Effective computer training for people with disability

Kaveh Farbeh-Tabrizi
Hamilton Methodist Social Services, Hamilton, New Zealand
kaveh@hmss.org.nz


Abstract
This paper describes the development of computer courses at Methodist City Action computer school for students with psychological and physical disabilities and discusses the motivation behind developing these courses and the original research and development which led to their establishment. It also outlines methods of delivery and the impact of these courses on the students’ quality of life, independence, social inclusion, literacy, numeracy and employment status. This research was carried out by using available literature found from local libraries and Internet, interviews and classroom observations, and concludes that there is an apparent lack of participation in tertiary education from people with disabilities in New Zealand.

Keywords
Technology, disability, learning difficulties, special needs, accessibility tools, digital divide

1. Introduction
Methodist City Action, the social service outreach of Hamilton Methodist Parish, has a strong focus on the use of technology for an inclusive society. A society where all members have access to, and can use ICT (Information and Communication Technology) confidently and competently, to enhance the quality of all aspects of their lives, and realise their social, cultural and economic ambitions. Currently Methodist City Action computer school has an intake of over 3000 students per year, with 1200 of these students having some sort of physical or psychological disability. Some of the students with disabilities use computer technology by accessing the Internet to obtain information and to socialise online, others are successfully studying computer modules made available to them by Waikato Institute of Technology. Some students have used their computer skills to advance themselves professionally in their workplace. These students have learnt the benefits of assistive technology by taking part in special courses for people with disability at Methodist City Action, which helped them to take a more independent approach in their studies and employment.

To ensure positive integration of students into the society, Methodist City Action has established close partnerships with agencies in the surrounding area. These are agencies who provide vocational, educational, and rehabilitation services to people with disability. And include: Community Living Trust, Graceland Vocational Services, Literacy Waikato, Adult Mental Health Services of Waikato District Health Board, and WorkBridge. Methodist City Action also partners with Volunteering Waikato and Waikato Institute of Technology, to recruit suitable volunteers to support the students with disability in their educational efforts.

2. Literature Review
The preliminary search for literature on the subject of information technology (IT) and assistive technology for students with disabilities returned very few results from New Zealand. The most relevant results were two articles found by using Internet search engines. The Ministry of Economic Development (2006) concluded that the sense of empowerment available through IT in New Zealand is not well researched and, as much as disabled people continue to look to society at large for understanding and support, they have a new realisation that through IT real empowerment is something they can at last begin to achieve for themselves. van Praagh (2004) conducted a study of possible technological solutions and communication devices to enable dyslexic learners to communicate more effectively. She concluded that communication via a computer might be socially inhibiting and expensive for students with disabilities.

This literature search highlighted the special nature of this subject, which until this point has had little research and promotion in New Zealand. Considering that 17% of New Zealanders have disabilities (Statistics New Zealand, 2007) there is a significant gap in research and study in the area of IT for people with disabilities that needs to be addressed. Studies done in Australia also suggest an apparent lack of research on the subject of information technology and disability in that country (Williamson, Schauder, Stockfield, Wright & Bow. 2010). Other countries, like the United States and the United Kingdom, have extensive literature, research papers, and very strong integration of assistive tools for people with disabilities in the education system and workplace.

3. Motivation and History
After inauguration of the Methodist City Action computer school in 2000, it was noticed that a considerable number of adult students who attend the school had disabilities; these students were attending the school mostly to take advantage of the computer technology, offered to them with a minimum donation (Kohas). These adult students with disabilities were showing interest in browsing the Internet, sending e-mail, uploading digital pictures into their computers and recording pictures on CD ROMs. Writing and printing letters of application and CVs for seeking employment were also very popular among these students.

Most of these students were attending the computer classes with support from staff members who were allocated to them from the agencies they belonged to. These staff members were helping the students to read their textbooks, manuals, and onscreen instructions, and were taking notes for them when required. These students, and their support personnel, were frequently asking the IT staff at the Methodist City Action computer school for structured courses to help them in better use of computers. Therefore, Methodist City Action computer school recognised the need to develop specially designed courses for students with disabilities. Recognising that most students with disabilities are adult learners, great care needed to be taken to develop a teaching style that reflected adult teaching methodologies and literature.

4. Preliminary Research
Designing computer courses for students with disabilities proved to be a complex task. Most of these students had not learned about IT at school, some did not have the fluency of the students without disabilities, and some had difficulty with their hands or eyesight that hindered them in using computer interface devices. Some of these students were completely or partially illiterate, and some had difficulties in reading or writing in a way that Methodist City Action computer school staff had not experienced before. The physical access barriers as discussed by Cullen (2003, p. 3) seemed to be a major hindrance in students’ performance, however attitudinal barriers were not very noticeable, as students seemed to be using the technology to increase their self-esteem.

Research showed that IT developments have made it possible for more people with disabilities to realise their educational and employment aspirations. Bearing in mind that students with disabilities are students first and disabled second (Gross Davis, 1993), there was a huge learning curve ahead. At first a small survey was conducted to find out the students’ expectations and their possible limitations in using computers because of their disabilities.
A sample of 20 students with disabilities were chosen and interviewed with close ended questions, shown in Table 1. The questions were designed to be straight to the point, and not challenging for some of the students with possible short attention spans. The answers were then recorded in and are also shown in Table 1.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have fun when working with computers?</td>
<td>Yes 13 No 7</td>
</tr>
<tr>
<td>Do you want to learn more about computers?</td>
<td>Yes 15 No 5</td>
</tr>
<tr>
<td>Do you like to learn how to use a computer without someone helping you all the time?</td>
<td>Yes 15 No 5</td>
</tr>
<tr>
<td>Do you find it hard to use a computer keyboard?</td>
<td>Yes 12 No 8</td>
</tr>
<tr>
<td>Do you find it hard to use a computer mouse?</td>
<td>Yes 13 No 7</td>
</tr>
<tr>
<td>Do you find it hard to use the computer screen?</td>
<td>Yes 9 No 11</td>
</tr>
</tbody>
</table>

Table 1: Survey questions and responses

After interviewing the students we realised that the majority are interested in a more independent way of study, away from their support personnel and at their own pace. Some of their comments were as follows:

- Student A had a plan to save money and buy her own computer to use at home for e-mailing and doing computer courses.
- Student B wanted to use the Internet to make greeting cards and learn foreign dances from the Internet without relying on someone to read for her.
- Student C wanted to use computers as a pastime to play online games, find recipes and read the Internet pages about travel, and news of her favorite sport.
- Student D needed to become proficient in use of computers to be able to get a promotion at work.
- Student E had a computer at home and wanted to learn how to use it better on her own, improve her literacy skills, and do SPACE courses.

We also found that students with disabilities are able to accomplish a greater range of tasks without physical assistance from others and are able to enter a greater number of academic fields with increasing success (Bitter, 1996).

Later observations were conducted of students who had answered yes to questions 4 to 6 and no to question 3 to find out how they continued using their computers amid their difficulties with using the computer keyboard, mouse and screen. We realised that the majority of these students had real problems with recognising the letters on the keyboard, this was caused either by their lack of literacy skills or eyesight problems, and many students had no idea about the functionality of the computer mouse and why and how it is used. These students were very dependent on their support persons to guide them constantly and show them which key to press on the keyboard or which part of the screen to click by using their mouse, in most cases the support person would have carried out the tasks for them. However we also observed that despite their disabilities, most students were good listeners with good attention spans and were able to learn the instructions and memorise them to a reasonable extent, especially when the instructions were read to them by their support personnel. Their way of learning seemed to be more effective if it was combined with visual demonstrations and consistent repetition. These findings about students’ preferences and their way of learning led us to use assistive technology tools, so development of the courses began by utilising such tools available in the Windows operating system.

5. Methods

The Windows operating system has accessibility software such as Screen Magnifier, Optical Character Recognition, On-Screen Keyboard, and the Narrator, which could be utilised by the students with disabilities. To deploy assistive technology tools, it was vital to construct a solid infrastructure to support the technology (Lazzaro, 2001). Therefore the courses were devised in four main phases (see Figure 1).

6. Preliminary Evaluation and Training

The structure of the computer courses available at that time and the materials used in the courses seemed to be comprehensive enough to teach the students how to learn different aspects of computing and (with some extra instructions) also enable the students to use the accessibility tools appropriate to their disability.

The first phase of the courses began by familiarising the students with accessibility tools available on their computers. To achieve this, each student was assigned a dummy project to do with the aid of accessibility software. At this stage a peer instructor was allocated to support the student through the steps of using the accessibility software and completing the dummy project. In most cases the student was given the task of reading or listening to a short story and then repeating the story back to the peer instructor.

The students were shown how to:

- use a scanner to scan the story from a sheet of paper using Optical Character Recognition software (such as Microsoft Office
The important goal of the review phases was to ensure that the students were not set for failure, especially if they were to continue their suitable subject and routine of study. Students were encouraged to complete their assessments by using the accessibility tools; it was at least eight questions correctly in order to gain a pass mark of 75%. After the student completed the whole project and completed all nine slides in the presentation, a tutor checked the presentation by asking the student to present the work to the tutor before presenting it to the class. At this stage the tutor checked the slides for spelling and grammar errors and checked the technicality of the work by ensuring that all the slides transitions and animations are correctly done, and student’s presentation was assessed properly to be made to the student’s presentation, then the tutor gave a list of required changes to be made to the presentattion to the student, and enough time to revise the presentation to the self-directed learning tutorial’s specifications. If the student has fulfilled the requirements, then he/she was also required to present the work in a group presentation, at this stage the student presents the work independently, and then would answer questions asked by the tutor and the audience, these questions were about the assistive tools the student has used to develop the presentation, and how the student created such visual or audio effects etc. This phase made up 75% of the whole mark. The evaluation strategies such as multi choice tests were also developed to assess the student’s progress in more in depth courses such as MS Word and MS Excel. The tests were open book and designed to be read by text to speech and magnifier software. Each test had no more than 10 multi choice questions, and each question would have a straight forward answer that could be circled or ticked by the student. Student should answer at least eight questions correctly in order to gain a pass mark of 75%. If a student failed to gain the required mark after the third assessment, he/she would be subjected to a review process to find a more suitable subject and routine of study. Students were encouraged to complete their assessments by using the accessibility tools; it was interesting that some students with speech impairments used the text-to-speech software to talk for them during their presentations (Stephen Hawking style).
education elsewhere. Therefore, whether successful or not, all students were subjected to a review process. The main goal for this review process was to determine if the students required a more suitable subject and/or routine of study, and to help them overcome the obstacles they had encountered in their previous studies. This phase also proved to be valuable in fine-tuning the adaptive or non-adaptive equipment to increase their efficiency at specific tasks (Lazzaro, 2001). After the review, the students were introduced to another accessibility tool or had their study schedule modified to better suit them or were offered a more advanced subject to study.

10. Impacts of Computer Courses on Students with Disabilities

Using computers has become an important part of the students' lives. Attending the classes and using a computer in general have improved student's punctuality, organizational skills, literacy, numeracy and social behaviour. Students with disabilities use computers as tools which not only entertain them but also interact with them tirelessly and without passing judgement on their disabilities. Using a computer puts the students in the "driver's seat" and gives them a good sense of self-reliance.

A computer can repeat a difficult to understand word or article as often as needed. Computers let the students communicate with others with least difficulty, overcome the barriers of vocal communication and even enable the students to "construct real friendship online" (Murray & Aspinall, 2006, p.7). Using computers has also given the students confidence in using other technologies available in society.

Students who had good participation records showed good progress in their personal lives, socialising skills and job ethics. One good example of this is the recent achievement of one of the students who passed his driver's license test with flying colours by using a computer at the AA centre.

10.1 Independence

One significant breakthrough has been reducing the caregiving burden and improving the students' self-confidence and independence in learning. This breakthrough has special significance among the students with visibility impairments and reading and speech disorders. Accessibility software has given these students the opportunity to pursue their studies independently without needing caregivers to read the text and explain the content to them. The ability to use the accessibility software to provide repetition has been a major factor in achieving independence, especially with students who were shy or embarrassed to ask the caregivers to provide the same amount of repetition for them.

10.2 Organisation

Great care was taken to reinforce the social expectations that the student will encounter outside the classroom (i.e. libraries, Internet cafes, and workplaces); this helped the students to improve their organisational skills and social behavior. Online feedback forms, completed by students at the end of their study sessions, helped them to grasp an understanding of time management and how to schedule and track their studies. Their desire to learn and use the technology helped them in their punctuality and in following their schedule of study for each session to the best of their ability.

10.3 Literacy and Numeracy

Most of the students with visual impairments and reading and speech disorders did not have high levels of literacy and numeracy when they started the courses. Many of those students were even unable to distinguish between letters on the computer keyboard to type meaningful words. After long and hard use of touch-typing programs and accessibility software, and persistence in their training, students showed a significant improvement in their keyboarding skills, literacy and choice of vocabulary. Today they type their progress notes in a coherent and understandable form.

10.4 Further Education

One of the important aspects of this education model was to consider the possibility that the students would one day end their preliminary studies and move on to a higher or alternative education elsewhere; the goal was to pave the way for the students' success in the "outside world". To create a real-world study experience for the students a pilot computer education programme was organized and made available for the students to undertake computer modules offered by Waikato Institute of Technology. The students who took up the challenge used computer accessibility software to study their modules; these students have now passed most of their required modules of study and are continuing their efforts.

10.5 Social Networking and Bridging the Digital Divide

The students' long time desire to communicate, be understood, and replied to has made social networking sites and web-mail important in their training. These tools empower students with a sense of inclusion in society, help them to break out of isolation caused by their disabilities and stimulate their interest in learning. These tools break communication barriers so that the students want to improve their literacy skills in order to communicate more clearly with their online friends and their family.

One potential downfall that needed to be avoided with using these tools was to stop the students getting deeply involved with them and help them remember that computers are just one tool in the wider process of achieving the quality of life enjoyed by people without disabilities. Therefore to ensure that the students did not hide behind their computer screens all the time, they were encouraged to follow their time schedule consistently and have regular breaks from their computer studies.

The negative aspects of using the Internet with minimum supervision were also taken into consideration in training the students; they should not intentionally or unintentionally access or download any objectionable materials or visit objectionable websites. Therefore, before the students began using the Internet, the correct use of the Internet in our organisation was explained to them, and also an Internet filtering program was installed on the system to monitor their Internet activities and prevent access to such websites.

10.5 Employment

Some of the students with disabilities learnt to use computer technology as a pastime or hobby, for fun or socializing, others were employed in jobs that directly or indirectly required them to use a computer. Many students with disabilities who were in paid employment and undertook training with software application tools like word processors or spreadsheets managed to use their skills to improve their employment conditions in terms of hours and pay.

11. Conclusion

Amid the success stories and bitter disappointments, it has been a very long and rewarding time since establishing the courses for the students with disabilities at the Methodist City Action computer school. The process of learning about the use of computers and the assistive technology that they offer has had a significant effect in developing and delivering our teaching practices for the students with disabilities. Learning the positive impacts of these technologies is only the beginning in constructing new methods to encourage them to enroll in tertiary education and earn tertiary qualifications.

People with disabilities have been less likely to participate in tertiary education in New Zealand, especially at bachelor level (Ministry of Education, 2009), than in countries like Spain (Digital Solidarity, 2002) or the United States (Miglione, Butterworth, & Hart, 2009). Increased participation is likely to result in more people with disabilities entering the work force with a tertiary qualification.

Acknowledgements

The author would like to acknowledge the following people for their invaluable support: Meegan Farheb-Tabrizi, RN,PGCertHSC, Dr. Michael Verhaart, Rev. Dr. Susan Thompson, Dr. Donald Joyce

References


