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"Hopefully, I Will Gain Confidence": Hope in Pre-Service Teachers' Mathematics and Numeracy Testing

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Abstract: The recent introduction of a personal literacy and numeracy test (LANTITE) has been part of tighter accreditation of Initial Teacher Education programs across Australia. This article focuses on pre-service teachers' experiences, beliefs and feelings about the new high-stakes testing regime. The data are drawn from a six-month project intended to evaluate students' experience in a first-year university mathematics unit. The focus in the present article is on students' responses to open-ended questions about their expectations of the unit, their level of confidence in areas of using and teaching mathematics and their thoughts and feelings about their own skill level being assessed. Results from 85 participants indicate that alongside experiencing high levels of mathematics related anxiety, positive and hopeful attitudes towards testing strongly appeared. Individual differences and self-regulated learning processes were also dominant in participants' responses as reported in this article. These findings contribute to the growing body of research on the importance of growth mindset and instilling hope and optimism in pre-service teachers.

Introduction

A recent concern in the Australian education system is that students' learning outcomes are falling behind other countries in international testing regimes such as PISA and TIMMS (Gallant & Riley, 2017; Klopper & Pendergast, 2017). Real and perceived beliefs about the quality of teacher practice have seen Initial Teacher Education (ITE) programs in Australia identified as a cause of this decline (Klopper & Pendergast, 2017). A common concern is that the numeracy skills and basic mathematical knowledge of graduates who are entering teaching in the primary years is lacking (Ormond, 2016). There has been a consistent call for improved Initial Teacher Education programs to see effective mathematics graduates (Ormond, 2016). Relevant to this is the distinction between Numeracy and mathematics. Pre-service teachers need to demonstrate Numeracy competence, an ability or disposition to use mathematics effectively to meet day-to-day demands, so that they can apply it in the classroom as a general capability and across all subject areas (Forgasz & Hall, 2019). In an attempt to align Australia's educational goals with national economic productivity targets (Gardiner, Cumming-Potvin & Glass, 2017, p. 95), a measurement-oriented approach to teacher education is seen, which includes: the introduction of minimum skill level to enter the teaching profession, the emergence of tighter accreditation of initial teacher registration and an increased requirement to show evidence of outcomes in all Australian states (Kleinhenz & Ingvarson, 2004, pp. 34-35).

Recently, a personal Literacy and Numeracy Test for Initial Teacher Education (LANTITE) was made compulsory. The LANTITE requires participants to identify mathematical information, identify and apply mathematical knowledge to specific situations, and to interpret, evaluate, communicate and represent mathematics in different ways (DET, 2017). ITE students are afforded three attempts to demonstrate that they have reached the required level of competency and they must pass all test components in order to graduate and be eligible to work as a classroom teacher in Australia (DET, 2017). The LANTITE was introduced across Australia as a way to "ensure teachers are well equipped to meet the demands of teaching and assist higher education providers, teacher employers and the general public to have increased confidence in the skills of graduating teachers" (ACER, 2018). Under the current Australian Institute for Teaching and School Leadership (AITSL) policy regarding ITE programs, a rigid scheme of testing and accountability mechanisms have been included (Gallant & Riley, 2017; Gardiner, Cumming-Potvin & Glass, 2017). A recent report published by the Teacher Education Ministerial Advisory Group (TEMAG) explains that the reforms have been implemented in over 350 ITE programs around Australia (Klopper & Pendergast, 2017, p. 3163; Knipe & Fitzgerald, 2017; AITSL). The high-stake risk associated with the LANTITE creates a new reality in ITE programs, particularly if pre-service teachers are not successful in one or more attempts. This additional test is said to demonstrate the routine attack of teachers and teaching in the media, claiming there is an over reliance on high stake test scores as an indicator of worth (McGraw & Fish. 2017, p. 122). The increase in regulation, compliance and surveillance of teachers' work call for focused attention on understanding pre-service teachers' experience, beliefs and perceptions. It also adds another dimension to what is currently understood about the importance of affective factors, teachers' beliefs and growth mindset in mathematics education (Attard, Ingram, Forgasz, Leder, Grootenboer, 2016; Boaler, 2013; Grootenboer & Marshman, 2016).

The affective domain is defined as the values, attitudes, emotions and beliefs individuals hold towards and about mathematics (Marshman & Grootenboer, 2012). Whereas mathematical growth mindset is defined as an individual's belief that their mathematical abilities can be developed (Boaler, 2013). Internationally, researchers have highlighted the role of the affective domain in teaching and learning of mathematics (Cobb, 1986; Cobb, Stephan & Bowers, 2011; Hannula, Pantziara, Wæge & Schlöglmann, 2010; McLeod, 1992; Uusimaki & Nason, 2004) and it is now widely accepted that affective factors are important considerations in mathematics education (Attard, Ingram, Forgasz, Leder, Grootenboer, 2016; Grootenboer & Marshman, 2016).

Pre-service teachers hold complex educational belief systems from many years of learning mathematics, which shape their future teaching (Bailey, 2014; Mittleberg & Forgasz, 2009). This article focuses on first-year university pre-service teachers and their beliefs about mathematics and about self and mathematics, relative to personal numeracy testing. The purpose behind our study was to explore and describe the kinds of beliefs presented in relation to personal numeracy testing and to establish the mathematical mindsets of first year ITE students. The study sheds light on the nature of these beliefs, the emergence of hope, the mathematical mindsets of first year students and the implications for Teacher Education.

Literature

In the last 25 years, and since the work of McLeod (1992) on the affective domain in mathematics education, research on ITE students' beliefs, attitudes and emotions have been the focus of increasing research (Barkatsas & Malone, 2005; Guy, Cornick & Beckford, 2015; Ignacio, Banco & Barona, 2006; Jao, 2017; Leder & Grootenboer, 2005; Rayner,

Pitsolantis & Osana, 2009). McLeod (1992) has asserted that "beliefs, attitudes, and emotions are used to describe a wide range of affective response to mathematics" and vary in their stability, intensity, cognitive process, and the time they take to develop (McLeod, 1992, p. 578). As an explanatory framework, in the preceding section of this paper we review key literature on mathematics beliefs, emotions, mathematics anxiety and hope theory.

Mathematics Beliefs and Emotions

Students hold strong beliefs about mathematics, about their own ability in mathematics, about mathematics teaching and about the social context of mathematics learning (McLeod, 1992). In the first year of their studies and before they have had opportunities to build upon and disturb student-oriented beliefs about mathematics, ITE students' beliefs are rooted in past student-experiences (Loughran, 2013; Miller & Shifflet, 2016). Old fears, beliefs and attitudes about mathematics learning and teaching are difficult to change, even with supportive interventions (Bailey, 2014). Existing mindset, beliefs and emotional responses to learning mathematics impact ITE students' problem-solving abilities, their mathematical content knowledge and pedagogical knowledge (Ball et al., 2008; Hurrell, 2013; Jao, 2017; Livy, Vale, & Herbert, 2016; McCombs & Marzano, 1990; McLeod, 1992; Norton, 2017).

Emotions are intrinsic to teaching: they are an essential part of the teacher-student relationship, central to teachers' investment in their practice and significantly impact behaviour (Stephanou, 2012; Yoo & Carter, 2017). More specifically, emotions play a central role in pre-service teachers' experiences of learning mathematics (Bailey, 2014; Loughran, 2013). Emotions follow from the goal-directed thought process (Stephanou, 2012; Snyder, 2000). Positive emotions associated with positive experiences produce positive beliefs about mathematics, whereas negative emotions hinder cognitive capacity (Bailey, 2014). Over repeated past experiences, students learn to attribute success and failure in mathematics to specific factors and eventually perceive themselves as 'not good at mathematics' (Boaler, 2013; Ignacio, Nieto & Barona, 2006). Ignacio, Nieto and Barona (2006) suggest that some students perceive mathematics to be an unpractical and difficult abstract that should not be learnt by everyone. ITE programs can change pre-service teachers' beliefs about mathematics instructional practices through explicitly teaching critical reflection and consciously engaging with their underlying beliefs (Barkatsas & Mclone, 2005; Jao, 2017; Loughran, 2013). However, when exactly in the course of an ITE program, pre-service teachers' beliefs change is not entirely known (Jao, 2017).

Mathematics Anxiety

Mathematics anxiety is multidimensional and includes test anxiety, worry, numeracy anxiety, math course anxiety and negative emotions towards maths (Rayner, Pitsolantis & Osana, 2009). The literature differentiates between an individual's stable tendency toward anxiety about mathematics (trait), and the temporary condition that results from a stress-evoking situation (state) (Ainley, 2006; Spielberger, Gorsuch & Luschene, 1970; Zielger, Ehrlenspiel & Brand, 2008). Mathematical anxiety is a common concern in primary teacher training and may lead to avoidance and non-engagement with course materials (Bailey, 2014; Norton, 2017; Wilson, 2009). According to Taylor and Galligan (2006), tertiary students in Australia "are often not prepared for the academic numeracy rigours of their discipline" and "such students are often anxious about studying mathematics at any level" (2006, p. 1). Pre-service teachers' in Australian ITE programs, experience greater levels of mathematics

anxiety than any other undergraduate discipline across the university setting (Greshem, 2007; Novak & Tassell, 2017; Rayner, Pitsolantis & Osana, 2009).

Individual traits, such as attitudes and beliefs about mathematics, can impact the level of mathematics anxiety (Leder & Forgasz, 2002). Anxiety reduces the working memory, interferes with attending to the task at hand, inhibits performance, affects future opportunities and results in a fixed mathematical mindset (Rayner, Pitsolantis & Osana, 2009; Stephanou, 2012). Meaney and Lange (2010) claim that high-stake tests in teacher education and a lack of confidence in one's own mathematical abilities in the tertiary setting, can result in mathematics avoidance and anxiety when students enter into in-service practice (Meaney & Lange, 2010). Boaler (2013) suggests that students who simply 'give up' and find a comfortability with the notion that they are not mathematically 'smart' display a fixed mindset.

A negative correlation between mathematics performance and mathematics anxiety has been found in several studies (Alzahrani & Stojanovski, 2017; Karimi & Venkatesan, 2009; Khatoon & Mahmood, 2010; Levine, & Beilock, 2013; Vukovic, Kieffer, Bailey, & Harari, 2013). Stephanou (2012) reports that anxiety in mathematics is common in students who have both successful and unsuccessful performance in mathematics education. Depending on an individuals' mathematical mindset, their subjective view and their relationship with mathematics, they can also have either a positive or negative reaction to mathematics testing (Boaler, 2013; Cooke, 2007).

Hope

Another key component in the subjective mathematical learning experience is hope. Hope is defined by Snyder (2000) as "the sum of perceived capabilities to produce routes to desired goals, along with the perceived motivation to use those routes" (p. 8). While some would be quick to dismiss hope as an unproductive delusion or wishful thinking, research shows it is a well-developed psychological construct (Peterson, Gerhardt & Rode, 2006; Snyder, 2000). Hope influences how individuals feel about and interpret their achievements; it enables problem-solving despite encountering obstacles, and enhances goal attainment (Stephanou, 2012). Hope is both a trait and a state and in both it can predict learning behaviours that affect performance (Peterson et al., 2006; Snyder, 2000).

Hope theory includes three main elements: goal orientation, pathways-thinking and agency-thinking (Snyder, 2000). Desired goals are valued by the learner and their attainment is uncertain to some extent (Snyder, 2000). Pathways-thinking includes thoughts about ways to achieve the desired goals and the consideration of plausible routes of actions (Snyder, 2000). High-hope individuals are known to be able to think of multiple alternate routes when faced with an impediment (Snyder, 2000). Agency-thinking comprises of the motivation to undertake a specific route of action (Snyder, 2000). Some studies show that agency-thinking is a stronger predictor than pathways-thinking and the main factor in overcoming obstacles and achieving learning and performance goals (Bailey, Eng, Frisch & Snyder, 2007; Bissessar, 2014; Stephanou, 2012). High-hope people, who are able to see failure as a setback and can create alternative thoughts, have more positive emotions compared to low-hope people (Snyder, 2000).

Related concepts to hope theory are optimism and self-efficacy. Optimism is a "stable tendency to believe that good rather than bad things will happen" (Scheier & Craver, 1985, p. 219; cited in Bailey, Eng, Frisch & Snyder, 2007). Bailey et al. (2007) report that those with a high level of optimism use problem-solving coping strategies and are better able to find alternate routes of thinking "to reappraise or reframe negative events" (p. 173). Bandura's

(1986) theory of self-efficacy maintains that beliefs about how successful one can be, impact the learning process. Self-efficacy in teachers is seen in association with their level of confidence, motivation and risk-taking (Norton, 2017).

Peterson, Gerhardt and Rode (2006) claim that what differentiates hope from other related concepts is its distinctive consideration of actual actions that go beyond a perception, tendency or belief. Bissessar (2014) builds on this notion by positioning hope as a component of psychological capital and suggesting that hope, optimism, self-efficacy and resilience are all significant for individual wellbeing. State hope is a mediation between trait hope and task performance and can be manipulated with verbal persuasion (Peterson et al., 2006). For example, in their work that examined the relationships among hope in its state and trait forms, Peterson and colleagues measured participants' state hope immediately after reading a set of instructions that were manipulated with persuasive positive or negative messages about how hopeful they should feel to be able to complete the task successfully (Peterson et al., 2006). They found that negative verbal cues lowered the levels of state hope; however, positive reinforcement designed to elevate state hope did not seem to have the same effect. The researchers conclude that "words alone may not be enough to increase hope" and suggest that in order to increase state hope, stronger positive persuasion and explicit development of strategies and alternate routes to address barriers are needed (Peterson, Gerhardt & Rode, 2006, p. 1107).

Recent studies report on the emergence of hope in mathematics learning and teaching. For example, Stephanou (2012) studied Grade 5 and 6 students' perception of mathematics performance in relation to performance expectations. She found that hope, along with attribution and emotions, predicts to some extent successful performance expectations in mathematics. In another study, Yoo and Carter (2017) found hope and vulnerability in teachers' reflections about their mathematics professional development. They suggest that in order to cultivate positive emotional growth amongst teachers in relation to mathematics, that the acknowledgement of the complexity of emotional identity is necessary. In relation to ITE students, Bailey (2014) recommends that in order to support pre-service teachers in constructive alternative conceptions about mathematics' learning, providing them with alternate pathways for teaching differently to how they were taught in the past is imperative (Bailey, 2014). Helpful measures that could increase hopeful thinking include formulating clear goals, commit to pursuing them, engage in creative and explorative thinking, promote eagerness and questioning and reframe obstacles as challenges (Stephanou, 2012; Yazgan-Sag & Emre-Akdogan, 2016). Furthermore, Forgasz and Hall (2019) suggest that providing multiple examples of numeracy and how it is embedded across the curriculum can increase the engagement and confidence of all pre-service teachers, including those who self-identify to have weak mathematics and are anxious about using numeracy. In this study, a workshop that focused on numeracy in the Arts was found to provide an opportunity to those who were not overly confident with mathematics to step forward as experts and support their peers (Forgasz & Hall, 2019, p. 31). Arguably, one could say this is an example of increasing ITE students' state hope. The unit described in Forgasz and Hall's (2019) study provided alternative pathways (various subject-specific lenses) to achieve the desired goal (numeracy competence), thus increasing ITE students' agency or, in other words, their "willingness to engage their future students in numeracy-based activities" (Forgasz & Hall, 2019, p. 31). Looking at hope as a construct in ITE programs may serve us to better understand and support ITE students in mathematics learning and testing. The study described below builds on these ideas by providing some additional insights.

The Study

The qualitative study reported here investigated first-year teacher education students' thoughts, emotions and beliefs about teaching mathematics, using mathematics and being tested on their personal numeracy skills. The key research question was: *What affective factors and personal beliefs are associated with numeracy testing and first year pre service teachers' sense of self in mathematics Initial Teacher Education?* After obtaining university ethics approval, participants were sought out from first-year students enrolled in a compulsory unit in the Bachelor of Education (Primary) and Bachelor of Education (Early Childhood and Primary). This unit was designed to teach key concepts in early childhood and primary school mathematics education. At this early stage of their four-year course, participating students had not yet attended a professional placement. Demographic details of the participants are seen in Table 1.

Participants	Male	Female	Year 12 Pathway	Diploma Pathway	Undergraduate Pathway
85	15	70	55	26	4

Table 1: Participants' demographic information

The 12-week unit was structured around a flipped classroom model where students engaged with weekly theoretical content via an online learning management system prior to attending a 2-hour face-to-face weekly class. These workshops provided students with opportunities to engage in practical activities that were targeted towards the development of mathematical pedagogical content knowledge. Table 2 provides a breakdown of the weekly concepts taught in this unit.

Week	Weekly Concept Targeted
1	Personal Competency Test (Hurdle)
2	Mathematics vs Numeracy
3	Mathematics in the Real World
4	Personal Competency Test (Results)
5	Mathematics and Numeracy in Early Childhood
6	Concept Development
7	Play and the Environment
8	Supporting Mathematical Development
9	Mathematics and Numeracy in the Primary School
10	Mathematics Curriculum Connections
11	Mathematics and ICT
12	Personal Competency Test

Table 2: Mathematics Education Unit – Weekly Overview

A personal numeracy competency test was embedded in three points throughout the unit. The test was designed to assess if students' skills met a minimum required level, so that they are well-positioned to fully engage with the materials of this unit. The test also made it possible to identify students who might need additional support in developing their own personal numeracy skills prior to sitting the LANTITE. This article does not examine the hurdle test's conditions or reliability, nor does it compare students' pre and post results; but rather, the results discussed in this paper focus on students' perceptions and beliefs about mathematics learning and teaching and their beliefs about the testing environment.

Questionnaires were completed at the beginning of the first session and prior to sitting the first numeracy test (Week 1); before completing a second attempt of the test (Week 4); and, at the end of the teaching cycle (Week 12). In all three collection rounds, the same pen-

to-paper questionnaire was used. The tool was adapted from Boyd, Foster, Smith and Boyd (2014) and had three distinct sections: (1) Demographic information; (2) Eight items presented on a 5-point scale measuring the key constructs of attitudes toward mathematics (N.B. this was an inverse scale), and (3) open-ended questions about attitudes and beliefs regarding mathematics. Adaptations made to Boyd's et al., (2014) original tool, which involved contextualising the open-ended qualitative questions to suit the Australian testing context and the nature of the mathematics taught in this unit.

This paper reports on the qualitative analysis of the open-ended questions only. The five open-ended questions were: *(1) What are your expectations from this (mathematics) unit? (2) Would you take this unit if it had been an elective? Please explain. (3) As you are aware, this year there is a requirement to sit and pass the National Numeracy and Literacy Test (LANTITE); what do you think or feel about this? (4) Comment on your level of confidence in both areas: teaching mathematics and using mathematics. (5) How do you feel and what do you think about your own mathematics abilities being assessed?* Hard copies of the questionnaires were anonymously collected, scanned and data were transcribed verbatim. Participants were invited to use a pseudonym, which has allowed us to match between the same students' first, second and third questionnaire when applicable. Checking all scanned copies for completion and validity was then conducted. Drawing on naturalist inquiry methods (Lincoln & Guba, 1985), a data-driven inductive approach was employed to explore students' attitudes and beliefs in relation to the research question (Berg, 2004). This first step included assigning units of meaning to identify recurring themes (Johnson & Christensen, 2008). Each question was analysed within and across the three points of data collection. The initial categories from the first sitting of the questionnaire informed the analysis of the following sets, where initial themes have been confirmed or disputed and new themes emerged and checked against the first set once more. The coding was checked by the two authors for accuracy and validation. In this method of cross checking, clear findings began to emerge across all sources of data, showing patterns of repeated themes, attitudes and beliefs as reported on below.

Results Discussed

Anxiety, Self-Efficacy and Hope

A key theme that emerged from the analysis is the centrality of students' attitudes to being tested and their level of concern and anxiety. A range of negative emotions in relation to being tested was a recurring theme. Participants reported on feeling nervous and worried with the prospect of failing their numeracy test. The focus of students' concern was seen in correlation with the perception of their abilities, skills and understanding. This was evident in comments such as *"I am very poor in my maths skills and abilities which put me in a very anxious as well as uncomfortable level",* "*I feel anxious because it's been a long time since I've had had to sit a 'test'"* and *"(I need to) get over feeling anxious about failing and not understanding"*. Participants who self-testified that they failed one or more attempts of the hurdle test reported feeling overwhelmed: *"I get sick to the stomach and anxious"*. These findings are similar to other studies that highlight the extent of mathematics anxiety in teacher education (Grootenboer, 2017; Meaney & Lange, 2010; Novak & Tassell, 2017). When asked their opinion about the LANTITE national testing, anxious responses were accentuated e.g. *"I feel extremely anxious and worried about this test"* and *"I am aware I feel extremely anxious – I have always felt a failure when I cannot pass a maths test".*

Feeling anxious also appeared independent of testing. Some students self-testified to successfully passing the unit's hurdle test, yet still expressed a level of worry and

nervousness about their own mathematics abilities. Furthermore, some comments displayed positive attitudes despite feeling anxious*:"(I feel) anxious, but excited to test my level of knowledge", "I feel anxious about (failing) the test, but I am a good learner and study, so I'm confident I will be fine", "It makes me feel anxious. I will need to do lots of study to increase my skills", "It makes me anxious but I understand the need for it".*

Interesting to note is that learners' self-regulation (*"I will need to do lots of study*") and self-confidence (*"I am a good learner"*) appear throughout the data, showing students' engagement with and self-awareness related to developing their skills and improve performance. While commonly students experience testing situations as stressful (Jamieson, Peters, Greenwood & Altose, 2016), our results indicate that not all the students perceive stress negatively. Similar to Zimmerman's (1989) notion of self-regulated learners, we found evidence of personal accountability, high self-efficacy and an initiative to self-direct efforts to improve mathematical skills (*I feel anxious…I'm confident I will be fine")*. The results reveal that some students start their course with a growth mindset disposition despite feeling anxious.

Another affective factor found in association with anxiety was hope. Similar to Peterson, Gerhardt and Rode's (2006) notion that hope is an essential coping strategy for managing learning towards desired goals, our findings show feeling hopeful emerges despite a sense of fear: *"I hope to overcome my fear / anxiety about mathematics and hope to feel comfortable about teaching maths to students", "I feel a bit stressed, but hope to do well in it", "I hope I don't fail and I hope I am able to keep up with the class".* Hope was also seen as a more general common disposition among the participants, not always associated with avoiding negative outcomes: *"I hope to be able to understand all content to be able to teach mathematics", "I hope to become confident in teaching maths as well as my own mathematics abilities", "Regarding my non-English speaking background, I hope that I can do more research and learn concepts of mathematics in English".* Hope was therefore found to be a central feature in pre-service teachers' outlook at potential outcomes and their learning journey. It is seen in the data in relation to ITE students' pathways-thinking about alternative actions they may take to improve their current mathematical skill level (e.g. *"I can do more research"*) and seen alongside optimism: "*I also hope to learn to engage math more than I currently do*", "*My confidence in maths isn't really high, but (I) do hope to improve in it (this) unit*".

ITE students' hopeful attitudes were also seen alongside a positive belief in their ability to develop the necessary mathematical competencies: *"I am sure I will become more confident as the unit progresses"* and *"I believe I will be able to teach mathematics once I am confident with the material"*. Similar to other studies (Greshem, 2007; Warwick, 2008), these results show an intrinsic self-efficacy that is derived from individuals' internal notions of success in mathematics. At the same time, ITE students demonstrated a connection to, engagement with and reflect on their past student-experiences in mathematics: *"It would be interesting to find out if I have improved since I left school", "I am just nervous as I have only passed year 10 maths", "(I feel) nervous! I never did well in high school", "I'm very nervous about it as it's been while a while since I've done any maths education and I sometimes have an issues with being tested".* Holding such stable and inflexible beliefs about mathematics that derive from past school experience is not uncommon (Kagan, 1992). It is perhaps the emergence of hope that signifies what Miller and Shifflet (2016) call a development of possible future selves, constructing visions of desired alternatives. As one participate noted in relation to the testing: *"It does make me nervous - I have been (off) school for a couple of years, so nervous about how I'll go. But hopefully, I will gain confidence over the course and will complete/ pass it".* Hope emerged as a way for students

to mediate between current skills and a more capable future-self, and a way for individuals to imagine their growth and develop pathways-thinking.

Beliefs about Teaching Mathematics

Another theme that emerged in the data was the view that teaching mathematics in the Early Years is easy. This belief emerged in association with high self-confidence: *"I think I can teach simple maths well …I'm teaching babies", "Teaching mathematics at a really low level should be easy", "using mathematics is not my strongest area, teaching it is possible with some kind of guidance and only till primary level", "I'm confident with the primary maths"*. There was a shared belief that being able to teach mathematics in the Early Years and lower primary level requires less expert knowledge and is more achievable. Research tells us that such a display of overly confident self-beliefs at the start of the semester may cause some students to refrain from the necessary effort required to grow in their learning, or hinder their openness to make good use of feedback (Guy, Cornick & Beckford, 2015). Nevertheless, increased motivation and confidence associated with holding positive beliefs about self and about the task (Ignacio, Nieto & Barona, 2006; McCombs & Marazno, 1990) may in turn indicate the necessary growth mindset that is central to students' ability to be hopeful, positive and expect to succeed. Forgasz and Hall (2019) report that ITE students showed high confidence in their numeracy skills at the start of the teacher training program. Norton (2017) suggests that ITE students tend to over report on their mathematical capabilities. This could be because some students might be unwilling to report on low confidence if they assume they are required to meet a certain standard, while others might be unaware of their skill level.

When asked if they would take the mathematics unit if it had been an elective, the majority of participants responded that they would study the mathematics unit. They justified this view with beliefs that mathematics is important to society and to their training as teachers: *"vital to Australia's education", "essential", "very important", "crucial" and "a key component"* were key ideas that emerged in the data about mathematics. The small number of students who stated that they would not have taken the unit if it was an elective, cited their own lack of confidence and deep rooted self-beliefs about mathematics as the reason: *"No, because I'm not confident", "I'm not good at it", "I'm very bad at maths", "I'm not a fan of maths", "I struggle in math" and "I have never done well in maths".* These findings correlate to Boaler's (2013) assertion that students with a fixed mindset struggle in mathematics if they are not exposed to targeted intervention.

The final theme that emerged in the data was the articulated beliefs of students' anticipated growth through participation in the unit: The expectation to (1) increase one's understanding, skills and knowledge of mathematics, (2) to gain greater math teaching strategies, (3) to learn strategies to engage young students, and (4) to increase one's own confidence and comfort with the level of maths required for teaching were all common themes that emerged. Such findings suggest that these students entered the ITE program with a growth mindset and a measure of optimism about their mathematical learning.

Interestingly, opinions about the LANTITE were found to be of a positive nature. Despite a small number of negative comments about testing in general *("not another test", "sick of doing them"),* the LANTITE was described as an essential instrument for ensuring quality teaching*: "the LANTITE is necessary", "a good idea", "important" to ensure that "teachers can successfully teach young students maths".* When asked about their thoughts and feelings about the LANTITE, strong opinions emerged in favour of standardised testing*: "I feel it is a way for students to get the standard of teaching they deserve", "It is important*

to have effective teachers with maths skills", "it's an important subject for teachers to understand as it is a vital aspect in the field of teaching", "I think it is good to make sure teachers are smart", "I think it's a good idea to make sure teachers know what they are meant to be teaching", "I believe all teachers should be held at a specific level"; "there are a lot of teachers out there that don't have good literacy or numeracy knowledge", "I think it's a good procedure set in place to make sure all teachers have a sound understanding and know the basics of maths", "I think it's a great idea. It sends a benchmark for all future teachers".

Although the participants in this study were directly affected by the new LANTITE requirements and despite feeling anxious and concerned about their own mathematical skills, a strong positive attitude in favour of the national numeracy test was found. One could argue that these beliefs echo public opinion and scrutiny of teachers' quality (Klopper & Pendergast, 2017, p. 3160) that unless we *"make sure teachers know what they are meant to be teaching"*, we will continue to have "*a lot of teachers out there that don't have good literacy or numeracy knowledge"*. Without debating about the truthfulness of these comments, the findings suggest that not only are student beliefs rooted in past student-experiences (Loughran, 2013; Miller & Shifflet, 2016) but they might also be influenced by social beliefs about teacher quality. In this study, the critique on teacher quality does not seem to decrease ITE students' personal self-efficacy or hope.

Concluding Remarks

In this study it appears that ITE students were aware of their own anxieties, past experiences with mathematics testing and consciously engaged with their confidence level. There was a level of optimism and a hope that the tertiary environment would generate a positive change that would enable them to be successful in the new high stakes testing environment. While one might assume that those who pursue a teaching degree possess some kind of hope to become a teacher, insights into what students think are not always established in the tertiary environment and could be drawn upon more explicitly. This study reinforces Yoo and Carter's (2017) findings that hope is central to mathematical learning and that teacher preparation courses should draw upon and acknowledge individual's personal reasoning to enter the teaching profession. Whether personal numeracy testing has a positive or negative impact on student affective factors, mindset and sense of self in relation to mathematics teaching require further exploration. Moreover, exploring whether hope is a precursor of students attending a teacher education program has not yet been undertaken. Future studies may use insights into students' thinking to shed light on the implications of the LANTITE for universities, in relation to embedding testing preparation in ITE courses and in effectively directing resources to better support pre service teachers' mathematical and numeracy competencies. We could assume that personal beliefs about teachers and society's beliefs about teachers as a social group (Bissessar, 2014) would be more easily detected at the start of the ITE program and before ITE students begin a personal journey towards developing their own teacher-identity. The accepting attitudes towards numeracy testing and findings of optimism and hopeful attitudes, could provide teacher-educators with opportunities to engage students in more effective ways of learning.

The findings described in this paper show that despite mathematics related anxiety and concerns about testing, ITE students enter the ITE program with positive hopeful attitudes, pathways-thinking towards desired goals, a growth mindset and optimism. This is an area in the tertiary environment that warrants further investigation. Potentially, lecturers could build on students' hopeful attitudes if they attend to their mindset more explicitly at the

start of the ITE program. This is particularly important in relation to the mathematics components of ITE courses, which can be extremely challenging for ITE students. Possible interventions that promote hope, optimism and growth mindset could become an important addition to ITE mathematics education. This study has demonstrated that despite the introduction of high-stakes testing in ITE courses, in relation to mathematics education, students are hopeful that they will grow and succeed. The current study is limited by the number of participants and the specific unit's context. Additional research is needed to examine individual students' beliefs and state hope in relation to their mathematics, particularly as ITE student's progress in their course in this new high-stakes testing environment.

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