



Tailored Resources to Facilitate and Enhance Learning

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Abstract

“The fast evolution of learning technologies has multiplied the number of decisions one must make to create an eLearning system” [1]. Tailored stimulating resources to facilitate and enhance eLearning are unique and critical to the learning experience. Resources must encourage, support and provide guidance, thus increasing engagement and motivating and inspiring students to learn. An understanding of the demographic of the student cohort specific to the individual course is critical.

When creating mathematics courses for preparatory students enrolled in the Skills for Tertiary Education Preparatory Studies (STEPS) programme at CQUniversity Australia (CQU), staff must consider the diverse social and educational backgrounds of students. Additionally, CQU caters for students across the country and given the geographical vastness of Australia, remoteness is a significant issue that eLearning is able to overcome, if managed effectively. Unfortunately, due to the absence of a national broadband, internet capabilities in remote locations also need to be addressed.

Visually stimulating slides, using the Tablet PC and Camtasia, allow for the creation of instructional videos for each mathematical concept covered in the courses. Students can see and hear an explanation of the concepts and the logical progression of solutions, simulating a classroom environment. In order to overcome the internet and downloading issues mentioned previously, these resources are provided on a DVD as well as through Moodle - the online Learning Management System (LMS).

In addition to enhancing learning outcomes, the videos create a connection with students, increasing engagement and communication, which is often difficult in distance courses. Through watching the videos, the student gets to know their lecturer, which makes them more willing to contact them for help when required. In addition to the slides and videos, students are provided with weekly revision sheets with full handwritten solutions in colour to show the connections between steps, and demonstrate expectations in regard to mathematical communication for assessment.

In order to determine the effectiveness of the eLearning experience, a study was conducted asking students for feedback in regard to the resources provided and also their confidence levels prior to and on completion of their course. It was found that 88% of students felt the videos aided their mathematics comprehension and student mathematical confidence also improved.

1. Introduction

“The fast evolution of learning technologies has multiplied the number of decisions one must make to create an eLearning system” [1]. Tailored stimulating resources to facilitate and enhance eLearning are unique and critical to the learning experience. Resources must encourage, support and provide guidance, thus increasing engagement and motivating and inspiring students to learn. An understanding of the demographic of the student cohort specific to the individual course is critical. The decision on which technologies to implement and the nature of resources is ultimately governed by funding and staffing. Therefore creating meaningful resources, that cater to the aforementioned requirements, with little time or money becomes the real challenge.

Central Queensland University (CQU), is primarily located in regional Queensland, Australia. It is widely recognised as accepting non-traditional students and caters to approximately 7000 fulltime equivalent domestic students per year. CQU has one of the highest rates of low socio-economic students in Australia. The CQU Skills for Tertiary Education Preparatory Studies (STEPS) programme commenced in 1986. Initially funded by a government grant, it aimed to bridge the gap between tertiary education and underrepresented groups of people – which included Aborigines, migrants, women, and people from low socio-economic backgrounds and those from isolated areas [2]. The programme has evolved to meet the changing needs of people who have not been able to attain their educational goals through traditional educational pathways, often referred to as ‘second chance learners’ [3].



Within the STEPS programme there are three levels of TM courses: Fundamental Mathematics for University (FMU) - a course in elementary mathematics designed to have the student commence work on the foundation concepts, rules and methods of basic mathematics; Intermediate Mathematics for University - an intermediate preparatory course designed to follow on from FMU; and Technical Mathematics for University - a technical preparatory course designed to follow on from IMU. IMU and TMU together met the prerequisite requirements for undergraduate engineering and applied science degrees. All of these courses, and the associated resources, are grounded in adult learning principles and the cognitive behavioural model.

2. Cognitive behavioural approach

Many preparatory students suffer from anxiety and learned helplessness, usually as a result of negative experiences at school. Learned helplessness is based on the premise that when people's repeated efforts in certain situations meet with resistance, or even punishment, they can learn to stop trying [5]. If a student failed at school, they expect continual failure. If someone told them they were useless, they think they are. The role of the lecturer therefore extends beyond delivering content as they must get students to challenge their beliefs.

The cognitive-behavioural approach integrates emotion and intellect to learn within the context information is presented [4]. It enables students to overcome difficulties by changing their thinking, behaviour and emotional responses. This approach, enhanced by positive psychology, provides the most appropriate learning environment for adult students. Essentially, in addition to teaching content, the lecturer is challenging the preconceived beliefs of the students and providing as much encouragement and support as is required. Of course this depends on the individual student and their reasons for completing the course in the first place – it may not be necessary for everyone. In addition to resources outlined below, formative assessment is one way of providing essential feedback to students, especially those studying by distance. Therefore, resources for these students must not only address content but also facilitate confidence building and changes in attitude.

3. Resources

Tailored stimulating resources to facilitate and enhance eLearning are unique and critical to the learning experience. Resources must encourage, support and provide guidance, thus increasing engagement and motivating and inspiring students to learn.

The Tablet PC enables the lecturer to draw pictures, complete graphs and use the full palette of colours and highlighting to link concepts visually as well as conceptually, facilitating the explanation of step-by-step solutions, stimulating memory, thus improving understanding and retention. Visually stimulating slides, the Tablet PC and Camtasia, are used to create videos for each mathematical concept covered in the TM courses. The videos allow the student to see and hear an explanation of concepts and the logical progression of solutions, simulating a classroom environment. In order to overcome internet and downloading issues, these resources are provided on a DVD as well as through Moodle - the online Learning Management System (LMS).

In addition to enhancing learning outcomes, the videos create a connection with students, increasing engagement and communication, which is often difficult in distance courses. Through watching the videos, the student gets to know their lecturer, which makes them more willing to contact them for help when required. In addition to the slides and videos, students are provided with weekly revision sheets with full handwritten solutions in colour to show the connections between steps, and demonstrate expectations in regard to mathematical communication for assessment.

4. Study overview

The study was conducted to profile the student demographic and the effectiveness of the resources and eLearning experience associated with STEPS Transition Mathematics (TM) courses. A portion of this study surveyed students regarding their mathematical confidence prior to and after completing one or several of the TM courses. Students were also questioned on the usefulness of extra study resources and support supplied with the course. As all students were studying in distance mode it was vitally important that they engaged with the material and did not feel isolated.

4.1 Student demographic

An understanding of the demographic of the student cohort specific to the individual course is critical when developing resources. When creating TM courses and associated resources, staff must consider the diverse social and educational backgrounds of students. Additionally, CQU caters for students across the country and given the geographical vastness of Australia, remoteness is a significant issue that eLearning is able to overcome, if managed effectively. Unfortunately, due to the absence of a national broadband, internet capabilities in remote locations also need to be addressed.

One hundred and forty distance TM students completed the online survey. This included 99 females and 41 males. There was a relatively even spread of age groups with the 30-34 age group having the largest representation at 23.3% (figure 1). The lowest level of education amongst the participants was grade nine (see figure 2). 16.4% of students had only completed year 10 (Junior Certificate) while 24.5% and 25.8% respectively had completed either year 12 or TAFE (Institute of Technical and Further Education). The majority of the students completing the survey had completed or were completing the FMU course. It is assumed that students that had already completed year 12 at high school had either not performed well academically or had studied subjects that no longer facilitated their chosen career goal.

Figure 1

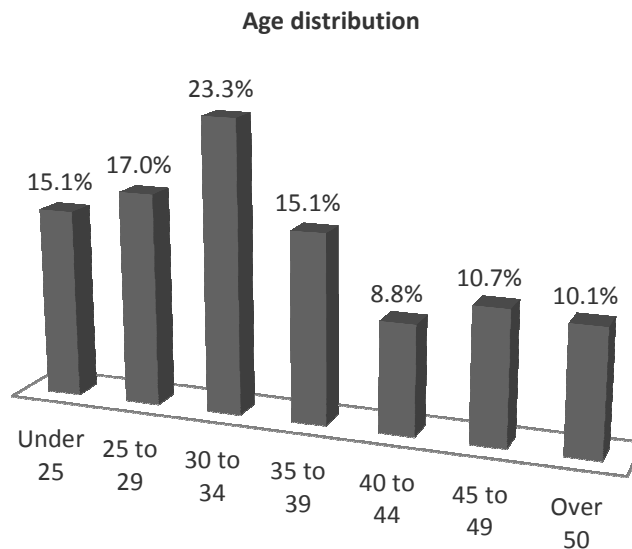
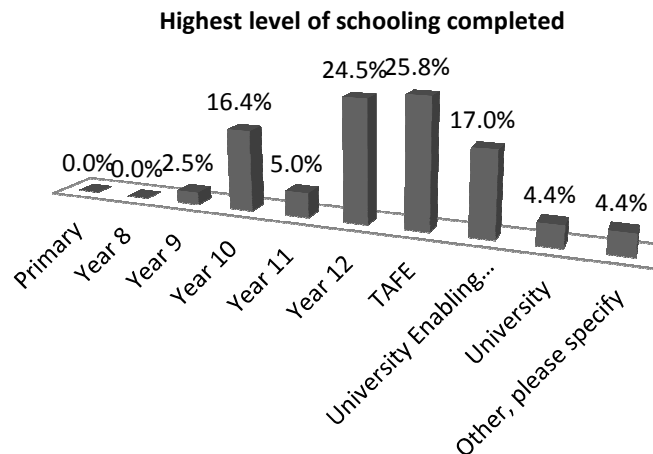


Figure 2





4.2 Resources

Of the students partaking in the study 94% received videos with 78.3% claiming they watched them. 88.5% of the students who watched the videos felt their learning was enhanced by the videos, 10% remained neutral. The videos and the textbook were designed to be complimentary, 86.7% found this had been achieved while 13.3% remained neutral. The clarity of the instruction is important. When asked if the videos explained concepts clearly, 81.6% responded affirmatively and 15.4% were neutral. Some typical remarks received from students in relation to the videos were:

When ever I was stuck on a question I would always check the Moodle course, and after watching it a few times I would understand it completely and would be able to complete my work on time.

I am not sure if it is because I am older but I am enjoying Math more than I thought I ever would and love the challenge. I think that having the video to go over as many times as you need helps a lot.

The videos were the reason I was able to understand the concepts more easily. Being able to see the problem written on the board and the ability to rewind it if necessary enabled me to achieve the results I did. This method of study would be wonderful to access in all courses

Though the majority of the students were pleased with the video support the following two comments highlight the extremes: *very boring! and quite slow and they were too quick*. Also 9.7% of students did not find the videos to be a good substitute for face-to-face teaching.

To assist students with individual problems they may be having, lecturers provide handwritten solutions and examples. These are written using the Tablet PC making them quick to both compile and return via email. Students who requested this additional assistance found that the handwritten solutions aided understanding.

4.3 Confidence

To ascertain if student confidence increased, students were asked to answer a series of questions stating how they felt before and after the course. A sample of the questions and results are included in Table 1. The results supported previous anecdotal evidence suggesting that the courses and the tailored resources did indeed improve confidence. Some of the student comments relating to their improved confidence and ability include:

I was hopeless at maths at school due to the way it was presented. Since doing the Trans Maths 1 course I feel somewhat confident due to the way in which it was presented.

I usually find maths scary and confusing but if I had to do it as part of an undergraduate degree which I'm sure I will, then I hope that I can use similar videos or have Anthony Dekkers as a helpful lecturer. Then I will be able to practice what I have learnt and hopefully not be too intimidated by it anymore. With math problems I feel if they were presented to me using female friendly terms or concepts in a step by step order like they were in this course, then I would feel more at ease.

I am currently undertaking TM1. Before I began I thought I was crazy to undertake mathematics as a subject because I had such a bad learning experience in high school. However I have now come to the understanding that I am just as smart as the average person when it comes to maths, and I look forward to sitting down and doing the work each day. I am confident that I will be able to complete each task successfully, where as I never used to be.

Table 1

Question	Positive Answer Before	Positive Answer After
I have more trouble learning mathematics than other subjects	42%	12.6%
When I have difficulties with mathematics, I feel like I can't handle them	47.5%	16.4%
I don't have a mathematical mind	35.5%	17.4%
It takes me longer to understand mathematics than the average person	33.3%	14.9%

5. Conclusion

The Tablet PC enables the creation of tailored resources that facilitate and enhance eLearning. The resources must encourage, support and provide guidance, thus increasing engagement and motivating and inspiring students to learn. In order to achieve this, an understanding of the



demographic of the student cohort specific to the individual course is critical. Catering to students from diverse educational backgrounds can result in students at the extreme ends of the scale not being completely satisfied. Therefore providing resources that cater to a range of learning styles allows for broad spectrum coverage.

References

- [1] Paquette, G., & Rosca, I. (2004). *An ontology-based referencing of actors, operations and resources in eLearning systems*. Paper presented at the 2nd International Workshop on Applications of Semantic Web Technologies for E-Learning (SW-EL).
- [2] Doyle, S. (2006). *Central Queensland University STEPS - celebrating 20 years - 1986-2006*. Rockhampton: Central Queensland University.
- [3] Adams, N., & Hayes, C. (2009). *Does teaching with a tablet PC enhance the teaching experience and provide greater flexibility?* Paper presented at the Australasian Tablets in Education Conference (ATiEC), Monash. <http://www.monash.edu/eeducation/assets/documents/atiec/2009atiec-nadineadamsclintonhayes.pdf>
- [4] GARLAND, E. L., & THYER, B. A. (2012). COGNITIVE-BEHAVIOURAL APPROACH *Social Work Theories and Methods* (pp. 159).
- [5] Seligman, M. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment*. Free Press.