

**1. Title:**

Assimilating Transformative Learning amongst a Diverse Cohort of Enabling Mathematics Students.

**2. Authors**

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**3. Presentation Type:**

Paper Presentation

**4. Short Description:**

This study examines the change in students' confidence in their mathematical ability and their perception of mathematics upon completion of at least one preparatory mathematics course.

**5. Long Description**

A paradigm shift in higher education is occurring – internationally, universities are changing the focus of their undergraduate degrees, increasing enrolments and broadening participation. As a result, non-traditional students who would once have been excluded from university studies are now being accepted. Given the vast social and educational diversities of these students, how do we, as educators, prepare them for undergraduate study?

Transformative learning is described as the process of changing the frame of reference that defines an adult's world. Many students entering university through non-traditional means have decreased mathematical confidence and a diminished perception of mathematics and their mathematical ability. Previous studies have indicated that student confidence in their mathematical ability is important and has a direct impact on their grade.

Preparatory mathematics courses that follow adult learning principles can both provide content knowledge and increase confidence whilst catering to the diverse social and educational backgrounds these students. A study conducted by CQUniversity Australia (CQU) examining students' mathematical confidence prior to and after completing at least one Transition Mathematics course, found students reported a reduction in their fear of mathematics and increased mathematical confidence.

**6. Keywords**

Mathematics. Transformative Learning, Andragogy

**7. Knowledge Focus**

**7.1. Thesis statement:**

Can preparatory mathematics courses with supportive frameworks transform the mathematical perceptions and confidence as well as knowledge in students studying externally?

### **7.2. Methodology:**

CQUniversity students who had been or were enrolled in any of the Transition Mathematics courses as an external student during 2010 or 2011 were invited to partake in the study. Participants were requested to complete a 5-10 minute online survey.

### **7.3. Results:**

One hundred and forty distance Transition Mathematics 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 22%. The lowest level of education amongst the participants was grade nine (3%). 18% of students had only completed year 10 (Junior Certificate) while 22% and 26% respectively had completed either year 12 or TAFE (Institute of Technical and Further Education). Of those students completing the survey, 93% had completed or were completing Fundamental Mathematics for University (the first level preparatory mathematics course).

All age groups showed a significant reduction in mathematical fear and confusion upon completion of one or more Transition Mathematics courses. We did not find age a significant factor affecting mathematical confidence. The learning process and the scaffolding and support provided with the course appeared to increase student confidence. This is an important aspect of the course as Parsons, Croft and Harrison 2009 p. 53) concluded that "students' confidence in their ability in mathematics does matter' and courses should be structured to increase mathematical confidence. In their study Parsons, Croft and Harrison (2009) found that as confidence increased so did the student's grade.

### **7.4. Conclusions and Implications:**

Through the implementation of scaffolding preparatory mathematics courses are able to improve both mathematical knowledge and confidence and improve students' perceptions of mathematics.

## **8. Theme Selection**

Theme 10: Science, Mathematics and Technology Learning.

Theme 8: Technologies in Learning.

## **9. Scheduling Note**

No scheduling preferences.

## **10. Biographical Information**

Nadine Adams is a Lecturer with Academic Learning Services Unit ALSU at CQUniversity Australia. In this role she teaches bridging mathematics at several levels and in different modes of delivery. Nadine is instrumental in the bridging resource development team within the ALSU

Mathematics team. Nadine has also provided mathematical assistance to undergraduate students from a wide range of disciplines. Present research interests include the use technology, namely the tablet PC, to provide individualised assistance and personalised feedback to external students, as well as the growing deficit in mathematics globally.

Clinton Hayes is a Lecturer with Academic Learning Services Unit at CQUniversity Australia. In this role he teaches bridging tertiary mathematics and university level mathematics across varied disciplines. Clinton has taught Physics, Mathematics, Information Technology disciplines at university level. Present research interests include the use technology as an educational supporting mechanism, Near Infrared Spectroscopy and Chemometrics.

Antony Dekkers is currently Senior Lecturer with Academic Learning Services Unit at CQUniversity Australia and has had seventeen years' experience in delivering tertiary mathematics. He is also part of team developing mathematics material used within the unit. His role includes delivery and development mathematics courses in the STEPS program, assisting undergraduate students with the mathematics component of their study program and small group learning support sessions in a range of mathematics topics. Current research interests include the development and delivery of online based resources for teaching within the tertiary system using the Tabletpc.

## **11. Language**

English