

TECHNOLOGIES FOR IMPROVED TEACHING AND LEARNING OUTCOMES FOR APPRENTICES AND TURBULENT TIMES

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Introduction

During the turbulent times of a skill shortage in economic prosperity or equally in employment downturn, State, Territory and Commonwealth governments, have implemented a range of measures to address the country's skills needs by strengthening the apprenticeship system and the industry's need for a higher level of knowledge and skill. The objective of this paper is to identify teaching and learning strategies, specifically assistive technologies, which address attrition and increase the unit of competency completion rates of apprentices and trainees, with deficiencies in language, literacy and specifically learning disabilities. This paper is based on the findings of research conducted for the Community of Practice sponsored by the National Centre for Vocational Education Research (NCVER) and a pilot project at the University of Victoria, highlighting the use of accessible and portable technology as a teaching and learning aid.

Findings from the NCVER research project indicate that while apprentices considered technologies as a valuable initiative for assisting learning, this is not been implemented widely across the trade areas. Skills Victoria at Victoria University however, has funded one such initiative. The pilot programme, one of three in Victoria, has been funded to identify and address systemic and institutional factors that can restrict and make an impact on completion of qualifications by young people in a Vocational Education and Training setting. Initial findings lend insight into the type and nature of teaching and learning strategies employed and any early indications of success with an analysis of some accessible and portable technologies that can assist apprentices with their studies. Freeware that would aid literacy such as D Speech, Top OCR, VU Bar, Power Reader and Hot Notes will be demonstrated and discussed as valuable and effective learning tools.

Participants in this study are referred to by Marateo and Ferris (2007), as the NET generation; the first to grow up with digital and cyber technologies. As such these students are advantaged in dealing with using the new technologies to access learning. Findings from these studies indicate the application of these strategies and, more significantly, how assistive technologies enable the students to access information and build success for all. For a generation already familiar with the use of the internet, social networking sites and forums, ipods, mobile telephones, game technology, new portable assistive applications will be, for the most part, quickly adapted for

individual use. By far one of the best features of portable and accessible applications is the universal appeal to a wide range of students, not only those students with a diagnosed learning, processing or organisational disorder, but also to students from lower socio economic backgrounds, students with education gaps, English as a second language (ESL) or students who struggle with language or literacy/numeracy.

Although a number of factors contribute to the completion and non completion of apprentices, those with deficiencies in language and literacy and specifically learning disabilities, experience additional barriers to the completion of units of competency. Moreover, training organisations as part of legislative compliance are required to accommodate apprentices with a learning disability. These apprentices have the intelligence, reasoning and concept formation (Knapp, 2000) to learn the skills of the trade. As a consequence of neurological impairment, however, they experience processing problems with linguistic materials that impair their ability to learn how to read and can impact organisational capacity. These apprentices, therefore, face specific barriers in accessing course information and as a result of repeated academic failure, may also experience low self-esteem and self efficacy that erodes their motivation (Wong 1996). Findings from both studies show that certain strategies and in particular, assistive technologies, allow students to overcome processing problems and access course information.

Review of the Literature

Specific strategies for improved teaching and learning outcomes

An investigation of the literature reveals the compensatory strategies that enable students to access information at post secondary levels in spite of impairment, language and literacy difficulties. These include: notetaking, taped lectures, mentoring, extensions for assignments, use of laptops, digital recorders and a change in instructional techniques. According to Borgå (2009), for example, a number of students with learning disabilities found it difficult to listen and take notes at the same time in lectures. To offset this difficulty, handouts were invaluable for a number of students while some organised peer notetaking. Swanson and Hoskyn (1990) emphasise instructional factors that engage and build on individuals' conceptual strengths through questioning, modelling answers, scaffolding and cooperative learning.

Additional time to practice and acquire a new skill is a fundamental adjustment for these students. Based on the research of, neuroscientist, Shaywitz (2003), students with dyslexia have a neurological disorder causing phonological processing difficulties so “far and away the most critical accommodation for the dyslexic reader is extra time. Dyslexia robs a person of time: accommodations restore it” (Shaywitz, 2003, p.314). Similarly, to overcome the difficulties of poor writing in assignments, Herrington and Simson (2002), developed the use of alternative assessments with taped responses and a videoed listener's support package.

To offset poor organisational abilities and time management difficulties, Milson and Dietz (2009) recommended that students be assisted with time management skills, the

use of planners and the development of study skills and self reliance. As a way of compensating for their deficits in phonological processing, Trainin and Swanson (2005) and Wong (1996) identified the use of metacognitive strategies or self-regulated behaviours for students who rely on different cognitive processes that don't involve decoding. With training in metacognitive skills, students learn to manage their own time, decide with whom to study and to monitor their comprehension with a variety of internal and external supports such as peers, family and relevant staff members. To promote their healthy social and emotional development, Reis and Colbert (2004) advocate a supportive learning environment in which to implement these strategies and to overcome the social, emotional, developmental barriers and underachievement experienced by these students.

Emergence of Technologies

New technology has an important role to play in delivering these compensatory strategies so that students are afforded the same accommodations while becoming engaged and self reliant in the learning environment. As rapid advances are made in hardware and software applications, technology has the capacity to assist students with learning disabilities overcome phonological processing deficits and difficulties with writing and organization. Free applications such as Click n Type, Power Reader and D Speech and commercial word predicting products like Co Writer SOLO, Soothsayer and Read&Write 9 Gold are just some of the current products available. Word predicting and auto completion software helps to build success by improving fluency and decreasing spelling and grammatical errors.

MacArthur's (2009) study of the use of technology to support students with a learning disability identifies the benefits of the wide range of computer applications for struggling writers. Shaw (2004) also encourages the use of assistive technologies to accommodate students with a learning disability. These technologies range from basic word processing, spell checkers, word prediction and speech recognition for transcription and revision, to the use of the Internet as an online communication tool. Speech recognition and voice activation packages such as *Wynn and Dragon Speak Naturally*, respectively, according to MacArthur (2009), enable writers who struggle to compose by dictating, to see the emerging text and read as necessary. As a result, the use of these packages allows students with illegible or slow handwriting to produce longer and higher quality papers than by handwriting or word processing. MacArthur (2009) also identifies the potential of the Internet to improve students' writing and communication skills. An important feature is improved accessibility with the emergence of free computer software known as "freeware" and portable software programs such as D-Speech that convert text to speech. The written word on a computer screen or a page can either "liberate or disadvantage a student." (Kennedy, 2009). Text to Speech applications allow the learner to hear the words, rather than read them, as this task can be difficult for some learners. Content can be listened on the computer (with ear phones if in class) or easily converted to a wave file and listened to on more portable devices such as mobile phones, ipods or other MP3 players. As the NET generation as labelled by Marateo and Ferris (2007), these students are advantaged in dealing with using the new technologies to access learning. Research conducted for the Department of Education Science and Training (2007)

acknowledges the positive social and cognitive development achieved through such strategies and poses what pedagogical approaches using technology are most effective to optimise learning.

The research method

Research for this project was conducted at the largest training organisation in Western Australia. This training organisation in Western Australia has over ten thousand apprentices and approximately 450 trade lecturers across 35 industries areas was considered as representative of a cross-section of apprentices and staff to provide an adequate sample for the purpose of this study. A questionnaire was used to gather data from 21 apprentices with a learning disability who are making progress in their certificate III trade qualifications. Two focus groups were conducted with volunteer lecturers and Disability Services staff, while interviews were conducted with family members and staff unable to join the focus groups. Participants in this study were chosen for their experience of and insights into the subject. Given the constraints of resources and timeframe, this study concentrates only on unit of competency completion based on the premise that this is evidence of progress towards retention, and eventually to the completion of a trade qualification. Apprentices receive their qualification from the training organisation when they are competent in both the training and on the job components of the course. This Western Australian study which explores the effectiveness of all teaching and learning interventions, links with action based research at Victoria University supports the universality of introducing technology to mainstream groups of pre apprentices. The Student Completions Project (One of three pilot projects currently being run in Victoria) at Victoria University is focussing on best practice across a range of industry areas. Recently, the engineering program was re structured to include the use of more technology. In addition to the technologies used in the workshop area, the program is currently using e-portfolios, Internet, game technology (OHS) and has access to many portable free applications on an access apps usb stick.

Findings

Students participating in the research at the training organisation in Western Australia experienced the following difficulties in accessing the course information.

Table 2 Difficulties experienced by apprentices as a Result Of a Learning Disability

Difficulties experienced	Students Reponses	
Difficulties	Response Percent	Response Count
Understanding the texts	73.7%	14
Reading	78.9%	15
Writing	52.6%	10
Maths eg measuring	42.1%	8
Assessments	57.9%	11
Time Management	15.8%	3
Being organised	10.5%	2

Apprentices and focus group members identified instructional approaches as being amongst the most effective interventions. Consistent with literature, students acknowledged the importance of individual tuition, with 77% of apprentices specifying mentoring or tutoring as the most helpful strategy. In a supportive environment the measures that compensate for processing difficulties while enabling the students to demonstrate their understanding, include:

- simplifying terms and clarifying concepts
- mind mapping
- task analysis
- use of equipment and visual representations to present abstract concepts
- use of technologies such as laptops and tape recordings
- scribing assessments conducted verbally.

While technology was used to a limited extent with apprentices in this study, 22% saw technology and the use of computers as an effective intervention. One student stated that he would like to have more accessible technology available. Another apprentice in automotive used the Internet to look things up to see how they are made and work. Computers assisted two other students who described themselves as visual learners. For these students the benefit was the immediacy of a written result and the ability to manipulate material using the features of Word and use of the spell and grammar check. Students with poor writing were able to demonstrate competency with the use of laptops and digital recorders. Lecturers and support staff also welcomed the use of technology and described how it had been used to allow apprentices to access materials and demonstrate competency. The use of a laptop and digital recorder, for example, enabled one student to record and film his assessment task, achieving competency and commendation from the lecturer. After discussion with disability staff, the lecturers acknowledged that technology is a viable means of students demonstrating their understanding of the subject and competency in assessment tasks. Staff in one department use the Internet as a source of online delivery. These presentations using visual aids and animation not only accommodates a variety of learning styles but also has application for students who may not be able to attend all lectures. This delivery fulfils the potential of the Internet to improve student learning as identified by MacArthur (2009) who indicates that this medium has a capacity to assist all students including those with a learning disability.

Although most had little exposure to assistive technology and freeware, the research conducted in Western Australia suggests that there is the capacity to improve teaching and learning for apprentices with the use of assistive and new technologies. Many of these technologies are accessible through everyday items such as internet, mobile phone, organizers such as blackberries. In addition, a large number of portable, free applications that can assist people with literacy, language, organizational, planning and vision deficiencies are available over the Internet through RSC Scotland. The portability of these applications allows them to be used in the workplace, at home or at school/TAFE.

These applications were introduced to key teaching staff at a secondary school in a lower socio economic area in the outer western suburbs of Melbourne in 2009. A technology consultant demonstrated their uses and a second, follow up session was

held. The teaching staff resolved to fund the duplicating of the freeware to provide a copy of the applications to all students.

Processing problems that impair fluency and comprehension are addressed by the use of voice activated software. Word documents are read to the student enabling access to information or the requirements of assessments tasks. Once introduced to the technology, students can reduce their reliance on other staff and peers to become resourceful and self reliant learners. Poor organisation and time management is another characteristic identified by 36% of those surveyed may be accommodated by the use of Mind mapping tools Freemind and XMind, Hott Notes and Sunbird Calendar, (all available on Access Apps.)

Conclusion

As educators working with apprentices we need to continue to explore new and interesting ways to capture students' attention, to engage all students across the spectrum of abilities and skills. Success in VET for all students, and especially students with additional needs depends on a combination of traditional and contemporary approaches to teaching and learning. Whilst traditional approaches include the development of industry skills through work shop practice and competency based training methods, contemporary approaches must include a range of appropriate software and technologies for use in the classroom and beyond.

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