Australian Journal of Teacher Education

Volume 39 | Issue 7 Article 1

2014

Valuing assessment in teacher education - Multiple-choice competency testing

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Abstract: When our focus is on assessment educators should work to value the nature of assessment. This paper presents an innovative approach to multiple-choice competency testing in mathematics education. The instrument discussed here reflects student competence, encourages self-regulatory learning behaviours and links content with curriculum documents and with collaborative and cooperative learning episodes.

Introduction

Globally higher education sectors are under increased pressure to break away from the cycle of tradition. They are immersed in an era of new academic standards, of mass participation of students who want to be active in the learning process and are under increased pressure to develop productive assessment practices (Black & Williams, 1998; Phillips, 2005). The purpose of this study is to introduce an innovative design for a mathematics education multiple-choice competency test [herein MCCT]. This MCCT challenges traditional tests in that it presents assessment outcomes as being directed to the student rather than the teacher. The test is designed to alleviate mathematical anxiety by building confidence and encouraging independent learning. For educators, the assessment instrument identifies specific conceptual areas for targeted cohort support. Most importantly it provides base-line information to students on levels of individual achievement and introduces them first-hand to pedagogical issues in mathematics education.

The MCCT is one component of an interconnected unit of work that is based on creating effective mathematics pedagogies. This unit of work '*Working mathematically*' contributes to the current trend towards building evidence-informed practice (see government funded reports, for example, Anthony & Walshaw, 2007, Ingvarson, Beavis, Bishop, Peck, & Elsworth, 2004). As detailed in Martin (2012), '*Working mathematically*', is multifaceted in that it engages pre-service teachers in personally and professionally relevant sessions of mathematics education by effectively linking individual and collaborative cognitive engagement to experiences that assist in overcoming barriers in learning in first-year mathematics education.

The following literature review examines pre-service teacher knowledge and attitudes toward learning and teaching mathematics. MCCTs are then discussed in terms of what they provide teachers and what they offer students. There is also a discussion on implicit messages MCCTs send to students about what we as educators value and an examination of the positives of repositioning learners within the assessment process. Overall, the literature review builds a strong case for an innovative MCCT mechanism; one that addresses the current and differing needs of learners and teachers.

Literature Review

Testing Pre-service Teachers' Mathematical Competency

Research into the levels of mathematical competency demonstrated by primary pre-service teachers confirms that large proportions of pre-service teachers possess an inadequate understanding of the mathematics they will eventually teach, (for example, Afamasaga-Fuata'i, Falo, Meyer & Sufia, 2006; Aitken, 2007; Ball, 1990; Itter, 2010; Ryan & Williams, 2007; Seaman & Szydlik, 2007; Stacey, Helme, Steinle, Baturo, Irwin & Bana, 2001; Tobias & Itter, 2007). A common assessment instrument to measure pre-service teacher competence is a multiple-choice test. MCCT instruments satisfy requirements such as "the need to measure large numbers of participants without taking a large amount of time or money" (Gleason, 2010, p. 2). They provide base-line data and when repeated offer a measure of growth. MCCTs are mostly evaluative, "seeking to appraise the adequacy of individual teacher's knowledge" (Hill, Sleep, Lewis & Ball 2007, p. 11).

As many MCCT items assess pre-service teachers' mathematical competency, in terms of the mathematics they are expected to teach, they are often similar to tests given to students and aimed at a level appropriate for upper primary to lower secondary students (Afamasaga-Fuata'i, et al., 2006; Aitken, 2007; Ryan & McCrae, 2005; Southwell & Penglase, 2005; Tobias & Itter, 2007; White, Way, Perry, & Southwell, 2006). In teacher education programs these tests are common for identifying individual and/or collective errors and misconceptions. Indeed research shows that pre-service primary/elementary teachers consistently demonstrate difficulties and misconceptions with the concepts of place value, fractions and decimals (Seaman & Szydlik, 2007; Southwell & Penglase, 2005; Tobias & Itter, 2007; Kaminski, 1997; Ryan & McCrae, 2005; Ryan & Williams, 2007; Stacey, et al., 2001). Research also indicates that pre-service primary teachers' mathematical knowledge is primarily procedural, rule-bound and compartmentalised in nature, as is demonstrated in traditional MCCTs (Ball, 1990; Itter, 2010; Ryan & Williams, 2007). These research outcomes are in line with a broader perspective of mathematics education research, which demonstrates that primary/elementary education majors have one of the highest levels of mathematical anxiety and lowest levels of mathematics teaching self-efficacy of all university students (Hadley & Dorward, 2011; Hembree, 1990).

Mathematical Anxiety

Mathematical anxiety is defined by Hembree (1990) as a general fear of contact with mathematics. Research by Isiksal, Curran, Koc, and Askun, (2009) highlights school environments as incubators of this anxiety and their research supports the work of Hembree (1990) and Ma (1999), who found that mathematical anxiety impacts on student learning and on teachers' effectiveness in teaching. Therefore, teachers who experience mathematical anxiety often promote the early development of mathematical anxiety in their students. In turn, learners who present as mathematically anxious also exhibit low levels of self-efficacy, as they have limited self-belief in their personal ability to achieve. These research outcomes serve to focus pre-service teacher educators on the need to address mathematical anxiety.

Research as reported from a longitudinal study, conducted by the first author Martin (2010), found that mathematical anxiety in a pre-service teacher cohort was considerably reduced by engaging pre-service teachers with mathematics in student-orientated classrooms, or breaking away from the cycle of traditional learning environments, and by building strong mathematical understandings/knowledge. Part of this breaking away from tradition related to a sustained focus on reframing assessment.

The Nature of Testing Mathematical Competency with MCCT

As educators we know that standard MCCTs enable us to set the criteria, select evidence and make judgements in a very short space of time (Biggs & Tang, 2007). They are time-economic, offer easy and reliable scoring and provide clear benchmark indicators. However, in a world struggling to engage people with mathematics it is important to consider what pre-service teachers take from any testing process. Kvale (2007) discusses how standard MCCTs stifle independent and creative thinking and simplify acquired knowledge. Kvale's work supports work from Biggs and Tang (2007, p. 174) that demonstrates that users of MCCTs often see the score as the "important thing, not how it is comprised. [Learning is] … represented as the total of all items correct". Biggs and Tang further describe how the MCCT format engenders the presumption that only low cognitive-level processes are required and therefore learners are encouraged away from deeper learning. In addition, the summative nature of a MCCT demonstrates to participants that they have no voice in the assessment process; that they are simply being measured and classified. It is understandable, therefore, that poor mathematical knowledge is linked with heightened levels of anxiety (Rayner, Pitsolantis & Osana, 2009) and that negative emotions are linked with this type of assessment (Kvale, 2007). These factors impact, as discussed by Hodge (2008), on how learners link understanding with competence and identity. Indeed, the micro and macro processes in which the mathematics is situated contribute to students' relationship with the mathematics.

Assessment as a learning tool

It is important to consider assessment and the level of learner participation in the assessment as an intrinsic part of learning. By integrating learning and instruction in the assessment process learners share in the responsibility for determining levels of understanding and assessment develops as a powerful learning tool (Dochy, Segers, Gijbels, & Struyven, 2007). Self-evaluation, reflection, collaboration and peer-assessment all become key factors in learners becoming active assessors of their achievement. This involvement also enables them to become comfortable with any reporting on achievement shifting away from a single score to a profile (Dochy, et al., 2007). In addition, through learners experiencing assessment, where a variety of tools offer interesting, meaningful, authentic, challenging and engaging opportunities, the intent of assessment shifts from a single reflection of students' cognitive performances to one that also demonstrates metacognitive, social and affective learning outcomes (Dochy, et al., 2007). This widened perspective continues dialogue from 1989 where the National Council for Teachers of Mathematics [NCTM] stated:

> The assessment of students mathematical power goes beyond measuring how much information they possess to include the extent of their ability and willingness to use, apply, and communicate that information (p. 205).

It also extends work from Leal and Abranes (1993), who argue that the instrument for assessment must be consistent with the teaching methods and measure,

> … efficiency of teaching, diagnose difficulties of the students, provide the teacher with valuable information, give clues to the student about the quality of his or her work, give him or her fundamental feedback on the work, in all, play an important role in an effective teaching process (p. 174).

Educators alert to the power of assessment for both learners and teachers realise that the mechanisms they use are reflective of their commitment to learning and that to work at optimal strength the assessment methods and instruments selected must demonstrate consistency with both the instruction and with the teacher's underpinning philosophy.

Competency testing: the old and the new

Before 2008 we as pre-service teacher educators at a regional university campus used a traditional MCCT. In consideration of what this test demonstrated and provided to us and what it demonstrated and provided to our students we were encouraged to undertake a complete rethink of the multiple-choice testing mechanism. Within this process we first considered the pros and cons of the current MCCT. Following is a 'snapshot' of what we thought the MCCT, completed in exam type settings, offered us as educators. We knew that the data analysed from the current MCCT:

- Enabled us to direct future learning
- Enabled us to measure changes in student performance, and
- Provided pre-service teachers with near immediate pass grades or invitations to revisit the mathematics and resit a new or revised test

However, we believed these test situations:

- Exposed learners to a social comparative situation, where each individual's expectancy of future success was directly or indirectly linked to their own images of how their skills compared to those of others
- Increased the circumstance in which ability in mathematics was held back by emotional concerns, as pre-service teachers ascribed failure to low ability, consequently lowering their expectancy of success
- Not only led pre-service teachers to a reduction of effort on challenging tasks but also through the adoption of passive coping strategies, led them to unproductive strategies for seeking assistance, and
- Conflicted with our understanding of what constitutes quality leaning.

To reframe the competency testing into a more sophisticated assessment mechanism we realised a need to create a MCCT instrument that served many purposes. It needed to:

- Empower the pre-service teachers toward self-analysis of results and toward making personal judgements about their future learning
- Make direct links between current knowledge and the breadth of mathematical concepts addressed in primary school education
- Inform both the pre-service teacher and the lecturer of competency levels
- Increase productive on-line work
- Ensure a fast turnaround of results for learners and teachers
- Ensure the work was both user-friendly and wholly reflective of our philosophical position
- Involve pre-service teachers in consideration and application of a structured order in developing mathematical concepts
- Connect assessment with affective or social attitudes, and
- Align the structure with current curriculum guidelines

This added functionality to a standard MCCT required the assessment to be both summative, in terms of communicating to the lecturer each pre-service teacher's ability, and formative in terms of informing each pre-service teacher of future action.

In 2008 the first author (Martin) constructed a new MCCT. Martin used information as listed in Table 1 to establish a test where the nature of the learning was demonstrated not only by the task but also by:

- How clearly it linked learning and teaching, and
- How the work impacted on learner success in mathematics education

This focus allowed us to move away from situations where the MCCT contributed to a dislike for teaching mathematics and perpetuated the decline in interest in and competency with mathematics (Weiner, 1992). The new focus allowed us to address through sustainable assessment, anxiety, ownership and relevance of mathematics as well as to provide strong teaching and learning opportunities. It was anticipated that the new design would encourage the pre-service teachers to experience elevated self-belief and confidence in and with mathematics.

ANXIETY	OWNERSHIP	RELEVANCE	TEACHING/LEARNING VALUE
Reduce anxiety	Demonstrate how to establish personal meaning by building onto their identity with mathematics	Foster collaboration, value social and cultural aspects of learning mathematics by drawing on the diverse knowledge of peers/family	Become alert to the sequence of mathematical development and to differential achievement
Lift confidence	Take control of personal learning by re-evaluating prior knowledge and building persistence in learning	See real life/authentic examples of the mathematics and interconnectedness of mathematical concepts	Value their role as a pre-service teacher then set and challenge all expectations they may have
Lift competence	Participate in the learning in different ways (different in terms of how results from a MCCT are used)	Validate learning the concepts	Challenge perceived teacher/learner roles, be aware that the learning space is broader than the classroom and understand current curriculum guidelines and expected knowledge levels

Table 1: Areas of relevance

Martin understood that within the new design, students needed to be empowered to:

- Value their role in the assessment process
- Value the sequence of development in building mathematical knowledge
- See a professional reward in understanding where the knowledge being assessed connects to the 'bigger picture', and to
- Value the effort they put in to attain this broadened understanding.

Addressing a need for pre-service teachers to value their effort was integral in providing pre-service teachers with the motivation to try again after any degree of failure.

An overview of the new MCCT

The MCCT as constructed in 2008 has continued to develop. Advances continue to add depth and to improve useability. In 2013, the MCCT demonstrates clear maturity. For example, it now provides enhanced opportunities for pre-service teachers to develop ownership (as discussed by Sullivan, Clarke & Clarke, 2009). The foundation of the MCCT was based on the premise that clear communication about what learners were doing and why they were doing it would encourage them to focus on engaging with the task and that this in turn would motivate, shape, elaborate and deepen understandings, all elements of strong assessment as discussed by Biggs and Tang (2009).

This MCCT was constructed around the curriculum, in 2008 from the then Victorian Essential Learning Standards [VELS]. In 2013 the program has evolved into sets of questions based around the three content strands used in the Australian curriculum documents. Due to the original construction being designed specifically around VELS the following discussion will use the VELS framework to demonstrate how the MCCT was constructed as this design offers the greatest detail.

All questions aligned with the VELS five dimensions of mathematics: Number; Measurement, Chance and Data; Space; Structure and Working Mathematically. Under these headings the following ten subsets were further created:

1. Number – counting, pattern and order,
2. Number – addition and subtraction,
3. Number – multiplication and division,
4. Number – integers and ratio,
5. Number – common and decimal fractions,
6. Measurement - Probability and Data,
7. Measurement - Money, Time and Temperature, Volume and Mass,
8. Measurement - Perimeter, Area, Length and Weight,
9. Space – Shape, Transformation, Symmetry and Location,
10. Structure – Algebra, Set, Logic and Function, Equations linear and simultaneous.

The dimension of Working Mathematically – was integrated throughout all sections using problems that addressed Symbolic representation, Problem Solving, Conjecture, Formula, Solution, Communication, Mental and Calculator computation.

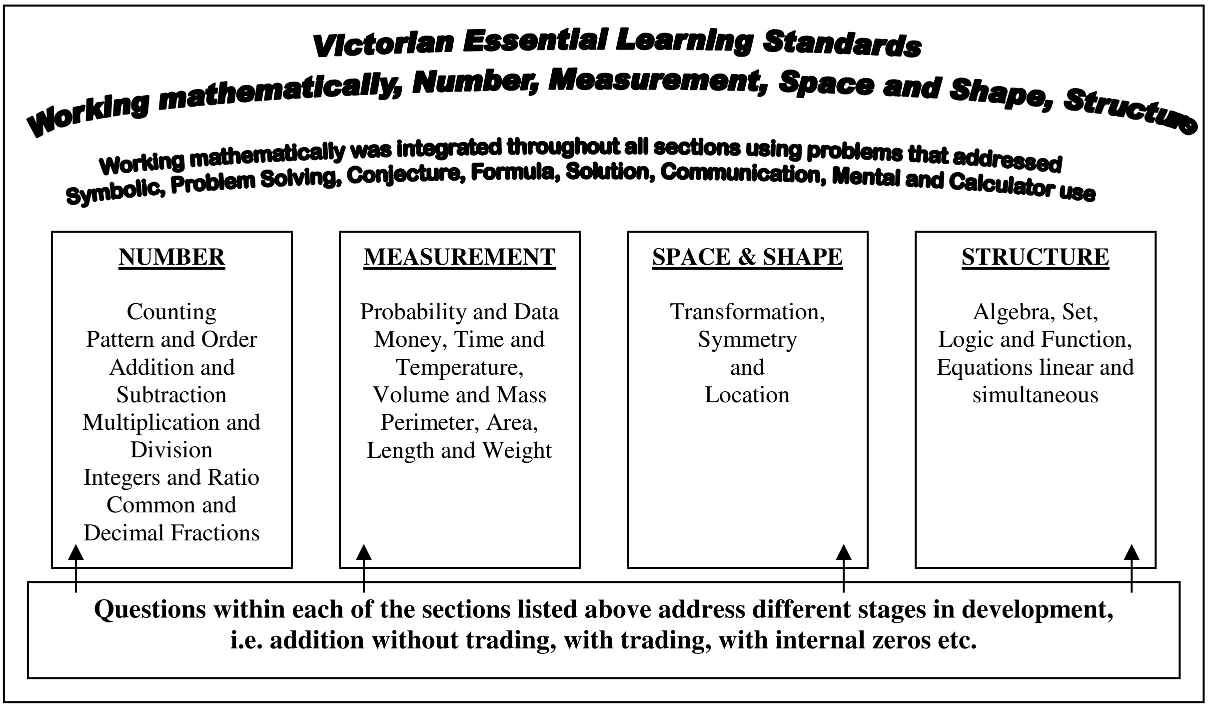

Table 2. Overview

Under each of these subsets, for example Number – Addition and subtraction, there are at least five further categories:

a) Addition and subtraction with no renaming
b) Addition and subtraction with renaming

c) Addition and subtraction with internal zeros
d) Addition and subtraction with decimal fractions and like common fractions
e) Extend to include addition and subtraction using estimation, mental/calculator computation.

In applying similar sequences of subsets to each of the ten categories a substantial bank of at least fifty different types of mathematical questions was developed. Now, within a complete test, each pre-service teacher is exposed to an ever-changing selection of questions that address each subset across each category. This equates to 10 individual tests consisting of 10 individual questions. Each question has a unique eight point alphanumeric code. So for example, if a question is repeatedly answered incorrectly due to a problem with the wording, or the working, or a conceptual area is highlighted as requiring additional attention, then each question can be directly and relatively easily revisited.

Current delivery

The MCCT is delivered on-line. Pre-service teachers have access to it at the end of semester one, the unit that houses the MCCT is a second semester unit. Pre-service teachers are introduced to the test at a lecture before the end of first semester. This introduction lets them know that they may access the work during the semester break preceding mathematics education classes and as a consequence have one aspect of their work-load complete or partially completed before second semester starts. This early opportunity to start the subject has multiple benefits, the main one being that the pre-service teachers come to the second semester already thinking mathematically. Due to the MCCTs alignment with VELS, pre-service teachers also begin with an understanding of what it means to work with the State Government curriculum documents. It allows the lecturer to access data before day one of classes and to have an indication of pre-service teachers strengths and areas of weakness. The introduction also covers what is immediately clear - that in order for the MCCT to be accessed online we have given up the notion of a controlled environment in which to conduct the test. We encourage pre-service teachers to work in an environment that they consider conducive to good learning and we strongly encourage them to work with a family member, friend, peer; anyone they feel comfortable with to talk the mathematics through. Real emphasis is put on what this collegial opportunity offers pre-service teachers both as learners and as teachers. We also signal that we understand that this unrestricted environment enables pre-service teachers to take an unscrupulous approach to the test. However we stress the idea that they will only disadvantage themselves if they work around expectations, and that this is a genuine opportunity for them to prove to themselves that they are capable of teaching mathematics in a primary/elementary school. We also discuss how working through the MCCT prepares them to connect with the structure of class work in semester two and, more importantly how it will impact on them as future teachers of mathematics.

When the pre-service teachers log onto the MCCT question sets they encounter support material (see Figure 1) that includes:

- An introductory spiel that discusses the value of these types of questions in terms of how and where they fit within the State/National curriculum documents
- An explanation of how records are kept. While the amount of the time students are logged into the site is recorded, as is their level of attainment each time they are logged-on, these are not factors used in collating marks for the unit. Assessment relates to their score. While the highest score is permanently logged, questions are not closed off once a satisfactory mark is attained. This opportunity

to revisit each test is an important point for students who feel they need more opportunity to work within a particular conceptual area

- Discussion about the occasional need for a calculator or a mathematical dictionary
- A video clip option that displays how each area of mathematical content knowledge is used in real life situations, giving validity to each mathematical concept
- A list of references for further study that includes titles and locations of mathematical text books, interactive DVDs and web sites that explore concepts through interactive activities, and finally
- Web sites that offer free on-line tutors for more involved or for further mathematical development

It is important to have the class texts beside you as you begin each set of questions:

Booker, G., Bond, D., Briggs, J., Sparrow, L., & Swan, P. (2010). Teaching Primary Mathematics, (4th ed.). Frenchs Forest NSW: Pearson (available at the La Trobe Bookshop).

de Klerk, J. (2007). Illustrated Maths Dictionary. 3rd Edition. Melbourne: Pearson Longman.

Revisiting your school mathematics texts

Some of the best books for revisiting mathematics are the books you had at high school.

Remember how proudly you carried the Year 7 through to Year 10 Maths text around each day and how eagerly you worked your way through every page of exercises?

Well now it is time to revisit them all and to redo the problems, to reread the hints and reviews and to check off with great big ticks the answers in the back of each book.

If these texts were used so frequently they fell apart, or if you lovingly passed them onto your very best friends, *don't despair* most libraries have copies for you to reminisce with. The maths textbooks will be catalogued around the 510.712 to 510.76 area of the library.

Or, unbelievable as this may sound, you can often pick them up very cheap at second hand stores!

Enjoy!

A recommended interactive resource

While there are many quality CD resources designed support you in developing a greater understanding of mathematics, often selecting one that has appropriate content is time consuming.

The Mathematical Association of Victoria, a not-for-profit oganisation sells a number of teaching and learning resources for maths. One that we would recommend is an interactive cd-rom called 'People Count: numeracy for adults'.

Mathematical Association of Victoria

Go to Publications and Resources / The MAV Online Shop. Then go to the catalogue and do a search for: ' People Count'. It runs on both PC and Mac.

Websites

Some good sites to visit are:

Mathematics Enhancement Program. Interactive Tutorials from The Centre for Innovation in Mathematics Learning.

Figure 1 Partial screenshot of from the introduction page

All of this support material is designed to inspire the pre-service teachers to value the process of learning mathematics for teaching and to take ownership by being personally honest and accountable. Indeed, the issue of an online testing environment that is not policed in anyway is an immediate and ongoing topic of discussion. It immediately signals that the pre-are trusted and therefore empowered to create a strong learning environment for themselves, they are encouraged to value their position within the learning process.

Figure 2 provides an example of the question format pre-service teachers encounter within the MCCT.

Question 6
Not yet answered
Marked out of 1.00
Flag question

$$\begin{array}{r} 10406 \\ -8090 \end{array}$$

Select one:
- a. 1316
- b. 2316
- c. 2215
- d. 2216

Question 7
Not yet answered
Marked out of 1.00
Flag question

$$27+12 \leq 15+24$$

Select one:
- True
- False

Figure 2 MCCT screenshot

During the semester

During the semester pre-service teachers are involved in leading very structured tutorial presentations on set topics (see Martin 2012). Within these presentations they are each expected to illustrate connections between a set of questions from the MCCT (a set they select) with current curriculum documents and to discuss the structure of the questions in terms of their increasing levels of difficulty and how this order relates to the development of mathematical concepts in children. Pre-service teachers are also required to create new questions relating to the conceptual area they are presenting on, questions that connect to the subsets and to offer these questions to the class. If there is full consensus that these questions are representative of the mathematics under investigation and that they fit with the order of development these questions are added to the question bank by the lecturer. The power of this discussion cannot be underestimated in terms of having pre-service teachers break down to precise levels of difficulty the mathematical problems offered. As part of this work the increasing level of difficulty is discussed in detail. This work ensures that the quantitative instrument or MCCT connects the assessment with the curriculum and with the structure of student learning in mathematics education. A point of interest here is that during these discussions there is usually, and this is encouraged, a debate on the requisite level of knowledge for a primary/elementary teacher. This debate usually comes about when pre-service teachers connect questions with year 10 curriculum standards. During these sessions the pre-service teachers work as a community freely discussing the relevance of different mathematical concepts to mathematics education and connecting these concepts to the levels of knowledge required to be a successful teacher in primary/elementary schools.

A comparison pre 2008 – 2013

The subject ‘Working mathematically’, [EDU1WM], is a core unit in the first-year of a four-year primary/elementary-school teaching degree. The MCCT assessment mechanism is a ‘Hurdle requirement’, meaning a pass grade must be achieved before the pre-service teacher can successfully complete the subject. The original hard copy test was administered during week one of a thirteen-week semester block to on average 250 pre-service teachers. The test consisted of forty multiple-choice questions and covered a wide range of mathematical concepts. Pre-service teachers needed at least 61% of correct answers to pass. On average one-third of the pre-service teachers passed the test at the first sitting. Another third, of the original cohort completed a new test, and passed on the second sitting while the final third would take up to five sittings of new or revised tests and sometimes end with an oral examination. This oral examination determined whether pre-service teachers passed or failed the subject. The test was administered within strict conditions where many pre-service teachers exhibited signs of heightened anxiety. Whether the outcomes exceeded the time taken to prepare, assess, rewrite and assess up to 5 or 6 times, were questions of much debate. The entire retesting process was time consuming to administer, caused increased angst for those being tested, and reflected a dissidence between what we taught and our philosophy of teaching and learning.

In 2013, pre-service teachers completed an unsupervised test at any time from the end of the first semester up until the end of the fifth week of the second semester, that contains one-hundred and ten mathematical questions, divided into ten sections. In 2013 pre-service teachers require just over 81% correct to pass each section. In 2009 for example, 40% of the cohort had taken the option to complete the work before semester began with a further 20% completing some parts of the test. By focusing on just one randomly selected aspect of the work we can provide an overview of the data, see Table 4 Number – counting, pattern and order (2009 cohort *n*-275). The fact that 84% passed this *Number* section at their first sitting offers a clear indication that pre-service teachers were largely comfortable within this conceptual area of mathematics. That 26% returned to the test when they did not have to indicates that pre-service teachers valued the test in terms of linking this level of mathematics to the requisite knowledge levels of primary school teachers. Note: this outcome is fairly consistent across the years 2008-13.

84% Pre-service teachers were right the first time - no need to go back	16% Pre-service teachers did not achieve a pass mark on their original attempt
Out of these:	*Out of these:*
8% Obtained a perfect score at their first attempt	2% Passed on the second attempt 1 pre-service teacher had 17 attempts before obtaining a perfect score
26% Kept going back when they did not have to	5% Passed on their third attempt
6% Obtained a perfect score after repeated attempts	Remaining pre-service teachers passed on the fourth attempt
65.26% of pre-service teachers had received a pass grade in this section before the semester began.	
1% of pre-service teachers continued to access this assessment set after the semester was complete.	

Table 4: Number – counting, pattern and order

Data demonstrates 84% of the pre-service teachers completed this section of the test at the first sitting, another 2%, on the second sitting, others took up to four sittings. No pre-service teacher exhibited signs of heightened anxiety to the lecturers. All pre-service teachers had instant feedback and directions on where to seek immediate assistance. Pre-service teachers voluntarily retested when there was no requirement to do so. There was no added load to the lecturer in the retesting process and there was clear alignment between the test and our philosophy of teaching and learning.

Conclusion

As lecturers, the current MCCT promotes strong conditions for cognitive development and allows us to use this and other assessment processes that align with our philosophical positioning of wanting to engage pre-service teachers within communities of practice. The design of the current MCCT focuses learners' attention on their own understandings and deflects the social comparative situation of most multiple-choice tests, where each individual's expectancy of future success is directly or indirectly linked to their own images of how their skills compare to those of others.

A strong research method built into the design of the MCCT and into the unit of work that houses it enables each element of the program to be measured/investigated. This paper contextualises the MCCT other research papers provide an analysis or highlight different aspects of the overall subject EDU1WM (see Martin 2012, Thomas, Martin, & Pleasants, 2011, Campbell & Martin 2010). The MCCT demonstrates a strong and evolving contribution to reform in university education and assessment, reform that will further impact mathematics education, as the pre-service teachers involved become practicing teachers themselves. These are teachers who have in their training explored pedagogical understanding in mathematics education by linking practice with theory and who have been independently involved in working with aligned and transparent goals.

In summarising this paper, the outcomes here demonstrate that as teachers and as researchers, when our focus is on overall quality we must value the nature of the assessment mechanisms we use. In contextualising this new MCCT we demonstrate an opportunity to consider not only what the test instrument offers teachers but also how it can influence the extent of a students' learning, and their understanding of what it means to be successful in that learning (Hodge, 2008).

As teachers and as researchers we must take every opportunity to consider the benefits of reconceptualising standard forms of assessment and aim to see the potential in widening often narrow assessment opportunities.

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