Implementing a site licence for an assistive technology literacy tool: Action research in a regional high school.

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Introduction

The beginning of the new millennium has seen an increase in the availability of assistive technologies (Blackhurst, 2005). For example, the number of assistive technology tools available to teachers increased from 20,000 in 2001 to 25,000 in 2003 (Edyburn, 2001, 2005). Teachers and their students now have at their disposal a range of technologies to support accommodations and modifications to learning programs.

The term assistive technology can cover a wide range of technologies (O'Connor, 2008). This paper uses the British Educational Communications and Technology Agency (Becta) definition of the term assistive technology, which is identified as "the software and technology which helps people with disabilities and special needs to overcome the additional challenges they face in communication and learning"(2003).

The research concerning the use of assistive technology by students with disabilities and learning difficulties in schools is limited but emerging (Abbott, 2007; Edyburn, 2007; Okolo & Bouck, 2007; Wehmeyer, Smith, & Davies, 2005). This research indicates that assistive technology has the potential to have an impact on the learning and educational performance of students in schools (Edyburn, 2007; Edyburn, Higgins, & Boone, 2005; MacArthur, Ferretti, Okolo, & Cavalier, 2001; Okolo & Bouck, 2007; Wehmeyer, Smith, Palmer, & Davies, 2004).

Particularly in the area of literacy, researchers have begun to examine the role of assistive technology and student learning outcomes. Lewis (2005) describes two research projects that have investigated assistive technology and literacy outcomes for students with learning disabilities. Firstly, the Enhanced Writing Skills Project, designed to research the use of word processing tools by students with learning disabilities in grades 4 to 12. Findings from the project found that word processing had a positive impact upon the accuracy of student writing, word prediction increased typing speed and spelling checkers were effective editing tools. Secondly, Project LITT, a three year study concerning the effectiveness talking story book software, or hypermedia, in improving literacy skills. Findings indicated that talking storybook programs did have a positive impact on student's overall skill development. A study by Zhang (2000) using a specially designed computer program as a writing tool to assist 5th grade students in a weekly based writing curriculum showed positive effects on the students' writing behaviors and their written products. The research of Higgins and Raskind (2000) concerning speech recognition software found improved word recognition and reading comprehension.

A meta-analysis (MacArthur et al., 2001) of literature published during the period 1985-2000 on the use of technology to teach or support literacy among students with mild disabilities found "cautious optimism about technology's potential to improve literacy skills and instruction" (p.298). More recent literature reviews concerning assistive technology and literacy (Anderson-Inman & Horney, 2007; Center for Implementing Technology in Education, Undated; Davies, 2003; Disseldorp & Chambers, 2002; Lange, McPhillips, Mulhern, & Wylie, 2006; C. Lewis, 2007; R. B. Lewis, 2005; MacArthur et al., 2001; Quenneville, 2001; Sitko, Laine, & Sitko, 2005; Stewart, 2002; Strangman & Dalton, 2005; Strangman & Hall, 2003) confirm the exciting potential of assistive technologies in relation to literacy and students with disabilities and learning difficulties.

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With the increasing availability of assistive technology in schools but limited research around it efficacy, teachers have access to little research data to assist in decision making. Castellani and Castellani (2005) highlight this point when they observe that "special education teachers are using technology to accommodate and adapt curriculum without the use of research or data-driven decision-making processes to guide practice" (p. 847). The gap between research and practice in special education is generally acknowledged (Jenkins & Dix, 2004; Odom et al., 2005), and given that researchers will never probably keep up with the rapid pace of assistive technology development, it could be argued that teachers need to undertake their own research to inform their practices and drive their decisions. Action research is a research paradigm which has the potential to make this happen by providing a framework which allows teachers to investigate their own practices. Action research is a disciplined process of inquiry conducted "by the person or the people empowered to take the action concerning their own actions, for the purpose of improving their future actions" (Sagor, 2005).

This combination of teachers utilizing these emerging assistive technologies, with the ability to make disciplined and informed data driven decisions, is an alliance worth exploring.

Action Research Background

This action research was conducted in a high school in the North Coast region of New South Wales.

In 2006 the high school was a participant in the New South Wales Department of Education and Training North Coast Region Assistive Technology Mentoring Project (Appendix 1). This project aimed to provide mentor support and resources to participating schools that had been identified as requiring assistance in the use of assistive technologies to support the learning programs of students with disabilities. One of outcomes from this project was the identification of the need to support the use of the literacy software tool, TextHELP: Read and Write Gold©, with a number of students at the high school.

TextHELP: Read and Write Gold© is a software program that assists students with their reading and writing. It provides a number of digital literacy scaffolds including text-to-speech, phonetic spell checker, word prediction, study and research tools, and text-to-mp3 (TextHELP, 2008).

Prior to 2006 students who required the use of TextHELP: Read and Write Gold© had been provided with this software via single user licence on a dedicated laptop. School staff indicated that the use of the software in this way was limited. Possible reasons provided included lack of staff training, lack of student training, and limited access to the software.

In response to the issue of limited access, a school site licence for TextHELP: Read and Write Gold© was approved for installation in 2007. This was the first regionally funded site licence for an assistive technology software package undertaken on the North Coast at that time. The anticipated outcomes of this initiative were better student access to the software leading to improved learning outcomes. In order to determine whether these outcomes were achieved an action research model of data collection and analysis was implemented.

The action research addressed the following questions:

1. Will implementing a site licence for TextHELP: Read and Write Gold© in a high school increase **access** to this software for students with disabilities who have been identified as requiring this assistive technology?
2. If so, does increase access to this assistive technology have an **impact** on the learning outcomes of these students (completion of in-class activities, completion of assessment tasks, improved assessment marks, increased student engagement)?

Research Methods

Research Design

An action research model was implemented to examine these research questions. Action research can be defined as a

> *collaborative learning experience where a community of practitioners come together to critically reflect on ways to improve their practice. It is transformative in that the learning is grounded in understanding experiences through a process of planning, acting, observing and reflecting on the work of teaching. For teachers, this is a rewarding and empowering process that equips them to determine approaches to teaching and learning that are professionally relevant, personally meaningful and effective in facilitating improved performance for students* (Fletcher, 2005).

This process of planning, acting, observing and reflecting leads to ongoing cycles of action rather than a simple snapshot in time or a single cycle of action (New South Wales Department of Education and Training, 2007).

Using a model of action research detailed Richard Sagor's book, *The Action Research Guidebook: A Four-Step process for Educators and School Teams*, (2005) an action research plan was developed using the four stages proposed by the author (Figure 1)..

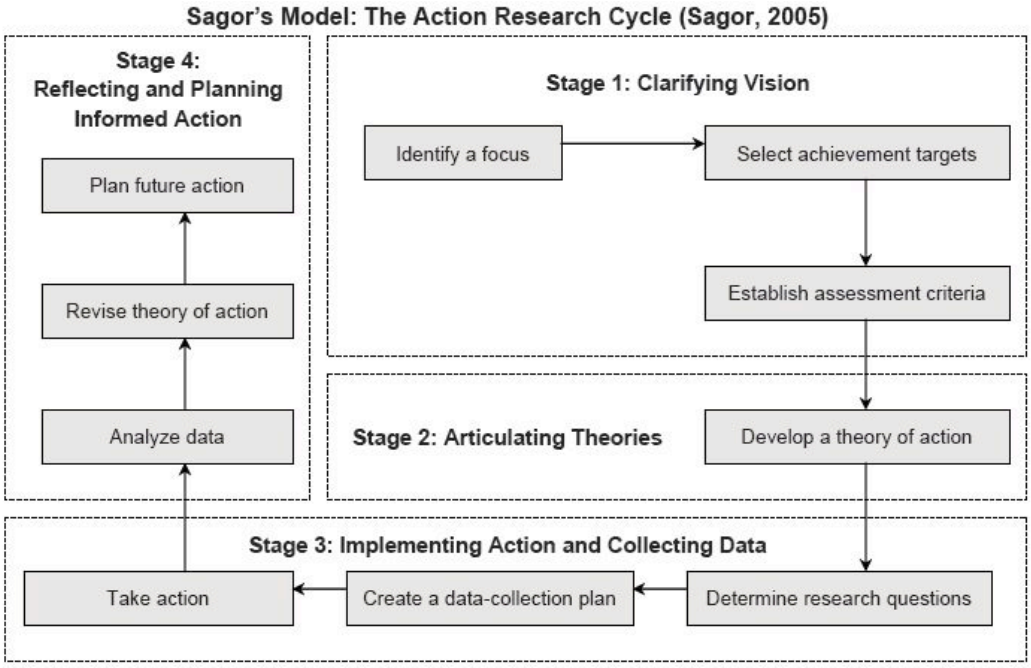

Figure 1

Stages 1 and 2 of Sagor's model were completed by the Learning Assistance Program (LAP) Coordinator in the school and the author during the initial stages of the project to determine the research questions and a plan of action in relation to stages 3 and 4. The LAP Coordinator was then responsible for coordinating the project, collecting the data and collaborating with school staff. The author undertook the role of 'critical friend' or mentor, providing advice and support in the implementation and management of the project, and assisting in the data analysis (Dick, 1997).

Five students in Year 9 who were assessed as possible users of the software program TextHELP: Read & Write Gold© were identified as subjects for the action research. None of these students were using the program on a regular basis in their learning programs. Appropriate consent was sought and gained for student involvement (See Appendix 2).

Data Collection and Analysis

A. Data collection and sources:

Data was collected from a variety of sources as outlined in Table 1. Where possible existing data already in the school was used.

Reliability and validation were attempted by triangulation of the data. Data was collected by seeking feedback from students and staff, examining student participation and results, and the keeping of a research journal by the LAP Coordinator.

Research Question	Data Source 1	Data Source 2	Data Source 3
1. Will implementing a site licence increase access to TextHELP: Read and Write by students?	Research journal kept by school staff member.	Observations of student access to the technology.	Observations of staff access to the technology.
2. Does increase access have an impact on student learning outcomes?	Research journal kept by school staff member.	Assessment results including semester reports, completion of assessment tasks, completion of in-class tasks, and student work samples.	Feedback from staff and students.

Table 1. Triangulation Matrix – Initial Data Sources (Taken from Sagor, 2005)

B. Data analysis:

Sagor (1992) states that data needs to be systematically collected to facilitate analysis. "Data analysis can be most simply described as a process of sifting, sorting, discarding, and cataloguing in an attempt to answer two basic questions: (1) What are the important themes in the data? and (2) How much data support each of these themes?" (p. 48).

Data collected during this action research was *sifted, sorted, discarded, and catalogued* through ongoing analysis by the LAP Coordinator and the author. This occurred either on site or via telephone or email. Patterns or *themes* in the data were then identified and analysed.

Results

Research Question1

> *Will implementing a site licence for TextHELP: Read and Write Gold© in a high school increase* ***access*** *to this software for students with disabilities who have been identified as requiring this assistive technology?*

Previous to this action research TextHELP: Read and Write Gold© was on two laptops in the school. As a result of the school site licence TextHELP: Read and Write Gold© was installed on almost all computers on

the school computer network by the beginning of Semester 2, 2007. This included every computer lab in the school (except for one lab which had a different operating system), and all library and staff computers. Computers accessed by students are those generally situated in labs.

It was observed that the 5 targeted students accessed the program extensively by the end of Semester 2 to read, take notes, and provide written material during English, Science, and Human Society and its Environment (HSIE) classes and exams. Their access depended upon the availability of either a laptop or classes being held in a computer lab.

Other students and staff were also reported to be aware of the availability of the program and its potential for use. Student requests to use the program were received, with some students asking about the program for home use as well as school. As a result all classes in Years 7 and 8, and some classes in Year 9, were provided with an introductory training session on its use. Consequently, plans were developed to introduce the program to all Year 7 students at the beginning of each year. Staff requests for training were also noted, and as was staff identifying three new students to be possible candidates for using this assistive technology. In general it was reported that staff and student knowledge of the program had greatly increased.

Issues resulting from increased access were also identified. Difficulties installing the program on the school networks were a result of administrative constraints. Full access to the program was not available until the second semester of 2007. Physical access to a computer was sometimes identified as an issue, particularly if classes were not timetabled in a computer lab. Teachers also encountered increased requests by support staff and students for the preparation of learning material in advance in a digital format.

Research Question 2

> *Does increase access to this assistive technology have an* ***impact*** *on the learning outcomes of students (completion of in-class activities, completion of assessment tasks, improved assessment marks, increased student engagement)?*

The installation of TextHELP: Read and Write Gold© was not completed until the beginning of Semester 2, 2007. During Semester 2 a number of improved outcomes were recorded for the 5 targeted students of the action research. Students were found to use this assistive technology literacy tool mostly in English, Science and HSIE classes. It was noted that the students reported a more positive attitude to their learning programs, and an increase in confidence and self esteem, when using the assistive technology literacy tool. A student also reported a reduction in stress when provided with this assistive technology in exams. Further, it was observed that students demonstrated more on task and independent behaviours when using this tool. For example, Students A, B and C were taking all class notes using the program by the end of Semester 2, and Student B handed in all in-class assessments, which was not previously the case. An improvement in the legibility quality of written assignments was also acknowledged as a result of the transition from handwritten to typed assignments.

The software program was also accessed by other students in the school. Students independently requested use of the program or were provided with access based on the recommendation of teachers. As a result the LAP Coordinator introduced the software to all students in Years 7 and 8. In addition a Year 9 class were provided with access during computer lab classes for literacy based activities. The teacher reported that for an in-class internet research task, the completion rate was 100% compared to previous completion rates averaging 30%.

Assessment data was collected for the 5 targeted students. English and HSIE exam scores for Semesters 1 and 2 2007 were compared for the students and these comparisons are represented in Figures 2 and 3 (Science did not conduct 6 monthly exams). Semester 1 exams were undertaken by students with the support of readers, adult helpers who assisted students in the reading of the text, but without the use any assistive technology. For Semester 2 exams all students used TextHELP: Read and Write Gold© as a special exam provision but no readers were used.

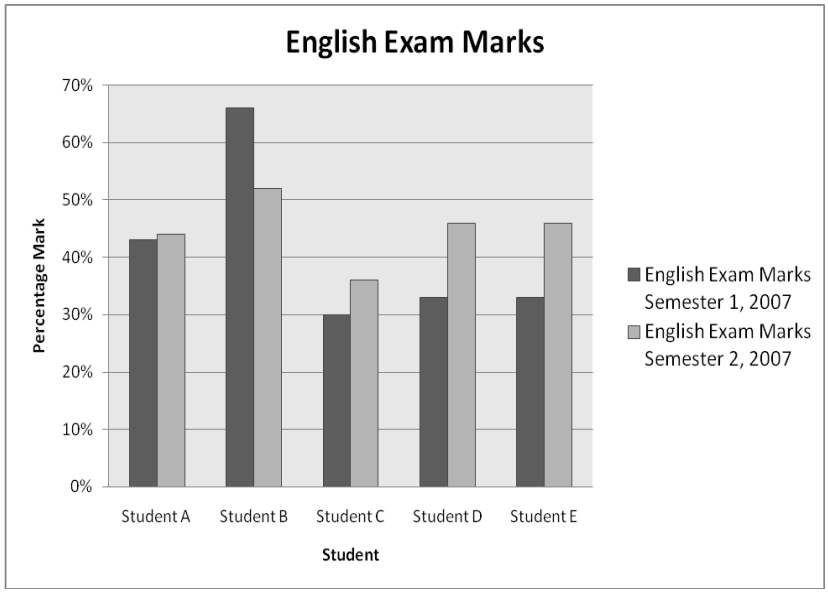

Figure 2

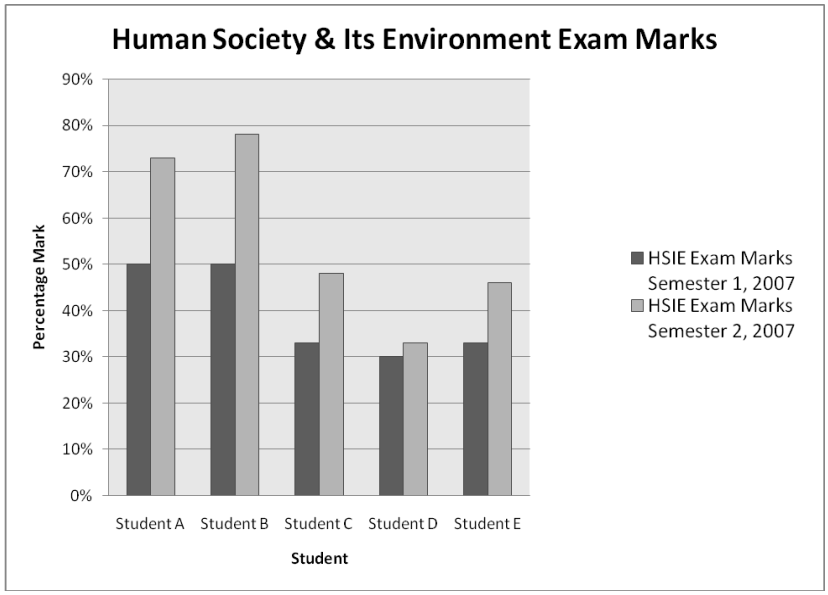

Figure 3

All students, except for Student B in English, showed improvement in test scores. The major variables that existed between exams were the introduction of TextHELP: Read and Write Gold© and the removal of the use of readers for the Semester 2 exams. In addition it was noted that Student B was unwell during the Semester 2 English exam.

Course assessment marks for Semester 1, 2006 and Semesters 1 and 2, 2007, were collected for each student and compared with each student's class average in the subjects of English (Figure 4), Science (Figure 5) and HSIE (Figure 6). Again, for each student access to TextHELP: Read and Write Gold© only began in Term 2, Semester 2 2007 for these subjects.

An analysis of the data reveals that students show similar comparison patterns for each of their three subjects. Students A and C course marks remain constant with the class average. The course marks for the remaining students (B, D and E) however do not follow this trend. For these three students in general their course marks comparison patterns move in a downward trend from the class average in Semester 2, when the assistive technology literacy tool was introduced. It would appear that the achievement gap with their class peers, reflected in course marks, becomes more negative in Semester 2.

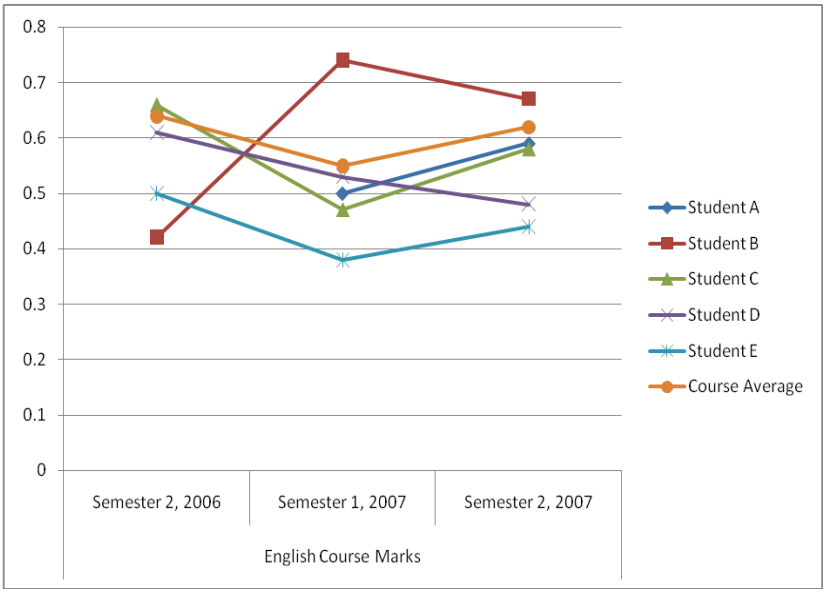

Figure 4: Comparison of Student Course Assessment Marks with Class Average in English

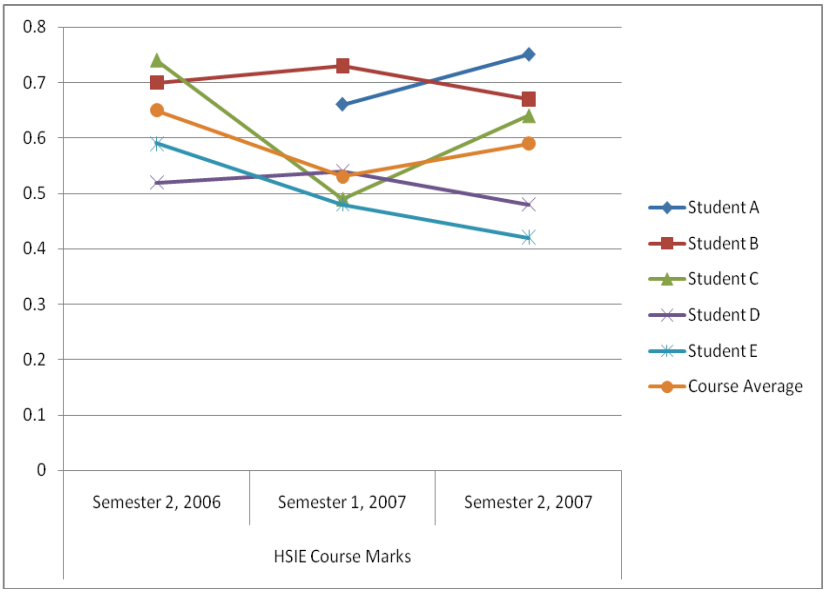

Figure 5: Comparison of Student Course Assessment Marks with Class Average in HSIE

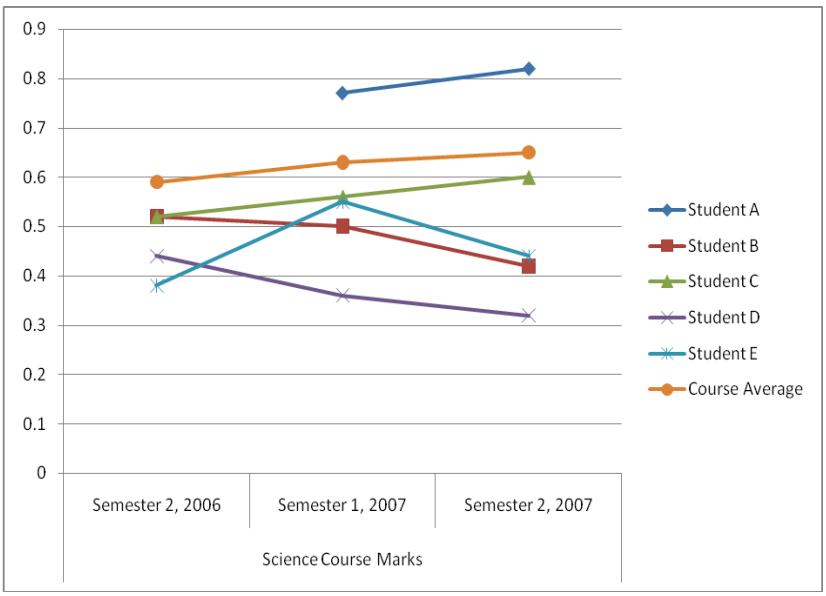

Figure 6: Comparison of Student Course Assessment Marks with Class Average in Science

Personal skills and abilities of all students are assessed by subject teachers in semester reports with a four point rating system from *never* to *always*. Figure 7 provides an example from a report format.

Personal Skills and Abilities	**H**	**C**	**D**	**N**
Completes classroom tasks				
Complete homework and assignment tasks				
Demonstrates independent work skills				
Demonstrates preparation and organisation for class work				
Responds positively to teacher directions				
Table Key: H - Always C - Often D - Sometimes N - Never				

Figure 7

Reports were analysed for the 5 targeted students to determine whether a change was recorded when identical personal skills and abilities were graded between reports in Semesters 1 and 2 by the same teacher. Overall analysis found that students either maintained or improved their assessment levels for these personal skills and abilities. Students A and C generally maintained their ratings between reports. Students B, D and E all recorded improved ratings in the areas of classroom and homework task completion, and independent work skills.

The reported increase in student independence was also reflected in the change of role undertaken by teachers' aides in Semester 2. Teachers reported taking more direct responsibility for in-class student learning and requiring less close supervision of student work by teachers' aides. As a result teachers' aides could spend more time preparing digital lesson material in advance to facilitate greater student independence in class.

Discussion

This action research project investigated whether implementing a site licence for TextHELP: Read and Write Gold© would increase student access to this program, and if access was increased, did it have an impact on student learning outcomes.

Analysis of the data identified that implementing a site licence for TextHELP: Read and Write Gold© did improve access to the software for the 5 targeted students. After one semester all students were using this literacy tool extensively in English, Science and HSIE. Students then used the software program as a special provision in the end of year exam in these subjects. In addition, it was observed other students and staff across the school also began to explore the use the software as a literacy tool. This has led to planning for a more systematic approach to the introduction of the software to all Year 7 students in the future.

Increased access has meant staff needing to prepare lesson material and exam papers in digital format in advance. Initially more time by staff is required in lesson and exam preparation because more students are accessing the software program. What this looks like in the following school year is worthy of future examination. Timetabling classes to computer labs to ensure student access to the software program is also a potential problem in the future.

The implementation of a site licence for this software program, as opposed to individual licences on dedicated computers, not only improved access for targeted students but also facilitated the identification of other students as possible users. A more comprehensive regime of student identification and access to this assistive technology literacy tool is an area for future action. This will also involve the need for ongoing professional development to ensure all staff are aware of the potentiality of the program to support accommodations and adjustments to learning programs for all students.

The data collected and analysed during this action research project did indicate that the increased access to TextHELP: Read and Write Gold© impacted on student outcomes in a number of ways.

Students and staff reported an increase in student confidence and self esteem. Improved test results, completing assessment tasks and providing a quality finished product were all outcomes attributed to using this software program. An overlay to these outcomes is the reported increase in student independence in the classroom. This has had a direct impact on the role the teachers' aide in supporting student learning programs. How this role changes as a result of continued implementation of this software program across the school requires further investigation.

All students showed an improvement in test scores for the end of year exams with the introduction of TextHELP: Read and Write Gold© as a special exam provision. The implications for their exam requirements at the end of the year when they sit for the state wide School Certificate tests need to be explored and addressed.

The analysis of the course assessment marks, however, indicated that three of the students fell behind their class mates in relation to all assessable tasks after the introduction of the software program. Further cycles of action research will be required to drill down to uncover a deeper understanding of what this indicates. Possible questions to be asked in future cycles of action research include:

1. Is there a time lag between increased student independence and improved assessment results? Students who have relied on an adult to support their learning have now moved to becoming more independent in a short period of time.
2. Are there other variables which may have impacted on these assessment marks? Not all variables were identified and considered in the analysis of data.
3. Did teacher expectations increase for students with the introduction of the software program, and if so, did this impact on assessment data? Teacher expectations and what success looks like for students using assistive technology needs to be further examined.

Conclusion

This paper details a small action research project that has begun to explore the possible benefits of a site licence for an assistive technology literacy tool in a high school. This project is modest in its scope but attempts to provide a framework which allows "a deeper understanding and more meaningful outcomes" (New South Wales Department of Education and Training, 2007) for students using this assistive technology. The methodology used has informed teacher decisions through ongoing cycles of action, reflection and change.

While the findings are contextual, and therefore limited, they do reflect the research literature concerning the potential of assistive technologies in the area of literacy. This program has made a difference for the five targeted students, and has the potential to support the learning of other students across the school.

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Appendix 1

2006 Assistive Technology Mentoring Project : North Coast Region, New South Wales.

Background

In 2006 schools in the North Coast Region were invited to apply to participate in the "Professional Learning Trial into the effective utilization of Assistive Technology with a Mentor". This project was a response to the difficulties encountered by schools in making informed decisions regarding assistive technologies and identified in the literature (Marino, Marino, & Shaw, 2006). A high school and a primary school were selected to participate in this trial. Both schools had identified that they had limited assistive technology knowledge and skills, and they had a cohort of students within their schools not currently accessing assistive technologies.

Project Goals

- Provide mentor support and resources to the participating schools to enable identification, assessment and trial of equipment with students who require assistive technology.
- Support the use of assistive technologies to facilitate access to the curriculum, minimize barriers to learning and improve learning outcomes for students with disabilities.
- Develop teacher skills and resources in assistive technology, and support the sharing of their knowledge and skills with other teachers and staff.

Implementation

Stage 1:
Teachers identify a student who is currently experiencing significant barriers to learning and participation and who they believe will gain a measurable educational benefit from using assistive technologies. Completion of student assistive technology profile utilizing the SETT Framework (J. Zabala, 2005; J. S. Zabala, 2000), the WATI Assistive Technology Checklist (Reed & Walser, 2000) and the Assistive Technology Consideration Guide (Wisconsin Assistive Technology Initiative, n.d.).

Stage 2:
Visit to schools by mentors to support completion of profile, identification of low to high tech solutions, and finalise implementation plan.

Stage 3:
Implementation phase including: visits from mentors, ongoing teacher and staff training, student training in the use of the assistive technology, integration of technology into teaching and learning programs, and monitoring of student outcomes.

Stage 4:
Evaluation and follow-up: identification of additional areas of need for staff and students.

Appendix 1 References

Marino, M. T., Marino, E. C., & Shaw, S. F. (2006). Making informed assistive technology decisions for students with high incidence disabilities. *Teaching Exceptional Children, 38*(6), 18-25.

Reed, P., & Walser, P. (2000). adapted from Lynch & Reed (1997). Wisconsin assistive technology initiative technology checklist. Retrieved 13/2/07, from http://www.wati.org/loanlibrary/techchecklist.html

Wisconsin Assistive Technology Initiative. (n.d.). Assistive technology consideration guide. Retrieved 13/2/07, from http://www.wati.org/AT_Services/consideration.html

Zabala, J. (2005). Ready, SETT, go! Getting started with the SETT framework. *Closing the Gap, 23*(6).

Zabala, J. S. (2000). Setting the stage for success: Building success through effective selection and use of assistive technology systems. Retrieved 12/6/06 from http://www.ldonline.org/article/5874?theme=print

Appendix 2

Parent Consent Letter

Dear

_____ High School has recently been provided with funding to install the software package, TextHELP: Read & Write Gold©, across the entire school computer network. Your ***son/daughter*** _____ has been identified as a student at our school who will benefit from the use of this software.

As a school we intend to undertake an action research project to find out whether providing this software across the entire school network will benefit the learning of students. The purpose of this letter is to ask your permission for _____ to participate in this project with a group of other students. All these students have been identified as benefiting from the use of this software.

The action research project will involve recording how often students use the software, and the impact the software has on their learning. Evidence will be collected by seeking feedback from students and staff, looking at student participation and results, and the keeping of a research journal by staff. This information will be analysed to give us a better understanding of how to use this software for all students. It is anticipated that this project will be undertaken during the remainder 2007.

All information collected will be strictly confidential and students participating in the project will be identified anonymously in any analysis, findings or reports produced. All names will be changed, as will details that may reveal the identity of any student.

Findings of this project:
1. Will be used by teachers at _____ High School to make decisions about the use of the software program.
2. Will be provided to Department of Education and Training regional personnel to help in decisions about allocating funding to schools for assistive technology.
3. May be used in presentations to other teachers and the education community in general.

_____ will be leading this project at our school and will be responsible for the collection of information. She will be assisted by _____, who will provide advice concerning the implementation and management of the project. _____ will visit our school as required to provide support.

_____ can be contacted at school concerning any aspect of the project and to answer any questions you may have.

Please indicate below whether you would permit _____ to take part in this project. Please note that participation in this project is voluntary and you can decide to withdraw approval at any time. Your cooperation would be sincerely appreciated.

Yours sincerely

Principal

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Parent Consent
Action Research Project – TextHELP: Read & Write Gold©
2007
_____ High School

I agree / do not agree to allow _____ to take part in this project.

I understand the purpose of the project as outlined above and I understand that I can seek more information from the school if required.

Parent Signature: _____

Date: _____

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NB. A copy of this consent will be returned to you, and a copy will be held at school.