

PERSPECTIVES ON DIGITAL TECHNOLOGY IN A REMOTE SCHOOL COMMUNITY

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ABSTRACT

The present article is based on a qualitative evaluation of the use of digital technology in a remote secondary school in the Scottish Highlands. The attitudes of teachers and pupils to the use of digital technology and the underlying tensions between formal and informal educational practices are central concerns addressed in this paper. The project was for one-year and designed to facilitate the embedding of digital technology across the curriculum.

Some of the benefits of participating in the project, according to the pupils, included an improvement in their ability to work successfully with others, independently from the teacher, and the development of their skills in creating moving images in both curricular and extra-curricular activities. Most participating teachers commented that they had improved their own ICT skills. In conclusion, some complex issues are raised in connection with schools in isolated communities.

INTRODUCTION

Disenchanted young people in the Highlands are looking for a future that offers more than picture postcard views... (McBain, 2006, p.14)

Young people have access to digital technology in their daily lives, but it is still typically peripheral to the learning process in the classroom in rural areas (Conlon & Simpson, 2003; Lee & Tsai, 2005; Wall *et al.*, 2005; Hartley, 2007; Williamson & Conlon, 2006; Davidson & Elliot, 2007). Opportunities for using digital technology in school appear to depend on a variety of contextual factors including school location, teachers' experience with digital technology, curriculum area, and personal characteristics such as, gender, age, culture, race, religion and socio-economic status (Leder & Vale, 2004; Tupling, 2004; Heemskerk *et al.*, 2005; Buie, 2006). Furthermore, the impact of the lack of access to digital technologies in some rural locations, particularly in remote schools, has been compared to the effects of socio-economic deprivation in urban areas, and both factors have been linked together in recent descriptions of a global digital divide (Servon, 2002; Yu & Wang, 2006). Measurement of the effects of Information and Communication Technology (ICT), on examination performance in England is complicated by the wide variation in the children's use of ICT, not only at school but also at home (Harrison *et al.*, 2006). Indeed, in UK schools the overall evidence from the literature suggests that access to ICT is patchy (Condie & Munro, 2007).

Curriculum-linked learning enhanced by the use of ICT has been reported in English, mathematics, science, modern languages, music, history and geography (Leask, 2001; Loveless & Ellis, 2001; Garland & Noyes, 2005; Wilson *et al.*, 2005; John & Sutherland, 2005). The latter authors point out that just because pupils use technology, it does not automatically follow that positive learning takes place.

In Scottish secondary schools, business education and computer studies usually provide more opportunities than other curriculum areas for working with computers (Scottish Executive, 2005). The former Scottish Executive's (2006) policy of *A Curriculum for Excellence* signalled an opportunity to revisit traditional assumptions about the nature of the curriculum, the use of ICT and assessment. The present study

provided an opportunity to explore the views of teachers and pupils about ICT-linked learning in various curriculum subjects.

The Digital Technology Project

The research context is a small secondary school in a remote part of the Highlands; the school has the largest geographic catchment area in the UK. Digital cabling had been recently installed in the school and some of the surrounding villages. In September 2004, the school had 203 pupils. A profile of key contextual characteristics of the school is shown in Table 1. The proportion of the school's pupils with a record of special needs and *Individual Education Programmes* (IEP) was seven per cent, which is above average for Scotland. A group of teachers at the school submitted a proposal to the *Future Learning and Teaching Programme* (FLaT) administered by the former Scottish Executive Education Department (SEED). The proposal, which was subsequently funded, was for a one-year project to facilitate the embedding of digital technology across the curriculum. The *Digital Technology Project* (DTP) was designed by staff already confident with using ICT (Ogg, 2003). However, as the project progressed more teachers decided to get involved.

Table 1: Profile of the Case Study School with comparators for Scotland

Contextual characteristics	Case Study School	Highland Mean	Scotland Mean
Pupils' Free School Meal Entitlements, FSME (%)	9.7%	10.5%	16.0%
Authorised absence (%)	6.1%	7.7%	8.0%
Unauthorised absence (%)	0.2%	1.3%	1.6%
Fourth year SCQF Level 5 (Standard grade Credit 5 or more)	49%	38%	34%
Fifth year SCQF level 6 (Highers - 3 or more)	28%	25%	22%

The main purpose of the DTP was to explore the use of digital technologies in the middle and upper parts of the school curriculum in order to develop a range of alternative pupil learning styles through an exploration of different teaching and learning approaches. Departments involved in the project included: art, music, modern studies, geography, science, modern languages (French), Gaelic, English and Support for Learning. A stated aim of the project was 'to use digital technologies to support pupils and encourage them to use their different learning styles and to think creatively and critically'. For example, pupils were given formal training and practical experience in digital filmmaking using the software suite *iLife* on Apple Macs purchased through the project. The *iLife* package, according to Blane (2005: 16): 'lets you create music, photos and video, and pull them all together'.

Research Questions

The evaluation aimed to investigate any ambiguities and tensions in the perceptions of teachers and pupils about the impact of digital technology across the curriculum. In sum, the main research questions are summarised below:

- i. What is the impact of the DTP on the skills of the participating teachers?
- ii. What is the impact of the DTP on the skills of the participating pupils?

iii. What is the overall impact of the DTP on the school and community?

METHODOLOGY

The research design employed a qualitative ethnographic-style approach. In order to gain a fuller understanding of the various viewpoints and experiences of the participating teachers and learners, the researchers also gathered the views of other staff, parents and community partners, and made informal observations within the classroom, around the school and in the local community. The research questions, methods, interviews schedules, topic guide for pupil focus groups, data analysis and detailed findings are described in the final report (Davidson *et al*, 2006). The main research methods involved two extended visits to the school in Autumn 2005 and included:

- 16 one-to-one semi-structured interviews with staff including DTP participants and non-participants, senior managers and project co-ordinators. Themes for the participating staff interviews are listed in Table 2. A modified version of this schedule was used with the non-participating staff to find out about the DTP's impact on teachers not directly involved in the project. A majority of school staff was interviewed and the profile of staff interviewees is given in Table 3.
- Eight mixed-sex pupil focus groups with an average of six per group: a total of 49 pupils (21 girls and 28 boys) who participated in the project from the middle and upper part of the school. (The pupil age range was from 13 to 18 years.) The main themes covered in the pupil focus groups are listed in Table 4. All pupils participating in the DTP were included in the focus groups. A profile of the composition of the focus groups by year level and sex is given in Table 5.
- 14 semi-structured telephone interviews with a representative selection of parents of pupils in the focus groups. (This represented the parents of 25 per cent of the participating pupils.) Themes for the parent interviews are listed in Table 6.
- Three semi-structured telephone interviews with representatives of community organisations connected to the school: the local radio station, the nearby Inverewe Gardens, and the local heritage museum. Themes for the telephone interviews with the community partners were adapted only slightly from the topics covered with parents (Table 6).

Table 2: Themes for the staff interviews

<ul style="list-style-type: none">• Level of understanding of, consultation on and agreement with the aims of the Digital Technology Project• Impact of the Digital Technology Project on teachers directly involved• Impact of Digital Technology Project on the skills of participating pupils• Impact of Digital Technology Project on parents and the community• Sustainability of the project
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Table 3: Composition of the staff interviewed

Type of staff interviewed	Number of interviewees
Senior manager	2
Project Co-ordinator	2
Participating teacher	5
Other participants from the Support Staff	3
Non-participating teacher	4
Total	16

Table 4: Themes for the pupil focus groups

<ul style="list-style-type: none"> • Pupils' involvement in digital technology • Pupils' development of knowledge and skills • Future learning • Concerns about the use of digital technology

Table 5: Themes for interviews with parents and community partners

<ul style="list-style-type: none"> • Level of publicity about the Digital Technology Project • Impact of the Digital Technology Project on pupils • Impact of the Digital Technology Project on local community • Sustainability of the Digital Technology Project
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Table 6: Composition of the pupil focus groups by sex and year level

Pupil Group	Year Levels
1	S2–S5 (3 boys, 2 girls)
2	S3 (5 boys, 2 girls)
3	S3 (3 boys, 3 girls)
4	S5 (2 boys, 3 girls)
5	S5 (5 boys)
6	S3 (1 boy, 4 girls)
7	S3 (4 girls, 4 boys)
8	S3 (5 boys, 3 girls)

The purpose of the pupil focus groups was to develop not only an understanding of pupils' views about digital technology in different subject areas, but also the pupils' ability to communicate with others about their experiences. A pupil-generated video clip was shown as a prompt to encourage discussion. Each discussion group lasted

up to an hour. (An exemplar pupil video clip on 'Emotions' is available through: <http://www.scre.ac.uk/gairloch>)

Qualitative Data Analysis

All of the interviews and discussions were recorded, with permission, using an iPod voice memo. The subsequent voice memos were downloaded and saved on to CDs. These recordings were used as an *aide memoire* to the researchers' partial transcription of the interview, which included summary notes and key quotes. The qualitative findings from all of the above data sources were analysed systematically for key recurring themes within and across the various data sources, based on the methods of triangulation and grounded analysis (Glaser & Strauss, 1967; Richards, 2005). The following terms are used throughout this paper to indicate the proportion of interviewees involved: *few* is one or two, *some* or *several* are more than one or two but fewer than half; *most* is more than half; *nearly all* is three quarters or more.

FINDINGS

In this section, some views and perceptions of the key stakeholders in the digital technology project - the teachers, the pupils and their parents - are highlighted sequentially. More detailed findings are provided in Davidson *et al* (2006).

Teachers' Views: Building on Expertise and Breaking Down Barriers

The participating teachers were already using digital technologies and had ideas for incorporating it further in particular subject areas, such as Music and Art. They saw the project as 'building on teachers' expertise'. They recognised that pupils needed 'ICT skills to equip them for life and work in the twenty-first century'. This point is illustrated by one participating teacher's observation: 'the twenty-first century has a different set of literacies'.

The majority of participating teachers indicated that they found the enthusiasm of the pupils infectious and a motivator for them to use digital technology in classroom activities. The following teachers' comments were typical:

Pupils enjoy this type of learning.

[There is an] extra dimension to children's learning...more visual types of learning...

[The pupils get to] fulfil their ideas. It encouraged ownership of learning.

A tension that surfaced in teachers' responses was between the ways in which the senior pupils wanted to explore digital technology and the pressure and constraints of external assessment. As a senior staff member put it:

I would rather have it [the DTP] in S1 or S2 [first two years of secondary school] than in the Standard Grade years [middle years of secondary school with an external examination at the end]!

However, a participating teacher did not share this view:

I don't see the tension between process and product, more like a complementary relationship. The process is the priority.

The perspectives of school managers, classteachers and pupils in relation to the place of technology in the years before external exams needs further exploration with diverse pupil cohorts over time in a longitudinal study.

The project, in some cases allowed teachers to work in different ways with colleagues. The best example of this was in Art and Music where the teachers brought their curricular knowledge together to allow the pupils to create fascinating

presentations on the topic of *Emotions* using visual and musical imagery. The DTP gave the participating teachers the opportunity to take a radical look at what they teach, how they teach and who they teach with in certain subject areas. One of the DTP project co-ordinators has recently indicated that, further e-resources (for example, in Science and Maths at Intermediate 1) have since been developed at the school for use in Highland region and on the Learning and Teaching Scotland's national digital network, Glow. Consequently, more research is now required to evaluate the benefits of digital technology and e-learning resources. There was a question mark, according to a few teacher interviewees, over how much all of the school's staff were able to join in such a process: it was inevitably somewhat limited by resources (the main project resources in short supply were Apple Mac computers, but the local ICT infrastructure was PC-based).

Some of the participating teachers explained that they needed to be able to cope with the technical issues that arise when using technology and this is exemplified in the quotes from two participants:

I've learned to be a brilliant technician.

ICT doesn't frighten me!

Another observation was that digital technology: 'makes you aware of your own teaching. It causes you to reflect on what you are doing and why'. A majority of the participating teachers emphasised that even though they had all had the opportunity for in-house staff development, they had spent a large amount of their own personal time on developing and exploring new ICT resources and teaching strategies for use in the classroom. Overall the participating teachers felt that their 'ICT skills have improved hugely', and that [the digital technology activities need] 'a lot of teacher input...The project was a steep learning curve'.

Pupils' Views: Communication with Others, Creativity and Independent Learning

The pupils enjoyed developing their digital technology skills at school and there was no apparent difference in attitudes between boys and girls. A selection of the memorable digital technology activities mentioned by the young people is summarised in Table 7. Activities highlighted by the participating pupils covered music, art, English, French and Gaelic, out-of-school trips and action films of hobbies (such as trail bike riding) made by students with additional learning needs based in the Support for Learning department.

Out-of-school activities that were filmed by the pupils included kayaking trips as part of The Duke of Edinburgh (DoE) Award programme. (This Award is a voluntary, non-competitive and flexible programme of cultural and adventurous activities designed to be suitable for all young people.) Although a film of one of the canoeing expeditions had been spoilt by dropping the camera into the water, senior pupils who had been involved in making digital video diaries about their outdoor expeditions were very enthusiastic about the process. Indeed, a few senior pupils indicated that they would like to be able to create video diaries that could be recognised for formal assessment in English instead of traditional text-based essays.

Table 7: Examples pupils gave of memorable digital technology activities

Subject area (s)	Activity
Music and Art (collaborative work)	Inventing a video clip about 'Emotions' using digital video recorder, GarageBand, Music loops, iMovie, creating music, DVD.
French	Role play by pupils in French language digitally video recorded.
Gaelic	Digital videoing of pupils' fashion show with subsequent addition of pupils' voice over in Gaelic.
English	Digital film made of pupils' discussion about Global Warming to be used with subsequent year groups.
Outdoor activities	Digital video of kayaking expeditions and related video diaries created by pupils to support their submissions for DoE Award.
Support for Learning	Professional quality digital videos, including sound tracks, about pupils' hobbies created by pupils with special needs. Outdoor activities filmed included trail bike riding.

The considerable expertise developed by pupils in the participating subject areas cannot be overstated and is exemplified by an S4 female pupil's remark:

We borrowed the video also for the Art and Music project. You can just ask to use the video. It is up to us. We know how to use it now: how to use the wires to connect ourselves up. We know about using a tripod to avoid camera shake and about framing shots.

A music pupil who played the guitar mentioned that he had successfully recorded his own compositions with *GarageBand* at school. Another music pupil elaborated further on the advantages of *GarageBand* and the additional equipment he would like to have access to at school:

I am doing Standard Grade Music. You can use the loops or make your own. With *GarageBand*: it is fun! But as I play the drums, including the snare drum, I can't easily record my own compositions. We don't have enough microphones for this. Each drum needs its own microphone. You know for the symbols, for instance. Instead, I use the loops in *GarageBand* to make the backing tracks, including the bass and drum and build on the guitar (S4 boy).

The pupils praised the DTP's positive impact on their social lives. Electronic communication generally proved to be very important to these young people. It helped them communicate with their peers: 'computers are a good way of staying in touch with people'.

In agreement with the interviewed teachers, the participating pupils explained that the new technology was opening up new creative ways for them to learn independently of the teacher and communicate their own ideas to each other. They mentioned that using digital technology usually involved working in groups and that they had to learn to get on well with each other. This was particularly important, they explained, because the editing of the videos was very time consuming work. Although future research could usefully involve systematic classroom observation, a majority of participating pupils commented that they perceived that their negotiating

skills had improved as time went on and that they viewed their teacher as playing a critical role in the success of group work. One S4 girl explained: 'we were told who we were working with. The teachers must have done some research because we all got on with each other OK... and... came up with the goods in the end!' An S4 boy emphasised: 'We were left to get on with it' and create a completely original piece of work in Music and Art. 'It lets you express yourself. There is not enough of that in normal school.' Several of the S5 pupils commented that their experiences with digital technology and making evocative films (particularly around the topic of Emotions) had given them new ideas about how to learn in different and creative ways and express themselves in a socially constructive manner at school. Indeed, how far pupils perceive that their experiences in Expressive Arts impact on the development of their communication skills in social subject areas, such as Modern Studies, Geography, History and/or Media Studies would form a fruitful focus for future research.

Some pupil participants had benefited from being filmed speaking in French and Gaelic and they reported that their fluency in these languages had improved. Although it was, admittedly, only their perceptions, it is worth noting that a few pupils emphasised that they found the practical nature of the activities to be beneficial to learning a foreign language. A female student elaborated that the practical activities and the use of ICT aided the development of language proficiency (S5 girl): 'You don't have to sit about all the time, getting up and doing things helps you learn better!' In general, the participating pupils were very enthusiastic about their experiences with digital technology and mentioned that it is now an integral part of their school life. The project had involved specific subject departments in the school and the pupils said that they appreciated the support and encouragement from the participating teachers. The pupils were pleased with the training that they had received and what they had been able to achieve with the DTP:

We had a day's training in using iMovie... we used different slides to create the scary stories in Music with GarageBand. The music we used could either be pre-recorded; that is, we made loops. Or we could record our own music (S4 boy).

A few pupils emphasised that it was time that digital technology resources were made readily available to *all* of the teachers in the school. Pupils specifically mentioned that the teachers from the non-participating subjects should be able to go on further courses to learn how to use relevant software packages for their subject areas. An S5 boy indicated that the school management team needed to encourage *all* staff to use digital technology in subject lessons: 'the Headteacher needs to get a move on!' Pupils pointed out that teachers, who were not involved in the DTP, had sometimes unwittingly limited their access to the technology:

It is dependent on the teacher; some worry you'll break the equipment! What's the point of having it then! It might as well be broken if the result is it sits in a cupboard! (S5 girl).

One S4 boy was disappointed to find that when his expectations had been raised about the possibility of making a film in Personal and Social Education (PSE), he would not be able to do so due to staff changes:

We were going to do something in PSE about drugs, alcohol and bullying... but it was dependent on the teacher and she left! (S4 boy).

In agreement with prior research, the participating students felt that the school management played a key role in facilitating teachers' involvement with ICT across the curriculum (Condie & Munro, 2007).

Parents' Views: Access to ICT Beyond the Classroom

Most of the evaluation's participants saw the Digital Technology Project as very worthwhile: there was a clear consensus among the school community that the young people had considerably extended their ICT skills. Access to the Internet was not easy in some surrounding villages near this case study secondary school. Broadband cabling has recently been installed in the vicinity of the school, and according to one parent interviewee, 'there are pockets without it'. In this area many people are not close to an Internet café and so, the DTP 'is quite valuable'. A few parents who lived in the surrounding villages and/or stayed in rented accommodation mentioned problems with access to ICT. The following quote exemplifies the difficulties:

I don't have Internet access at home. I'm a bit behind most people that way. There is Internet access in the library of the school itself and at the village hall...but it is fairly limited in terms of when it is open.

A minority of parents reported that they were familiar with digital technology and the Internet and the majority saw ICT skills as something very important for their children but not for themselves. Although the point warrants further study, the findings presented above may be typical of remote regions with similar demographic and geographic features.

DISCUSSION

The study provides a novel example of digital technology being used as a *social tool* in the classroom and beyond (John & Sutherland, 2005). Adults and young people participating in the project perceived that teachers often played a crucial role in supporting learning in terms of providing not only curriculum-linked knowledge, but also ICT support and advice. The pupils saw the importance of social interaction with peers and the school community in negotiating knowledge and developing an understanding of the world. Improvements in pupil communication skills linked to their involvement in making digital movies has been mentioned previously in the literature (Anderson, 2002).

It is no surprise that the pupils in this study liked technology-enhanced learning with graphics, animations, videos and sound effects (Bongo, 2005; Passey, 2006; Davidson & Elliot, 2007). However, in contrast with some earlier evidence, the pupils in this research expressed satisfaction with their school's ICT provision (Selwyn, 2006). However, the pupils showed no apparent gender difference in their attitudes to digital filmmaking. This is consistent with recent evidence that there is a lack of gender differences in pupils' attitudes to new types of ICT (North & Noyes, 2002; Colley, 2003). Indeed, in the DTP the participating teachers in Expressive Arts had produced their own artistic video exemplars about 'Emotions' as support materials for use with their pupils. A specialist software training day was also provided for pupils in order to ensure that they were adequately prepared for the challenging task of making their own video (Loveless, 2003).

The participating pupils appreciated digital filmmaking, not only in the Creative and Expressive Arts but also in other core subject areas of science and English. Further investigation into the ways digital technologies can support the personal learning of pupils in the other core subject of mathematics would be worthwhile (Beastall, 2006; Hallam & Ireson, 2006).

This study provides some evidence that the video diary can be a useful learning tool - by facilitating the development of communication skills - as has been suggested in previous literature (Noyes, 2004). The pupils appreciated being able to make their own video diaries for the Duke of Edinburgh Award and the focus group data provided some evidence that they recognised that they could use digital literacies effectively to communicate their ideas to others.

Some Swedish research confirms the present findings of a tension between realising pupils' creativity and the demands of the official school culture (Beach *et al.*, 2006). The potentially conflicting demands on pupils and teachers warrants further investigation, specifically in terms of the interconnections between creative expression, digital literacies and assessment criteria. Although the Scottish Qualifications Authority (SQA) has indicated that some of the material produced in this project may not be excluded from its assessment framework, the collaborative nature of work does not sit neatly with traditional forms of assessment (Davidson *et al.*, 2006). Internationally, there is recent evidence from New Zealand's new NCEA that although external assessment is the main way of recording achievement, parents and pupils welcomed the new accreditation of wider achievement internally available in schools (New Zealand Ministry of Education, 2006). The research evidence does suggest that the practical activities of the DTP had provided opportunities for participants to engage in the process of life long learning which links into the key aims of the former Scottish Executive's (2006) *A Curriculum for Excellence*.

In the Netherlands there is supporting evidence for the current findings of an unresolved tension *within* the school between the education managers and the class teachers: Admiral *et al.* (2006) report that school managers typically expect teachers to use their own initiative to keep up to date with technology. For ICT innovations to be effective and sustainable in individual schools, the use of digital technology needs to be built into all of the curriculum areas (HMIE, 2004). A few project participants expressed concerns about the sustainability of the project in the future. Some questions were raised about the purpose of short-term funding for one year only, and the best ways to manage carefully the expectations created in the isolated rural community for access to digital technology where local resources are limited. In sum, an obvious imperative emerging out of this research is for local councils to consider a regular audit of each teacher's ICT needs in order to provide them with relevant types of digital educational services in rural locations.

The DTP was unusual because it was entirely devised by the participating teachers and driven by their desire to use creative approaches to teaching using digital technology across the curriculum (rather than just the technology *per se*). A community radio project designed to empower pupils and their parents in social practices, in a creative way using technology, in the North East of Scotland, the Aberdeen Reading Bus Radio Project, has also been successful (Lewis, 2006). In contrast, in recently completed FLAT projects in other remote parts of Scotland the technology has proved somewhat problematic (Payne *et al.*, 2006).

CONCLUSION

The research demonstrates the complexity of implementing and sustaining change even when the innovation is originally conceived by a group of enthusiastic teachers *within* a school. A broad discussion of the prerequisites for sustaining innovation and educational change in Scottish schools implementing this type of 'bottom up' approach is outside the scope of this paper and is given elsewhere (Martin *et al.*, 2006). In conclusion, the best ways to sustain ICT across a whole school is an intriguingly complex question that warrants a comparative study of remote school communities in Scotland. In the longer term, the study raises questions about the organisational arrangements for schooling in rural areas such as this. Many pupils commute to school each day, spending up to three hours per day travelling. Could it be that digital technology affords the opportunity for pupils (particularly the senior pupils) to engage in more independent study not necessarily on school premises each day? Further longitudinal research involving observation of pupil activities revolving around digital technology would provide an opportunity to substantiate (or otherwise) some of this study's attitudinal findings about the learning experiences of secondary school students.

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