed to introduce such a reflective and evidence-based culture not only in digital education but across the curriculum.

3.1.9 Building research capacity and evidence-based practice (EBP) are linked because EBP is grounded in classroom research not only for the development of digital education but across the curriculum. There are certain barriers, such as time and resources, which need to be overcome when considering teacher engagement in research, nevertheless attitudes are equally important. When considering the future of building research capacity in schools, it is encouraging that 23 (79%) from the 29 principals were interested in building research capacity within their teaching staff while five had no interest and one did not give an answer. This is another area where school leadership can make a difference.

3.2.10 RECOMMENDATIONS:

The Department of Education acknowledges that ‘Leadership is second only to teaching as the factor most likely to influence outcomes for pupils’ (DE, 2016b). The

findings highlight the positive impact leadership can have in developing digital education but also the gaps evident in the support for leadership.

School principals have indicated that all aspects of digital education in primary, including guidelines for leadership, training, equipment, connectivity and technical support should be reviewed in order to identify an effective strategy for the development of digital education in schools.

Senior school management and staff should be supported to become self-improving by developing evidence-based and reflective practice in the area of digital education.

3.2 Teacher Professional Development in ICT

3.2.1 Teacher Continuing Professional Development (CPD) in all areas of the curriculum is a contentious issue, not least due to the industrial action taking place in Northern Ireland schools since January 2017, because of the time and funding constraints in schools (ETI, 2018). Technological advances make CPD in digital education even more imperative as teachers feel that they cannot keep up with developments in this area. This may affect their teaching but it can also cause stress relating to how their performance will be judged in this area. The comments below illustrate teachers' concerns:

> "I would like to know what ETI are expecting to see as information on this is very limited." (Male teacher, 5-10 years teaching)

> "ICT is at a stage now where it is very difficult to keep up to speed with and it's [difficult] having the time to inform ourselves as teachers, especially in a busy timetable which is already overloaded with other curriculum priorities and issues." (Male teacher, 11-20 years teaching)

> "All training needs to be updated as ICT is an area that is continually moving forward."

> "There has been no training of any kind to support teachers for teaching ICT. The pace of change in ICT is overwhelming at times. I feel I would need training in Animation, Music and Sound and Managing Data. Training support needs to be addressed by EA. Teachers will need constant training throughout their careers." (Female teacher, 20+ years teaching)

3.2.2 Eighty-five (35%) of the teachers surveyed did not believe there was appropriate opportunity for developing their ICT skills in their school while 37% believed there was. One hundred and twenty-nine (52%) teachers did not believe they were adequately trained to teach what is expected in ICT. Eighty-four teachers responded to an open question on any specific training support they needed to integrate ICT in their teaching. Their responses revealed a wide variety of needs and different levels of expertise in this area. These are the most characteristic comments:

> “How to develop and use a scheme of work to incorporate ICT fully and meaningfully into the Key Stage 1 curriculum effectively.” (Female Teacher, 20+ years teaching)

> “Programming software, robotics.” (Female Teacher, 11-20 years teaching)

> “ICT skills and primary school pedagogy.” (Male Teacher, 20+ years teaching)

> “I have received INSET in areas like programming and animation, but I find it difficult to retain the knowledge.” (Male teacher, 11-20 years teaching)

> “Refresher training on a regular basis.” (Female Teacher, 20+ years teaching)

> “I’d love Excel training”. (Female Teacher, 11-20 years teaching)

> “Further iPad training on film and animation.” (Female Teacher, 5-10 years teaching)

> “I could always benefit from more training in this area as most of my training has been rather lacking in how to best integrate it within classwork.” (Female Teacher, 11-20 years teaching)

3.2.3 These responses highlight the need for tailored training at different levels for teachers as there seems to be demand for both quite basic skills training (Excel, schemes of work etc.) and more advanced technical training (film and animation, coding, robotics etc.). There is also a demand for pedagogical guidance on how to apply ICT in teaching. The need for tailored training could also be explained by the respondents’ education background in ICT: 67% had none, 16% had GCSE, 10% had A-level and 14% had a variety of ICT qualifications ranging from degree and MSc to ECDL (European Computer Driving Licence) and O-levels.

3.2.4 It also seems that, even when training is available, the case may be that teachers cannot access and avail of it. There may be barriers such as a lack of availability of training across the whole of Northern Ireland. For example, referring to training provided by CCEA and Stranmillis UC, one teacher expressed the following views:

> “It’s very disappointing that CCEA have offered coding workshops for teachers in the East of the province and have not offered them in the West of the province. This issue also needs addressed. I have had to travel two hours from a very rural setting to attend relevant courses or events in Belfast and they are not offered in the West. This also applies to Stranmillis college who host an annual ICT conference in June. Teachers in the West of the province are being disadvantaged due to lack of opportunities to attend exciting ICT courses and events.” (Female teacher, 20+ years teaching)

3.2.5 The 2018 MATRIX report also highlighted the fact that 5,000 teachers in the year 2015-2016 participated in Creative Learning Centre (CLC) programmes. Creative Learning

Centres (funded by Department of Communities through Northern Ireland Screen) support the creative use of technology across the curriculum and maintain that demand for their services often outstrip what they can provide. There is also a strong argument that many schools supported by CLC programming become award-winning schools for ICT.

3.2.6 That all teachers do not have opportunities to avail of ICT training is also supported by 75% of the surveyed teachers reporting that they had not been on a professional course for ICT during the last three years. Types of courses attended by the remaining 25% of the respondents included those provided by the CLCs, CCEA on assessing ICT and iTeach[4] meetings and conferences. This finding is particularly interesting in the context of information on DE's website regarding investment in infrastructure:

> "Since 2000, DE has invested over £632 million in providing the ICT infrastructure in our schools through the Classroom 2000 project making Northern Ireland a recognised leader in the use of ICT in education." DE, URL: https://www.education-ni.gov.uk/articles/ict-schools

Arguably, investment in teacher professional development should match that of infrastructure to substantiate claims that NI is a recognised leader in the use of ICT in education.

3.2.7 Considering how teachers could be prevented from making the most of ICT-related training during work hours (including the industrial action and other constraints on teachers' time), the survey also explored teachers' willingness to participate in out-of-school ICT training if it were made available.

3.2.8 Most teachers (79%) responded positively with only 6% saying they would not take part in out-of-school ICT training and 15% being unsure. This is an encouraging finding as it shows that teachers are very keen on participating in professional development activities even in their own time. In the words of one teacher:

> "I attend a lot of training myself outside of school. There is little to no support for teachers in Northern Ireland." (Male teacher, 11-20 years teaching)

This finding is also surprising considering the industrial action and the reported reduction in teacher engagement in professional development opportunities in school (ETI, 2018).

The survey showed that the types of out-of-school ICT training, which teachers would prefer to attend, include accredited CPD courses (48%), skills only training (51%), skills and pedagogy training (56%) and postgraduate training (13%). It seems that teachers are proactive when it comes to their CPD when they feel it can improve their practice:

> "Hearing of good practice and ways people are using ICT - Cedar Lodge have run a series of evening workshops on various aspects of iPads. I have learnt much there." (Male teacher, 20+ years teaching)

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[4] iTeach was a company originally designed and created to assist pupils and teachers complete ICT at KS3, KS4 and KS5 programmes of study. They do not provide training any longer.

The 2016 MATRIX Digital ICT Report as well as the most recent Matrix Creative Technology Report 2018 and the Digiskills Digital Foundation Programme Report: March 2018, all refer to teacher professional development in ICT as one of the priority areas for funding. The recent Learning Leaders Strategy (DE, 2016) promises the development of a framework for teacher professional learning and this may be the catalyst needed for ICT teacher training to gain some impetus. Consistent with other research findings which highlight the importance of relevance to practice for teachers' uptake of ICT training (Galanouli, Murphy and Gardner, 2004), the data emerging from the Digital Education in Primary Schools Baseline Study strongly suggests that teachers are keen to invest their own time in such activities knowing that this will improve their practice and, consequently, pupil outcomes. It would be a missed opportunity if these teachers, who are so keen to learn more about ICT, were not offered appropriate training and support.

3.2.9 Regarding support for teachers for their CPD for ICT, 38% said that they felt they received adequate support from their school while 26% did not and 36% were unsure. When the teachers were asked about the support offered by the Education Authority (EA) 72% did not feel they received adequate support while 6% felt they did. Since the launch of EA in 2015, under-staffing and other issues have, to-date, hindered the new body in providing support in this area. Many teachers have commented on the important role the former Curriculum Advisory and Support Service (CASS) had played in CPD and the void that its dissolution has left. It seems clear that some form of alternative service must be provided under EA's current functions as the current arrangements seem to be ineffective in providing support to teachers.

3.2.10 Finally, the important issue of digital education provision at Initial Teacher Education (ITE) level was highlighted by 63% of the respondents who did not believe that they had received specific ICT training as part of their teacher education course. Teachers who had completed a four-year BEd degree seemed to offer slightly higher negative responses regarding their teacher education course and ICT skills development when compared to those with one-year PGCEs, although this difference was not statistically significant. When comparing years of teaching experience and ICT skills development during teacher education course, a higher percentage of teachers has given negative responses across the entire age range with the highest coming, predictably, from the more experienced group of teachers (20+ years of teaching experience); these teachers would have attended their ITE courses when digital education was still at the very early stages. Irrespective of years of teaching experience or ITE provider the majority of teachers agree that they did not receive specific training in ICT skills as part of their teacher education course. In the words of one teacher:

> "ICT should have a much more important role at teacher training colleges to help prospective teachers feel more aware and confident of what's required of teaching ICT and including it in teaching and learning." (Male teacher, 11-20 years teaching)

This data raises questions regarding initial teacher education and digital education provision across the board. ITE providers in Northern Ireland should review their provision regarding both ICT skills and ICT-based pedagogy and engage in consultation with all main

stakeholders including the EA and GTCNI to plan the way forward. ITE providers should also be part of any digital strategy in education considering they are responsible for the development of digital skills of student teachers and this should be a priority in overcrowded ITE courses.

3.2.11 RECOMMENDATIONS

Given that teachers feel that they are being left behind, with limited time and opportunities to upskill themselves and keep up-to-date with the advances in digital education, the following recommendations are made:

- **The ETI and DE must ensure sufficient clarification is provided regarding expectations in ICT in education in order to reduce confusion among teachers.**
- **New, differentiated and tailored training programmes should be provided to suit a variety of backgrounds and levels and to ensure equality of opportunity across Northern Ireland. The EA/HEIs should play a more focused role in supporting these types of teacher CPD in ICT.**
- **The dissolution of the Curriculum Advisory and Support Service (CASS) is widely perceived to have left a void in the area of teachers' CPD support. It seems clear that some form of strategically devised and delivered service must be provided under EA's developing functions.**
- **Training providers should meet a high standard set by the DE/EA and that a range of accreditation should be available to teachers to ensure that their time in training receives professional recognition.**
- **ITE providers should review their provision regarding both ICT skills and ICT-based pedagogy and engage in consultation with all main stakeholders to plan the way forward and ensure newly qualified teachers enter the profession with the required level of ICT skills. ITE providers should be part of any digital education strategy.**
- **This research shows that teachers are willing and keen to take up ICT training in their own time in order to improve their practice. Therefore, there should be appropriate support mechanisms in place for these teachers to pursue training in their own time and out-of-school.**

3.3 Aspects of ICT-related pedagogy and assessment.

3.3.1 The Strategy for Education Technology in Northern Ireland (DENI, 1997), published nearly 20 years ago, was the last Northern Ireland government document to guide teachers in their use of ICT in their teaching. It gave a new perspective to the traditional teacher competencies model as ICT was designed to feature at all levels of the learning and teaching process. Teachers were advised that they were required to demonstrate: personal competence in use of specific ICT tools (personal competence); competence in the

integration and evaluation of ICT in the teacher's main subject (subject competence); competence in planning, preparing, teaching, assessing and evaluating lessons which make significant use of ICT (teaching or pedagogical competence). Since 1997, this official strategy has only been occasionally updated by information circulars on the Department's website, for example one circular focusing on the Digital Transformation in Schools (2014) and one focusing on the Internet and WiFi guidance (2017).

3.3.2 The Education Technology Strategy made personal teacher competence (and confidence) in ICT crucially important for the delivery of the curriculum and various initiatives were launched to ensure teachers develop the required skills. The most important initiative to focus on this area of professional learning development, with the largest investment and widest scope, was the UK-wide New Opportunities Fund (NOF) ICT Training for Teachers and Librarians. This initiative, costing £230 million overall, provided training in all four countries of the UK in the late 1990s early 2000s (Galanouli, Murphy & Gardner, 2004). One independent evaluation of NOF training, while consulting with teachers on its effectiveness, also collected baseline data on teachers' ICT competence and confidence at that time both at the start and at the end of the NOF ICT training (2001/02 and 2003/04) (Galanouli, 2008).

3.3.3 Sixteen years after this baseline data collection, the Digital Education in Primary Schools Baseline Study survey gathered information on the current level of teacher confidence and competence in the area of ICT, for the sample of primary school teachers who participated in the survey. Several items from the original questionnaire used in the NOF ICT training evaluation were used in this survey to enable comparisons between the results from the baseline data from over 15 years ago and the recently collected data.

3.3.4 COMPARISON BETWEEN 2001/2, 2003/4 AND 2018 SURVEYS ON THE AVAILABILITY OF SUPPORT AND HOW PUPIL ICT USE AND KNOWLEDGE AFFECT TEACHING

The first set of questions, which can provide some comparison between the two data collection phases, referred to the support which was available to teachers in school, both in pedagogical and technical terms. It seems that, although both technical and pedagogical support showed improvement just after NOF ICT training was completed in year 2003/04, by 2018 they had both deteriorated again. One might argue that by 2018 teachers would not need such support anymore; however, our data shows that teachers still wish for more pedagogical training and support as well as technical assistance. The remaining items in this comparison refer to the teachers' views of their students' ICT skills. Just after they received NOF ICT training, the surveyed teachers appear more confident in relation to their ICT knowledge compared to that of their students, however, by 2018 more teachers in the surveyed sample believe that their students know more about computers than they do. Furthermore, their students' perceived ICT proficiency to influence their teaching (Table 1).

Table 1: Comparison of teachers views on their ICT competence in the surveys 2001/2, 2003/4 and 2018

Question	2001/02 n=208	2003/04 n=175	2018 n=244
	Yes		
Is support in your school available in terms of TECHNICAL assistance in using ICT equipment in your teaching?	55%	68%	61%
Is support in your school available in terms of guidance in how to incorporate ICT in your TEACHING?	66%	74%	67%
Do you feel your pupils know more about computers/ICT than you?	19%	13%	23%
Do you perceive your pupils having more access to computers/ tablets/ devices at home compared to, say, three years ago	99%	94%	95%
If yes to above, has this influenced how you prepare and perform your teaching?	53%	54%	55%

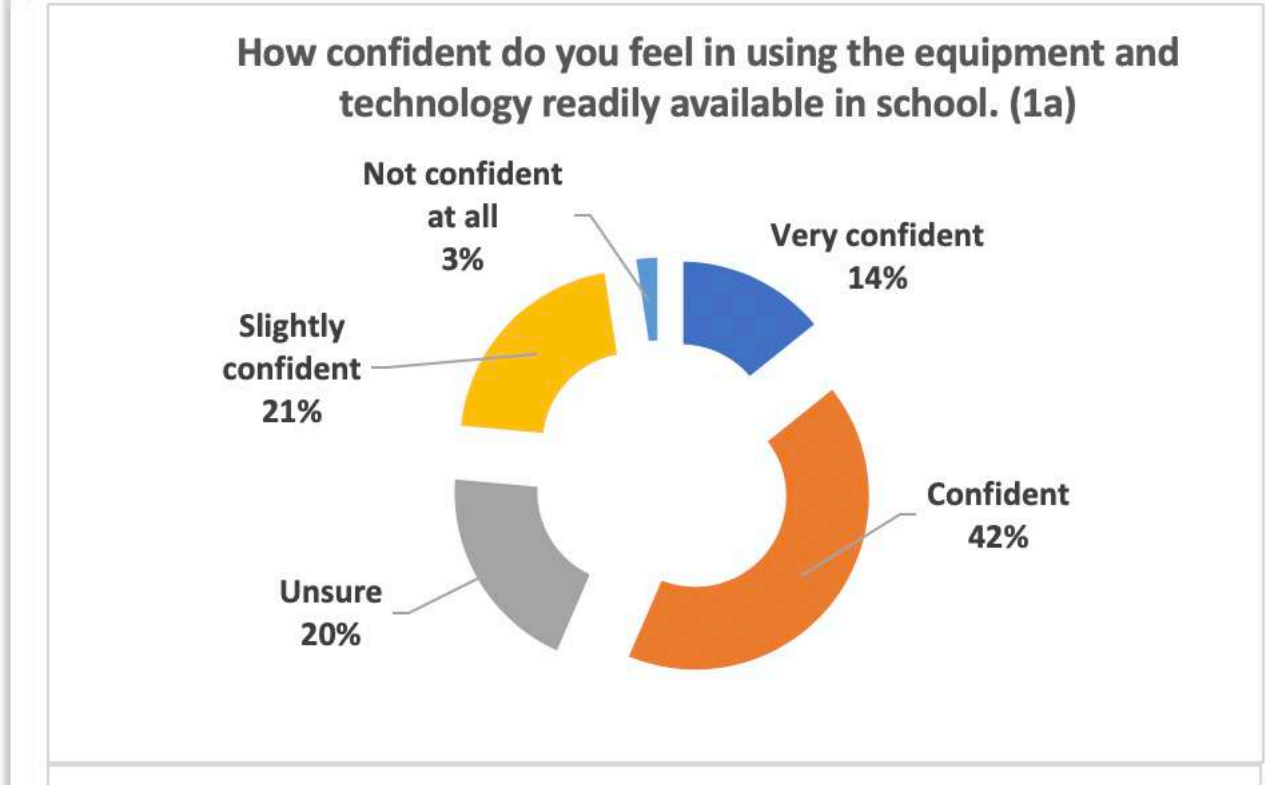
3.3.5 Teacher levels of ICT experience and confidence – 2018 survey

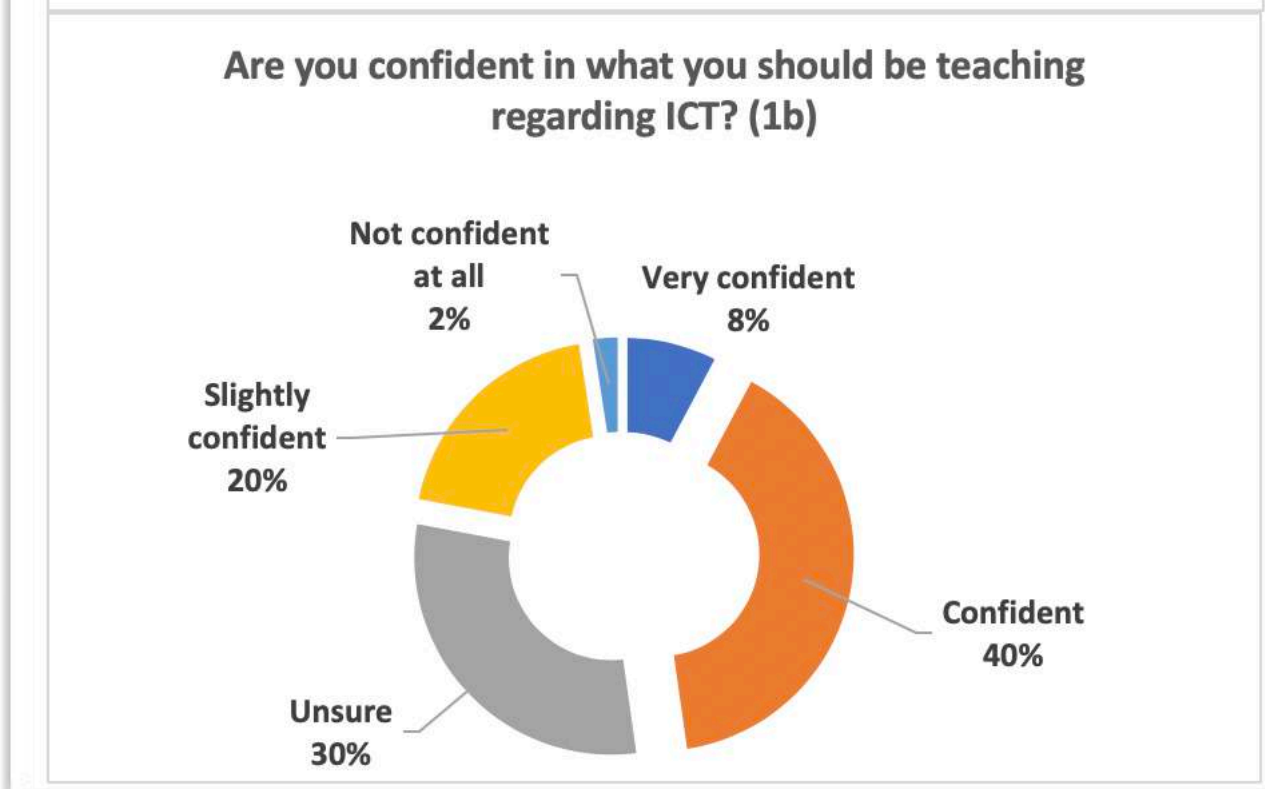
From the 246 respondents, 110 (45%) perceived their level of ICT experience as ‘average’. In contrast, 77 teachers (31%) felt their experience was ‘good’ and only 19 (5%) as ‘extensive’. One teacher said they had no experience. Confidence levels, however, seem to be slightly higher in some aspects of using ICT.

Over half of the respondents (56%) reported being ‘very confident’ or ‘confident’ in using the equipment and technology available in school however, this percentage remains quite low. Teacher confidence levels drop further when confidence is linked to what they should be teaching regarding ICT as illustrated in Figure 1 below:

Figure 1 (1a and 1b): Teachers’ confidence levels (2018 survey) in using equipment and technology and in what they should be teaching regarding ICT

These findings suggest that the teachers feel merely confident in their personal use of ICT but are not quite as confident in the pedagogy of addressing ICT within their subject teaching. The findings relating to teacher professional development in this area -or lack of it- may help to explain this low level of confidence in teaching ICT. In their open comments





throughout the survey, teachers highlight the lack of training and of advice in relation to using ICT. For example, teachers sometimes are not clear regarding what is expected of them:

> “I would like to know what ETI are expecting to see as information on this is very limited.” (Male teacher, 5-10 years teaching)

> “There has been no training of any kind to support teachers for teaching ICT. The pace of change in ICT is overwhelming at times. I feel I would need training in Animation, Music and Sound and Managing Data. Training support needs to be addressed by EA. Teachers will need constant training throughout their careers.” (Female teacher, 20+ years teaching)

> “I would like more training on the ICT requirements.” (Male teacher, 20+ years teaching)

The need for further training to enable ICT to be better integrated in teaching is evidenced in the majority of the teachers’ comments:

> “Could always benefit from more training in this area as most of my training has been rather lacking in how to best integrate it within classwork.” (Female teacher, 11-20 years teaching)

> “[We need] training in all areas.” (Female teacher, 20+ years teaching)

> "There is a need for training and support from EA”. (Male teacher, 20+ years teaching)

> “By completing this survey and giving true answers I hope the ICT skills and expectations of teachers will be examined. In short, training is NOT good enough to meet the increasing curricular demands. ALL teachers I know, would welcome training and support. I feel money was spent in getting computers/iPads into classrooms but the knowledge from teachers wasn't there and we were expected to learn 'on the job'. This clearly hasn't worked, I hope for future generations this strategy is better planned and implemented.” (Female teacher, 20+ years teaching)

All these comments illustrate teachers’ views that there has not been sufficient investment in teacher training and how they feel that they are not properly prepared or sufficiently confident to teach what is expected of them. Arguably, the breadth of commentary on this issue from the respondents, suggests that teachers need a lot of support and training before they can feel confident about ICT pedagogy within their own teaching. Both the ETI and EA are named in these comments as two bodies who could provide more clarity (the former) and training to teachers (the latter).

3.3.6 Teacher confidence levels drop slightly lower when teachers are called to consider how confident they feel to assess the ICT skills of their pupils. In this case less than half of the respondents (46%) report being ‘very confident’ or ‘confident’ and just over a quarter (26%) are ‘slightly confident’ or ‘not confident’ to perform this task. Again, this lack of confidence may be linked to lack of clear guidance and training in assessing the use of ICT. This seems to be the case despite CCEA providing guidance on their website on the assessment requirements for Using ICT across the curriculum, at a level appropriate to the pupils’ ability. For example, the pupils should be enabled to develop skills in Using ICT and the teacher can evaluate their usage by using the five ‘E’s: Explore, Express, Exchange, Evaluate and Exhibit. (CCEA, 2015).

3.3.7 However, the five ‘E’s were not without criticism among the surveyed teachers. For example, several expressed negative comments on the effectiveness of this method for assessing Using ICT among their pupils and on how this method was conceived without

wider consultation among non-specialist teachers. The type of comment is illustrated by this example:

> "The primary ICT curriculum - 5 E's - is clearly written by post primary or primary specialists and is unrealistic for non-specialists in ICT. The assessment in particular is too advanced for pupils and non- specialist ICT teachers to complete. The assessment, instead of being an integrated system and part of normal ICT work, has become a task that is daunting for all but the newest teachers and is so time consuming that it is taking up to 30 hrs of work just to get the E-portfolios ready. There was no consultation on this new ICT curriculum and assessment other than with the ICT enthusiasts and not the average primary school teacher. Very poor consultation, implementation and support. Teachers in primary schools, particularly non-specialists, have been left to train themselves and depend on ICT coordinators who have had little time or training also. CCEA need to come up with a simpler curriculum which can realistically be completed within the school year and not ask ICT specialists or enthusiasts. They need to simplify the 5 Es into clear targets per year group." (Male teacher, 20+ years teaching)

This comment by an Assessment Coordinator highlights the strong feelings ICT assessment has caused among some teachers. Although CCEA has been providing training in this area, there is an argument that more focused effort is required if non-specialist teachers in the primary sector are to make the most of the assessment procedure, and successfully assess their pupils.

3.3.8 The respondents reported similarly low levels of confidence when asked to compare themselves to their school colleagues. In this case, when asked how they felt about their own ICT skills when compared to the ICT skills of their colleagues in their school, only 48% responded that they felt 'very confident' or 'confident' when comparing their ICT skills with those of their colleagues; 22% were 'unsure' and 30% felt 'slightly confident' or 'not at all confident'. A particularly low morale among primary school teachers appears to exist and substantial training and support are required if this is to be remedied.

3.3.9 The type of training, its relevance to practice and the support offered are clearly very important factors as they can determine the training's success. As described above, although the NOF ICT training was a large investment, it did not succeed in bringing about any significant change in teachers' competence and attitudes to ICT overall. However, when comparing confidence and competence against the two NOF training providers in Northern Ireland, those teachers who attended the more personalised, face-to-face training by a local provider with good support mechanisms, reported higher levels of ICT confidence and competence in the classroom after NOF was completed (Galanouli, 2008). Therefore, well thought-out, planned and delivered training and support are crucial for teacher ICT skills' development. Teachers can tell (2018 survey) when the training they are offered is not of the necessary quality:

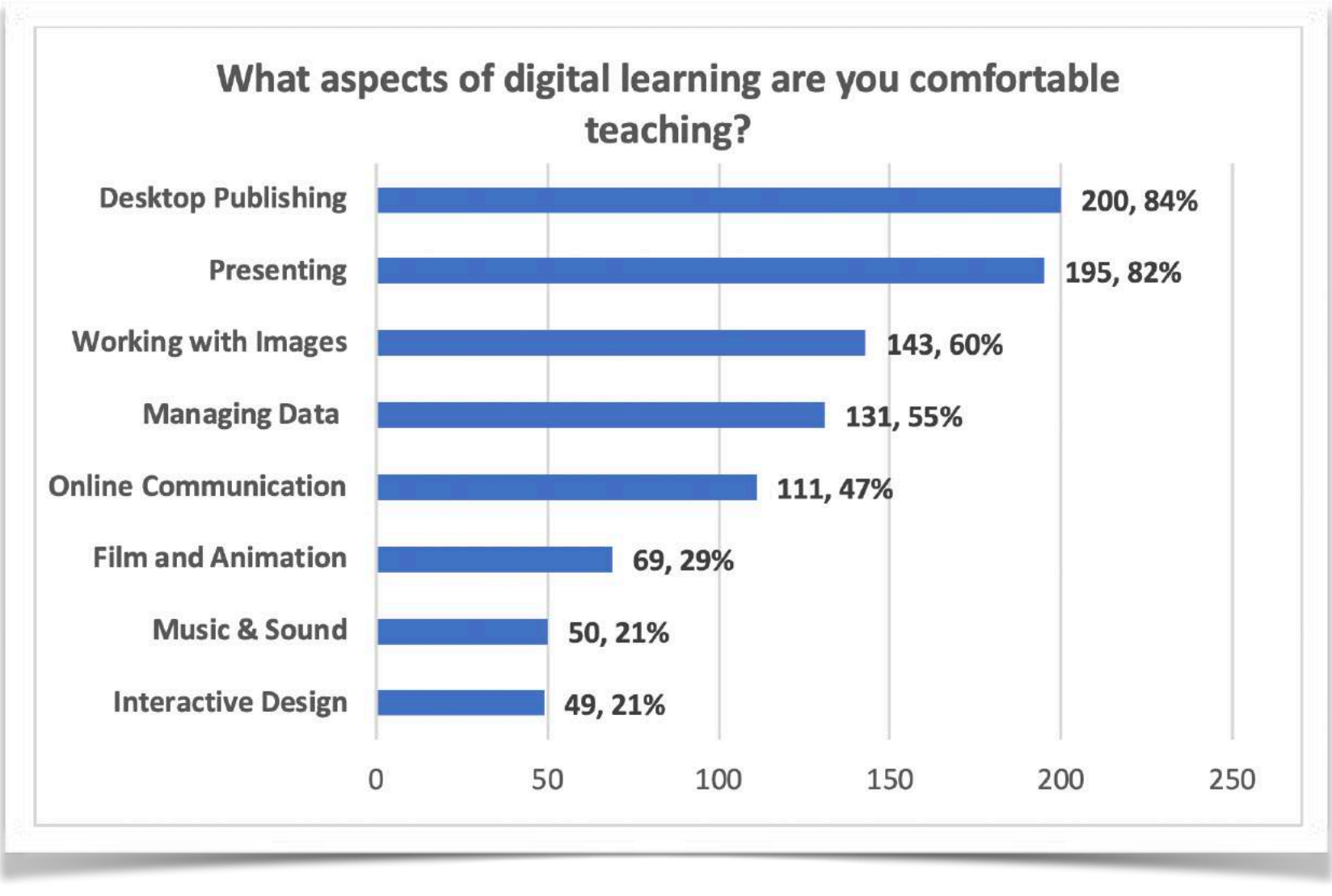
> "…Training is always on the cheap and technology continues to change leaving the untrained behind. Teachers can only help pupils develop their ICT skills if proper and regular training is delivered." (Male teacher, 20+ years teaching)

3.3.10 USING ICT IN THE CLASSROOM

The 2018 MATRIX study on creative technologies in Northern Ireland expressed concerns that primary school teachers are not confident enough to develop primary pupils' digital skills. The findings regarding teachers' confidence in the current study show that these concerns have some basis in fact. Furthermore, when teachers were asked which aspects of digital learning they were comfortable teaching, Figure 2 shows that more than half of them indicated they felt comfortable teaching Desktop Publishing, Presenting, Working with Images and Managing Data, while lower percentages felt comfortable with Online Communication, Film and Animation, Music & Sound and Interactive Design.

However, 71% of the respondents felt 'very confident' or 'confident' to teach E-safety while 15% were 'unsure'. Figure 2 clearly suggests that teachers need extra support with these latter creative technology skill elements whilst being more at ease with more traditional ICT tasks. Arguably, these creative elements can be offered through the Department for Communities/Northern Ireland Screen funded Creative Learning Centres (CLCs), which may be currently underused.

Figure 2: Aspects of digital learning teachers are comfortable to teach



3.3.11 Lack of confidence is not, however the only factor undermining better use of ICT and digital skills teaching. When teachers were asked what inhibits their use of ICT in the classroom, Table 2 shows that a lack of access to equipment for them and their pupils, and unfamiliarity with the available software were top of the list.

Table 2: Factors that inhibit teachers' ICT use in the classroom.

Main factors to inhibit use of ICT in the classroom n=237		
Lack of classroom/pupil access to ICT	106	**46%**
Unfamiliarity with the software available	106	**46 %**
Lack of personal skill with ICT	74	**31%**
Lack of knowledge about how to manage and use ICT	57	**25%**
ICT is not a priority in my school	15	**7%**
Lack of encouragement/ support in my school	13	**6%**

These, along with their perceptions of lack of personal skills, can help to explain the low confidence levels. There is, however, a small number (6%) of teachers that report a lack of encouragement and support in the school regarding ICT. This is perhaps slightly more worrying as it points to a school culture that will need to change if progress is to be achieved with digital skills education.

Another important barrier for teachers coming through strongly in their open comments and one that has always being the crux of professional development for teachers is that of time:

> "Time constraints is a major issue." (Female teacher, 20+ years teaching)

> "If anything, it would simply be the lack of time to trail through all relevant ICT programs and software to find ones that truly suit the needs of the children and the task at hand." (Female teacher, 11-20 years teaching)

> "ICT is at a stage now where it is very difficult to keep up to speed with and it's having the time to inform ourselves as teachers, especially in a busy timetable which is already overloaded with other curriculum priorities and issues." (Male teacher, 11-20 years teaching)

However, considering the current industrial action, it is highly unlikely that more time will be allocated to teacher professional development unless there is a change in government regulations that directs more focused use of the ten days that are currently set aside for professional development.

3.3.12 To help teachers overcome the barriers presented in Table 2 above, and which cause or contribute to lack of confidence and perhaps low competence levels, it is necessary to establish what types of support/action does help teachers to use ICT and what discourages them from becoming more enthusiastic ICT users. Table 3 shows that, despite the considerable investment in equipment through C2K, problems persist regarding access to ICT resources according to 68% of the surveyed teachers.

Asking for more training comes as no surprise as teachers have taken every opportunity during this survey to argue for further and better training. The reference to examples from other teachers is very interesting and promising as it shows that teachers wish to participate in wider dissemination of good practice and that participating in communities of practice is an important way forward.

Previous research on best models of school-based professional development of teachers commissioned by the GTCNI (Galanouli, 2010) has showed the benefits to be had from teachers working collaboratively in their own school and across schools. Teach Meet[5] is another initiative which brings teachers together to discuss their practice. All teachers and school leadership should become aware and be encouraged and facilitated to participate in these and other non-traditional, alternative professional learning models. This survey suggests that most of the dissemination of good practice takes place in-school currently, with only 18% of the respondents mentioning sharing good practice within a cluster of schools; for example, in some cases as part of the Shared Education Programme initiative (Duffy & Gallagher, 2017).

Table 3: Help teachers need so that they can use ICT more often in the classroom.

What would help you most to use ICT more often in the classroom? n=246		
More resources	167	**68%**
Training outside of school	157	**64%**
Examples from other teachers	156	**64%**
Clearer curriculum guidance	121	**49%**
Technical support within school	110	**45%**
Advice on how to assess ICT	85	**35%**
Clearer leadership direction in the school	29	**12%**

Clearer curriculum guidance and advice on how to assess ICT, although they did not attract very high percentages in this survey, indicate that further support and clarifications are needed from CCEA, EA and the ETI. It is also encouraging that only 12% of the sample asked for clearer leadership direction in the school which suggests that the majority of

[5] *A TeachMeet is an organised but informal meeting (in the style of a conference) for teachers to share good practice, practical innovations and personal insights in teaching.*

teachers are content with their school leadership. Teachers' comments overall do illustrate good school leadership in the use of ICT. For example, the comments below belong to teachers in the 56% of the respondents who feel encouraged to be innovative with their use of ICT in school. They show that school leaders and the ICT coordinator can be the catalyst for ICT innovation and efficient teaching of digital skills:

> "ICT has been given high priority within the school and a yearly action plan supports new learning for staff and pupils. This enables staff to learn new skills which enhances the learning experiences for children." (Female teacher, 20+ years teaching)

> "Our principal leads the way with innovation and encourages everyone to take on challenges and learn new skills. He provides support and makes training possible." (Female teacher, 11-20 years teaching)

> "New technology is always being introduced to our school and we are encouraged to incorporate it into our lessons. ICT coordinator always gives us excellent support." (Female teacher, 20+ years teaching)

3.3.13 More practical questions on the teachers' use of ICT in school revealed that nearly a third of the respondents do not have a scheme of work to follow with regards to Using ICT and from those who do have one, only 53% think it is effective and 63% believe it does provide evidence for pupil progression in aspects of ICT.

3.3.14 Regarding the use of Interactive White Boards (IWB), 60% of the respondents said that they have alternative resources prepared in case the IWB does not work while 34% did not and that they totally relied on the IWB for the delivery of their lesson. Given the uncertainties surrounding reliable use, this dependency on IWB should perhaps be discouraged.

3.3.15 In addition to the challenges described above, many primary schools also claim that even when they make improvements to digital education in their school, it can often be the case that, once their pupils reach post-primary education, this trend discontinues, and there is no broader understanding of what skills pupils should have when they enter post-primary:

> 'In my experience children leaving our school with excellent ICT skills e.g. in Desktop publishing, Coding etc are not given the same exposure to ICT in post primary until GCSE level. Many of our children who have returned to visit the school bemoan the fact that they have SO little access to computers and skills have not been advanced in years 8,9 and 10.' (Female teacher, 20+ years teaching experience)

3.3.16 In summary, recent Northern Ireland Screen funded research (Review of Digital Education Policy and Implementation in UK and Ireland, RSM Consulting, Northern Ireland Screen, 2018) has concluded that, currently, Northern Ireland has neither an up-to-date

digital education strategy nor appropriate strategic level leadership in this area. This can possibly explain why there is a lack of direction and coherence when it comes to digital education in schools at present, as the findings of this research suggest. Additionally, comparison of these research findings with past research worryingly suggests that there has not been much progress in the areas of technical and pedagogical support in schools. There also seems to be a disconnect between the investment in infrastructure and the investment in teacher professional development. A significant amount of funding has been invested in equipment and infrastructure via C2K yet there are reports among the responses of insufficient computers for pupils. Furthermore, teachers who report higher confidence levels in their personal use of ICT, are neither as confident in their teaching of this topic nor in assessing it. They are also unclear about what is expected of them.

3.3.17 RECOMMENDATIONS:

Linking ICT skills to pedagogy needs considerable attention and a fresh approach to understanding how teaching using ICT can benefit from new pedagogical approaches.

- **DE and education agencies, including ETI, EA, GTCNI and CCEA should review their roles, guidance and actions in providing teachers with information, advice, direction and training in the teaching and assessing of digital skills.**
- **CCEA should consider tailoring a programme of curriculum support training in relation to the five 'E's for non-specialist teachers in the primary sector.**
- **Professional development and training should be provided and focus should be on software available in school but also specifically in relation to the creative technologies element of the curriculum. Creative Learning Centres may be best placed to provide this.**
- **The Department should consider how the ten days that are currently set aside for professional development (DE, 2016a) should be directed towards high priority training activities in promotion of digital skills education.**
- **Schools should be encouraged and facilitated to participate in the wider dissemination of good practice. Communities of practice are an important means of sharing approaches to digital skills education challenges (DE, 2016b). Greater support is required to encourage effective communities of practice for ICT between schools and at different levels of competence.**
- **Continuity with regards to digitals skills development between primary and post-primary education should be explored; skills gained by pupils while at primary school should be further developed at post-primary level.**

3.4 Equality of access and the learner experience

3.4.1 The UK digital Strategy (2017) advocates among other, digital skills and inclusion – giving everyone access to the digital skills they need. As is the case with the rest of the UK, Northern Ireland has its own history of underachievement in education, which is expressed as regional inequalities in educational outcomes (NI Assembly 2016). The anticipated Digiskills programme aims to reach all schools and particularly these in disadvantaged areas ensuring equality of access and opportunity to develop digital skills for all children in Northern Ireland.

3.4.2 The C2k project provides the infrastructure and services to support the enhanced use of ICT in schools in Northern Ireland and is managed by the Education Authority (EA) on behalf of the Department of Education (www.c2kni.org.uk). The ongoing investment in ICT infrastructure is a positive development for digital education in Northern Ireland but questions do have to be asked if it is value for money and benefits learners, particularly equality of access, if significantly high numbers of teachers do not feel that they are confident with using the technology in class.

3.4.3 The most recent ETI report 2016-18, refers to those NI schools that have gained awards since 2000, with 62 schools in September 2018 having achieved the Digital School of Distinction Award. This might be attributed in part to DE's investment of over £632 million in providing ICT infrastructure to schools through the Classroom 2000 project. This investment was intended to guarantee not only the excellence some schools achieved but also equality of access to all pupils, irrespectively of socio-economic or other background. Why have these schools excelled when others with the same access to ICT have been left behind? It would be worth reviewing whether Creative Learning Centre teacher training and programming and training from other providers may have had a role.

3.4.4 However, research findings from this survey suggest that there is a lot of variation in the available resources among schools, with some schools having advanced technology such as robots (40%) and Apple TVs (40%) etc. at their disposal whilst others report not having sufficient equipment to carry out basic ICT tasks. For example, 7% of the respondents said they do not have access to an IWB and 11% do not have access to mobile tablets (iPads etc.). Teachers' open comments describe some of the challenges:

> "It is very difficult to take a class through an ICT task when there aren't enough for each child." (Female teacher, 20+ years teaching)

> "You cannot integrate animation etc. into normal teaching in any reasonable timeframe with a few computers and 30 pupils per class. To teach ICT properly schools we need much more hardware per class, a simpler, more manageable ICT curriculum and properly trained staff. If you keep adding to what teachers need to do in ICT you lose them altogether." (Male teacher, 20+ years teaching)

3.4.5 Just over half of the respondents felt they had appropriate access to technology for teaching their class ICT skills while over one third did not feel they had. With regards to the ICT resources available throughout all key stages and classes in each school participating in the research, less than half of the respondents said there were equal ICT resources

throughout key stages and classes while just over one third said there were not. These findings (see figures 3a and 3b below) strongly suggest that equality of access is still proving to be elusive in some Northern Ireland schools despite the big investment during the last two decades.

Figure 3a: Access to technology for class teaching

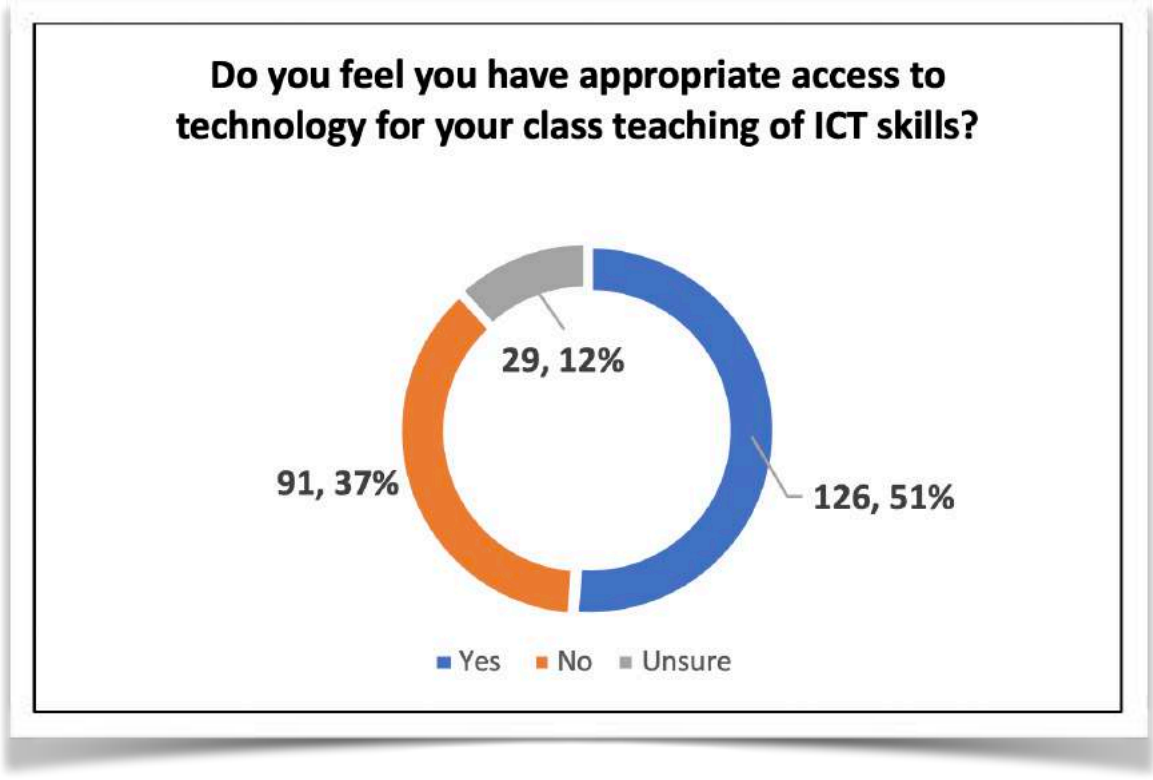
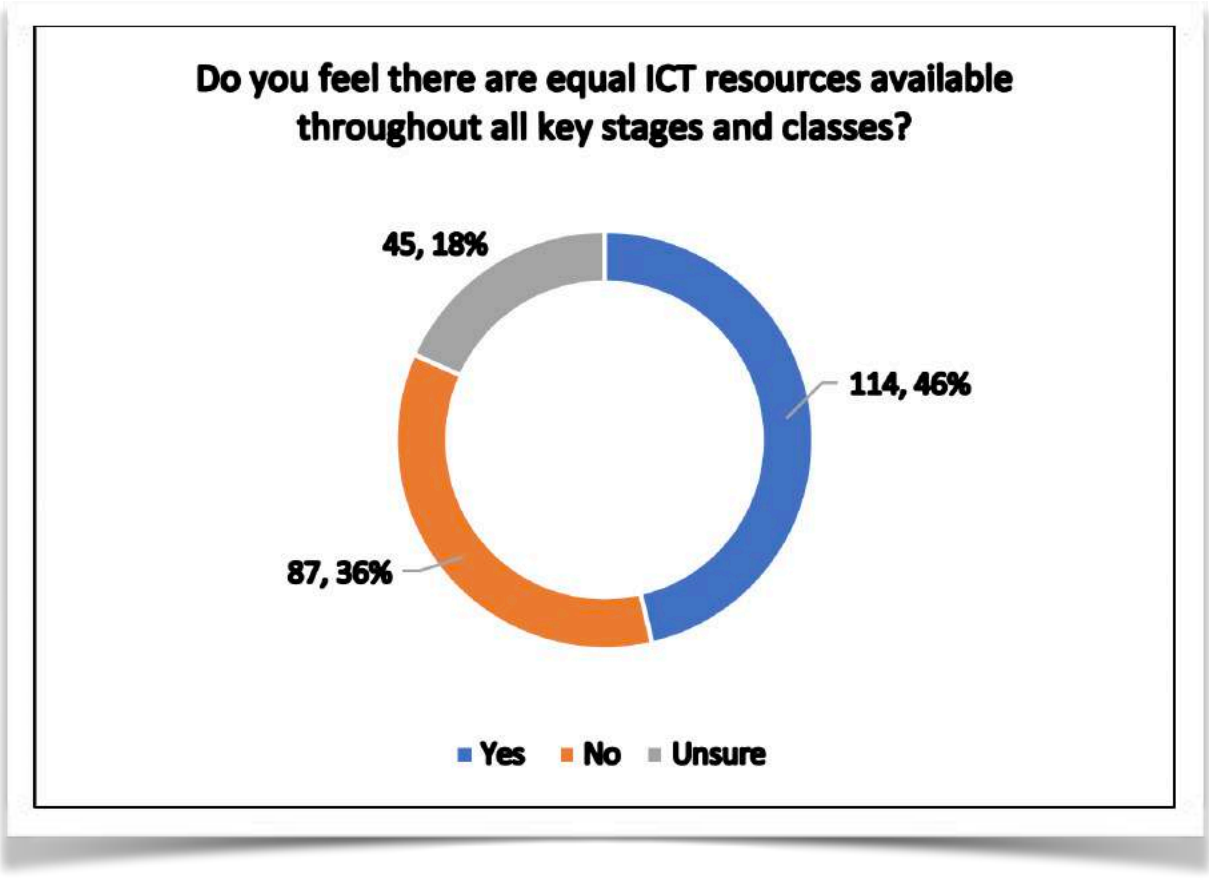


Figure 3b: Access to equal ICT resources across key stages and classes



3.4.6 Another important element of digital education is that of the teachers' experience, competence and confidence. The Chief Inspector's Report 2016-18 also refers to the need for the development of teachers' digital skills:

> “Given the constant and ongoing advancement of technology, such as in coding, more teachers need to learn to develop their digital skills in order to prepare better their pupils for the increasingly digital society they inhabit.” ETI report 2016-18

The ICT coordinators are aware of the variety of ICT provision in their schools and how it depends on the individual teacher’s ICT confidence and competence. One ICT co-ordinator commented that:

> “… all pupils have the same access to the computer suite for ICT lessons, but there can be no guarantee for quality of experience due to individual teachers’ experience and their confidence in delivering the lessons.” (ICT Coordinator interview)

It is clear that, even when there is sufficient equipment for all pupils to use and, therefore, there is equality of access, equality of teaching and learning experience cannot be guaranteed. The findings of this study regarding teacher confidence and competence, also in combination with the lack of a uniform professional development experience for all teachers, and their varied ICT background, suggest that the teaching and learning experiences of pupils in digital skills are varied.

3.4.7 Some schools seem to approach ICT purely as a medium to teach other topics and there is no time devoted to developing digital skills – again, lack of time and resources and different priorities are mentioned as barriers at school level. Although ICT can be used as a delivery tool and it is, indeed, a cross-curricular theme, it also is a topic on its own right and it has to be taught properly as Numeracy and Literacy:

> “Many opportunities in ICT are provided from Primary 1 to Primary 7 in school, however, Literacy and Numeracy do seem to still be the main priority in our school as I would say is the case with many other schools. Although these opportunities are provided, the difficulties are: ensuring we have enough resources and making sure resources work with regards to difficulties with Wi-Fi; also, what causes difficulties is teachers’ skills in delivering what is expected at a particular level and also lack of time. It appears that ICT seems to be used more as a teaching tool to enhance, say, for example, presentation in Literacy or talking and listening, rather than addressing specific skills in Using ICT.” (ICT Coordinator interview)

> “Yes … I do think it depends on the enthusiasm and the confidence of the teacher that has that particular class, and how that teacher promotes the use of ICT in their classroom. Some teachers maybe are reluctant, they think they are not confident in using ICT ... ICT is planned to be taught to a good standard generally within our school and again, as I said, planners are evaluated and monitored regularly, samples of work are collected every two months after we have completed our desirable feature and they are marked to ensure that the quality of experience is equal across the school. (ICT coordinator interview)

3.4.8 Although there has been a big investment in infrastructure in the last two decades, inequality of access persists. Difficulties with connectivity etc. are reported despite C2K's successful roll-out of services. There are some very high achieving schools in the area of ICT with awards of excellence, but there are also schools where, according to the participating teachers, there is not enough equipment for a class to carry out ICT work. Even more pronounced than equal access to resources is equal access to good ICT teaching.

3.4.9 RECOMMENDATIONS:

It is clear that there are significant and widening gaps regarding equality of access to digital education across Northern Ireland. This is despite investment in C2K which aimed to ensure equality of access to ICT in education. With the much-cited digital skills (Tech Nation, 2018; Citizens On-Line (UK), 2017) gaps evident in Northern Ireland this inequality needs to be addressed as a matter of urgency as follows:

- **A comprehensive strategy/plan should be drawn up urgently to tackle inequality in access to digital education including a plan for teacher training.**
- **EA to examine and report why award-winning schools are able to build capacity and improve and to identify barriers for progression in other schools.**
- **C2K should review and ensure that all schools have access to sufficient equipment for all pupils to be able to develop digital skills.**
- **Training providers (e.g. EA and CCEA) should ensure the provision of training designed to promote teacher ICT competence. In order to ensure that teachers become successful leaders in this part of the curriculum, mentoring and peer support to boost ICT confidence must become available and readily accessible.**

3.5 Parental Engagement

3.5.1 Digital skills development takes place at home as much as in the classroom and access to digital technology at home can, sometimes, be much better than in school; 95% of the respondents in this research perceive that their pupils have more access to computers, tablets and other devices at home compared to three years ago. Parents have a role to play when it comes to the development of digital skills both at home, through their involvement with online, productive and creative tasks, internet safety etc. and at school, as they are required to support their children while doing their homework at home.

3.5.2 However, not all parents have the necessary skills or experience, and many would need guidance in how to help their children. Therefore, how schools engage parents in this area can be important in how pupils progress in using ICT. The School Principal Survey revealed that only 48% of the participating schools provide guidance for parents in Using ICT (other than internet safety) while over 90% of these schools reported that they provide guidance in the curricular areas of Communication and Using Maths.

3.5.3 These schools have supported parents by providing one-to-one, online and email advice; information evenings or one-to-one sessions with teachers. Some schools have gone one step further and provided resources for parents:

> "We have created an E-Learning booklet to help all parents support the pupils in software learning programmes." (Principal survey)

Another school took the opportunity to create a partnership with more experienced parents by asking them to assist the school in this area:

> "We have used parents who have had expertise with ICT to help us in various areas." (Principal survey)

3.5.4 However, the teacher survey gives a different perspective on the parent/school engagement with regards to ICT: only 9% of the teachers surveyed agreed or strongly agreed that parents regularly support school ICT events, 43% said that they give feedback to parents about ICT use and 33% that they discuss their pupils' computer skills with their parents. These numbers are quite low and there may be a need to build a more productive relationship between parents and teachers if better learning outcomes are to be achieved by pupils in these schools.

3.5.5 The ICT coordinators refer to the yearly reports and also to curriculum evenings at the start of the year as ways to engage with parents, though some schools go further by providing more support through workshops etc. They also share the same view with the school principals that many parents may be more knowledgeable / experienced ICT users while it is noted that, while the principals refer to instances where parents are called in to provide help and support, the co-ordinators feel that with some parents having good ICT skills, teachers themselves must upskill so that they can offer advice and support:

> "We do have workshops within school which explain the curriculum for the year. We would also produce information about what they are learning, what we are trying to do, we have had workshops on e-safety […] any project or ICT thing that they would maybe be taking to do at home, they would have guidelines about things that they can do and ways to use ICT. There is always need for more training to help our staff to help parents at home; again, it is one of those things that is moving very, very, very fast and there are probably parents who know a lot more than us at times." (ICT coordinator interview)

Funding availability is also a factor when considering school engagement with parents. One ICT coordinator explains how Shared Education Programme funds have been used to help the school upskill the parents and provide training in areas such as internet safety:

> "What we have done through our Shared Education programme is that we have provided some opportunities to upskill parents in the use of iPads; we have provided

internet safety training and so on as well, and that is something that we hope to develop now this incoming year as well. Through the additional funding which the Shared Education Programme has provided, we are able to get expertise from outside the school, we are able to pay for those people to come in and work with parents and give them a snapshot of the type of work we are doing and so on." (ICT coordinator interview)

3.5.6 In summary, data from the Principal survey, the teacher survey and the ICT coordinator interviews suggest that school guidance in ICT is not as common as with other topics. In some schools, parents with ICT expertise have been called in to help with ICT while in others, funds have been used to upskill parents so that they can support their children. Findings also show low numbers of teachers discussing pupils' ICT skills with parents and very few teachers think that parents support school ICT events. This lack of engagement with parents may be caused by teachers' low confidence with ICT. Again, experiences vary across schools and, although it is encouraging to see parents becoming involved in the school life and offering support, this may also impact on teachers' confidence.

3.5.7 RECOMMENDATIONS

Parental engagement is essential to support pupils' learning in all areas of education therefore we need to understand how parents' engagement in this area of the curriculum can be improved. We also need much greater communication between teachers and parents to support young people. To this end we recommend that:

- **Further ICT training is necessary for teachers to feel better equipped to engage with parents who are experts in the area of ICT and to help these parents who need support.**
- **Parents' Curriculum Support evenings should also include information on the digital elements of the curriculum in school and advice on how to support.**
- **A research study designed to understand parents' role and how they can support digital skills development for pupils would contribute to better parent/teacher partnerships when supporting pupil ICT skills development.**

3.6 Teacher Attitudes to ICT and Computers

3.6.1 The teacher Digital Education in Primary Schools survey was designed to collect data on a variety of issues and one of these was to obtain an insight into the attitudes of teachers towards computers and digital technology in general.

A similar survey was conducted during the period of the last large-scale ICT training for teachers in Northern Ireland in 2001/02 and 2003/04 (Galanouli, 2008). The attitude scale from this earlier survey was adopted so that progress over time could be tracked. The data from this attitude scale in 2018 were analysed for frequencies. Number of respondents for the three surveys are as follows: 2001/02 survey, n = 464, 2003/04 survey, n = 478 and 2018 survey, n = 246.

3.6.2 Table 4 below presents these statements which express positive attitudes to computers and digital technology and where the most recent survey has higher percentages of agreement when compared with the survey from 2003/04, just after NOF training was completed.

Although the slightly higher agreement rates are encouraging, for example, 90% of teachers believing that all teachers should be able to use ICT in their teaching, there is arguably much work still to be done. Nevertheless, these figures show a slight progress (Table 4).

Table 4: Positive attitude items with higher agreement for the 2018 survey

Item	**Strongly Agree/Agree**			Unsure			Disagree/Strongly Disagree		
	2001 2002	**2003 2004**	**2018**	2001 2002	2003 2004	2018	2001 2002	2003 2004	2018
	%	**%**	**%**	%	%	%	%	%	%
All teachers should be able to use ICT in their teaching.	88	83	**90**	8	12	7	4	6	3
I have bought, or would like to buy, a home computer.	87	85	**89**	3	7	4	10	8	7
I would like to know more about computers/using ICT.	91	81	**84**	5	7	13	4	7	3
I use ICT in many ways in my daily life.	64	72	**81**	9	7	12	27	21	7
Figuring out problems with ICT appeals to me.	32	32	**38**	28	22	23	40	47	39

The remaining items expressing positive attitudes are presented in Table 5 below and a clear drop in the figures expressing agreement can be seen for the most recent survey. For example, fewer teachers are ‘feeling OK’ about trying something new or working with computers/digital technologies now than in 2002 or 2004; these findings suggest that confidence levels must have dipped, and this lack of confidence could be attributed to the lack of training discussed earlier in this report and to advances in technology which leave teachers feeling insufficiently skilled in this very important area.

Further research data from the 2010 GTCNI survey Teachers' Voice show that confidence levels remained high for a period of time with 74% (of a sample of 804 teachers) in 2010 and 64% (of a sample of 1,238 teachers) in 2006 agreeing that they feel confident in the use of ICT (GTCNI, 2010).

Table 5: Positive attitude items with lower agreement for the 2018 survey

Item	**Strongly Agree/Agree**			Unsure			Disagree/Strongly Disagree		
	2001 2002	**2003 2004**	**2018**	2001 2002	2003 2004	2018	2001 2002	2003 2004	2018
	%	**%**	**%**	%	%	%	%	%	%
Learning about using computers, digital devices and ICT is worthwhile.	97	99	**88**	2	1	3	1	-	9
I would generally feel OK trying something new on a computer/digital device.	81	81	**76**	9	9	15	10	10	9
I am generally quite good with ICT.	70	73	**63**	15	14	21	15	13	16
I feel fairly confident when working with computers and digital devices in general.	71	76	**57**	13	12	21	15	13	22
At this point in my career I believe I can do advanced ICT and computer work.	46	49	**31**	26	22	32	27	29	37

3.6.3 Regarding the items expressing negative attitudes, surprisingly, in the 2018 sample, a rather higher percentage of respondents expresses agreement with statements describing feelings of intimidation, threat and in general lack of confidence when computers or ICT are involved when compared to the 2001/02 and 2003/04 samples.

Table 6 below, and to a lesser extent Table 7, suggests that the investment in equipment that has been made available to schools since 2000 has not contributed to clear increases in positive attitudes towards computers and digital technology in general. To develop confidence in using ICT, training is as important, if not more important, than a sufficiency in levels of appropriate equipment.

This small-scale study has revealed that neither sufficient equipment nor training have been available to teachers in some Northern Ireland schools. It is important to emphasise that these results are based on a small sample of 246 teachers out of 31 primary schools. A larger scale survey would be necessary to establish the real extent of the support and

practical assistance that teachers require in order to equip their pupils with the essential digital skills they need to contribute and succeed as part of the future workforce.

Statement	Strongly Agree/Agree			Unsure			Disagree/Strongly Disagree		
	2001 2002	**2003 2004**	**2018**	2001 2002	2003 2004	2018	2001 2002	2003 2004	2018
	%	%	%	%	%	%	%	%	%
I feel intimidated if a conversation turns to computers and ICT.	13	12	**21**	11	12	**23**	75	76	**56**
Advanced ICT skills would not improve my teaching.	15	15	**19**	13	14	**20**	72	71	**61**
I am not the type to do well with digital devices, computers and ICT.	5	6	**13**	11	10	**19**	83	84	**68**
I feel threatened by the thought of having to use a computer/digital device.	10	9	**10**	5	6	**9**	86	85	**81**
I do not understand how people can enjoy working with computers and ICT.	5	8	**9**	9	9	**14**	83	84	**77**

Table 6: Negative attitude items with higher agreement for the 2018 survey

Statement	Strongly Agree/Agree			Unsure			**Disagree/Strongly Disagree**		
	2001 2002	2003 2004	2018	2001 2002	2003 2004	2018	**2001 2002**	**2003 2004**	**2018**
	%	%	%	%	%	%	%	%	%
61. I am often unsure what to do when using a computer/digital device.	23	20	16	13	12	22	**64**	**68**	**62**
58. It is not important to me to use ICT material/digital devices in my teaching.	12	12	10	12	14	9	**76**	**74**	**81**
56. I avoid using computers/ICT whenever I can.	8	12	6	7	5	14	**85**	**83**	**80**
44. I find computers and ICT boring.	9	10	5	8	11	17	**82**	**79**	**78**
52. I do not like using ICT in my teaching.	7	10	2	12	9	11	**81**	**82**	**87**

Table 7 shows that again, even if not as pronounced as in the Table 6, small pockets of negative attitudes persist, although for these items below there is clearly a decline when compared to the 2001/02 and 2003/04 samples.

Table 7: Negative attitude items with lower agreement for the 2018 survey

.7 Digiskills and Teachers as Researchers

3.7.1 As explained above, a ‘teacher as researcher’ methodology was employed for this study in line with ‘Learning Leaders: Strategy for Teacher Professional Learning in Northern Ireland’ (DE, 2016). All the qualitative data for this study (ICT coordinator and teacher interviews) were collected by the ICT coordinators themselves after basic research training and with support from the project’s research fellow. A short post-project evaluation of the experiences of the ICT coordinators who were the teacher researchers was conducted and the findings suggest that this was a positive experience for all participants.

3.7.2 The evaluation sought to collect data on the quality of training and information provided to participants to help them carry out their data collection tasks, on the suitability of school-based research tasks as professional development method and on their willingness to participate in other research related to their practice. From the 31 participating schools, 23 responses were received.

3.7.3 Overall, 96% of the respondents found that they were provided with enough information/training to conduct their data collection. Most of the respondents (83%) would consider school-based research an appropriate professional development method providing appropriate support and funding for teacher release were provided and the current industrial action was no longer in place. Only 56% expressed interest in conducting their own school/ classroom-based research citing again time constraints, lack of funding and the current industrial action. The responses variously suggested that time (100%), training (87%) and support (83%) would all have to be in place for teachers to consider further involvement in school-based research.

3.7.4 The ICT coordinators offered their views about being a teacher researcher for the Digiskills project in open comments. These comments suggest that they found participating in this project an empowering experience, one that made them feel valued as professionals and helped them realise that others share their frustrations with regards to ICT. These comments also confirm that allowing for sufficient time when planning school-based research and providing support are both crucial for the success of the activity.

> “It was good experience and it gave our school a focus and time for looking at ICT.”

> “It was enjoyable and gave teachers an understanding of how limited we are in ICT through no fault of themselves. With the ICT update and speed of development it is very difficult to keep up, especially with time issues and lack of understanding plus other huge demands in the education sector.”

> “It was a bit rushed and it would have been good to have had a little longer to complete. The only stressful part was uploading the interviews. I found being able to contact the researcher really helpful and the fact that she was in constant contact and sent reminders to help us keep to the schedule was very helpful.”

> “It was a very positive experience talking with other professionals and feeling like a valued member of the teaching community.”

4. CONCLUSION

4.1 The aim of this study was to better understand how the development of digital education is progressing in primary schools in Northern Ireland and it sought to provide information on developments in the areas of leadership in school, teacher professional development, aspects of pedagogy, assessment and teaching approaches, equality of access and the learner experience, and parental engagement.

4.2 The findings from this study, in conjunction with other Northern Ireland Screen-funded research, strongly suggest that Northern Ireland needs an up-to-date digital strategy for education and strategic level leadership in the area of using ICT and digital skills development. Some primary schools lack direction at both leadership and teacher level and clarifications are needed by statutory bodies with regards to what is expected by teachers.

4.3 Connectivity and equipment issues persist despite the investment in infrastructure since 2000 and there is need for tailored ICT training, including pedagogical skills development, to ensure that teachers can use the equipment they do have access to, otherwise this significant investment is at risk. The problems with equipment and training suggest that there is inequality of access to the technology and to the learning experience which worsens with the widening gap in teacher confidence to teach ICT. This is further supported by the findings regarding some teachers' negative attitudes to ICT and digital technology. Parental engagement also varies, with some schools reporting that experienced parents are used to help out in schools and other schools reporting that they organise training sessions to upskill parents so that they can support their children with their school ICT tasks. Despite these challenges it has been argued that, even when pupils leave their primary education with a good level of digital skills, their experiences often deteriorate at post-primary education level.

4.4 The small sample of 31 Northern Ireland primary schools which participated in this survey includes schools that have excelled and have won awards in the area of digital technology while others from the same sample do not have access to enough computers or other digital devices to carry out an ICT lesson. This sample also includes teachers who are expert ICT users and others who still feel intimidated if a conversation turns to computers or ICT. Considering the wide variation in equipment availability and teaching expertise in ICT in such small sample (31 out of 832 primary schools), further larger scale research would be necessary to ascertain the extend of inequality regarding access to digital education across the primary sector.

It is perhaps appropriate to recall the words of Larry Cuban (Stanford University) when he wrote in 2002:

> 'As for enhanced efficiency in learning and teaching, there have been no advances […] over the last decade that can be confidently attributed to broader access to computers. […] Teachers have been infrequent and limited users of the new technologies for classroom instruction. […] Computers have been oversold and underused, at least for now' (p178/179, 2002).

Nearly two decades after Cuban's observation, the results from this survey suggest that much still needs to be done to enable some teachers to be regular, competent and confident users of ICT in their teaching and in their pupils' learning. To remedy this situation the recommendations presented in this report should be considered and acted upon by all stakeholders including government agencies such as EA, CCEA, DE and the HEIs. In summary, the urgent priorities for development are as follows:

- **DE urgently need a comprehensive strategy/plan to build capacity for digital education. In particular, addressing inequality in access to a digital education at government-level, including a plan for teacher professional development in ICT and also ITE provision.**

- **ITE providers should review their provision regarding both ICT skills and ICT-based pedagogy and engage in consultation with all main stakeholders to plan the way forward and to ensure newly qualified teachers enter the profession with the required level of ICT skills.**

- **The ETI, EA, GTCNI and CCEA should review their roles, guidance and actions in ensuring teachers have ready access to quality advice, direction and training in the teaching and assessing of digital skills.**

- **DE should consider how the ten days that are currently set aside for professional development (DE, 2016a) should be directed towards high priority training activities in promotion of digital skills education. Teachers willing to take up ICT training in their own time should be professionally acknowledged and these teachers should be supported by their school to pursue such quality assured training in their own time and out-of-school.**

Further research recommended to support parental engagement and transition from primary to post-primary education:

- **A research study designed to understand parents' role and how they can support digital skills development for pupils would contribute to better parent/teacher partnerships when supporting pupil ICT skills development.**

- **A research study to explore continuity with regards to digitals skills development between primary and post-primary education; skills gained by pupils while at primary school should be further developed at post-primary level.**

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ISBN 978-1-85923-285-9