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Using technology to motivate student learning

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Abstract

The motivation of students to effectively learn and complete their secondary education is a key priority for education systems. This paper explores ways in which technology can be used to enhance this motivation, particularly for those students who experience the greatest risk of failing to finish their education. A design-based research approach, with a case study and action research methodologies will be used to explore the problem. Using authentic learning tasks as a framework, a variety of technology based learning tools will be introduced to the students. Through the observation of the process, interviews and an analysis of student work and attitudes, changes in motivation will be recorded. As a result of this research, information will be gathered on the ways in which motivation is affected by the choice and methods by which technology is used within schools. From this information, further models can be developed that ensure schools have the strategies and the means to reengage those students who, through a lack of motivation, are failing to meet their full learning potential.

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Using technology to motivate student learning

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Abstract:

The motivation of students to effectively learn and complete their secondary education is a key priority for education systems. This paper explores ways in which technology can be used to enhance this motivation, particularly for those students who experience the greatest risk of failing to finish their education. A design-based research approach, with a case study and action research methodologies will be used to explore the problem. Using authentic learning tasks as a framework, a variety of technology based learning tools will be introduced to the students. Through the observation of the process, interviews and an analysis of student work and attitudes, changes in motivation will be recorded. As a result of this research, information will be gathered on the ways in which motivation is affected by the choice and methods by which technology is used within schools. From this information, further models can be developed that ensure schools have the strategies and the means to reengage those students who, through a lack of motivation, are failing to meet their full learning potential.

Introduction

Increasing the level of student achievement has been a major focus of school systems in many countries as part of a general movement in educational reform. Equally important is the need to ensure that the one third of students who are not completing secondary school in Australia, the USA, UK and Europe are reengaged into the learning process. The consequences of failing to address the issue of student retention have been stated for some time. Braun (1993) estimated that the costs to society of students failing to complete secondary school were \$100 billion each year.

The Business Council of Australia has recognised this trend in the Australian community. Lahey (2003) summarises:

Those young people who leave school early and do not pursue other forms of education and training or find sustainable employment will face a life characterised by unemployment and poor living standards. However, there are flow on effects beyond the individual. The broader community pays through higher welfare costs, higher health costs, higher crime rates and other social impacts. Business faces labour and skills shortages. (p. 14)

In order to meet these challenges a change in paradigm is needed to meet the demands of a post industrialised society. (Braun 1993)

Such a shift in educational thinking requires a sound background in research. This paper describes a research direction that supports this change by looking at the extent the motivation of students can be influenced by the use of the technology learning tools delivered within a student centered classroom environment. In looking at the motivation and changes in attitude of students rather than improvements in learning outcomes the research addresses the concerns raised in the report – *One Third of a Nation: Raising Dropout Rates and Declining Opportunities* (Barton, 2005), which stated: ‘For the past two decades, the agenda of school reform has been to improve the quality of schools and raise the levels of student achievement. The task now is to broaden this effort to encompass school completion as well as higher achievement.’ (p. 6)

The background to the study

Following twenty years of experience in working with programs to engage adolescents who risk 'dropping out' or 'failure' within the secondary school systems, this researcher has worked in a range of educational settings. Throughout this experience, the question has continued to be explored – 'What effective strategies can be used to enable disengaged students to fulfil their potential by becoming self motivated learners and productive citizens in their society?'

The need for research to address this issue is evident from the continuing concern over the number of students failing to finish their secondary school. After making some inroads during the periods of high unemployment and concentrated government funding in the 1980s, rates of retention in both the USA and Australia have declined. In the European Union (EU) community concern over the lack of improvement in retention rates has prompted the establishment of benchmarks to mark significant improvements up to the year 2010. Overall, countries within the EU in 2004 averaged 76% of 22 year olds who had completed secondary schooling. By 2010 the EU has set the benchmark at 85%. (Commission of European Communities, 2005, p. 45)

With a growing acceptance that further demands of industry require a workforce with a sound understanding of continuing learning processes, this trend is concerning.

In this setting exploring how student retention can be improved through increasing the motivation and engagement of students in the learning environment becomes an important focus for educators. While some countries such as the UK have adopted strategies such as making payments (EMA or Education Maintenance Allowance) to students who stay on (with some success), this paper investigates strategies that address the intrinsic curiosity and learning needs of the student. These strategies will result in a long-term ability to learn – a key component of educational plans for institutions seeking to guide education through the 21st century.

The problem or purpose of the study

The primary purpose of the research detailed in this paper is the investigation of ways in which technology based, student centred learning tools can be designed and implemented to increase the engagement of students presently showing a lack of motivation and participation in learning. While specifically targeting those students failing within their present classroom settings, the research will have broad implications for all students.

Issues with students failing to reach their full potential concern parents, schools and school systems, resulting in the adoption of a variety of approaches which seek to improve the educational participation and learning outcomes for these students. Examples of these approaches include a focus on basic skills, standardised performance testing, vocational programs, modifications in curriculum, alternative schools, specialised programs and remediation programs

The models used for developing alternative approaches have been comprehensively researched and evaluated to provide an extensive

outline of the key components. These evaluations use a number of parameters to measure success and failure for alternative programs including:

- Attendance rates
- Retention and/or dropout rates
- Truancy
- Number and severity of behaviour problems
- Completion of high school program
- Self esteem, self concept, locus of control ratings
- Participation in the community and workforce after school

Handley (2002) compares the work of Morley, (1991), Barr and Parrett, (2001), Raywid, (1994) and Aronson, (1995) to summarise these components. From these studies several characteristics can be identified that are components of successful alternative education programs. The characteristics most consistently reported were:

- Caring and demanding teachers. Barr and Parrett (2001) identify this characteristic as the most powerful component in effective programs for at-risk students.
- Choice and commitment. In many successful programs both students and teachers chose to participate (Raywid 1994, Barr and Parrett 2001)
- Comprehensive and continuing programs. Short-term or intensive programs seldom assist students who are unsuccessful in mainstream schools. Students benefit from long term programs that focus on the development of the whole person, and their academic, social, behavioural, family and health needs (Barr and Parrett, 2001)
- Small program size is needed to provide the flexibility, individuality and positive interactions important for success (Wehlage 1983, Jacobs, 1994)

While these attributes apply more specifically to the setting of programs designed as alternatives for disengaged students there is also evidence that the way content is presented within these settings can also be a significant factor. In their review of programs to address the needs of at-risk students Rossi and Montgomery (1994) note 'Technology is "empowering and motivating," a self-paced and ever-patient tutor that provides immediate feedback; it enables students to create high-quality products of which they can be proud; it helps train them for a technology-rich workplace; it can be deployed to create more flexible learning environments that accommodate students who learn in different ways . . . ' (chap. 8e, para. 15).

By using the advanced tools that technology affords for the delivery of learning, the constraints felt by schools have a means for being overcome. The purpose of the study outlined in this paper is to analyse the way in which these tools can be effectively used to create the student learning environment outlined in the statement above.

The significance of the study

This study brings together two important issues – the need to improve the motivation and retention of students in full secondary education, and the issue of creating the most effective means by which technology can be used to support a pedagogical direction that both seeks to improve learning outcomes and address the issue of student retention. From this study a framework will be confirmed and a model developed that provides a practical means by which the research findings can be implemented into future classrooms.

Schools, teachers, students and parents will directly benefit as this model provides an accessible and affordable alternative learning approach to use with students failing within the school system. Indirectly, the broader community benefits from increased productivity and a reduction in the social costs associated with students failing to complete a full secondary education.

Defining the unmotivated student

Within the purpose of the research it is necessary to define the students for which the research is directed. Many terms have been used to describe students who show a lack of willingness to positively participate in school. The distinctions between these descriptions are often unclear and confusing. Some common descriptors are alternative, dropouts, at risk, unmotivated, behaviour disordered, disengaged, underachieving, non-academic and students with special needs. While each term carries certain emphases in terms of the social, academic and behavioural development of the individual they can be used to define a common group of students for whom school is neither an enjoyable nor productive experience. This group will be referred to in this study as disengaged students.

For the purpose of this research the overriding definition will be the existence of a significant difference between the potential of a student to learn and the performance of that student in their learning. This definition allows for academic, social and kinaesthetic skills to be considered, and is inclusive of each of the categories outlined above.

Research Questions

The research questions that will direct the focus of the study are:

To what extent do computer-based learning tools motivate the learning of students with a history of disengagement from formal education?

What components and inherent advantages of computer based learning tools result in an increased motivation and participation of students in the completion of learning activities?

Methodology

The methodology for the study involves the development of an Action Research Model and several Case Studies as well as the quantitative collection of data profiling the participants, their backgrounds and attitudinal changes over time.

Observations, field notes, student self ratings, student portfolios and interviews will provide the central tools in the gathering of information for interpretation with the use of content analysis.

Constant comparison and content analysis methods will be employed to establish connections between the different components of this study such as motivational style, readiness to change, choice of technology learning tools and task performance.

Research Design

Several stages are planned within the design-based research approach.

Stage 1: Analysis of practical problems by researchers and practitioners

For students at risk of failing to complete secondary school, a learning experience that stimulates, motivates and re-ignites an interest in learning is required. The use of technology based learning tools, managed within a situated learning framework, is reported in the literature to provide the conditions for this to occur. To assist in the management of these conditions attention needs to be given to both the qualities and characteristics of the tools, and the characteristics and orientation of the students. It is the purpose of this design based research to address these factors so that a learning model can be developed that better understands the interaction between the motivation of disengaged students and the use of technology based learning tools.

Stage 2: Development of solutions with a theoretical framework

1. Develop of a set of principles and learning environment design principles that incorporate a theoretical understanding of situated learning, motivation and stage based change.
2. Develop two authentic learning tasks to be used within a situated learning environment. Each task will consist of an issue and a challenge to be addressed, and require approximately six weeks of time to complete using several periods per week.
3. Select the technology learning tools to be used in the completion of the authentic learning tasks. These tools or packages will include the following components:
 - Presentation tools such as desktop publishing, PowerPoint or web design applications such as FrontPage, GoLive and Dreamweaver
 - Hypermedia and hypertext using multimedia authoring applications and applications such as Powerpoint, Hyperstudio and Microsoft Word
 - Video and sound editing application such as iMovie, Windows Moviemaker, Photo 3 and QuickTime. Digital video will also be utilised using DV camera.
 - Animation and graphics applications such as Macromedia Flash and PowerPoint,
 - Research using search engines such as Google and webquests.

Stage 3: Evaluation and testing of solutions in practice

The learning environment developed in Stage 2 will be implemented and evaluated with students in Stage 3 of the research.

Data collection

1. The Sample group will be targeted and background information collected from student reports, attendance records and discipline records.
2. Interviews will be conducted with students prior to participation and at the end of each of the two terms. These interviews will involve open questions in a discussion of the students' views on school, education and thoughts of the future. Both digital tape and video camera will be used to capture a record of these interviews.
3. Observations and record sheets will be used each week to record progress. Field notes will be used to gather qualitative information on student participation and attitudinal changes reflected in behavioural changes. Video camera data will be collected to document the occurrence and quality of collaboration between students during the completion of the authentic task.
4. As work is developed a digital portfolio will be used as the means for both storing work and maintaining a record of work quality over time.
5. Information will be collected from teachers presently working with the target group in mainstream settings using rating scales to determine the level of motivation shown by students to learning both prior and consequent to the study.

Participants

To enable an Action Research method a secondary school setting will be used. The school setting will also facilitate the collaboration necessary to authenticate these methods and provide a source of observations and reflections from students and teachers. The participant group will consist of ten students already targeted by the Welfare and Discipline Committee of the school. Students are referred to the committee following the collection of information from various sources such as parent concerns, suspensions, discipline slips, faculty progress slips, counsellor referrals, HSLO referrals and learning support team referral. Following a referral from this committee, students and parents will be informed of the nature of this study and formal consent as specified by the NSW Department of Education and Training will be arranged before the commencement of the research.

Data Analysis

To analyse changes in the engagement of students a triangulation of evidence will be used. Comparisons will be investigated in the data from the content analysis of interviews, the qualitative information gathered from students rating scales and field observations, and the evidence of student work presented in the student portfolios.

QSR NVivo or an equivalent program will assist in the content analysis of transcripts from the interviews conducted before and during the study and in the correlation of triangulated data. The design

of this Content Analysis will be centred on the principles described by Viney (1988), Gleser, Winget & Seligman (1979) and Petersen & Seligman (1984) and will use criteria from the Model of Stage Based Change outlined by Prochaska, Norcross and Diclemente (1994). To further assist in the processing of this data, constant comparison methods as developed by Glaser and Strauss (1967) will also be employed to group and conceptually label information recorded in student interviews.

From the two authentic learning tasks given to students data will be collected through the review of work submitted in digital portfolios. The criteria for this review will include:

- Level of Completion
- Does the project answer the question or solve the problem outlined?
- Using a five point rating scale:
- How does the learner rate the quality of their work on this task?
- How does the learner rate their satisfaction in doing the task?
- Student portfolios through print and electronic media will be used to provide evidence of work completed.

Stage 4: Documentation and reflection to produce design principles

Following the analysis of this data a matrix will be established that provides a guideline to the changes in motivation that can occur with students using technology based learning tools. This matrix will consider both the learning orientation of the students and the types of tools that provide the most effective response in motivation.

As a result of this matrix learning models can be established that enable a mass customisation of stimulating learning approaches suitable for use in any classrooms and especially effective with students for whom most learning experiences produce a minimal response.

Given the characteristics of the sample group – unmotivated adolescents, the collection of honest, genuine data is often difficult. The use of triangulated data collection involving objective data such as attendance records, indirect data collection methods through the content analysis of semi structured interview conversations, and work portfolios provide some means of addressing this limitation.

Other limitations include issues arising from the interaction of the researcher with the subject. Since many of the students involved have had repeated ‘sessions’ with teachers, counsellors, psychologists and medical practitioners, they can develop a negativity that results in guarded or defensive responses. The contribution that this defensiveness or reluctance makes to the authenticity of the data must be considered as part of the interpretation of the data.

Student participation, while voluntary, must also give some longitudinal element to this study. Data must be able to show more than just a novelty effect from an initial involvement in a new and interesting program. A lack of commitment to continue with the study can be used as a general indicator of continuing disengagement.

Much of the literature addressing dropout rates, school failure and 'disadvantage' look at the factors beyond the student and the school. Socio-economic conditions, racial background, family characteristics, mobility and health status are seen as indicators of a predisposition for failure. However, for the purpose of this study these factors will be acknowledged but not included in the discussion. The emphasis of this study remains with identifying how student motivation and engagement can improve with the use of technology based learning tools presented within an authentic learning task.

Expected outcomes

The major outcome of the research will be a better understanding of how the use of educational technology tools affects the attitudes and motivation of students to learning. In breaking down the factors that contribute to this affect teachers and educational planners can direct a specific focus on the provision of resources, the training of teachers and the design of programs that utilise the more effective use of computers in the classroom setting.

As education systems look to increase the content to be covered, change the way teachers present this content and address the issue of maintaining or increasing retention rates due to the increasing demands in the workplace for learning-competent members; the focus on attitudinal change becomes a significant investigative area.

Factors that appear significant in achieving this attitudinal change and which will be validated through this study cover both the characteristics of the teaching approaches used to deliver the educational technology and the types of tools used.

Teaching approaches

Jane Hunter (2007) describes a number of changes in the way teachers interact with students in the classroom as technology is utilised. These include more emphasis on collaborative approaches between teachers and students, the use of small group activities and the rotation of group through different activities, a focus on personalised or independent approaches to student learning and the use of inter-classroom learning through video conferencing links.

For students with low motivation and often deficit in age related academic skills the use of project oriented tasks that use a clear, multimedia example of the finished product and a flexible, creative way in which to produce this product can result in increased participation and engagement. This can be achieved using relatively inexpensive technology tools such as a computer with Microsoft Powerpoint, a data projector and internet access. When students can visualise the outcome and feel competent in managing the tools to reach this outcome they actively seek out the skills needed to fulfil the task. Rather than being pushed to learn students are pulled into learn by the desire to reach the final multimedia-style product. Along the way they interact with the content of the presentation and use higher level thinking skills in the interpretation and synthesis of information.

For students with a poor record of work completion and academic success the tasks presented also require careful scaffolding. By 'clunking' the task into several shorter and more manageable activities

students can achieve short term results and are not overwhelmed by the possibility of learning too many new skills. The reporting of student success is also changed as the product of learning can stand it's own ground as a record of effort and expertise. As students demonstrate the work completed through the presentation of their multimedia presentations and experience the feedback from peers and staff their efforts are reinforced.

Effective tools of educational technology

In terms of the type of tools that can be used to produce a change in the motivation of students an important balance needs to be achieved between the scope of the tool to provide multiple avenues of interest for the student such as animation, use of text/video/image/sound, interaction with the internet, access to multiple layers and flexible sequencing, and the its availability and ease of use. While software programs such as Adobe Flash and Photoshop provide a great depth and scope in terms of what can be achieved they are largely unavailable to students in schools due to their price and hardware requirements. They are also difficult to use with students and teachers who have a varied competence in the use of multimedia software. Programs such as Microsoft Powerpoint , Quicktime, iMovie and Moviemaker provide readily available access and generally recognisable tool menus for students to explore. As interactive whiteboards become increasingly available ability for teachers to demonstrate and interact with technology tools in the classroom will increase the speed at which new skills are learned and increase the sophistication of the multimedia products created by students in response to their set tasks.

As these changes are achieved educational practice will draw closer to the educational philosophy of the present time that articulates a focus on lifelong learning, independent thinking, quality teaching and an ability to recognise, understand and adapt to the changing society in which we live.

To assist these changes a model will be generated for the design and implementation of programs that have the potential to produce the highest level of engagement for students. Students will more willingly become self directed in their learning and teachers will be able to move away from the power struggles that characterise school classrooms and become more supportive guides and facilitators for learners. This model will also provide an innovative approach by which the goals for the introduction of ICT across the school curriculum can be effectively achieved.

The final outcome is that a group of students who were previously at risk of failure in the school develop the motivation and skills to become self directed, cognitively active and performance enhanced students with a greater chance to become responsible and successful members of the wider community. While presently many models for working with at-risk students are based on behaviourist management principles and remediation as the focus of learning, the model developed from this research presents a constructivist management approach with a focus of learning on higher order thinking skills. This provides a realistic alternative for those students present unable to access education because of their inability to fit the behaviourist model.

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