SQA Adapted Examination Papers in Digital Format

2007 Pilot Project Report

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SQA Digital Papers 2007 Pilot

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1. Executive Summary

Since 1995 the number of candidates requesting Assessment Arrangements to sit Scottish Qualification Authority external examinations has increased by over 300%. In 2006, 10,650 candidates (7.2% of the total number of candidates) requested Assessment Arrangements for use in 43,291 examinations.

Excluding requests for Extra Time, the use of Readers and/or Scribes are the most common type of support used by candidates who have difficulty reading the standard question paper and writing or recording their responses. There were 16,815 requests for a reader, and 15,059 requests for a scribe, in 2006.

The use of readers and scribes raises issues of candidate independence, and since each candidate who uses a reader and/or scribe requires a member of staff to provide the support, a separate room, and an invigilator, some Centres have difficulty providing enough staff and finding sufficient accommodation. There is also a significant cost to Centres and SQA.

Digital question papers for candidates with additional support needs were used for the first time in SQA examinations in 2006 with considerable success. We believe that SQA are the first examination authority anywhere to have developed and used such digital papers for candidates with additional support or special educational needs. Candidates who used the digital papers in 2006 preferred them to readers and/or scribes, while staff felt that candidates were more independent, confident and motivated with the digital papers than with traditional methods of support. Analysis of attainment by SQA suggests that the digital papers did not influence the marks achieved by the candidates.

The pilot was repeated on a larger scale in 2007 and 80 candidates from twelve centres requested 490 digital papers for use in 200 entries. The results of the 2007 trial confirm the findings obtained in 2006 and enabled SQA to develop and test digital paper production and distribution on a larger scale. Digital question papers offer a more independent and appropriate method of support to candidates with additional support needs who have difficulty with standard papers.

The use of readers and scribes presents challenges to schools and Centres throughout the academic year – not just in May and June each year. Candidates with reading and writing difficulties require support for accessing prelims, NABs and course work in class and at home. One positive effect of the introduction of digital question papers is that Centres who have used them in the pilot trials are developing digital versions of these other learning resources, which therefore improves candidates' opportunities to access the curriculum.

The SQA digital papers were developed in response to requests from educationalists, and designed to fit into existing SQA Assessment Arrangement practices. The papers are a solution to an identified problem, in contrast with many ICT-driven initiatives which are too often a solution looking for a problem. The mechanisms that have been developed by SQA and CALL to create the digital papers are cost-effective and scalable, while administration of examinations for Centres is practical, reliable and low cost.

2.   Background and Aims

Candidates who have a difficulty with accessing question papers, or writing or recording responses, can request the use of Assessment Arrangements. This can involve the use of, for example, extra time; reader; scribe; helper; transcription of the paper; the paper in an adapted format (e.g. on coloured paper or a different font, in large print, or in Braille); or a deaf interpreter.

The number of candidates requesting Assessment Arrangements has increased over threefold over the past decade, from 3,094 in 1995 to 10,650 in 2006; while 43,291 requests for Assessment Arrangements were made in 2006 (SQA, 2006).

The largest single identifiable group of candidates with difficulties are those with Specific Learning Difficulties, including dyslexia (66%, Figure 1). 4% of candidates have significant visual impairment.
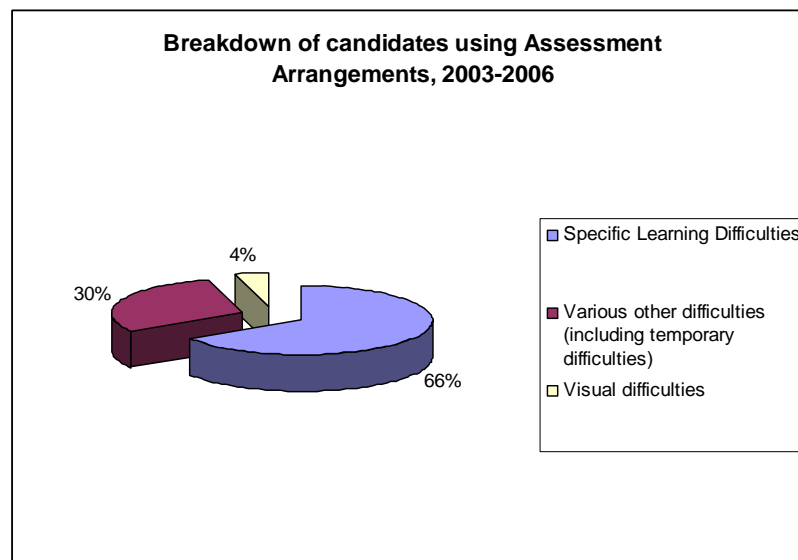
Figure 1: Difficulties of candidates requesting Assessment Arrangements

The CALL Centre and SQA have been developing and testing Digital Question Papers since 2003 (Nisbet *et al*, 2003a, 2003b, 2004), and in 2006, thirty-one candidates used Digital Question Papers for the first time to sit SQA examinations. The pilot was very successful, with 28 out of the 31 candidates stating they would use digital papers again (3 were not sure), while all school staff involved felt that digital question papers should be available from SQA as another type of Adapted Paper (Nisbet *et al*, 2006).

The majority of candidates who used the digital papers in 2006 preferred them to traditional methods of support, such as readers and scribes, and Centre staff felt that the use of digital papers offered greater independence, motivation and confidence for candidates. Staffing and accommodation requirements for administering digital papers were felt to be lower than other methods, such as use of readers, scribes and transcription of the paper. Analysis of the marks obtained by the candidates using the digital papers suggested that candidates were neither advantaged nor disadvantaged by using the papers.

SQA and CALL agreed to conduct a second pilot in 2007, but on a slightly larger scale in terms of numbers of candidates, centres and papers. Repeating the trials would help to verify (or refute) findings obtained in the first pilot, and provide another opportunity to identify and address technical, production, distribution and administration issues.

The digital papers are intended to be accessible for the majority of candidates who require assessment arrangements, and to offer an alternative to the existing methods of support. The digital papers are another type of adapted question paper, like Large Print, papers printed on a different colour paper or Braille. Apart from Extra Time, requests for readers and scribes are the most common type of support requested (Table 1) and, aside from issues of candidate independence, Centres are having difficulty in finding accommodation and staff for the increasing numbers of candidates tape who need scribes and readers. One hope and aim of developing Digital Question Papers is to provide candidates and Centres with a more independent and cost-effective method for sitting examinations.

Table 1: Support requested in 2006 examinations	
Type of support	Number of requests
Extra Time	34,803
Reader	16,815
Scribe	15,059
Use of ICT	3,063
PA Referral	2,480
Coloured Paper	1,327
Transcription with correction	1,190
Calculator	892
Enlarged Print	889
Transcription without correction	678
Question Paper signed to candidate	69
Candidate Signs Responses	56
Braille	28
Use of tape recorder for responses	25

3.   Project Overview

A Focus Group comprising CALL, SQA and participating Centre staff had been formed as part of the 2006 pilot, and this group met to review the project on 29th September 2006. Feedback from this discussion was used to inform the Final Report of the project, which was completed in October 2006. The Report (Nisbet *et al*, 2006) provides a record of:

- the rationale for investigating digital papers for candidates with additional support needs;

- technical details regarding the digital paper format;

- production and distribution;

- analysis of candidate attainment using the digital papers;

- analysis of evaluation data from candidates and centre staff.

We felt it was not necessary replicate all the information given in last year's document in this report of the 2007 pilot: here, we summarise the actions and activities over the past year, present data from the 2007 pilot, and highlight any particular issues that have arisen.

In order to increase the number of Centres and candidates who might elect to use digital papers in 2007, staff from 18 Centres were invited to attend a Focus Group meeting on 29th September 2006.

At the meeting, the findings of the 2006 pilot were presented and a plan for 2006-07 discussed. Staff were invited to consult with colleagues and candidates in their Centres and draw up a list of papers that candidates might be interested in using in digital format in the 2007 examination diet.

Schools were provided with CDs with digital past papers and with documentation to help them install and use the papers.

A 'mini-site' was created on CALL's web site, with documentation, a sample digital paper, and project reports[1].

The Focus Group Centres tested and used the digital past papers and then requested digital papers on behalf of individual students to SQA, for use in the 2007 examinations.

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[1] www.adapteddigitalexams.org.uk

4.   Digital Question Papers

Digital Paper Format

Previous projects undertaken by CALL for SQA (Nisbet, Aitken & Shearer, 2004; Nisbet, 2003a, Nisbet 2003b) investigated and evaluated digital formats for digital papers for candidates with additional support needs. Adobe PDF was chosen as the most suitable format because:

- SQA can generate 'raw' PDF versions of papers for zero cost, since papers are already created in this format for printing. In contrast, creating papers in other formats such as Microsoft Word, HTML (web format) or DAISY (a digital talking book format designed for the visually impaired) would require the papers to be completely re-designed. (Note that there is still a cost to insert answer boxes for the question and answer PDF papers, and to 'speech enable' the papers for accessing using text-to-speech software.)

- The cost of software for Centres to use the PDF papers is now zero: from 2008 Centres can use free Acrobat Reader software and the free Browsealoud[2] text reader. (For the 2006 and 2007 pilots, schools used Adobe Acrobat Standard, which costs around £20 per licence, but the latest version of Acrobat Professional can save papers so that they can be fully accessed using Acrobat Reader.)

- The PDF standard is generally more stable and reliable than most other formats.

- PDF versions look exactly like the hard copies of the question papers which is helpful for candidates, staff, invigilators and markers.

- PDF digital question papers can be magnified on screen and the foreground and background colours adjusted to suit candidates with visual or perceptual difficulties.

- A large number of candidates have difficulty reading the paper text (Table 1) and so it is important that the papers can be accessed with support from text-to-speech software. Acrobat has a basic text-reading facility, but TextHelp System's PDFaloud[3] software was evaluated and found to be more practical and helpful for candidates with reading and/or visual difficulties. This product is cost-effective because SQA 'speech-enable' the digital question paper allowing it to be read using a free version of PDFaloud or Browsealoud. Therefore, Centres do not have to buy any specialist software to access the question papers thus reducing costs and encouraging the uptake of digital papers.

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[2] Browsealoud is a free software tool for reading 'speech-enabled' web sites and PDF documents. www.browsealoud.com

[3] PDFaloud reads PDF documents. www.texthelp.com.

- PDF digital question papers can be made interactive through the addition of form fields. These allow candidates to type their answers on screen. (Assistive technologies such as speech recognition software, word prediction programs, and alternative keyboards and mice can all be used to insert text into the answer boxes, and to navigate around the paper.) This interactivity is a key factor in the usability of the digital question papers, and is an advantage of PDF over digital book formats such as DAISY or Microsoft Reader, which are not interactive. Around half the digital question papers produced were question and answer format, with form fields.

- Candidates can use study support tools with which they are familiar (e.g. spellcheckers, highlighters and bookmarks) and which they regularly use for coursework.

- The SQA papers are designed to be accessed and completed on paper, not on a computer, and some questions are not particularly suited to the digital medium or to PDF. Maths and science papers requiring worked examples, equations, formulae and drawing are less satisfactory than communication subjects.

- PDF digital question papers are accessible for the majority of candidates with additional support needs (Nisbet, 2007), although blind candidates using screen readers may have difficulty with some of the digital question papers. In such cases the original electronic document would need to be redesigned, or the text would have to be saved into a plain text format and further edited (for example, text descriptions inserted to replace graphic material). CALL and SQA intend to explore digital formats for candidates with significant visual impairment in 2007-08.

Production and distribution of Digital Papers

Digital papers were produced in-house by the SQA design team:

- All SQA Question Papers are designed and laid out using Quark Express, and then saved as PDF for printing. These 'raw' PDF files provide the starting point for creating accessible digital papers for candidates with additional support needs.

- The first step is to insert form fields (answer boxes) to the Question and Answer papers using Acrobat Professional. Different types of form fields are required for different papers and questions: the most common are text boxes for typed answers and check boxes for multiple-choice style questions. The SQA production team draws in each field and then checks completed papers for consistency and to ensure the answer can be typed in. Question-only papers do not require form fields.

- Both Question-only and Question and Answer papers are then 'speech enabled' using TextHelp Systems' *PDF Accessibility Editor*. This is a single click task. Papers are then saved and checked. By

speech-enabling the paper, a candidate can click on the text and the (free) PDFaloud or Browsealoud program can speak it out using the computer's synthetic voice.

- The completed papers are sent to Centres on CD using standard SQA delivery procedures. Papers could also be emailed or downloaded from a web server, provided measures are taken to ensure security of the paper.

Accessing Digital Papers

The digital papers are designed to be accessible for the majority of candidates who have difficulty reading the standard hard copy paper or writing and recording their answers. The papers can be magnified and re-sized and foreground and background colours altered for candidates with visual impairment or who have colour preferences. Some of the PDF papers are not suitable for the small number of blind candidates who use 'screen reader' software, and SQA and CALL are researching suitable digital formats for this group. Candidates with physical or motor difficulties or dyspraxia can type their answers into Question and Answer papers on screen, while pupils with spelling issues can spellcheck their answers. The PDFaloud or Browsealoud text-to-speech software can be used by candidates with visual impairments or reading difficulties, to access text and questions. Candidates with language or vocabulary issues as a result of hearing impairment or because they have English as a second language can also benefit from using the text reader software.

Figure 2: Digital English Standard Grade Question Paper

5.   Digital Papers Requested

Overview

Twelve Centres requested 490 papers on behalf of 80 candidates in respect of 200 entries. This compares with requests for 152 papers for 65 entries on behalf of 34 candidates, from eight centres, in 2006. While the number of Centres increased by only 50%, the number of candidates increased by 135%, and the number of papers by 222%; each Centre therefore requested a larger number of digital papers, for more candidates, than in 2006. The aim of increasing the number of centres, candidates and papers requested was therefore achieved (Table 2).

Table 2: 2006 and 2007 requests			
	2006	**2007**	**% increase**
Number of centres	*8*	12	50%
Number of candidates	*34*	80	135%
Number of entries	*65*	200	208%
Number of different papers	*57*	115	102%
Total number of papers	*152*	490	222%

One of the reasons that far more individual papers were requested in 2007 compared to 2006 is because schools used standard SQA procedures for requesting arrangements, which deal with entries rather than individual papers. A request for a Standard Grade English entry, for example, might result in five digital papers being provided (e.g. Reading Text Foundation; Reading Questions Foundation; Reading Text General; Reading Questions General; and F/G/C Writing), even although the pupil might not necessarily require all five papers – some pupils might only require the two digital Question Papers and use hard copy versions of the Text and Writing papers. In comparison, in 2006, the school would have specifically requested the two digital Question Papers needed only.

Digital Paper Subjects

Table 3 breaks down the papers requested by subject. English papers accounted for almost half (45%) of the digital papers requested, which reflects both the popularity of the subject and also the fact that the digital papers are suited to the content, style of questions and the needs of the candidates.

Table 3: Number of Digital Papers requested, by subject			
Subject	**Digital papers requested**	**Subject**	**Digital papers requested**
English	219	German	8
Computing	41	Business Management	6
Geography	32	Mathematics	4
French	31	Art & Design	3
Craft & Design	24	Science	2
Administration	19	Social & Voc Skills	2
Biology	17	Accounting	1
History	17	Accounting and Finance	1
Physical Education	11	ESOL	1
Home Economics	10	Human Biology	1
Modern Studies	10	Media Studies	1
Physics	10	Product Design	1
Chemistry	9	Psychology	1
Drama	8		
Total number of Digital Question Papers Requested:			**490**

Digital Paper Levels

Figure 3 gives the digital papers requested, by level. Papers at all levels were requested, with Standard Grade (Foundation, General, Credit and Writing or Stimulus) papers accounting for the majority (386, or 79%) of the papers.
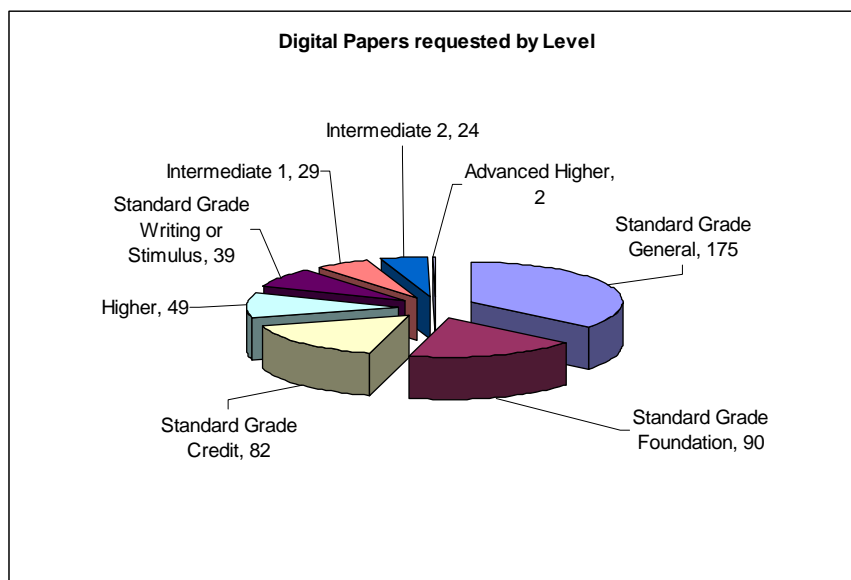
Figure 3: Digital Papers requested, broken down by Level

Pilot centres

Table 4 gives the number of candidates, entries and papers requested by each of the twelve participating centres. Ten of the twelve Centres are mainstream secondary schools; while School A is a school for pupils with physical disabilities and School L is a specialist unit supporting pupils with severe visual impairment.

The number of candidates for whom digital papers were requested varied widely across the Centres, from 15 candidates at School H and School J, to one at School G and School L. The uptake of digital papers does depend on a number of factors which are discussed later in the next section.

Table 4: Candidates, entries and papers			
Centre	**Number of candidates**	**Number of Entries**	**Number of Papers**
School H	15	40	84
School J	15	38	97
School C	14	20	62
School D	10	34	99
School K	6	25	45
School A	5	8	19
School E	5	13	35
School I	4	8	20
School B	2	5	10
School F	2	7	13
School G	1	1	5
School L	1	1	1
TOTALS	**80**	**200**	**490**

Comparison between 2006 and 2007

Table 5 compares the requests made by Centres in the first pilot in 2006, with those made in 2007. As noted earlier, the total number of pupils, entries and digital papers increased from 2006 to 2007, with all of the schools who piloted the digital papers in 2006 requesting them again in 2007.

The average number of pupils from a Centre for whom digital papers were requested rose from 4.25 in 2006 to 6.67 in 2007 (57% increase). At School A and School B, the number of candidates for whom digital papers were requested fell slightly, although the actual number of papers increased. The numbers of pupils at the other six schools who had piloted the papers in 2006 increased considerably: from 2 to 10, at School D, for example. We surmise that the Centres requested papers for more pupils this year as a result of the positive pilot in 2006.

On average, each candidate was entered for 2.5 entries using digital papers, resulting in provision of 6.125 papers for each candidate, compared with 3.26 papers per candidate in 2006. As well as requesting for more candidates, centres asked for more papers for each candidate so that the total number of papers in some Centres increased several times over (e.g. in School D, from 4 papers for 2 candidates in 2006 to 99 papers for 10 candidates in 2007). Consequently, the average number of digital papers requested by schools increased almost threefold, from 13.9 in 2006, to 40.8 in 2007. (Although as we note later, not all of the papers requested were required or were used.)

Table 5: Comparison between 2006 and 2007				
Centre	Number of candidates 2006	Number of candidates 2007	Number of Papers 2006	Number of Papers 2007
School H	9	15	30	84
School J	4	15	11	97
School C	6	14	18	62
School D	2	10	4	99
School K	3	6	18	45
School A	6	5	16	19
School E	-	5	-	35
School I		4		20
School B	3	2	9	10
School F	1	2	5	13
School G	-	1	-	5
School L	-	1	-	1
TOTALS	34	80	111	490
Centre average	4.25	6.67	13.9	40.8

Reasons for requesting digital papers

Figure 4 presents the candidates' difficulties identified by staff when making requests for the digital question papers. Specific Learning Difficulties (including dyslexia) was the most common difficulty, identified in 39 (49%) out of 80 candidates. The proportion of candidates with specific learning difficulties who requested digital papers is smaller than that of the overall population requesting Assessment Arrangements (66%, Figure 1) and also of the group in 2006 (64%). It is unlikely however that this is significant given the small numbers of candidates who participated in the pilot.
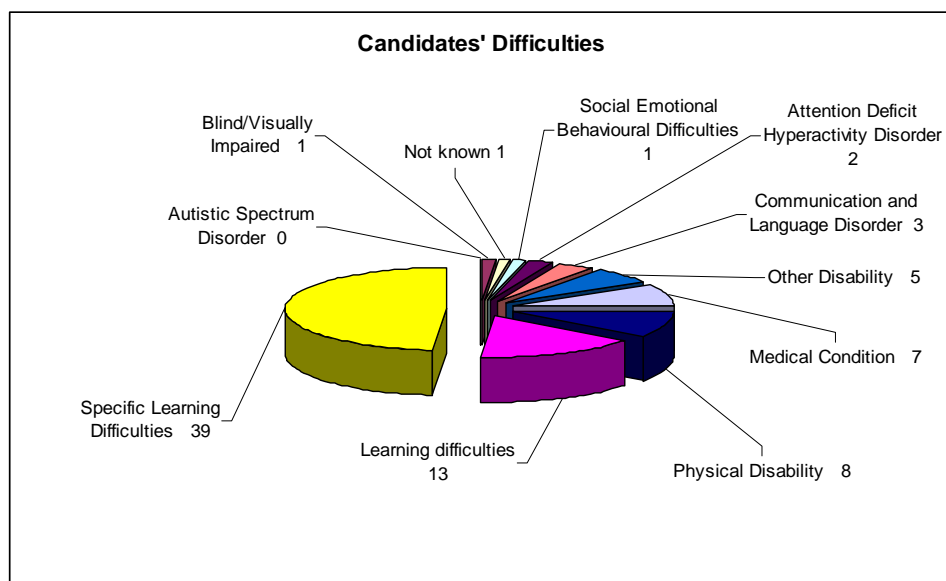
Figure 4: Difficulties of candidates requesting digital papers

Comparing digital papers with other requests for Assessment Arrangements

In this section we briefly consider the uptake of the digital papers with other types of Assessment Arrangements.

Table 6 gives the number of candidates and entries from each Centre and numbers and percentages of candidates who used digital papers.

The numbers of candidates for whom Assessment Arrangements were requested, and the proportion of the overall number of candidates, varied quite widely between Centres: 97% of candidates at School A (which caters for pupils with physical disabilities) requested Assessment Arrangements, compared with 4.1% at School K. Note that only one candidate within the Visual Impairment Unit at School L participated in the pilot (the Support for Learning department at the school did not take part) and hence the percentage of candidates requesting arrangements, who used digital papers, is just 3%.

Excluding School A and School L, 11.4% of candidates at the mainstream secondary schools requested Assessment Arrangements. This compares with a Scottish national average of 7.2% in 2006. The Scottish national average for 2007 was not available to the author at time of writing but it is unlikely that the percentage is much greater than 7.2% and so the proportion of candidates for whom Assessment Arrangements were requested at the pilot schools was higher than the average. The figure of 11.4% correlates with returns from four secondary schools in a recent survey of pupils with difficulties in seeing text, reading text, understanding text, handling books, or writing and recording, where 12% of pupils were estimated to have difficulty accessing learning resources (p. 25, Nisbet & Aitken, 2007).

On average, 15% of candidates using Assessment Arrangements requested digital papers; from 2% at School B, to 45% at School D. The percentage of candidates who requested digital papers as an Assessment Arrangement increased in most of the

schools who took part in both 2006 and 2007 pilots, to an average of 18.6% candidates. In some cases the increase was considerable – from 5% to 20% at School J, or from 18% to 45% at School D, for example.

The small numbers of schools and candidates involved does not permit meaningful statistical analysis but based on these increases it seems likely that a reasonably large proportion of candidates in Scotland who require Assessment Arrangements are likely to benefit from and opt for digital papers, were they to be offered by SQA.

Table 6: Candidates for whom Assessment Arrangements were requested												
	School A	School B	School C	School D	School E	School F	School G	School H	School I	School J	School K	School L
Number of candidates from Centre	31	385	536	227	483	435	157	433	484	527	419	525
Number of entries	100	1979	2230	1185	2357	2139	775	2211	2771	2524	2210	2913
Number of candidates who requested assessment arrangements	30	94	42	22	54	55	15	41	50	74	17	38
Number of candidates who requested Digital Papers	5	2	14	10	5	2	1	15	4	15	6	1
% of candidates who requested assessment arrangements	96.8%	24.4%	7.8%	9.7%	11.2%	12.6%	9.6%	9.5%	10.3%	14.0%	4.1%	7.2%
% of AA candidates who requested digital papers (2007)	17%	2%	33%	45%	9%	4%	7%	37%	8%	20%	35%	3%
% of AA candidates who requested digital papers (2006)	13%	3%	16%	18%		2%		33%		5%	21%	

Support for Writing

One hope and aim of introducing digital papers for candidates with additional support needs is to reduce reliance on human support in the form of scribes and readers in order to offer candidates greater independence and also reduce demands on school staff and accommodation resources. Table 7 compares the number of requests for digital papers with other methods of supporting writing and recording. In most centres ICT (usually in the form of a word processor with or without spellchecker) was more commonly requested than digital papers because digital papers only give an advantage, in terms of writing, over a word processor when the paper is question and answer format. If the paper is not question and answer format, and the candidate can read, then the candidate typically reads the hard copy paper and types answers with a word processor.

The bottom row of Table 7 gives the ratio of requests for ICT and/or digital papers to scribes. The proportions vary considerably between Centres (from 2:27 (i.e. 2 requests for ICT/digital papers and 27 requests for scribes) at School G, to 42:1 (42 times as many requests for ICT/digital papers as there were for scribes) at School J.

Table 7: 2007 Requests for Assessment Arrangements to support writing and recording (no. of entries)											
	School A	School B	School C	School D	School E	School F	School G	School H	School I	School J	School K	School L
Scribe	24	21	16	9	144	44	27	109	85	5	45	37
Use of ICT	28	67	24	34	33	13	1	114	13	82	21	17
Digital Papers	8	5	20	34	13	7	1	40	8	38	25	1
Transcription with correction	0	7	5	2	5	0	1	0	15	1	1	13
Transcription without correction	0	1	0	1	0	0	1	0	0	0	8	13
PA Referral	0	0	0	0	0	2	0	0	0	9	0	0
Use of tape recorder for responses	0	0	0	0	0	1	0	0	1	0	0	0
Total	60	101	65	80	195	67	31	263	122	135	100	81
ICT and DPs : scribes	**3:2**	**24:7**	**11: 4**	**68:9**	**23:72**	**5:11**	**2:27**	**154:109**	**21:85**	**42:1**	**46:45**	**18:37**

It is encouraging that those Centres which participated in both 2006 and 2007 pilots (excluding School L, because only the VI Unit took part) are using ICT or digital papers more often than scribes. And overall, ICT and/or digital papers were requested more often than scribes (Figure 5).
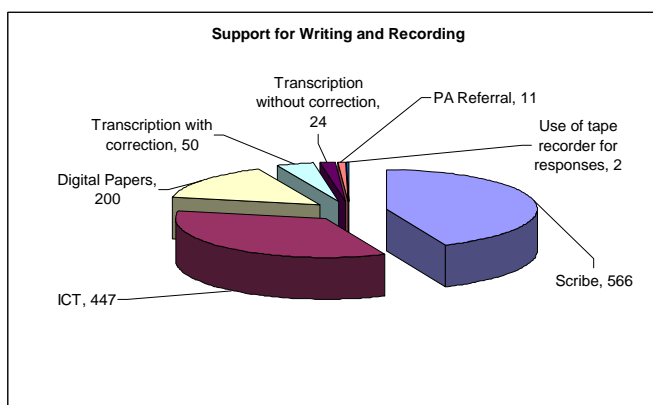

Figure 5: Requests to Support Writing

Support for Reading

There were far more requests from the pilot Centres to support writing and recording in examinations than reading (1300 compared to 776). However, there were more requests for readers than scribes and so we are interested in the potential for candidates to use text-to-speech reader software (TRS) instead of human readers. The SQA request procedure does not distinguish between requests for digital papers to support writing from digital papers to support reading, and so Table 8 compares the actual use of text-reader software (TRS) as reported by staff in the pilot Centres, with other the methods of supporting reading.

Whether text-reader software is used or not depends firstly on the needs and skills of the pupils. For example, at School A, where most pupils have physical writing and recording difficulties and fewer have reading difficulties, there were 60 requests for writing support and only four requests for readers, and no candidates used the PDFaloud TRS. There seem to be very few poor readers at School J, because there were only 5 requests for readers (compared with 135 requests for writing support) and none of the candidates used PDFaloud either.

Some Centres did not use TRS at all, although there were many requests for human readers. School H made greatest use of TRS, with 20 instances, compared to 110 requests for readers. Amongst the Centres who did use TRS, the ratio of use of text-reader software to readers varied from a minimum of 3:64, to a maximum of 1:2.

Table 8: 2007 Requests for and use of Assessment Arrangements to support reading (no. of entries)											
	School A	School B	School C	School D	School E	School F	School G	School H	School I	School J	School K	School L
Braille Paper	0	0	0	0	0	0	0	0	0	0	0	3
Coloured Paper	2	18	0	0	0	0	0	0	50	10	0	0
Enlarged Print	4	0	0	0	0	3	0	6	0	0	0	28
Reader	4	64	27	10	140	49	24	110	100	5	34	51
Use of Text – reader software	0	3	6	5	0	0	0	20	0	0	0	0
Total	10	85	33	15	140	52	24	136	150	15	34	82
TRS : Reader	**0:1**	**3:64**	**2:9**	**1:2**	**0:1**	**0:1**	**0:1**	**2:11**	**0:1**	**0:1**	**0:1**	**0:1**

It is likely that use of TRS depends on policies, practices and expertise in the Centres as well as the needs of the pupils. Accessing digital papers with text-reader software to read the papers is more complex for Centres and candidates than simply writing and recording with the digital papers: the candidate has to learn to both read and write using ICT and Centre staff have to install the text-reader software which, although free, is an extra task. It is therefore quite likely that Centres would choose to introduce digital papers to support candidates with writing difficulties first, and then extend the option to candidates with reading difficulties who might benefit from digital papers with text-to-speech software. In 2006, for example, text-reader software was used to access exams in 2 entries in School C, none in School D and 11 in School H, while usage in the same Centres in 2007 was 6, 5 and 20 respectively. Consequently, we would hope that the other Centres who piloted digital papers in 2007 would make greater use of text-reader software in 2008.

So far then, progress towards replacing human readers with digital papers and text-reader software in the pilot schools is slower than the take up of ICT in preference to scribes. (Note that some candidates will always prefer human support to the use of ICT and digital papers and so while ICT and digital papers should be developed and encouraged, candidates should always have a choice of methods of support.)
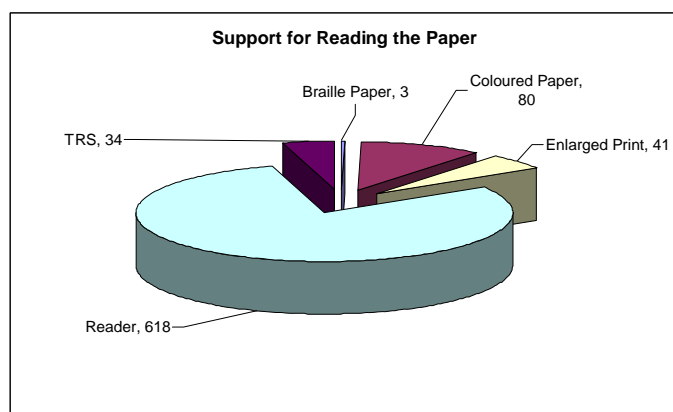

Figure 6: Support for Reading the Paper

Nevertheless, it is clear that digital papers accessed using text-reader software has considerable potential to reduce the number of readers required in examinations, and to improve the opportunities for candidates to sit assessments more independently.

6.   Use of 2007 Digital Papers

Questionnaire

A wide range of detailed opinion and feedback was sought from candidates and staff who used digital papers in the 2006 pilot (see Nisbet *et al*, 2006) and so the project team felt it was not necessary (or reasonable, in terms of demands on staff and pupils) to seek the same amount of information again. Instead, a questionnaire was designed (Appendix 1) to record which pupils used the digital papers that were requested and the use of the PDFaloud text reader facility. The questionnaire also asked for comments about individual papers, reasons why a paper might not be used, and for comments or suggestions to improve the digital papers, means of supply, and arrangements for administering the examinations using digital papers in school. The questionnaires were sent to Centre staff partially completed, with the names of candidates and the papers that had been requested.

Use of Digital Papers

Staff were asked to indicate whether a candidate used the digital paper in the actual examination, and if not, to say how the assessment was completed. Table 9 shows how many pupils used a digital paper in an actual examination.

Table 9: Candidates' use of Digital Papers				
	Number of pupils who requested DPs	Number of pupils who used DPs	Number of pupils who did not use DPs	Not known
School A	5	5	0	0
School B	2	1	1	0
School C	14	14	0	0
School D	10	10	0	0
School E	5	4	1	0
School F	2	1	1	0
School G	1	1	0	0
School H	15	13	0	2
School I	4	4	0	0
School J	15	15	0	0
School K	6	6	0	0
School L	1	1	0	0
Totals	**80**	**75**	**3**	**2**

93.75% of the candidates who requested digital papers did use papers in examinations (Figure 7); 3.75% of the candidates did not use the papers at all, and it was not clear from the feedback forms whether the other two candidates did use the digital papers or not. The candidates who did not use papers at all felt that they were not confident with the papers and chose to use reader and scribe and/or word processor.
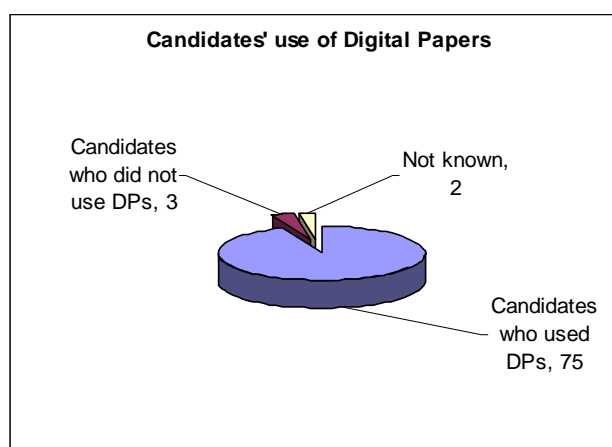

Figure 7: Candidates' use of Digital Papers

Table 10: Use of Digital Papers requested - Entries				
	Number of entries where DPs were requested	Number of entries where DPs were used	Number of entries where DPs were not used	Not known
School A	8	8	0	0
School B	5	3	0	2
School C	20	19	1	0
School D	34	32	2	0
School E	13	10	3	0
School F	7	3	4	0
School G	1	1	0	0
School H	40	26	0	14
School I	8	7	0	1
School J	38	35	3	0
School K	25	15	0	10
School L	1	1	0	0
Totals	**200**	**160**	**13**	**27**

Table 10 shows that digital papers were used in 80% of the entries for which they were requested. Digital papers were not used at all in 6.5% of entries and it was not indicated on the feedback forms for 13.5% of entries. It is likely that the digital papers were used for these entries because in most cases candidates used the papers for other entries.
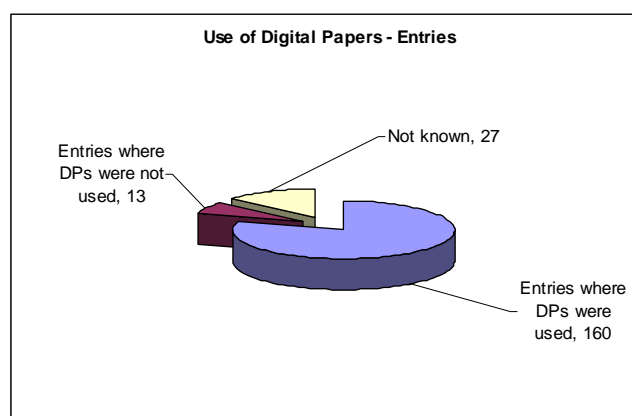

Figure 8: Use of Digital Papers in Entries

The usage of individual digital papers requested is shown in Table 11.

Table 11: Use of Digital Papers requested - Papers				
	Number of DPs requested	Number of DPs used	Number DPs not used	Not known
School A	19	15	4	0
School B	10	6	4	0
School C	62	42	20	0
School D	99	78	21	0
School E	35	16	19	0
School F	13	5	8	0
School G	5	3	2	0
School H	84	64	0	20
School I	20	17	3	0
School J	97	70	27	0
School K	45	24	6	15
School L	1	1	0	0
Totals	**490**	**341**	**114**	**35**

70% of the digital papers requested were used; 23% were not; and the feedback forms did not indicate whether they were used in 7% of the papers. Again, we suspect that in most cases where it is not indicated, the papers were used, because the same candidate did use the digital papers for other entries.

Reasons for not using papers

The fact that 23% of the digital papers were not used is worthy of closer investigation, especially given that 105 of the 111 papers (95%) requested were used in the 2006 pilot.

Staff were asked to note the reason why a candidate did not choose to use a digital paper on the day of the examination, and how they otherwise accessed the paper and recorded their answers.

1. The most common reason for not using a digital paper was because the candidate could read the hard copy and so the digital paper was of no advantage.

In 2006, Centres made specific requests for digital versions of individual papers, whereas in 2007, Centres used the standard SQA mechanism for requesting digital papers, where a request is made for an accommodation for an entry. Consequently, a candidate might only need one particular paper (usually, the Question paper, for writing answers) but the request might generate several digital papers.

An example of this would be a request for digital papers for a Standard Grade English entry (the most popular digital paper entry). Such a request results in provision of five digital papers:

- Reading Text General and Foundation (or Credit);

- Reading Questions General and Foundation (or Credit);

- Foundation/General/Credit Writing.

A candidate with both reading and writing difficulties might use all five papers: reading the Text, Questions and Writing Papers with support from the PDFaloud text reader; typing their answers into the digital Question paper; typing the Writing paper response using a word processor (because the Writing paper does not have answer boxes).

Candidates with a writing or spelling difficulty and no problems reading, on the other hand, might not use the digital Reading papers or the digital Writing papers because they do not need the text reader: they can read the hard copy. The candidate would type answers into the digital Question Papers, and would use a word processor to answer the Writing paper. This candidate would therefore use only two out of the five papers that were requested.

Given that requests for support with writing are more common than requests for support with reading, many digital papers were therefore requested but not actually required.

2. In a few cases the candidate did not use a digital paper because it had been requested in the expectation that it was question-and-answer format. When the candidate found that it was not possible to type their answers in, they used a word processor (usually) or some other method instead.

This may have been because the member of staff who initiated the request (in most cases a Support for Learning teacher) thought that the digital paper was question-and-answer format with answer boxes when in fact it was not. In respect of the comment above, this is an easy mistake to make since the Modern Studies Foundation Paper is question-and-answer with answer boxes, but the General paper is not.

"If we had realised this paper had no answer boxes we wouldn't have requested a DP as he does not require help with reading. He was unsettled by having to answer on a word document as he wasn't expecting it."

Teacher, referring to a candidate who sat Standard Grade Modern Studies General

There is therefore a need to alert staff making requests for digital papers to the design of the paper and whether it has answer boxes, or not. It might also be possible to lay out more papers in question-and-answer format rather than question only, although this would require the original paper to be redesigned, which may alter the assessment itself.

3. Two candidates preferred to use a reader, scribe, handwriting or word processing because they were not confident with the digital papers; one candidate did not sit the examination at all in respect of two papers; and another candidate was not entered for another two papers.

In most cases where digital papers were not used this was because Centres made requests in respect of entries rather than individual papers.

Provision of these papers did not disadvantage Centres or candidates, while the papers that were not used were predominantly question-only types which are quick and inexpensive for SQA to produce; therefore there is no particular justification to alter the procedures for requesting digital papers. There is a need, however, to help staff to be aware of which papers are question-and-answer format and which are not, in order to avoid confusion.

7.   Feedback from Centres

Reliability

One of the reasons for choosing to provide the digital papers in Adobe PDF is because it is a mature, well developed and tested technology. The overall reliability of the digital papers themselves was excellent and a credit to the authoring and quality assurance processes developed by the SQA production team. Out of 490 papers requested, technical difficulties were reported with only 7 papers:

- One Centre had problems printing drawings inserted into a digital Intermediate 1 Biology paper. It was not clear whether this was an issue with the paper itself, or the Centre computer or printer, but the Support for Learning teacher suspected that an option on the Print dialogue box on the computer was not set correctly. It was not possible to confirm this because the invigilator did not allow the teacher in the room while the examinations were in progress. (There is a need for clear guidance for invigilators with regard to digital question papers. This is discussed later.)

- A few pupils at another Centre had difficulty finding the drawing tools in the Acrobat menu system, which demonstrates the need for practice with past papers.

- One pupil reported that the screen froze at one point and he had to restart the computer.

- One Centre found that they could not open the English Foundation Reading Text and Questions side-by-side, whereas this was possible with the digital past papers. It is not clear why this was the case because the papers in question can be viewed in this way, so it is likely to have been a misunderstanding on the part of candidate or staff.

- One candidate had 'disc errors' with an English Standard Grade Foundation Question paper.

At School A, the school network crashed on the morning of an examination but it did not effect the pupils using the digital papers: *"Even a network failure did not affect the digital exam, because the computers had been set up in advance with special exam profiles."*

Digital Papers

Centre staff were asked to make specific comments about the digital papers. In general staff and candidates found the papers easy to use, confirming the results from the pilot in 2006 and the trials in 2005. However, a number of issues were raised:

Question and Answer papers

Candidates with writing and spelling difficulties benefit from using the digital interactive papers with answer boxes into which they can type their answers to

questions. Several staff asked if answer boxes could be added to more papers, at all levels. This was discussed at the follow-up Focus Group meeting in August 2007 and the main difficulties are that it would involved re-design of the paper to give sufficient room (thereby changing the digital paper so it no longer matched the paper copy) and more importantly, it could alter the nature of the assessment itself.

Font

Staff at one school asked if the digital papers could be provided in a different typeface (Comic Sans). It is possible to change the font of the papers but in most cases it would require the paper to be re-designed using the original desktop publishing software.

Answer booklets

Several staff asked for digital versions of answer booklets, either in PDF or Microsoft Word format. Staff felt that it would be helpful to have an answer booklet with a front page (with answer boxes for candidate, Centre, etc) that could be completed and used by candidates. It would also be helpful if the answer booklet had the question numbers already inserted, to save the candidate typing them in, because some candidates can become confused when moving between the word processed answer document and the question paper. Designing bespoke answer booklets with question numbers may be impractical, but provision of general purpose Word and PDF answer booklets would appear to be a helpful and tractable development.

Papers requiring drawing

Some candidates used the drawing tools available in Acrobat Standard and others chose to draw on the hard copy instead. One member of staff commented that pupils had difficulty finding the drawing tools in the menu system. Centres did receive User Guides giving instructions on how to use the software (see www.adapteddigitalexams.org.uk) but there is perhaps a need to develop more resources for teaching pupils how to use the drawing tools (and other facilities) in Acrobat Reader. For example, an on-line interactive tutorial could be useful for developing candidates' expertise with the digital papers.

Maths and science

A small number of maths and science papers were requested and used without difficulty. However, there are few Adobe Acrobat tools for drafting calculations, worked examples, equations and formulae and so many candidates reverted to handwriting or scribing. This is a pragmatic way of dealing with the problem but it would be beneficial if better drafting tools were available. It would be helpful to research this further to determine if suitable software tools could be provided.

PDFaloud text reader

There were a few comments about the PDFaloud text reader software. One member of staff suggested that a human recording of the English Close Reading texts could be inserted into the digital version in MP3 or other audio format, as this would be of superior quality to the basic computer voice. It is straightforward to add such a sound file to a PDF paper so that a candidate can click on it and have it played back and this could be considered by the SQA and CALL digital paper team. Another possibility which is currently being explored by CALL is the provision of high

quality computer voices with Scottish accents[4] for use with text reader software. We hope that high quality Scottish voices will be available free of charge to Scottish schools in 2008.

Access with Acrobat Reader

Candidates who participated in the 2006 and 2007 pilots used Adobe Acrobat Standard to access the digital papers. This software costs approximately £20 per licence through Learning and Teaching Scotland and schools were provided with free copies funded by the project budget. Acrobat Standard was required in order that candidates could save their answers and use drawing tools – at the time, the free Acrobat Reader software did not have these capabilities. However, the latest version (8) of Acrobat Professional has an option which enables answers to be saved and drawing tools used when the paper is opened and accessed using the free Acrobat Reader software. From 2008 on, schools will be able to use this free software to access the papers. This development has a number of advantages:

- lower cost for Centres, since Acrobat Reader is free;

- wider availability and therefore increased opportunities for access and practice, since Reader can be installed on every machine throughout the Centre, and also on home computers;

- a cost-effective mechanism for Centres to create their own interactive assessments, tests, exercises and worksheets. By purchasing Acrobat Professional 8 (approximately £50 through Learning and Teaching Scotland), Centres can create interactive resources in PDF which can then be accessed using Reader on school and home machines.

"Papers are fine, but producing them in Acrobat Pro 8 to be compatible with Reader 8 would be much more powerful as a tool – free software, pupils can practice past papers at home or on laptops, more pupils can sit exams simultaneously, option to standardise practice across school and prepare resources in digital format - while allowing saving too."

Arrangements to request and supply papers

The standard SQA Assessment Arrangement mechanisms were used by Centres to request digital papers and these seemed to work well. In a few schools it was clear from comments from staff that communication between staff responsible for using the digital papers and the school SQA coordinator could have been better. Individual CDs for each entry and candidate, together with a backup CD, were created and sent to Centres along with other adapted papers. Centres were generally happy with the procedures for delivering CDs.

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[4] A high quality Scottish voice is available from CereProc (www.cereproc.com) and is already used to speak documents on the Scottish Government web site. CALL is seeking to arrange a licence to provide the voice to Scottish educational establishments.

Centre arrangements for using digital papers

Different Centres adopted different arrangements for administering the digital papers according to local staff, accommodation and technical resources. A number of issues were raised on feedback forms and during discussion with staff at a follow-up Focus Group meeting on 30th August, 2007.

Networked and standalone computers

Centres used both standalone and networked computers and desktop and laptop machines, but it was agreed that the optimum arrangement is to use networked computers with an 'Exam Profile' that permits pupils to access the digital papers and print with network printers, but prevents access to the internet or to other storage facilities on the computer or network.

By networking the computers in this way, staff can load a digital paper on one machine and quickly copy it across to the others that require it. This is much faster than loading the papers from CD on to individual standalone computers. (Although it does not take long to insert a CD into a drive, open it and copy a paper to the computer, if there are many machines to set up staff may run out of time.)

As well as improving efficiency prior to the examination, networked computers allow candidates to print the completed paper easily, reliably and quickly. Schools that did not have networked machines had to collect the papers from each PC on floppy disc or Memory Stick, and then queue to print from a standalone computer with printer attached. One Centre tackled this issue by installing the printer driver on all the computers and then *"the printer was placed in the middle of the room with a long USB lead which could be moved from laptop to laptop to allow printing"*.

Several staff thought that access to sufficient suitable computers could be an issue if more candidates were to request digital papers.

In the 2006 pilot report, we noted that none of the schools in one particular local authority were able to use networked computers because of concerns over the reliability of the systems and because the software to access the papers could not be installed. Throughout 2006-07 schools in the authority benefited from new computers and new Windows XP software but nevertheless, Centres were still unable to use networked computers to administer the digital papers, citing poor and/or expensive technical support as the main reason. (The authority has a particularly rigid managed service provided by a commercial supplier, and staff report that it is difficult for them to get any assistive software installed.)

Accommodation and Technical Support

Most Centres set up computers in dedicated rooms for the digital exams. Staff noted that good quality technical support is essential both in advance of and during the examinations in order to set up suitable computers with user profiles, install the software, load the papers, and ensure that completed papers are printed out.

"Having a designated room is essential, complete with printers and network. ICT support is vital."

> *"We had 2 rooms set up with double sized tables to allow a comfortable amount of room for laptop and papers. Each candidate was allocated a table which was the same for each exam. All tables were numbered and we made use of screen dividers which created a booth effect and cut down distractions and gave a certain amount of privacy in the small classroom. We had 9 candidates sitting the exam in digital format and 2 writing in the same room for the Standard Grade English exam. Candidates names and numbers were on the desks, and times."*

Figure 9: Candidates using digital question papers

Preparation

SQA stipulate that the papers can be loaded on to computers up to 1 hour before the start of the examination, and some staff felt that this did not give sufficient time to load the papers, particularly if there were a large number of papers to install on standalone computers. The 1 hour limit was also problematic in cases where examinations ran over or overlapped with the start of other assessments, which is often the case when candidates are allowed extra time.

> *"1 hour in advance to check the digital exam isn't enough when one has to check all the other ICT resources are in place and functioning correctly as well."*

Invigilation

Invigilation practices varied across schools; in most schools, Support for Learning staff installed the papers, were available to provide support if necessary and assisted in the collation of the printed papers at the end of the examination. Technical staff were also involved in several Centres. In one school, the invigilator did not permit the Support for Learning staff to be in the room where the digital papers were used. It was felt that SQA should offer guidance for invigilators and Centres regarding the best procedures for installing papers, supporting candidates and collating printed scripts.

> *"We really appreciate this format of exam paper. The pupils are generally much happier to be independent rather than depend on scribes and readers. This year all our S3 and S4s sat the SG English examination at the same time. If we had had to provide readers and/or scribes for this we would not have been able to staff it."*

Predicted uptake for 2008 and beyond

Staff were asked to estimate the number of pupils that they expected to use digital papers in 2008. In most Centres staff expect more pupils to take up the digital option in 2008, continuing the trend from the first pilot in 2006 (Table 12).

Table 12: Likely uptake of digital question papers in 2008			
Centre	Number of candidates 2006	Number of candidates 2007	Likely number of candidates 2008
School H	9	15	25
School J	4	15	10
School C	6	14	8
School D	2	10	14
School K	3	6	Not known
School A	6	5	10 to 15
School E		5	5 to 10
School I		4	10
School B	3	2	5 to 6
School F	1	2	7
School G		1	1
School L		1	Not known
TOTAL	**34**	**80**	**95 to 106**

"I personally would like to see digital exams as the default choice for pupils with physical disabilities, and paper, helpers, scribes etc as options that would need to be specially requested, because I believe they [digital exams] are empowering, less difficult to administer and cost-effective."

Impact on wider access to curriculum resources

Some Centres which have used the digital question papers have begun to create digital versions of prelim papers, National Assessment Bank and 5-14 tests, and of classroom resources. Guidance from SQA states that *"Any adjustment to the assessment arrangements should reflect, as far as possible, the candidate's normal way of learning and producing work"* (SQA, 2004) and common sense suggests that if a candidate benefits from working independently with a digital examination paper then he or she will also probably benefit from working with a digital version of other resources. This knock-on effect was in fact one of the original motivations of the CALL Centre team for developing the digital question papers. While some students will always require one-to-one support from staff in class, in many cases students could be working more independently and effectively using materials in alternative, accessible formats (Nisbet & Aitken, 2007). By offering question papers in examinations in accessible digital formats, pupils, staff and families are encouraged to explore the possibilities for accessing other learning materials in alternative formats.

"We were very pleased with how the whole Pilot went and this year our prelims and third year exams were in digital format using Word and WordTalk[5] as well as class tests. We have now purchased Acrobat Professional and are working on converting all our class tests into a format similar to that of the SQA exams."

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[5] WordTalk is a free text reader for Microsoft Word, available from the CALL Centre, www.wordtalk.org.uk

8.   Comments from candidates

A small number of comments from candidates were received via the Feedback forms, and these are reproduced in the box below.

"it made me feel more confident"

"it was much better not having to spend so much time on my spelling"

"I found it much easier to put my answers down on the computer"

Comments from candidates who used the papers in 2006 are also given here because they provide useful insights into the practical application of the digital papers.

Why did you want to use a digital paper for this exam?

Bad hand writing

To help me along with spelling and writing

As I feel I work best on a computer and do better work.

most people have trouble reading my hand writing also I'm a faster at typing then writing

Because I have horrible hand writing

I understand information easyer on A pc I can type faster than i wright

because my writeing to bad
and I get a Reader

It would allow me to choose to reread and read any part of the exam quickly without requiring a reader at the time.

because my handwriting IS VERY bad.

because its easier to use than a assistant reading and scribing

To help with my reading problem
Also I am faster at typing then writing

Because it's easier to read than a paper copy. It's easier for me to describe my answers directly rather than using a scribe."

Typing into the paper is much easier than writing. Prolonged writing is difficult and causes a lot of pain.

Writing for long periods is painful. My writing is illegible - even to myself! It avoids the need for a scribe. I don't like using a scribe.

It is easier and quicker. It is preferable to see the question when typing in an answer, rather than typing into a blank document using a Word Processor.

Comments on using digital papers

It is a good way to help people with difficulties just hope people are not talking advantage

Very straight forward and easy to understand

Much easier than trying to write!

Prefer it to using a scribe. Easier to give answers.

Easy to do. You can see both the questions and the text at the same time.

Enjoyed using it!

It give equal oppertunities for people who would loose marks due the bad handwriting

It allows quick access to reading tools and speeds up the process for the pupil

because it's good, its not a nervous experience. compered to the hall.

It is easier to understand
Dont feel as stessed or rushed.

It helps you to understand the paper better

It allows all people to have an equal chance if they do not have bad handwriting or something else.

Not everyone is used to typing on a computer Maby a choice wether you want to do one or not

It's easier and less stressful than having to write it yourself.

Papers are simpler to use. You do not have to fiddle about with different papers. By switching windows, you can see both the question and the text at the same time.

Digital paper is easier to use. It is easier to type answers in rather than write them in.

It saves time. It is simpler to use. You don't have to fiddle with lots of paper. You can see the text and the questions at the same time.

It makes it easier for many pupils to do their papers this way.

Because it is much easier to use than a reader.

9. References

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10. Appendix 1: Sample of SQA Digital Question Papers for Students with Additional Support Needs 2007 Feedback Form

Please return to Paul Nisbet at the CALL Centre, University of Edinburgh, Paterson's Land, Holyrood Road, Edinburgh EH8 8AQ by post or email (Paul.Nisbet@ed.ac.uk) by **Friday 15th June**.

The form is partially completed with the pupils and digital papers that were requested. If details of pupils or papers are wrong please amend them. Tick if the pupil used the digital paper and if not, please say why and what other support was used. Tick if the pupil used the PDFaloud text-to-speech to help read the paper, and add any comments about the pupils and/or paper. On the last page of this form are some general questions about the papers and arrangements.

Centre: XXXXXX High School

Completed by: ……………….

Candidate	Code	Subject	Level	Paper	Digital paper used?	If the Digital Paper was not used, why not and how did the pupil access the paper?	PDFaloud used?	Any comments about <u>this</u> pupil and <u>this</u> digital paper?
AB	2640	Modern Studies	28	Foundation				
			28	General				
DG	0600	Craft & Design	30	General				
			30	Credit				
	0860	English	30	Reading Text General				
			30	Reading Questions General				
			30	Reading Text Credit				
			30	Reading Questions Credit				
			30	F/G/C Writing				
LH	1540	History	28	Foundation				
			28	General				
	4200	Business Man	28	Foundation				

			28	General				
NH	0860	English	30	Reading Text General				
			30	Reading Questions General				
			30	Reading Text Credit				
			30	Reading Questions Credit				
			30	F/G/C Writing				
	1260	Geography	30	General				
			30	Credit				
	4200	Business Man	30	General				
			30	Credit				
NM	0020	Administration	30	General				
			30	Credit				
	0560	Computing Studies	30	General				
			30	Credit				
	0600	Craft & Design	28	Foundation				
			28	General				
	0860	English	28	Reading Text Foundation				
			28	Reading Questions Foundation				
			28	Reading Text General				
			28	Reading Questions General				
			28	F/G/C Writing				
	1540	History	30	General				
			30	Credit				

1.   Have you any suggestions about how the <u>digital papers themselves</u> could be improved?

2.   Have you any suggestions about how the <u>arrangements to supply digital paper</u>s could be improved?

3.   Have you any comments about your <u>school arrangements to administer the digital exams</u>? (e.g. accommodation, access to computers, staffing etc)

4.   How many pupils (approximately) do you expect to use digital papers next year, in your school?

5.   Any other comments or suggestions?

Thank you very much for your time and support.