Examples of the utilization of assistive technology in the education of children with disabilities

Finding the BEST FIT

Introduction:

In New Zealand there is a national Ministry of Education Assistive Equipment Policy and process. As it is specific to education it focuses on assisting students overcome barriers to learning or to accessing the school environment. It is based on the needs of the student, rather than on categories of equipment or cost. (Other technology essential for all of life remains the responsibility of the Ministry of Health.)

A student must fit into one of the Ministry’s “Special Education 2000” initiatives to qualify for assessment and provision of Assistive Equipment:

☆ Ongoing and Reviewable Resourcing schemes (ORRS)
☆ Speech-Language (Communication) Initiatives
☆ Severe Behaviour Initiatives
☆ Special Education Grant
☆ Resource Teachers: Learning and Behaviour (RTLB)
☆ National provision for students with sensory impairments and physical disabilities
☆ School High Health Needs

Equipment applied for is then clustered into five categories:

- Hearing Access
- Personal Care
- Physical Access
- Written communication
- Vision

The focus of this presentation is how we, as a team, are addressing the specific needs of students within the area of written communication.

Our Journey into finding the Best Fit
As a Special Education team in the far north of New Zealand, technology is not a direct strength or specialist skill. Historically we depended on specialist communication consultants to fill this need around service provision to students. We decided to develop a Technology Team which consisted of a Speech-Language Therapist, an Occupational Therapist, a Physiotherapist, an Advisor on Deaf Children and one of our managers who had previously been a teacher. I was asked to be the Technology Coordinator as well as being the Occupational Therapist. The aim of the team is to process technology referrals and decide whether we can address the needs of the students within our framework or co-work alongside consultants. A second aim is to develop and expand our skills to take on more of the assessment and provision of technology over time.

The following three case studies reflect our growing knowledge and skills, as well as confidence in finding what works best for the students to whom we provide services. We will always work alongside and learn from communication consultants, even in an advisory capacity. Our skills and competencies are growing, but what I would not like to lose is the way we 'discover' the 'best fit' for the students we work with. That is, to identify the NEED, and hence make technology 'fit the student' rather than the student fit the current technology.

The students:
☆ Michael
☆ Mathew
☆ Serena

A description of each student:

Michael: Michael is 10 years old, has a quick sense of humour, loves learning and has acute hearing. He loves going out fishing with his Dad and has to participate in all the family chores. He always needs to know what is going on in terms of his education and input from others. He has spastic athetoid cerebral palsy affecting all limbs and voice output. He is in a manual wheelchair and another person pushes him where he needs to go. Over the years his head has been identified as his best point of body control.

Mathew: Mathew is 9 years old and in primary school. He loves playing soccer and golf, and is a great student who is very motivated and keen. He participates in all activities in school and is willing to try out adventurous activities, including rock climbing. He has athetoid cerebral palsy which makes all movements strenuous and it is difficult for Mathew to be exact with his muscle control.

Serena: Serena is a 13 year old who has just started high school and intends to go to University. She is a keen student who fights hard for her independence and is resistant to being treated differently to her peers. She has SLE (Systemic Lupus Erythematosus), with Polyarticulararthritis.
This primarily affects her joint mobility and strength and flares up over the colder months. Over time, it has reduced her hand strength and range of movement significantly.

Finding the 'best fit' seems to be a combination of:

- being certain of the learning goals
- the skills of the student
- clearly identifying the barriers to their learning
- teaming
- appropriate technology

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<thead>
<tr>
<th></th>
<th>Michael</th>
<th>Mathew</th>
<th>Serena</th>
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<tbody>
<tr>
<td><strong>The Goal</strong></td>
<td>To independently write his own stories</td>
<td>To produce legible writing for both himself and others to read.</td>
<td>To write even when unwell.</td>
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<td></td>
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<td>To work alongside his peers in group seating arrangements.</td>
<td>To carry own writing gear between classes.</td>
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<td></td>
<td></td>
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<td>To work alongside her peers.</td>
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<td><strong>The Skills</strong></td>
<td>Willingness to work and experiment with technology.</td>
<td>Good knowledge of language and early literacy skills.</td>
<td>Competent writer</td>
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<td></td>
<td>Some head control.</td>
<td>Can write by hand.</td>
<td>Has ability to self monitor her condition.</td>
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<td>Has good knowledge of sight words.</td>
<td>Able to self evaluate.</td>
<td>Able to self evaluate.</td>
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<td>Able to self evaluate.</td>
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<td>Basic keyboarding skills.</td>
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<td><strong>The “Barriers”</strong></td>
<td>No functional control of other body parts.</td>
<td>Writing is very strenuous and time consuming.</td>
<td>Pain and reduced strength and mobility in her joints, especially over winter. She is then unable to write.</td>
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<td>Insufficient independent head control for long term and sustained output.</td>
<td>Mathew’s athetoid movements cause writing to be large, irregular and difficult to re-read. Any hand movements are very difficult to control.</td>
<td>Minimal body strength so unable to carry a heavy school bag.</td>
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<tr>
<td><strong>The Team</strong></td>
<td>Michael, Aaron, Teacher Aide and brother</td>
<td>Mathew, Cheryl, Mum, Shane, Dad, Claire, Specialist teacher</td>
<td>Serena, Richard, Dad</td>
</tr>
<tr>
<td></td>
<td>Celeste, Mum</td>
<td>PT</td>
<td>Specialist Teacher, Intermediate and High School</td>
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<td></td>
<td>Specialist Teacher</td>
<td>OT/Technology Coordinator</td>
<td>Teacher Aides</td>
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<td>Special Education Advisor</td>
<td>Communication consultant: OT</td>
<td>Special Education Advisor</td>
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<td>OT/Technology Coordinator</td>
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<td></td>
<td>Communication consultants</td>
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<td>OT/Technology Coordinator</td>
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<td>Wheelchair Therapist</td>
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<tr>
<td><strong>The Technology</strong></td>
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It was the dynamic mix of the team around the student, the student's specific needs and the technology alternatives considered that led us to different solutions for each student. At times, as a team, we did not know of certain options in technology, but we attempted to identify what was needed first. Therefore, we fitted the technology to the needs of the student and not the other way around.

**Being Sure of the Goal:**

**Michael:**

To date, Michael has depended on others for all writing tasks. This has meant that he attempts to communicate verbally what he wants written either by using Yes/No responses or saying some key words and phrases. Michael wants to be able to “write” for himself.

Therefore, we needed to find technology that:

- enabled him to use his sight word knowledge, rather than try to type individual letters
- increased his own head control
- allowed for a system of single switch with scanning
- enabled him to access a word processor
- enabled him to use a computer and access data from the desktop
- could be a dual tool for oral communication as well as written.
Possibilities in Technology: Michael

Daessy stem mounting system with single head switch

Clicker 4 software: used for writing

Desktop computer for trial purposes

Evaluation: software suited his current and future learning needs
Head Switch: had potential but Michael had insufficient head control and limited use: i.e. only when he is in a scanning programme

Was there anything available to help give him head control?
Was there another way that he could access the computer with just head control?

The Witkit: forehead support for head control

The Smart Nav: infra-red software using eye gaze

A review of his wheelchair, seating and tray table to ensure ‘best fit’.

Evaluation: the Witkit worked very well, Michael agreed
Michael and Teacher aide completed comparative trials between head switching and Smart Nav

From discussion with the speech-language therapist (SLT) we decided that Clicker 4 needed to be for primary communication as well as school work.

Therefore, for ease of mobility a laptop needs to be considered

Results: we decided to apply for both the head switch and Smart Nav for immediate access and future skills.
Clicker 4: the entry desktop on his computer servicing both communication and learning
Laptop, Daessy stem mounting system arm, head switch and Witkit added to the framework of his wheelchair
Time Frame and Training:
From beginning to end the trial, assessment, evaluation and application process took over two years. This was due to the complexity of Michael's needs and of the technology, as well as the availability of technology. We had to ensure he was in the best seating possible so that accessing was an accurate reflection of his skills. Each cluster of trial equipment choices then required upskilling and training of Michael, his support staff and ourselves.

The biggest challenge has been the change of school staff and therefore the need to bring them up to speed with both the technology and how it can target the learning goals for him. The training for Michael was firstly to consolidate accurate head switching and then link it into the curriculum levels he is working within. With the approval of this equipment, the school has started to look at other software that may be useful, in particular for maths. I am currently providing fortnightly visits to support his staff and ensure we are targeting his educational goals.

Total Cost including Training: $12,368.00

Being sure of the goal

Mathew: Mathew can write; he worked solidly on letter and word production in his early years of school. Therefore, he had consolidated the visual, perceptual, sensory, cognitive and motor skills around letter shape and form. However, writing was so effortful and 'messy' that he was dissatisfied with the results and could not keep up with his peers or his own cognitive processing. He was very keen to look at how to produce faster, legible, written work.

Therefore, we needed to find technology that:
- made written tasks easier
- reduced errors from uncontrolled movements
- increased legibility for Mathew and others
- allow for independence in producing final product
- ensured he could work alongside his peers
Ensure Mathew is well seated for support and access

Observe Mathew writing versus keyboarding on the class computer

Evaluation: Mathew required more supportive seating. Keyboarding was easier, but he had a tendency to multi key or compensate by ‘dive bombing’ the keys. Sitting at the class computer removed him from his classmates.

Was there a word processor that was small enough to allow him to work alongside his peers? Was there some way of stopping multi keying?

Trial the AlphaSmart: a light weight word processor with normal key size

Supportive seating was found and school chose to purchase for Mathew

The AlphaSmart could be uploaded for formatting, printing and saving on the teacher’s computer

Trial a key guard over the AlphaSmart: a perspex cut out that allowed finger space for each key but prevented multi keying

Evaluation: The combination worked. Mathew liked it and found it much easier. He stayed working alongside his peers. Uploading to the class computer was made easy with the infra red pod as inserting plugs was very tricky for Mathew

Results: we applied for the AlphaSmart with key guard and the infra red pod to upload on the class computer. As Mathew moves on to High School it is likely this technology will need a review and alternatives sought to cater for his academic skills and increasing work load.
Time Frame and Training:

The total trial, assessment, evaluation and application process took approximately 6 months. This was in part due to the fact that Matthew lived in a small, isolated community in the far north; we were working with consultants who were a five hour drive away from Matthew's school.

The trial process consolidated the use of technology for Mathew. He was quick to pick up both the filing and typing skills. We equipped him and his staff on how to plug in and send work to the computer. Ongoing training is only necessary as he moves schools and this is to equip new staff in the technology and process.

Total Cost: $1,591.00

Being sure of the goal

Serena: Serena writes beautifully and up until recently was very keen to retain this as her primary form of written communication. During her last year at Intermediate School (Year 8), her SLE flared up and she found that writing became too difficult and was therefore, willing to look at how else she was going to keep up with the demands of school work. Serena moves between 5 to 6 classes a day, any system she uses must be light to carry. She does not want a Teacher Aide supporting her if possible and wishes to work alongside her peers.

Therefore, we needed to find the technology that:

- did not produce the pain and fatigue that she currently had with hand writing
- enabled her to sit with her peers
- enabled her to carry all her school gear between 5-6 classes/day
- enabled her to hand in written work alongside her peers
- was quicker and more sustainable than handwriting
Possibilities in Technology: Serena

Finding a lightweight word processor that:

- Can hold a day to a week's worth of information on it at any one time.
- Can have alterations to the screen to allow for clarity and font size.
- Is easy to save, retrieve and see text already written.
- That can be easily transferred to a computer or printer so that Serena can get work in on time to teachers.

1. Light weight Laptop: Tablet, weighing at about 1.8kgs

2. Dana: 0.9kgs, step up from the AlphaSmart. Shows eight lines of text, saves as much as required like a laptop, runs for over a day's work on rechargeable batteries, infra red uploading, has screen alterations for font clarity.

3. AlphaSmart: 0.9kgs, has infra red uploading, able to save 8 files of text.

Laptop: Serena could not carry it or get her fingers around it
AlphaSmart: Limited screen and file space but lightweight
Dana: This worked for Serena; she could do all the work she needed to do using this system and work alongside her peers.

Is there a way of allowing Serena to hand in her written work at the same time as her peers?

Trial an infra red uploading pod, this allows work to be uploaded without plugs to a computer for formatting.

Trial a USB cable so that she could print off straight to a printer at home.

Results: We applied for a Dana and to ensure Serena could print off her work as and when she needed we applied for two infra red pods, one for home and one for school. She had access to a home computer and printer. Serena informed us that she would use this tool when her condition was bad or getting bad. This can be for up to 6 months of every year.
Tim Frame and Training:

The total time from trial, assessment, evaluation and application took approximately eight months. The need was indicated at her last year at Intermediate school and we put trials on hold over the six week summer holiday period. Serena had already developed the initial keyboarding and filing skills. We have had to spend time communicating and training with home and school around how to use the uploading system and then teaching Serena how to effectively sort and save her work in a computer. This training is continuing as we match Serena’s needs with the capacities of the technology.

Her condition is now in remission, however she has lost further range of movement and is realising that keeping up with her keyboarding is important as she will need to consolidate this skill especially if she wants to go to University. She also informed us that as her strength was better now, that maybe in her future we might be able to look at a laptop for her.

Total Cost: $1,454.00

In Summary:

The need for access to written communication has helped to drive us to reach the best outcome for each of the students we have worked with.

The trial process at times has been very long: for Michael the ongoing trial process was well over a year and in fact still continues. However, when a student has complex issues I don’t think we can rush the process.

Our results or decisions around technology are also reflections of what we know to date, as well as the current skills of the student. Therefore, it is assumed that as we gain further skills, have more options and the students grow in their skills, then they may receive better services in the future with other choices of technology.

Listening to parents, teaching staff and most of all to the students was essential to find the best solution.

Technology is not the solution; it is part of the process of enabling students to reach learning goals and therefore, will always need reviewing. It is something that we can all learn about; teaming is something we can all facilitate.

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