



Assistive Technology – Background Information

Introduction

Assistive Technology (AT) is any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customised, that is used to increase, maintain, or improve the capabilities of people with disabilities, including students with reading difficulties, to function at their fullest potential as independently as possible.

Access to information versus access to learning

Rose and Meyer (2002) clearly differentiate between *access to information* and *access to learning*. The more traditional AT view of access to information through alternate formats and alternate media remains key and highly important. However, it is also necessary to consider the accessibility features of AT which are related to access to learning. This is particularly relevant for students with reading difficulties for whom *access to the medium of print* does not necessarily translate into *access to comprehending print*.

Mere access to the content is inadequate as an AT unless that access is mediated with instructional design supports appropriate for the specific disability of the user. Although the traditional AT intervention of providing an alternate medium or format of the content is helpful, difficult vocabulary, poor organisation, and distracting elements often remain. It still does not provide the necessary access to learning that many educators have identified (Rose & Meyer, 2002).

It is important to note the potential of technology to help a reader compensate for skill deficits without actually overcoming those deficits. The use of AT to compensate for specific reading deficits is not a substitute for instructional interventions to address those deficits (McKenna & Walpole, 2007).

Assistive technology versus intervention

Edyburn (2004) argues that routine reading failure (i.e., difficulties that chronically persist beyond the primary grades) indicates the use of AT, but it should be reserved for instances in which the demands of reading are excessive, even after intensive remedial instruction. In such cases, AT would serve as a last resort. But the process of reaching the conclusion that it is the last resort is a critical one, and one that requires further research. For example, future investigations might establish guidelines for judging the point at which diminishing returns can be expected as the result of intervention without AT.

Until further research evidence is available it would seem prudent that while intensive individual intervention is implemented AT is used to prevent the consequences of what Stanovich (1986) called the Matthew Effects. Stanovich described the situation in which good readers read more than poor readers, widening the gap between them over time.

Assistive technology and multimedia

Multimedia settings provide all readers, including those who struggle to read, with access to literacy via AT. However, it must be noted that AT applications can create an environment that may actually add to the metacognitive demands of reading (Kennedy & Deshler, 2010). Just providing access to various options for reading support is not sufficient when readers do not know how to select and apply the relevant assistance accurately and at the appropriate times. Such complex demands indicate extended supported practice so that an individual can understand AT supports, recognise its shortcomings, and eventually come to use the AT fluently (Kamil, 2003).

Selecting assistive technology

The technologies chosen to improve participation in education for students with a difficulty in reading need to be carefully selected. Students should be able to access and use the technologies with a high degree of confidence and competence. Decisions about assistive technology tools should always begin with a consideration of the individual student's needs and interests, the nature of the environments in which the student learns and the tasks needing to be completed (Zabala, 2005).

Tools have been developed to assist in use of assistive technology to support individual student needs. Two of these tools are:

- The [SETT](#) framework (Zabala, 2005) , and
- [Quality Indicators for Assistive Technology Services](#) (The QIAT Consortium, 2007).

SETT Framework

The SETT (**S**tudent, **E**nvironment, **T**ask and **T**ools) Framework, developed by Joy Zabala (2005), is an organisational instrument to help collaborative teams create student-centred, environmentally useful, and tasks-focused tool systems that foster the educational success of students with disabilities. Key questions are asked in each area to in order to guide teams in gathering data and information to support the consideration and implementation of appropriate inclusive technologies. These questions guide the discussion and enable the team to collaborate and form a consensus on support for the student'.

These key questions focus on a number of specific areas. For example:

STUDENT

- What are the student's current abilities?
- What are the student's special needs?
- What are the other students doing that this student needs to be able to do?
- What does the student need to be able to do that is difficult or impossible to accomplish independently at this time?

ENVIRONMENTS

- What activities take place in the environment?
- Where will the student participate—classroom, home?
- What is the physical arrangement?
- What activities do other students do that this student cannot currently participate in?
- What assistive technology does the student have access to or currently use?

TASKS

- What specific tasks occur in the environment?
- What activities is the student expected to do?
- What does success look like?

TOOLS

Tools are devices and services—anything that is needed to help the student participate and access learning programs.

- Are the tools being considered on a continuum from no/low to high-tech?
- Are the tools student centred and task oriented and reflect the student's current needs?
- Are tools being considered because of their features that are needed rather than brand names?
- What is the cognitive load required by the student to use the tool?
- What are the training requirements for the student, family and staff?

The SETT Framework is not a one off event but an ongoing framework for collaborative teams to gather information and ensure that the most appropriate inclusive technology tools are being utilised by the student. As a result there needs to be ongoing 'Re-SETting', where teams need to return to the SETT questions on a regular basis. Re-SETting involves keeping decision-guiding information accurate, up to date, and clearly inclusive of the shared knowledge of all those involved.

Quality Indicators for Assistive Technology

Quality Indicators for Assistive Technology (QIAT) Consortium has focused its efforts on defining a set of descriptors that serve as guidelines for quality in the development and delivery of assistive technology services.

These descriptors are organised under a number of areas:

- consideration of assistive technology needs
- assessment of assistive technology needs
- documentation of an individual education program
- assistive technology implementation
- evaluation of effectiveness of assistive technology
- assistive technology transition
- administrative support for assistive technology
- professional development and training for assistive technology

Classroom implementation

Recommendations regarding AT need to be sensitive to the realities of the student's classroom context. It is important to consider:

- how can AT help a student advance in reading skills and access to the curriculum given the time, texts, tasks, and grouping configurations that are available in the classroom, and
- what direct support needs to be provided to the classroom teacher, to build AT into the classroom infrastructure as a permanent, flexible fixture.

It is also important to recognise that competent use of AT does not necessarily transfer to new environments (Behnke & Bowser, 2010). The fact that a student can use AT well in primary school does not ensure that effective use will continue to high school or adult life. If students are to be successful AT users after they move on to new settings there needs to be systematic transition planning which includes the use of AT.

What assistive technology is available?

Assistive Technology	Description	Benefits and issues
Planning support	<p>Mind mapping software</p> <p>Mind mapping or webbing tools allow students to plan or present their ideas, thoughts and facts in graphical format, rather than linear based tools such as word processors and text editors.</p> <p>Some examples include:</p> <ul style="list-style-type: none"> commercial software such as Kidspiration and Inspiration. free software such as Freemind and XMind. online mapping tools such as Bubbl.us. 	<p>The key benefits include:</p> <ul style="list-style-type: none"> can present ideas in a graphical form provides an organisation and structure for planning support recall and understanding of key concepts and topics
	<p>Organisational tools</p> <p>Various programs can support students to plan, remember and record information, notes, dates and times, and things-to-do.</p> <p>Some examples include:</p> <ul style="list-style-type: none"> recording important information using a phone, digital voice recorder or hand held device. MS Outlook calendar and task sections. free portable programs such as Sunbird. 	<p>The key benefits include:</p> <ul style="list-style-type: none"> supports organisation skills. supports short and long term planning. auditory and visual reminders can be generated. more efficient than writing or typing.

Assistive Technology	Description	Benefits and issues
Speech to text	<p><i>Speech recognition converts spoken words to machine-readable input.</i></p> <p><i>Some examples include:</i></p> <ul style="list-style-type: none"> <i>commercial software e.g. Dragon Naturally Speaking Version 11 (MS Windows), Dragon Dictate for Mac (MAC OS X)</i> <i>inbuilt speech recognition MS Windows and Windows 7</i> 	<p>The key benefits include:</p> <ul style="list-style-type: none"> by-pass writing or typing difficulties. increase in productivity. <p>Speech recognition software can be useful, particularly for older students or those who speak well and have good language skills. It may take a few weeks to many months to become proficient – every situation is different and it does not cater to all students. Since the technology is sensitive to noise, a busy classroom is not the optimum place for this tool.</p>

Assistive Technology	Description	Benefits and issues
Reading Technologies	<p>Scanning Technologies</p> <p>Printed text such as books, newspapers, journals, handouts, worksheets and other printed documents can be recognised by a computer's or device's OCR Optical Character Recognition software and then imported or inserted into an MS Word document, Notepad or PDF file.</p>	<p>The key benefits include:</p> <ul style="list-style-type: none"> • text and reading material can be provided in an electronic format. • text can be edited, saved and customised to meet the specific needs of one or more users. <p>Copyright issues need to be recognised.</p>
	<p>Text to speech</p> <p>Text to speech software involves having electronic print text voiced back to a student through speakers or headphones.</p>	<p>The key benefits include:</p> <ul style="list-style-type: none"> • support for students reading large amounts of text. • access to classroom curriculum. <p>To allow students to benefit from this technology requires a large commitment to daily organisation, scanning of text and digital versions of presentations and lessons.</p>
	<p>Dictionary and thesaurus options</p> <p>These options include:</p> <ul style="list-style-type: none"> • MS word inbuilt dictionary • online dictionaries and thesaurus • dictionary, homophone and thesaurus support features of literacy support software e.g. TextHelp Read and Write and WYNN • iPad/iPhone/Smartphone Apps 	<p>The key benefits include:</p> <ul style="list-style-type: none"> • provides an alternative to paper-based dictionaries • can be used in conjunction with text to speech software
	<p>Onscreen display options</p> <p>Screen settings (i.e. font style and size, foreground and background colour, resolution) can be changed in the Control Panels – Display Properties on MAC OS or in MS Windows.</p>	<p>The key benefits include:</p> <ul style="list-style-type: none"> • impact on readability and access

Assistive Technology	Description	Benefits and issues
Digital devices and peripherals	<p>Scanning or reading pens</p> <p>Scan and transfer print text (usually via USB connections) to a computer. The text is imported into a text-based program.</p>	<p>The key benefits include:</p> <ul style="list-style-type: none"> portable. conversion of type-face text into electronic text.
	<p>Digital pens</p> <p>Models can</p> <ul style="list-style-type: none"> capture text written and later convert it to text (using OCR) . record the audio and playback using earpiece/headset directly from the device. 	<p>The key benefits include:</p> <ul style="list-style-type: none"> portable. files can be saved and exported to a computer. lessons can be replayed and studied after an event. <p>There are privacy issues regarding recording of lessons or lectures.</p>
	<p>Digital voice recorders and audio recording devices</p> <p>Digital voice recorders provide data entry via voice. Audio recording devices include devices such as PDA, mobile phone, iPod Touch, iPad, digital tablet, and eBook reader.</p>	<p>The key benefits include:</p> <ul style="list-style-type: none"> alternative to written or typed notes. folders can store different types of voice recordings or purposes. can be transferred to computer and stored in WAV or MP3 file format. <p>There are privacy issues regarding recording of lessons or lectures</p>
	<p>iPad, iPod Touch, iPhone</p> <p>These Apple devices are digital tools that require apps to be downloaded. Apps to accomplish many different tasks are available.</p> <p>Other vendors are introducing and releasing competing models with the Android or MS Windows operating system.</p>	<p>The key benefits include:</p> <ul style="list-style-type: none"> perceived and readily accepted as being mainstream technology without any associated stigma apps are available for many tasks – note taking, mind mapping, online storage and retrieval, pdf access, productivity tools, online literacy support
	<p>eBook readers</p> <p>These devices provide electronic access to books and other literature (i.e. online newspapers, magazines and articles).</p>	<p>The key benefits include:</p> <ul style="list-style-type: none"> MP3 playback. voice recording. accessibility features.
	<p>USB pen and thumb drive apps</p> <p>EduApps (www.eduapps.org) is a collection of free software that caters directly for students with reading difficulties.</p> <p>The software includes:</p> <ul style="list-style-type: none"> AccessApps LearnApps Create&Convert 	<p>The key benefits include:</p> <ul style="list-style-type: none"> runs directly from a USB drive. applications for speech recognition, mind mapping, note taking, dictionary, planning and organisational tools, vision and reading supports. create alternate formats (e.g. text to DAISY or audio to text). create accessible MS word documents.

Assistive Technology	Description	Benefits and issues
Talking books - DAISY File Format	Digital Accessible Information System, or DAISY is a talking book format presented with enabled navigation within structure synchronized with audio.	The key benefits include: <ul style="list-style-type: none"> • the ability to place multiple bookmarks and move around quickly enables students to find relevant material quickly. • DAISY navigation is excellent for skipping to sections in reference books. • the DAISY structuring allows essays to be completed to academic standards with footnote details and bibliography made possible.

Kennedy (2011)

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