

Provide a critical review of inclusive digital technologies in practice.

Inclusive Digital Technology

Scottish Education works on the presumption of mainstreaming. With the advancement of Inclusive Digital Technologies available in our classrooms, coupled with the principle of Universal Design for Learning, how competent are teaching staff in the use and implementation of inclusive digital technology allowing the specialist technologist to concentrate efforts on specialist technology in our schools? This Case Study aims to provide a critical review of inclusive digital technologies in practice with specific focus on roles and responsibilities and training needs amongst staff.

Word Count: 2,537

Introduction

“XXX” is an educational, specialist technology service supporting a large geographical area with 2 full-time members of staff covering pupil referrals from 173 schools. “XXX” aim is to provide specialist technology advice, training, software and hardware to aid pupils with severe and complex needs whose needs cannot be met with the usual compliment of technology resources within the schools.

“XXX” time was often spent upskilling teachers on non-specialist technology, readily available in schools, to meet the additional support needs (ASN) of many pupils. Time was rarely spent with pupils with severe and complex needs requiring specialised/bespoke solutions for their learning needs.

“XXX” is undergoing a rebranding with the focus on “core” and “non-core” pupils. “Core” pupils, requiring specialist technology, should account for most of “XXX” workload. “Non-core” pupils’ needs would be met by standard, mainstream resources and overseen by the teacher. However, there was concern that teachers had insufficient knowledge to give robust technology guidance to “non-core” pupils. These concerns were raised in meetings with Primary and Secondary Head Teacher groups but predominantly during discussions with Principal Teachers of Additional Support for Learning (ASL), expressing concerns around levels of

knowledge of mainstream, assistive technology and subsequent use within our schools (see Appendix 1).

Edyburn (2018) comments on the correlation between teachers' professional development and the success of students in utilising technology and the necessities for teachers to be equipped with the technology tools to meet all student abilities. With this in mind, this study aimed to critically reflect on the role of "XXX" and class teachers and identify assistive technology (AT) knowledge gaps and training needs to ensure AT is embedded effectively by specialist and teacher to meet need.

Methodology and Limitations of Study

Hammersley (2012) who discusses educational research methodological paradigms, questions if we should pursue knowledge or if this knowledge should be used to improve situations and asks if the use of qualitative or quantitative research is most beneficial. Using a Case Study method of presentation enabled me to consider existing research and compare with my own findings to suggest and implement improvements.

The short duration of this course meant it was impossible to carry out in-depth investigation of AT training needs of all teachers in this locale. Additional Support for Learning teachers (ASL) were selected as it is usually the expectation that they will instruct pupils in strategies to

support their learning, including the use of technology. ASL often act as a conduit between specialists, class teachers and pupils.

Two questionnaires, using Google Forms, were constructed (Appendix 2 and 3). The first to establish perceived competencies in using mainstream and assistive technology amongst ASL staff. The second to establish the availability of technology training in student teacher courses. Given time limitations and the need for speedy data retrieval, questions were mostly quantitative with limited scope to provide qualitative responses. A link to the Google Form was disseminated via PT ASL to their staff and completion was voluntary. All Universities in Scotland offering student teacher courses, were contacted via email and asked to complete the questionnaire.

Limitations to Case Study research:

1. Time constraints dictated mostly qualitative research with limited time for quantitative research to triangulate data.
2. Ten Universities were questioned, responses were received from three, one of which declared they had no student teacher training programme at present time.
3. PT ASLs do not oversee all ASL teaching staff. Primary ASL, controlled by Head Teachers, are difficult to trace and therefore question. Only 31 responses were received.

4. Using technology to receive responses (Google Forms) may exclude less computer literate participants and bias towards technology needs to be considered.
5. Research focussed on ASL teachers. Views of non-ASL teachers have not been recorded.

Ethical issues

An explanation regarding the purpose and use of the research data was given to all potential participants. Completion of the questionnaires was voluntary, and responses anonymised. Opportunity to withdraw data was given. Data was confidentially destroyed at the end of the study.

Discussion and Findings

The Scottish education system works on the presumption of mainstreaming. Scottish Parliament states 'It shall be the right of every child of school age to be provided with school education by, or by virtue of arrangements made, or entered into, by, an education authority.' (Parliament 2000, p.4) and with limited exceptions there is a 'Requirement that education be provided in mainstream schools', (Parliament, 2000, p.10). Depute First Minister and Cabinet Secretary for Education, John Swinney MSP, states "They should be provided with the support they need to reach their full learning potential." (Scottish Government, 2017, p.11). However, a recent study investigating the effectiveness of mainstreaming, raised questions about adequate training and preparedness of teachers to Get it Right for Every Child (Enable Scotland, 2016). In addition, responses to a consultation by Scottish Government (June 2018) indicated concerns from stakeholders regarding the ability to achieve mainstreaming for pupils with additional support needs. There is recognition that quality, robust training is needed to ensure teachers have an up-to-date, base-level understanding of what exists and how technology can reduce learning barriers. Newly qualified teachers may enter the profession via Undergraduate, Postgraduate or an alternative route into teacher. The expectation is these courses covers an element of mainstream assistive technology. Results from two Scottish Universities stated such levels of tuition ranged from 3-5 hours and 6-10 hours duration in total with some emphasis placed on experiential

learning during students' placements (Appendix 2). My research results, from practicing teachers, suggested that 84% received no University training on mainstream technology with the rest stating 5 or less hours were given in their course (Appendix 3).

Assistive technology (AT) could support inclusion of pupils with ASN. There are various definitions of AT but it is recognised that the broader understanding includes 'mainstream technologies and those developed specifically for persons with some form of impairment' (Cook and Polgar, 2015, p.3). Koch (2017) describes the existence of AT embedded in standard devices but questions the competencies of teachers in using them. It is acknowledged by Marino, Marino and Shaw (2006) that teachers may struggle to make decisions on appropriate technology and that training is important to the decision making and the continued effective use of the technology by pupils without the risk of abandonment. When questioned, ASL staff showed varying degrees of perceived competencies with just over half feeling competent with the use of 0365 but a far lesser number (12.9%) stating competent use of GSuite (Appendix 3).

The delineation between mainstream and specialist technology should be considered to establish roles and responsibilities. Highly specialist technology requires AT specialist input but there is a critical lack of availability and, according to Bausch et al. (2009), without an AT

specialist the implementation of such technology is considered impossible. However, the point of difference between mainstream and specialist technology can be a blurred line and one which is constantly moving. For example, according to British Dyslexia Association, New Technologies Committee (2015), text to speech (TTS) and speech recognition along with other adaptations of text can assist a pupil with dyslexia, provide support and help to remove barriers to learning. Stodden et al. ((2012) reported that TTS gave opportunities for more exposure to text and subsequently improved vocabulary, comprehension and rates of reading. Conversely Meyer and Bouck (2015) indicated little difference in reading skills whether using TTS or not, however, this research studied only three participants who all perceived better comprehension and fluency in reading. Such functionality used to be specialist but is now routinely embedded in a variety of standard devices. Regarding Assistive Technology competencies, my research results were varied dependent on function (Appendix 3). Well established functions eg changing font sizes, styles and background colour, were well understood. However, Uccula, Enna and Mulatti (2014) report there are contradictory findings in respect of the benefits of coloured backgrounds. Software purchased by our Authority, to aid inclusion (eg Communicate in Print and TextHelp) gave some questionable data with 71% feeling competent in the use of TextHelp (TTS) but just over one third (38.7%) stating skilled in the use of Communicate in Print. Functionality within devices demonstrated some correlation with most people feeling competent with Windows devices and

least with Chromebook. Competencies using speech recognition and accessibility functions on any device type demonstrated a need for training.

AT does not exist in isolation and other factors must be considered to eradicate barriers to learning. Hitchcock et al (2002) argue that Universal Design for Learning (UDL) could provide a positive learning experience. "If curriculum designers recognize the widely diverse learners in current classrooms and build in options to support learning differences from the beginning, the curriculum as inherently designed can work for all learners" (Hitchcock et al., 2002, p.2). A teacher who embraces UDL will ensure the class is engaged with the learning, all supports are available, and pupils permitted to evidencing their learning in a manner which best suits them. Mainstream technology will be readily accessible to support learning needs. This is echoed by Koch (2017) who acknowledges that embedding AT is a vital part of Universal Design for Learning and will benefit all pupils. In addition, Rose et al. (2005) state that AT and UDL complement each other and the lives of those with disabilities can be improved by the melding of both. My research (Appendix 3) indicated that approximately one third (35.5%) felt competent in the use of Digital Books the benefits of which are echoed by CALL Scotland (2017) who publicise the use of "Books for All Scotland Database" to foster independence and enable computer readers rather than human reader.

However, as my research highlighted, there is question if adequate hardware resourcing exists,

"There is an expectation that schools provide assistive technology for pupils with additional support needs however in reality we do not have enough laptops or computer equipment in school to allow us to support this".

Despite the principles of UDL, summative assessments to measure success, as required by the Scottish Qualifications Authority (June 2018), give less flexibility to evidencing learning. Digital exams and additional assessment arrangements do permit the use of AT, but my research indicated only 38.7% felt competent with Digital Exams (Appendix 3).

There is a range of inclusive digital technology within all Scottish schools. It is likely that more will always be requested but we need to ensure existing technology is utilised to greatest effect with a digitised curriculum. The functionality of this technology can remove barriers to learning but in order to be effective, teachers (and pupils) must be aware of functionality. Teachers have a role to play and formalised training needs to be available to upskill them with the knowledge of how mainstream assistive technology can aid learning. Standards for Provisional and Full Registration General Teaching Council (Scotland) (2012) states, teachers must have an awareness of all current legislation covering additional support needs and appreciation of barriers to learning,

liaise with partner agencies and specialists to promote learning and plan their teaching programmes appropriately - deploy resources to meet needs. This includes knowledge and competencies of digital technologies. My conducted research notes a variety of sources used by teachers to upskill (Appendix 3). The majority utilised the service of the specialist technologist (in person and their GLOW site), upskilled via personal investigation and collaborative learning, used the Authority's online training materials and "CALL Scotland". Limited use was made of training materials provided by Windows, Apple and Google and our Digital Leaders.

When considering inclusive digital technology, the role of the specialist Assistive Technologist cannot be ignored. According to Wojcik and Douglas (2012) the decision to introduce specialist AT should be the collective decision of many stakeholders but there should be someone who has AT knowledge. Any specialist must themselves be adequately trained and aware of emerging technologies to ensure the correct device is chosen for the pupil's needs. An Assistive Technologist should participate in a robust form of assessment when considering implementing specialist technology. (Zabala, 2005) defines a SETT framework which, by using a collaborative approach amongst all stakeholders, reflects upon the Student, Environment, Task and Tools. "Tools" may consist not only the technological device, but also the training necessary to allow the student to succeed. The Assistive

Technologist must ensure the class teacher is adequately and regularly trained to ensure non-abandonment of specialist devices. My research confirms that 93.4% of ASL teachers questioned stated they had no training on such specialist technology when they initially trained as a teacher (Appendix 3). One participant stated,

“Having dedicated specialists who can help pupils with significant needs across the curriculum is invaluable.”

In addition, Universities stated no training was given on such technology (Appendix 2) and would only be considered if a student encountered such a need on placement. It is likely that teachers would require much on-going training by the specialist technologist in the use of any specialist technology to give maximum chance of success and non-abandonment by pupils with this level of need.

CONCLUSION

Presumption of mainstream and inclusion is an expectation of the Scottish Government. Mainstream assistive technology complements UDL and provides useful tools to remove learning barriers but to be effective, all stakeholders must be suitably trained in their use. My research suggests student teachers receive limited tuition on mainstream assistive technology. As technology is constantly advancing, existing teachers may struggle to use technology effectively to support inclusion and training is

necessary to up-skill teachers on these changes. A variety of training sources are currently used by ASL teachers to promote competency, but Digital Leaders are not systematically utilised. Specialist technologists have an on-going role to play in delivering robust training for specialist technology but there continues to be a reliance upon them for mainstream technology training. To aid inclusion, action is required to systematically embedded training to ensure base level competencies for all staff utilising mainstream assistive technology.

As a result of this Case Study and recognition of a training gap, "XXX" are creating a training PowerPoint with embedded instructional "how to" videos on the use of mainstream assistive technology. This PowerPoint has an ambitious aim of creating base-level competency amongst our staff, but such training must be revisited regularly to allow for staff turnover and technology advancement. Liaising with Quality Improvement Management on a strategy for dissemination and delivery to all schools will be discussed.

Training delivery to Probationary Teachers, working collaboratively with ASL staff and Digital Leaders are additional routes which may enhance and maintain mainstream assistive technology knowledge. A robust, strategic plan from our Senior Leadership Team is necessary to ensure the capabilities of assistive technology are understood and utilised by staff to remove barriers to learning and aid inclusion.

This Case Study has enabled me to consider research, the breadth and depth of which I was unaware. It has made me a more reflective practitioner, seeking out relevant evidence to support my practice. Such evidence can be specific or generic, but I reflect upon this with a critical eye rather than a wholehearted acceptance of published works. I will always keep the pupil at the centre of my thoughts and appreciating they are individuals, not homogenous products and may not exactly fit the conclusions of the researcher. A considered and critical approach to research is always necessary.

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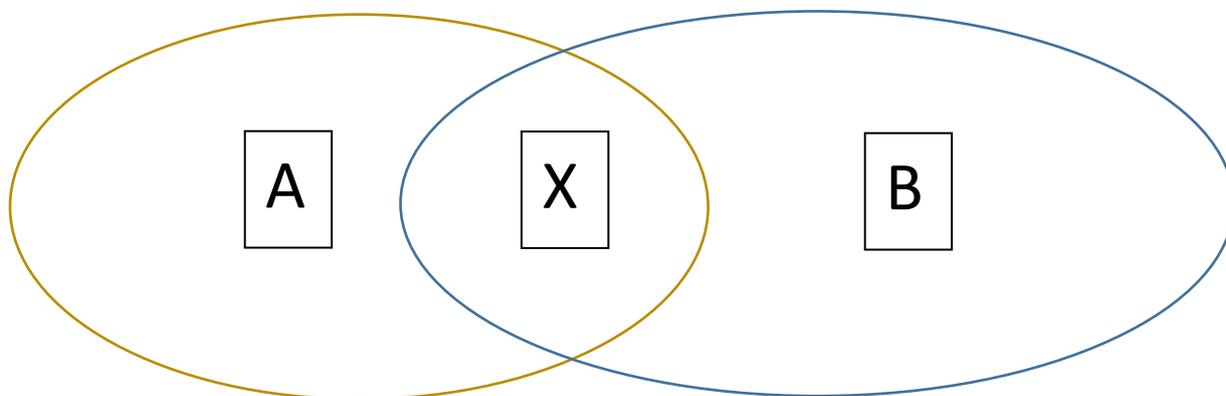
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APPENDICES

Appendix 1

Assistive Technology to Accommodate all Learners - discussed with PT
Additional Support for Learning staff x 17

ASSISTIVE TECHNOLOGY TO ACCOMMODATE ALL LEARNERS



ZONE A

What is available in “**mainstream**”. This is technology that all staff should generally be aware of. There may be some gaps in this training but robust training at **Post Graduate** level or **Probationary** level should ensure gaps are filled. Also, expectation via **Standards for Registration** that this is kept up to date.

ZONE B

Truly **specialist** technology – this is technology that we would not expect our staff to have a general knowledge of (unless pertinent to a pupil in their class). It is technology that the specialists would have to work with the school in a systematic way to embed to ensure non-abandonment.

ZONE X

This is the cross over between what was **specialist and** what is becoming available as standard within **mainstream**. Eg Speech recognition used to be specialist software, now all devices have this embedded (Siri, Dictation and Voice Typing). **However, this area is problematic – teachers do not know what they do not know, and technology keeps on advancing with every change in an operating system brining new tools for accessibility.**

Solution

Somehow Zone A and Zone X need to be filled. If we are happy to ensure and assume that Zone A will be covered, Zone X still needs to be addressed but by whom.

Appendix 2

Questionnaire to Further Education providers of trainee teacher.

Questionnaire sent - [redacted link]

Questionnaire emailed to	
Queen Margaret University	Strathclyde
Aberdeen	West of Scotland
Dundee	Royal Conservatoire of Scotland
Edinburgh	University of Highlands and Islands
Glasgow	Stirling
Responses received from 3 establishments one who stated there was no such course at the present time.	

UNDERGRADUATE COURSES

Course Title	Duration	Mainstream Technology Tuition (hours)	Specialist Assistive Technology Tuition (hours)
MA in Education	4 years	6-10	0
Food Nutrition and Textiles Education	4 years	Other – "This content is addressed through placement tasks and explored in relation to development of pedagogical skills throughout the programme."	Other – "The University does not have access to the technology. Students may experience this on placement."

POSTGRADUATE COURSES

Course Title	Duration	Mainstream Technology Tuition (hours)	Specialist Assistive Technology Tuition (hours)
PGDE	36 weeks	3-5	0
PGDE	36 weeks	Other "Our programmes are cross-sector and integrated. This content is mainly addressed in our ASN week, but is also considered and reflected on in tasks for placement"	Other "This would only be considered if a student was teaching a class where a pupil was supported by such devices"

ALTERNATIVE ROUTES INTO TEACHING

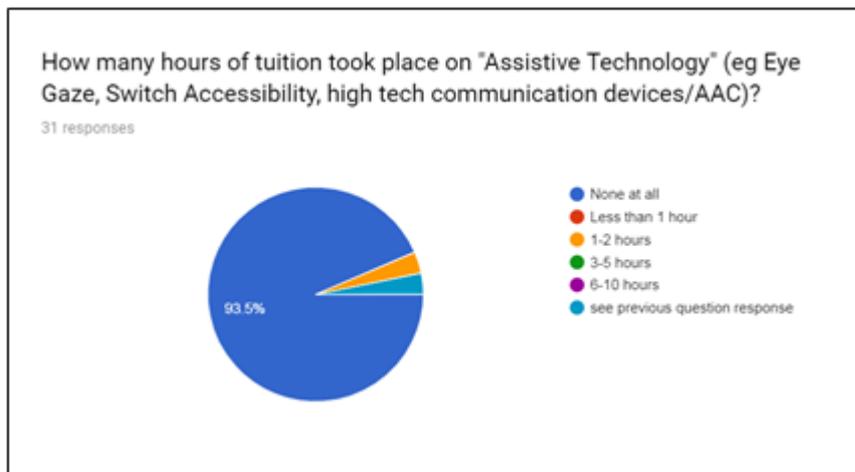
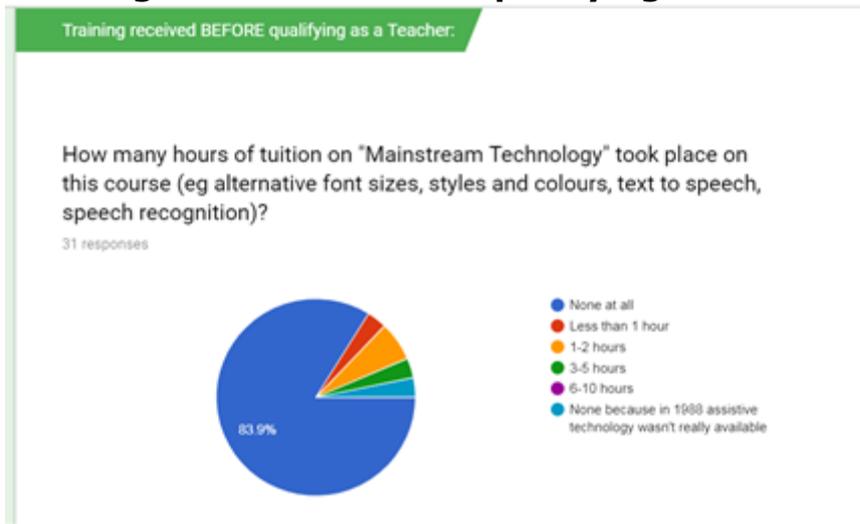
Course Title	Duration	Mainstream Technology Tuition (hours)	Specialist Assistive Technology Tuition (hours)
PGDE Primary	18 months	3-5	0

Appendix 3

Questionnaire to ASL staff.
Responses received – 31 (7 Principal Teachers and 24 ASL Teachers)
Areas of Teacher Training – 21 Scottish System, 10 Worldwide

Questionnaire sent [redacted link]

Training received BEFORE qualifying as a Teacher



MAINSTREAM TECHNOLOGY COMPETENCIES (31 ASL Teachers)

	How competent do you feel on the following:			
	1 (Excellent, I could train others)	2	3	4 (Unsure, I have rarely/never used this)
Office 365	9.7% (3)	54.8% (17)	32.3% (10)	3.2% (1)
GSuite	0.0% (0)	12.9% (4)	48.4% (15)	38.7% (12)

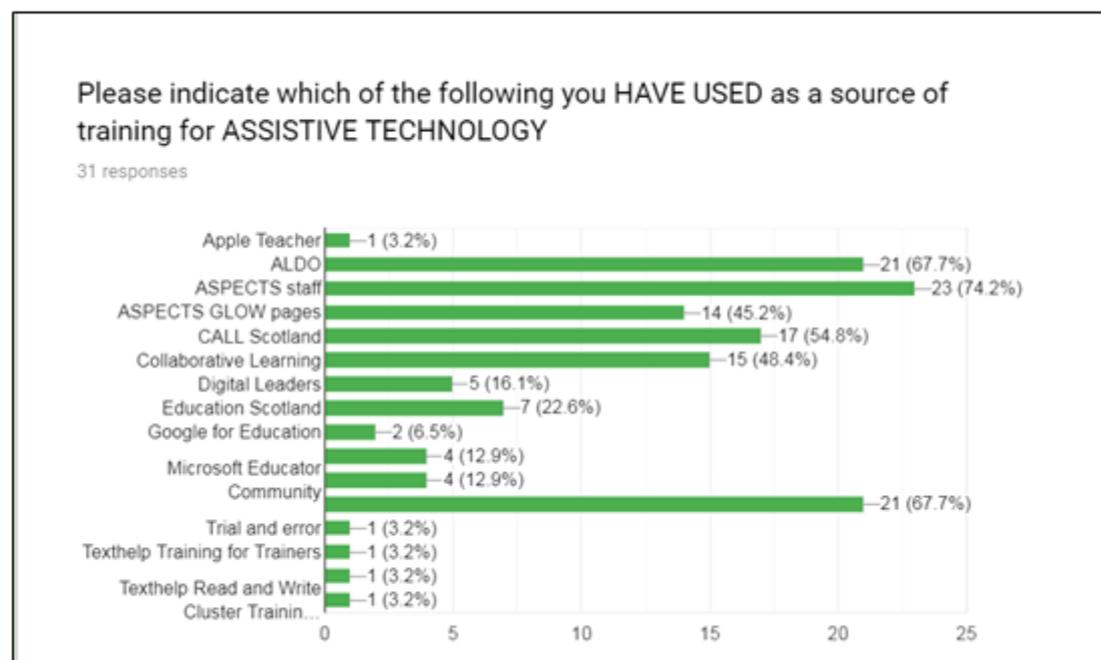
ASSISTIVE TECHNOLOGY COMPETENCIES (31 ASL Teachers)

	How competent do you feel on the following:			
	1 (Excellent, I could train others)	2	3	4 (Unsure, I have rarely/never used this)
TextHelp Read & Write	19.4% (6)	51.6% (16)	22.6% (7)	6.5% (2)
Communicate in Print (Widgit symbols)	9.7% (3)	29.0% (9)	19.4% (6)	41.9% (13)
Siri – Speech to Text	9.7% (3)	22.6% (7)	32.3% (10)	35.5% (11)
Dictate – Speech to Text	3.2% (1)	16.1% (5)	29.0% (9)	51.6% (16)
Voice Typing Speech to Text	0.0% (0)	16.1% (5)	45.2% (14)	38.7% (12)
Immersive Reader/Learning Tools	3.2% (1)	6.5% (2)	22.6% (7)	67.7% (21)
Changing Font Style / Size	67.7% (21)	25.8% (8)	6.5% (2)	0.0% (0)
Changing Background Colours	41.9% (13)	45.2% (14)	9.7% (3)	3.2% (1)
Windows Accessibility Settings	0.0% (0)	32.3% (10)	51.6% (16)	16.1% (5)
Chromebook Accessibility Settings	0.0% (0)	3.2% (1)	22.6% (7)	74.2% (23)
Apple Accessibility Setting	6.5% (2)	19.4% (6)	22.6% (7)	51.6% (16)
Windows Hearing Text Read Aloud	0.0% (0)	25.8% (8)	45.2% (14)	29.0% (9)
Chromebook Hearing Text Read Aloud	0.0% (0)	6.5% (2)	22.6% (7)	71.0% (22)
Apple Hearing Text Read Aloud	6.5% (2)	6.5% (2)	32.3% (10)	54.8% (17)
Windows Limiting Screen Clutter	3.2% (1)	16.1% (5)	25.8% (8)	54.8% (17)
Chromebook Limiting Screen Clutter	3.2% (1)	3.2% (1)	12.9% (4)	80.6% (25)
Apple Limiting Screen Clutter	6.5% (2)	9.7% (3)	19.4% (6)	64.5% (20)
Windows Magnifying Screen	6.5% (2)	32.3% (10)	32.3% (10)	29.0% (9)
Chromebook Magnify Screen	3.2% (1)	12.9% (4)	12.9% (4)	71.0% (22)
Apple Magnify Screen	3.2% (1)	25.8% (8)	12.9% (4)	58.1% (18)

OTHER TOOLS AVAILABLE COMPETENCIES (31 ASL Teachers)

	How competent do you feel on the following:			
	1 (Excellent, I could train others)	2	3	4 (Unsure, I have rarely/never used this)
Digital Books (eg Books for All)	12.9% (4)	22.6% (7)	22.6% (7)	41.9% (13)
Digital Exams	9.7% (3)	29.0% (9)	22.6% (7)	38.7% (12)

TRAINING/SELF DISCOVERY SOURCES (31 ASL Teachers)



Sources of Training for Assistive Technology used by those questioned (31 ASL teachers)	Number of Teachers
Apple Teacher	1
ALDO ("X" Learning and Development Online)	21
"XXX" staff	23
"XXX" GLOW pages	14
CALL Scotland	17
Collaborative Learning	15
Digital Leaders	5
Education Scotland	7
Google for Education	2
GTCS Website/support materials	4
Microsoft Educator Community	4
Personal Investigation	21
Other - Trial and Error	1
Other - TextHelp Training for Trainers	1
Other - TextHelp Read & Write	1
Other - Cluster Training	1

ADDITIONAL QUALITATIVE INFORMATION ON ASSISTIVE TECHNOLOGY

Please state any additional information on ASSISTIVE TECHNOLOGY within the teaching profession you think prudent to provide:

Basic information on all the programmes that the cluster use would be of great use.

I think all of it is prudent to provide as it's the way the children's future is headed.

Anything g that supports independent reading, spelling and writing.

There is an expectation that schools provide assistive technology for pupils with additional support needs, however in reality we do not have enough laptops or computer equipment in schools to allow us to support this.

I learn best by doing, so would be good if Digital Leaders were really good with assistive technology to show me things in my school,

Having dedicated specialists who can help pupils with significant needs access the curriculum is invaluable. The assumption that mainstream staff can provide as good a service with increased pupils, increased technology but proportionately less support staff is untenable. Yet again, ASL pupil needs are being pushed aside and the 'presumption of mainstream' is being made more and more difficult.

Positive experiences with Clicker and Texthelp. Using open access text to speech and speech to text software in wider educational practice, as well as apps in Community Learning practice.

Everything that we do not use regularly we forget. A weekly 'logon to keep it in your head' could be available, maybe?

Time to practise the technology at collegiate sessions

I trained over 20 years ago so the first 2 questions are not really relevant to the time. There needs to be standardized practice across primaries and into secondary - a minimum standard that ASL teachers can expect to be happening in every class.

I have begun to use various technologies which were then unreliable/ no longer available/ . Trained in a pre-computer era, worked for a long time very closely with Aspects- great service-miss it and remote technological support is not useful enough for me with completely full contact time . I would love face to face training on devices and systems that work and will continue to work and will support the apps that are useful to learners.