

**2008
NSW Premier's
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Ray Handley

**Campbelltown Suspension Centre
Lomandra School**

***Increasing learning motivation and skills
through computer technology for students
with behavioural and/or learning difficulties.***

RESEARCH STUDY TOUR REPORT – Ray Handley

It started with a question asked by a senior NSW Department of Education administrator in 1989. Looking at the issue of students being repeatedly suspended for long periods from school, the question was asked “What can be done to turn around the attitudes to school of these students?”. This research study was one outcome in a series of approaches developed to answer this issue within education in NSW.

Introduction

This 2008 Premier’s Special Education Scholarship was used to investigate, in two locations, the ways in which technology could be used to motivate students presently disengaged from mainstream school. The use of one-to-one laptops with the support of an integrated learning management system (LMS) or Virtual Learning Environment (VLE), as these are increasingly being called, was investigated in the state of Maine in the USA. The Maine Learning Technology Initiative (MLTI) had been operating since 2001 and provided an example of the effects of a coordinated and intensive application of technology within public education. While the ongoing evaluation of this program had looked at changes in teacher attitudes, pedagogy, student outcomes in basic literacy skills and the accessibility to learning for students with specific special needs, the effects of the program on students with behavioural and learning issues invited further investigation.

Complementing the program in Maine was the general introduction of technology across schools in the United Kingdom (UK). The use of electronic whiteboards, school-wide VLEs and the integration of information and communication technology (ICT) into the curriculum had been actively encouraged through the provision of facilities to schools and ongoing support through evaluation and policy research by organisations such as BECTA (British Educational Communications and Technology Agency).

In both the UK and USA, students with identified behaviour and learning needs have available an extensive range of support programs to provide them with alternative learning opportunities. The programs and approaches that used technology to provide these opportunities were the particular focus of this research scholarship.

Scope of the research

The scholarship was used to provide travel and accommodation costs while visiting programs and talking with key people working with learning technology across the state of Maine and throughout the United Kingdom. Destinations were targeted from extensive reading as part of an ongoing PhD project and previous experience as the director a regional alternative program in Maine. The focus questions of the research concentrated on finding strategies and approaches that used technology to increase the participation in education of students presently disengaged from mainstream schools and looking at how these approaches were working to effectively achieve what other non-technology approaches had repeatedly been unsuccessful in accomplishing.

The research focussed on finding patterns and connections between the technology and implementation processes that were used across different programs and locations rather than focussing on trying to quantify the changes that might be occurring for these students. The primary rationale for making this distinction was the difficulty of isolating causal factors for change with these students when they are involved in programs that introduce a multitude of influencing factors such as relationships with staff,

change in setting, timing of interventions, interaction with peers, changing expectations, increased staff interactions, modified curriculum and increasing maturity.

In looking for patterns, the study involved visits to a range of programs and extensive discussions with the students, teachers, administrators, policy-makers and evaluation teams working in these programs.

Overview of Findings

Before embarking on this study there was some anticipation that the findings would identify a set of technology tools (eg Animation software, Powerpoint, Multimedia programs) that were most effective in motivating the targeted students as well as the best approaches for implementing these tools. What was evident as a result of the study was that the tool itself was not of particular significance. What could be identified was that within the software programs or tools being used to effectively engage students in learning there were common characteristics that formed the basis of their success. These characteristics could be found across a range of programs from sophisticated multimedia programs to simple exercises using interactive text. In this report these characteristics will be detailed with support from examples found within the programs visited. These examples will also be used as the basis for understanding how technology is achieving this function as the principles of experiential education and brain physiology guide the discussion.

Characteristics of engaging technology

The widespread use of computer technology has only been available in schools since the early 1990s. Over this time researchers have been challenged to quantify the effectiveness of technology based strategies in the improvement of student learning outcomes. Schacter (1995) examined a number of programs involving technology in West Virginia, USA. While programs reported a more positive attitude in students and some improvement in standardised test results when technology was used, these changes seemed more linked to the teaching approach applied and the enthusiasm of teacher than in the inherent qualities of the technology implemented in the classroom. Reeves (1998) further articulates this link by looking at the difference between learning *from* technology and learning *with* technology. As a result, Reeves et al (2002) developed a model for authentic learning tasks involved students working co-operatively on significant projects based on their real life experiences and using technology as the means for research and presentation.

For students with some level of motivation this approach has provided an effective structure for learning design and with the support of scaffolding or 'chunking' to enable tasks to be broken down into more easily accessible components, students with a range of ages and abilities can be accommodated. Therefore, it was anticipated that elements of authentic learning would be evident in the patterns found in approaches found to remotivate students in learning. However, what was identified has little correlation with the principles outlined in authentic learning tasks (Reeves et al). An explanation for this disparity will be suggested later in this report.

Within the technology strategies or tools used by programs to successfully motivate students previously disengaged from mainstream education, the follow characteristics are evident.

The tools:

1. Include immediate, unambiguous feedback to the user
2. Are short in duration, simple to use and clearly defined in length

3. Are responsive and adaptive to student efforts such as creating easier questions when several questions are incorrectly answered or providing additional information through pop-ups or links to other resources
4. Provide clear options for explanation, additional information or correct response
5. Are embedded in a wider framework of activities such as webpage, multimedia file or VLE
6. Enable students to measure progress and achievement
7. Enable students to produce attractive and high quality work
8. Facilitate mentor support or guidance in designing work programs or completing tasks
9. Enable students to multitask and access varied media types

Each of these characteristics can be expressed with the use of varied software tools and packaged in different program formats but they remain the key components for successfully engaging unmotivated students. The evidence supporting the definition of these characteristics is provided from the observations of programs across Australia, Maine, the USA and the UK. In examining each characteristic individually, connections can be identified with the programs investigated.

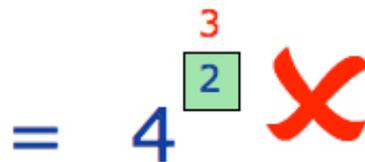
Evidence of characteristics

While it is beyond the scope of this report to detail the specific way in which programs use technology to engage their students, an overview is provided that allows links to be made and cites key examples to explain how the characteristics were defined.

1. Include immediate, unambiguous feedback to the user.

An example from the *Mathletics* program used in Australia, the UK and the USA demonstrates this characteristic by checking the answer and providing the correct response:

Fig 1:



Although presented many different formats across different programs this type of feedback consistently created in students the desire to move to the next question and try again. When students were asked ‘Why don’t you question the computer?’, they looked back perplexed and answered to the effect it would be stupid - it was just a computer telling me the answer.

This example raises one of the key issues when looking at how technology leads to greater engagement. If a teacher were to look over a student’s work and then place a large, red cross next to the answer then add the correct answer nearby, students in this target group would often respond by either refusing to complete the task or by personalising the correction of the answer and trying to engage the teacher in a confrontation over the work. However, this does not occur. Students see the computer correction as a challenge for them rather than an affront to them and respond by attempting the next question.

At Winslow Junior High School near Waterville in Maine, students work on reading skills using *1-2-3 Read* – a commercial reading package that uses this characteristic. The program, while containing some graphic stimuli is unsophisticated in design and students type, read or speak in response to the program content. Students comment that the program is easy to understand and they like to know when they get answers right. At the Carleton Project in northern Maine, students not attending mainstream schools use

the feedback from an online learning program to immediately go to another area of the program to get the information needed to successfully answer the next question.

The interactivity feature within this characteristic is available through the use of Flash question templates, within multimedia tools by *Notebook* and *ActivStudio* resources and within most virtual learning environments. They are also featured in most online learning websites found on the internet and these can be easily linked to VLEs.

2. Short in duration, simple to use and clearly defined in length

Students completed tasks that took no more than twenty minutes and preferred to repeat even shorter tasks. Sets of between ten and twenty questions were preferred and these were best contextualised within a broader overview of the work required. For example, students could identify five topics to complete, each with five activities consisting of ten questions in each. In courses arranged within a VLE such as *StudyWiz* which is used extensively across Maine, Australia and the UK or in online learning programs such as those used by the Carleton Project and Campbelltown Suspension Centre in Australia, short activities can be organised within sequenced thematic or subject oriented modules that provide students with expansive learning packages.

3. Responsive and adaptive to student efforts eg. creating easier questions when several questions are incorrectly answered or providing additional information through pop-ups or links to other resources

This feature of many commercial programs such as *Mathletics* and the *Measures of Academic Progress (MAP)* assessments designed by the NWEA (Northwest Evaluation Association) in the USA enable students to maintain interest and find examples at their present level of competency while then enabling an improvement of skills and an extension of their understanding. While these programs employ advanced scripting components to create their interactivity their interface with students remains simple. In the state of Maine all schools have access to NWEA through a licensing arrangement organised by the Maine State Department of Education. Used in conjunction with a VLE such as *StudyWiz* the NWEA software was used in special education and mainstream settings to develop individualised or personalised learning programs for students

4. Provide clear options for explanation, additional information or correct response

This characteristic, when used with characteristics 3 and 5, can be called the Pathways function of technology. While again evident in scripted software such as *Mathletics*, it is also found in many online learning tools, is built into Flash quiz templates and is part of the test /assessments feature of most learning management systems such as *StudyWiz*, *Janison* and *Moodle*. Schools such as the New Rush Hall School and Bridge Academy in London, The Carleton Project in Maine and in classrooms where one-to-one computer use enables students to utilise personalised interaction with computer programs, students discover their own way to learn and experience a personal control for learning away from the conflict with teachers that often accompanies these goals in the traditional classroom.

An interesting point of discussion raised with Don Passey and Colin Rogers from the Department of Educational Research at Lancaster University, UK was that broader access to learning facilitated by this feature of technology may lead to the flattening of the normal distribution of student achievement. As students find alternative ways of reaching common competencies and assessments are redesigned to reflect these thinking and skills competencies, rather than content competencies, the traditional bell

curve of student grades may be replaced with a plateau-shaped distribution. Passig (2003) refers to this change as intelligence that is creatively adaptive to new situations as opposed to intelligence that reflects the synthesis of familiar knowledge.

5. Embedded in a wider framework of activities such as webpage, multimedia file or VLE

Another one of the Pathways characteristics, this enables students to work at their own pace and within their own interest levels while maintaining a learning plan designed by a school or teacher. Throughout schools in Maine, where students in Years 6 to 8 are provided with laptops by the State Department of Education, students who are otherwise disorganised when it comes to books and equipment are generally able to find their way around their laptop or can use the organisational features and search tools of the laptop to keep track of their work. It also provides access to communication tools for teachers and students, who use dropboxes, email and social networking to maintain a range of ways to access work, information and forward questions/answers between each other. This feature is also used extensively in online courses such as Notschool.com and Wigan Online, and within the Sheffield City colleges and schools, where it provides students with ready access to the mentor support to be discussed in characteristic 8.

6. Enable students to measure progress and achievement

Often unmotivated students have a history of poor results and the non-completion of work. When programs provide clearly visible reminders of progress, this provides the positive reinforcement to maintain motivation. Interestingly, most students seem more interested in visible records of progress such as bar graphs and percentage scores rather than extrinsic rewards such as certificates and internet cash vouchers.

7. Enable students are able to produce attractive and high quality work

A recurring comment from students and teachers in all locations visited was the willingness of students to complete written tasks when using computers and software such as word processing (Microsoft Word, Apple Pages) and presentation tools (Powerpoint, Keynote, Comic Life) because they felt the end result would be a worthwhile product. At the West School in Portland, students with a history of school failure spend a significant part of their learning time working to draft and perfect stories because they know mistakes can be easily checked and corrected and the end result is a published product which they can proudly show to their families.

In evaluating projects looking at digital creativity in a number of schools across the UK, the Centre for Research in Primary Science and Technology (CRIPSAT), University of Liverpool in the UK documented the effects on student motivation of introducing audio and video editing projects for the production of a range of projects including short film animations, podcasts and documentaries. Students with little history of concentration and perseverance in their work developed skills in collaboration, planning and work completion, spending long hours on making sure they produced an interesting, fun and completed product.

8. Facilitate mentor support or guidance in designing work programs or completing tasks

In virtually all programs and settings investigated the role of mentors was important in the design of programs and the guidance of students completing online learning or technology-based tasks. In the UK, schools and colleges using the *Notschool.com* program for online learning required students to have

regular interaction with mentors through email, video conferencing, phone calls and visits. In the Wigan online program in northern England mentors met with students for one hour face-to-face sessions each week to discuss issues with their learning program. Student then remained in email contact with mentors 24 hours a day for the remainder of the week. In the Carleton Project in Maine, teachers mentored students to assess the long goals towards which they are striving and then worked to design online learning courses that allowed them to meet these goals. Mike Muir at the University of Maine has also developed programs in Maryland and West Virginia using the same model for students who have dropped out of high school.

9. Enable students to multitask and access varied media types

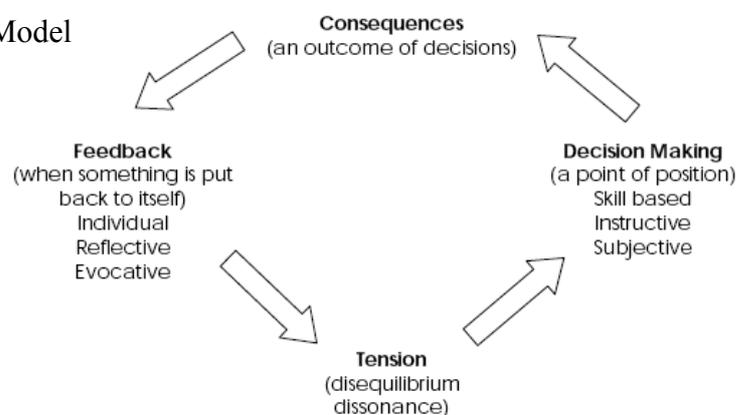
Many programs recognised that students operate in different ways and can maintain a multifaceted learning environment involving multitasking. Students often use technology to provide various environmental stimuli such as working while listening to iTunes or using social networking sites as a background to online learning. Rather than reduce concentration these additional stimuli seemed to encourage a work focus and provide a visual pace and stimulation that is required by many students to maintain their concentration.

While not essentially a technology tool or strategies a further common feature of programs successfully engaging students with technology is that they involve implementation practices and infrastructure led by educators who advise technicians on what is needed not by technicians who advise educators on what can be done.

A theoretical framework

In the development of a theoretical understanding of how the characteristics above may motivate learning the discussion is brought back to the question at the beginning of this report: “What can be done to turn around the attitudes to school of these students?”. In answer to the search for a turn around experience for ‘failing’ or ‘at risk’ students an explanation was developed drawing on the principles of experiential education outlined by Nadler and Luchner (1992). With additional reference to the work of Festinger (1964) who looked at the role that dissonance, or a tension between the beliefs that we hold, played in facilitating patterns of change, this author proposed the model below to explain the process of change for students with entrenched habits of non-compliance and non-participation in formal learning activities.

Fig 2: The Tension Model



In this model tension provides the catalyst to change while feedback from the natural consequences of a decision drives this tension. When students using technology are faced with a problem they view technology in terms of this cycle rather in terms of a linear or reciprocal interaction between themselves

and the teacher or the work itself. The cycle continues until the tension is reduced which occurs for most students when mastery occurs or the activity is successfully completed.

This model can also be applied to the principle of neuroplasticity that looks at the changes in brain responsiveness over time, especially in regard to an increasing exposure to computer applications such as video games. As a result of exposure to a gaming culture students are looking for short-term solutions to challenges with the realisation that answers are forthcoming if enough options are pursued. Feedback is not seen as a negative response but as a cue to try somewhere or something else.

Conclusion

From the model developed through this study, teachers and schools can utilise approaches with students that best focus on motivating learning. By identifying the characteristics patterned in the programs visited, decisions can be made on the best choice of software and learning resources as well as maximising access to materials on the internet and through educational resource collections such as the NSW Department of Education and Training's Teaching and Learning Exchange (TaLE).

To utilise these resources it is strongly recommended that schools, districts and regions utilise the facility of Virtual Learning Environments that encourage students to pursue a 24/7 approach to learning and enable students to find multiple pathways to the learning outcomes they desire.

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