Collaborative self-study and peer learning in teacher educator reflection as an approach to (re)designing a mathematics education assessment task

Leicha A. Bragg
Deakin University

Josephine Lang
Deakin University

Received: 10 April 2018 Accepted: 12 August 2018

(Re)designing mathematics assessment tasks that prepare pre-service teachers for teaching and offer learning opportunities for developing pedagogical practice is a challenging endeavour for teacher educators. Collaborative, reflexive peer learning teams provide expertise and support in advancing effective curriculum work, such as assessment tasks. This case study sheds light on the impact of self-study to facilitate changes in curriculum work and improve learning outcomes for pre-service teachers and teacher educators, thus, is worthy of further exploration.

Keywords assessment, teacher education, peer learning team, self-study, mathematics education,

"Curriculum work guides the re-culturing of schools and universities. Curriculum problems have to be first appreciated and then identified before a solution can be described. … The re-culturing requires sustained deliberation: judgement in relation to existing rules, imagination in keeping windows of opportunity open, negotiating the relations between vision and voice, trust in people and trust in processes, structures and agency." Fawns (2008, p. 158)

Introduction

Teacher educators are curriculum workers, where curriculum is used broadly and incorporates assessment. Once curriculum policy is lifted from the (virtual) page and enacted in the 'classroom', the curriculum work shifts from intention into practice. The enacted curriculum is the practised curriculum and embodies the pedagogical decisions made to support the implementation of curriculum policy frameworks within the social contexts of the learners and learning (e.g. Elbaz, 1991; Schiro, 2013; Willis & Cowie, 2014). In their analysis of curriculum understandings and practices in higher education, Barnett and Coate (2005) offered a dynamic framework of curriculum based on three interacting dimensions: knowing, acting, and being. They have found that representation of each of these dimensions create different curriculum patterns depending on the discipline and/or profession. Within the professions, like teaching, the dimension of acting comes to the foreground and is underpinned equally by the knowing and

being dimensions. From this theoretical perspective, teacher educators' work in curriculum and assessment are relational and interpretivist activities that are complex and may be contested. As described by Fawns (2008) in the quotation above, there is potential for transformation, or in his words, 're-culturing' within our teacher education curriculum and assessment contexts if there is reflexivity; where reflexivity is the iterative enactment of critical reflection for the purposes of improving teaching practice. Self-study, using a collaborative inquiry approach (Samaras, 2011), provides one such opportunity to interrogate and examine the work of curriculum, pedagogy and assessment. Elbaz (1991) has long argued that genuine, rather than contrived, collegiality is imperative in evaluating and improving curriculum work, which includes implications for assessment, with the potential for positive impacts for student learning. This study specifically addresses the research questions:

What impact does self-study have on curriculum and assessment work?

Why does self-study work in assessment (re)design?

Teacher professional learning

The theme of professional learning of pre-service teachers (PSTs) becoming teachers is substantial within the literature (e.g. Boshuizen, Bromme, & Gruber, 2004; Britzman, 2003; Cochran-Smith, Feiman-Nemsar, & McIntyre, 2008; Darling-Hammond & Bransford, 2005; Korthagen, Kessels, Koster, Lagerwerf, & Wubbels, 2001). Comparatively, the understanding of professional learning and development for teachers has a longer history and is even further developed (e.g. Day, 1999; Korthagen, 2016; Lieberman & Miller, 1999; Pickering, Daly, & Pachler, 2007; Shulman & Shulman, 2004). Yet research into the professional learning and development of teacher educators is a relatively recent phenomenon and a less established field (e.g. Brody & Hader, 2018; European Commission, 2013; Loughran, 2014). What connects these sectors of teaching professions is teaching and learning. The contexts are different and these create complex nuances; however, professional learning is ever present because of the desire to better understand and facilitate, more deeply, the learning of the learners they are entrusted.

The professional knowledge that underpins the professional learning of teachers and their practice is complex and messy, often arising from having to handle 'wicked problems' (Rittel & Webber, 1973). Schön's (1983, 1987) seminal work on professionals and their knowledge and learning reframed and (re)valued the way we thought about the knowledge of the professions. With a background in urban planning, Schön examined knowledge through the use of generative metaphors (Schön, 1983); particularly, the swampy lowlands and the high, hard grounds (Schön, 1995, p.28). In his use of these generative metaphors to knowledge, Schön analysed that the real estate metaphors of the swampy lowlands are often seen as wasted, valueless land in a property development construct and represent land in need of reclaiming. This lower status associated with swamplands could be associated with the less-valued standing of practical or procedural knowledge so often associated with the professions. Alternatively, Schön used the high, hard ground real estate generative metaphor, with its highly valued and elite positioning in markets of a desired location, for the higher status afforded to propositional, declarative knowledge. He argued that the professional, procedural knowledge of the messy and uncertain 'lowly swamplands' should no longer be less privileged than propositional knowledge of the declarative and (one) truth-bearing 'high, hard ground', which were his generative metaphors to describe the two kinds of knowledge. The practitioner swamplands are places where the rational and technical knowledge could fail because situations are complicated with unique features; i.e., problems that cannot be resolved with only established theoretical perspectives of declarative knowing. In naming the predominant knowledge of the professions as procedural, Schön

reasoned that the learning of professionals is also different, more complex and requires critical reflective practice.

Professional learning and reflection

In, *The Reflective Practitioner*, Schön (1983) built on Dewey's (1933) argument that reflection is a significant part of the learning process, particularly within the professional practitioner's daily work. Schön argued that central to the professional learning of practitioners, such as educators, is learning from experience using reflection. Consequently, reflective teaching (Zeichner & Liston, 1996) is now embedded in the heart of teacher education programs and yet, it is argued that it is still an elusive concept and practice in teacher education (Clarà, 2015).

Schön (1983) developed the concept of reflection-in-action that is 'central to the art through which practitioners sometimes cope with the troublesome "divergent" situations of practice' (p.62). Schön's reflection-in-action concept offered an alternative to propositional knowledge associated within a technical rationality model enshrined within the positivist paradigm that did not appear to recognise or value practical knowledge or offer practical resolutions to the work of professional practitioner's situated problems. In his analysis of reflection-in-action, Schön recognised the role that 'surprise, puzzlement or confusion' (p.68) plays as the practitioner reflects-in-action to make new meanings of uncertain situations in their practice.

Others have identified seeing problems in practice in renewed ways, as critical in achieving change in teacher practice and new understandings. For example, Korthagen and colleagues (2001) conceptualised teacher professional learning based on experience and reflection across three levels: gestalt formation > schematization > theory building (phronesis) in a model they called a pedagogy of realistic teacher education (see Chapter 10). Like Schön's work, Korthagen et al.'s model was based on the assumption of professional learning arising from experience and was extended by incorporating a five-step reflection model (ALACT; for more detail on ALACT reflection model and core reflection, see Korthagen & Vasalos, 2005) that informs personalised theory building or phronesis, a form of practical wisdom, that can be used in the situated teaching context. Korthagen et al. (2001) contended that using the realistic pedagogical approach in teacher education is underpinned by the teacher educator identifying suitable experiences for the PSTs to learn. They argued that the 'experience' needs to be 'challenging enough to offer opportunities for a confrontation with gestalts that the educator would like to change' (p. 202). Here, Korthagen et al.'s conception of 'confrontation' in experience for PSTs professional learning, can be likened to Schön's 'surprise, puzzlement or confusion' that is necessary to stimulate professional learning. Consequently, to disrupt the gestalts, which may be correlated to Polanyi's (1966) tacit knowledge, PSTs need an opportunity to confront their thinking to progress to a new level of understanding. As another illustration of using experience in professional learning, Tripp (1993) developed a pedagogical approach of critical incidents in teaching which asked PSTs to identify incidents that were critical to changing the way they think and practice as a teacher. This guided reflection and analysis of an experience (incident) shifts from a description of an event in an immediate context to finding a more generalised meaning, or personal, practical theorising, through problematising the significance of the incident. Thus, the critical incident involved reflection for meaning-making and was 'created by seeing the incident as an example of a category in a wider, usually social, context' to inform professional practice (Tripp, 1993, p. 25). Again, there are associations to Schön's principle for professional learning in that the trigger for identification of the critical incident is the observation of some 'surprise, puzzlement or confusion' that occurred in practice.

Although these illustrations of pedagogical approaches use experience for professional learning, they often rely on reflection-on-action, rather than Schon's reflection-in-action. The conceptualisation of reflection-in-action has been identified by Russell and Martin (2017) as a

persistent challenge for teacher education in understanding learning from experience and, they argued, is yet to be realised because most teacher education programs still worship at the altar of learning about theory first and then applying that theory into practice (experience). Russell and Martin (2017) argued that 'despite recent concepts such as that of a professional learning community, teacher education has never addressed the gap between theory and practice as a gap that requires a new way of thinking and knowing' (p.35). Consequently, they call for a new epistemology that 'depends on a professional learning process such as reflection-in-action' because it offers 'one productive way to begin to understand and work to resolve these fundamental epistemological tensions' of PSTs learning within the contexts of university and practicum (p.38).

Professional learning and teacher educators

In his conceptualisation of reflection-in-action, Schön (1983) transformed the understanding of the work of the professional practitioner and the act of reflection. When a professional practitioner, such as a teacher educator, reflects-in-action, they...

> become a researcher in the practice context. [They are] not dependent on the categories of established theory and technique, but constructs a new theory of the unique case. [Their] inquiry is not limited to a deliberation about means which depends on a prior agreement about ends. [They do] not keep means and ends separate, but define them interactively as [they] frame a problematic situation. (p.68).

It is perhaps this complexity of reflection-in-action that made Russell and Martin (2017) suggest that it 'appears to be much more relevant to experienced practitioners than to those who are entering a profession' (p.45) because teacher thinking behind the acts of experts is invisible to the novice (Berliner, 1987; Loughran, 2010). The implication is that a role for teacher educators is to 'assist those learning to teach in the process of linking tacit knowledge gained in practicum experiences to the explicit, propositional knowledge offered in their education classes' (Russell & Martin, 2017, p.42). This role requires teacher educators to be reflective practitioners themselves and model these habits of mind and practices for PSTs.

One approach to professional learning for teacher educators is through self-study – a collaborative, inquiry based, reflective methodology that draws from a number of research traditions (e.g. Loughran, Hamilton, LaBoskey, & Russell, 2004). In her long engagement with self-study, Samaras (2011) tentatively summarised that this type of research has five foci that are interconnected: personal situated inquiry; critical collaborative inquiry; improved learning; a transparent and systematic research process; and knowledge generation and presentation (pp.10-11). Just as shown above with approaches conceptualised by Korthagen et al. (2001) and Tripp (1993), Samaras (2011), using the concept 'living contradiction' drew on Schön's notion of 'surprise, puzzlement or confusion' to motivate reflection in experience as she described;

> [s]elf-study gives you the opportunity to examine your lived practice and whether or not there is a living contradiction, or a contradiction between what you say you believe and what you actually do in practice. … Examining the realities created by this gap leads to new understandings of personal theory making. (p.10; Samaras' emphasis)

Reflecting on his personal journey of becoming a teacher educator, Zeichner (2005) advocated that teacher educators;

> ...need to think consciously about their role as teacher educators and engage in the same sort of self-study and critique of their practice as they ask their students to do in their elementary and secondary school classrooms. They also need to do their work in teacher education with more conscious links to the programs in which they teach…and to conceptual and empirical literature in teacher education… (p.123)

In Zeichner's (2005) view, such engagement with and in teacher education research and scholarship is to generate new knowledge that is robust and informs how to deliver teacher education more effectively. Hence, the professional learning of teacher educators needs increasing attention which Loughran (2014) argued will build teacher educator agency for significant educational change.

Teacher educators as curriculum workers

In their review of the literature of the teacher educators and their work, Lunenberg, Dengerink, and Korthagen (2014) identified that curriculum developer was one of six roles incorporated into the identity and work of the teacher educator. Their literature review spanned across the period of 1991-2011, with an initial identification of a total of 1260 studies. Of these 1260 studies, a second level of analysis focused identification directly related to teacher education and this refined the selection to 405 studies for the literature review (Lunenberg et al., 2014, p.11); and only 14 empirical studies were 'about the role and behaviour of the teacher educator as a curriculum developer' (p.51). Their key findings included that curriculum development was influenced by local, social context and policy constructs that, unfortunately, often meant that the teacher educator was 'more likely to follow rather than lead' (p.55); and that there was an increasing trend of curriculum co-development with schools. Overall, Lunenberg and colleagues surmised that there seemed to be a distinctive lack of empirical evidence for establishing or implementing theoretical curriculum development constructs by teacher educators. They concluded that professional development of teacher educators for curriculum development was a rarity. Furthermore, they suggested that self-study could provide significant research and scholarship in this area if it shifted beyond storytelling and connected with the work of others and, particularly if teacher educators worked collaboratively to fuse their efforts (Lunenberg et al., 2014).

Bouckaert and Kools (2018) responded to Lunenberg and colleagues' (2014) call for more research into the role of teacher educator as curriculum worker with their empirical study into how teacher educators perceived their role, with a particular focus on curriculum work. As part of their study, they surveyed 75 teacher educators teaching secondary PSTs about the six teacher educator roles they connected. These roles arose from Lunenberg and colleagues' (2014) review. It was interesting to note that 84% of these teacher educators strongly connected with the identity of a curriculum worker. Only two other teacher educator roles were rated higher than curriculum developer and they were the categories of 'teacher of teachers' (89.3%) and 'mentor/ tutor' (85.3%) (p.38). Five new understandings of curriculum work by teacher educators emerged from Bouckaert and Kools empirical research that may inform teacher educator practice: *develop* a professional vision on and responsibility for the curriculum; *think* about pedagogic principles; *attempt* to create consistency and coherence within the curriculum; *apply* the latest theoretical and practical insights and developments in the curriculum; and, *engage* in materials development (p.44).

Further, Bouckaert and Kools (2018) suggested that teacher educators could engage collaboratively in the role of curriculum development and;

> experience for themselves whether they also learn most by doing, experimenting, and discussing curriculum development issues with their colleagues. …[T]hey could purposively try out the curriculum developer role as a means of becoming and growing professionally as a teacher of teachers (p.44).

A curriculum framework: Barnett and Coate

In their research on curriculum patterns in higher education, Barnett and Coate (2005) developed a curriculum framework that consists of three domains: knowing, acting and being, that form

curricular schema where these domains are represented in different ways, dependent upon the disciplines. Barnett and Coate unpacked the complexities of the three domains but to frame it within our conversation for the purposes of this article, we describe each domain briefly here as:

> knowing – representing the propositional knowledge of the discipline and the personal enactment of that knowing (p.60)
>
> acting – representing the procedural knowledge and the skills and 'acting out of the practices of a discipline' (p.62)
>
> being – representing how the self is 'becoming' and 'being' a professional; this element focuses on the ontological perspective of curriculum, the 'developing inner self' (p.63).

Their findings demonstrated that different curricula schema arose from different discipline clusters because the disciplines were shaped by distinguishable and diverse curriculum influences. One cluster of disciplines that Barnett and Coate analysed was the subjects associated with the professions (such as business, nursing). Their research uncovered that the curriculum pattern or framework for the professions were represented by a dominant representation of the acting domain where often the focus was to practise and perform the practices of the profession. Although the acting domain dominates the curriculum framework for the professions, the framework also signaled the equal weighting of the knowing and being domains. The presence of knowing indicated the significance of propositional knowledge or theoretical perspectives underpinning and shaping practice (acting). Furthermore, the equal presence of being (with that of knowing) in the professional curriculum framework pattern indicated the importance of the professional identity that embodied the knowing into the practice. In fact, they found that the professional curriculum framework was highly interactional between the domains, arguing that the 'close integration of these three domains provides the possibilities for being, acting and knowing that together bring new student subjectivities to the curriculum' (Barnett & Coate, 2005, p.78).

Central to the work of the teacher educators in this self-study, was the conceptual framing of curriculum patterns within the professions as discussed by Barnett and Coate (2005). The professions' curriculum framework provided a lens for analysis of the mathematics curriculum and underpinning assessment design for the unit under investigation.

Methodology

A case study describes a holistic analysis of an instance (Merriam, 1988) and investigates a phenomenon within its real-life context, drawing on multiple sources of evidence (Yin, 1984). In this case study, we are two teacher educators who form a peer learning team to inquire into our knowledge of curriculum work to (re)design a relevant and engaging mathematics education assessment task for PSTs. Over a four year period, variations were made to improve the assessment task completed by third-year PSTs in an undergraduate primary mathematics teacher education subject. Reviewing assessments in response to feedback is a common task for educators, however, it is the ongoing collaboration of varying the task and the exploration of best practices in assessment informed through a collaborative self-study approach (e.g., Samaras, 2011) that contributes to the field of MTE.

Self-Study of teacher education practices

Vanassche and Kelchtermans (2015) defined self-study research as possessing the following characteristics: "[It] focuses on one's own practice; for this reason, it privileges the use of qualitative research methods; collaborative interactions play a central role in the research process; and its validation is based on trustworthiness" (p. 508). Self-study of teacher education practices requires the input of critical friends to provide alternative perspectives and ideas (Samaras & Freese, 2009). Designing, varying, and refining the assessment task is an ongoing and rewarding process that calls on the insights and perspectives of fellow teacher educators. The process in this current study was modelled on Barnes' (1998) three characteristics of self-study: openness, collaboration and reframing (p. xii); and it involved collaboration between colleagues teaching the same cohort of PSTs, but not the same curriculum area.

Peer Learning Teams

Collegiality, cultivated through peer observation of teaching and the exchange of constructive feedback, has potential to improve pedagogy (Wilson, 2013). The reciprocal, reflexive process of peer observation moves beyond teaching in-situ to encompass the dynamic facets of teaching, including curriculum work, such as assessment design (Eri, 2014). Facilitating a taken-as-shared understanding of the nature of good practice shifts peers towards improvements in teaching (Byrne, Brown & Challen, 2010). Importantly, peer learning teams are not insular, but can have far reaching effects on the educational community more broadly, which is vital for curriculum reform (Goos, Dole, & Makar, 2007). This current study draws on the expertise of a peer learning team to (re)design curriculum work through incremental variations with the aim of impacting mathematics educational practices of future teachers.

Participants

As teacher educators in the Faculty of Arts and Education at Deakin University, Melbourne Australia, we are both the participants of this self-study research as well as the researchers: Bragg, a mathematics teacher educator [MTE] for 19 years; and, Lang, a specialist in curriculum, assessment, and pedagogy within the higher education context for the past 18 years. We teach in face-to-face, blended learning and wholly online modes in the undergraduate and postgraduate teacher education programs. As a result of a shared leadership role and later participation in a self-study research group, we developed a professional rapport and sought to share and improve our pedagogical practice through forming a collaborative peer learning team. The particular focus was on adopting innovative student-oriented approaches to assessment practices in mathematics to prepare PSTs for careers as reflexive practitioners; thus, drawing on Lang's field of expertise in assessment and Bragg's field of expertise in mathematics education.

The assessment tasks were designed for Deakin University pre-service teachers (PSTs) in their third year of a four year Bachelor of Education (Primary) program. Prior to their participation in this unit, these PSTs had completed one unit on Fundamental Concepts of Mathematics taught outside the School of Education, as well as one unit of Mathematics Education within the School. A two-week practicum in a primary school is always scheduled during the running of the mathematics education unit, so the PSTs have an opportunity to trial aspects of the assessment tasks with children. Over the four iterations of (re)designing this assessment task, PSTs ($n \approx 1200$) from four campuses have submitted the Portfolio of Mathematical Evidence task for grading. The Portfolio of Mathematical Evidence worksamples, along with feedback from PSTs, teaching staff, and the peer learning team, were evaluated and analysed to inform the progressive variations to the assessment task.

Establishing the Portfolio of Mathematical Evidence task

The critical incident that sparked the creation of the Portfolio of Mathematical Evidence task was Bragg's increased engagement in reflective practices within the self-study research group (see Bragg, 2017), paired with the PSTs' evaluative feedback of the unit, and observations of the limitations in many PSTs' capability to reflect on their pedagogy at an academic level. *The Australian Professional Standards for Teachers* developed for improvement in practice and professional growth is founded on reflective practice (Australian Institute for Teaching and School Leadership, 2011) and thus, it is an expectation that our PSTs are able to act reflectively in their practice.

Sharing the frustrations of the PSTs missing the purpose and value of reflective practices, and mixed with a desire to continually improve her own assessment practices, Bragg shared her puzzlement with Lang, who specialises in curriculum and assessment, which started Schön's reflection-in-action processes. Upon reviewing the draft of the assessment task, Lang pointed Bragg to the work of Barnett and Coate (2005) who talked of inspiring new energies in students through the triple engagement of "knowing, acting and being" (p. 3). Through her analysis of the assessment design, Lang recognised that the being domain seemed to be missing from the assessment task. Further conversations to understand the curriculum domains of "knowing, acting and being" and how to apply this framework to the assessment task flowed to deepen PSTs' reflective activity.

The Portfolio of Mathematical Evidence task

The 2018 version overview of the Portfolio of Mathematical Evidence task was introduced as;

> "... comprising examples of you "knowing, acting and being" a mathematics teacher (Barnett & Coate, 2005, p. 3). It is a portfolio evidencing; resources sourced to form a basis for your professional practice, your reading in the area of mathematics education, and a professional reflection on your teaching learning journey. The Portfolio of Mathematical Evidence has three sections: The Practice Section (Acting); The Readings Section (Knowing); and The Reflection section (Being). Each section of this assignment is interconnected to highlight the interconnectivity of "knowing, acting, and being" a mathematics teacher (Bragg, 2018).

The task is detailed over 7 pages, therefore, to capture the essence of the task, a brief summary follows in Figure 1.

The Practice Section (Acting) requires PSTs to, "Gather or create one manipulative to support your teaching practice and describe how you would employ this in the mathematics classroom." The range of manipulative tasks must be linked to the local curriculum documents and trialled with children during teaching practicum. The manipulative and associated tasks are presented to peers during an oral presentation in the penultimate week of the unit.

The Readings Section (Knowing) section states, "Source four academic readings and provide a review for each reading...The reviews should include the key ideas of the article that you see as relevant to you as a mathematics teacher. Select readings that inspire you to consider, "What does it mean for me to be a teacher in understanding my practice and developing my teaching strategies?" What question/s does this article raise for you as a mathematics teacher?
This section builds on your professional reading. Include one reading from each of the following areas as it relates to mathematics: hands-on manipulatives; reasoning and/or problem-solving; social justice; and indigenous learning OR inclusive education (e.g. children with: special needs, gifted, disability, EAL [English as additional language], autism spectrum), behavioural issues...You must include a reading related to your manipulative from the Practice section."

The Reflection section (Being) section includes, "The goal of this professional reflection is to make connections between theory and practice (the unit /course content and your professional teaching experience). How are you drawing on your experience of using the manipulatives (Section A: Acting), your readings (Section B: Knowing) to inform your being a mathematics teacher (Section C: Being)?
Reflect on trialling your manipulatives from the Practice [Section A: Acting] during your practicum, including how to encourage a child or children from your practicum class with diverse needs to reason and/or problem-solve. What connections were you able to make with your readings in these areas [Section B: Knowing], unit materials, and your practice? Include any relevant themes that have arisen from your reading reviews.
Consider one or more of the following prompts for your reflection:
How does this practical experience with the manipulatives (Acting) and your research through the readings (Knowing) inform how you think about yourself as a mathematics teacher (Being)?
How are you bringing these different elements of ***acting*** and ***knowing*** together to shape you as ***being*** a mathematics teacher?
What have you learnt from this experience?
What changes have these different elements made to you, as a mathematics teacher?

Figure 1. Excerpt from the 2018 assessment task.

Data collection and analysis

The data used in this study were reflective journaling, notes and audio recordings of our meetings, four iterations of the assessment task, and our teacher educator reflections on student worksamples of the task. These data were drawn on to create Tables 1 and 2 below. Two layers of analysis were undertaken, layer one consisted of an analysis of the variations to the iterations of the assessment task, and corresponding student worksamples conducted through Barnett and Coate's (2005) curriculum theory lens of knowing, acting, and being. Layer two of the analysis evidenced our teacher educator altering perspective of the changes implemented over time in conjunction with the peer learning team artefacts to reveal a picture of the impact of self-study on curriculum work and professional learning. Points of interest arising from these data are presented below in the results section.

Findings and discussion of the research

In this section, we report findings from an analysis of the impact self-study had on changes to the assessment task over three years. Initially, the assessment task was co-designed by the authors in 2015 using the self-study approach as we worked in a peer professional learning team that allowed Bragg to share her aspirations for the unit and PST learning through the assessment task. In this way, we created a safe, secret place to share our secret stories (Clandinin & Connelly, 1995) of teaching PSTs. Using the self-study method of critical collaborative inquiry (Samaras, 2011, p.10), allowed us to disrupt our assumptions and reframe ways of thinking about our teaching practice 'to engage in conversations where stories can be told, reflected back, heard in different ways, retold, and relived in new ways in the safety and secrecy' (Clandinin & Connelly, 1995, p.13) of our peer learning team.

Changes were enacted to the assessment task over the subsequent three years. In 2016 and 2017, without consultation with Lang, incremental changes were executed by Bragg to fine-tune aspects of the task in response to her reflections-in-action as she taught the unit. These changes were based on PSTs and teaching staff feedback. In 2018, returning to the collegiality and security of the peer learning team, Bragg shared with Lang her puzzlement and confusion of the perceived lack of reflexivity in the PSTs' submitted work. The PSTs oral and written feedback on the assessment task indicated they were still not deeply engaged in the assessment task, and they were confused about what constituted reflective practice and how to approach it. In our peer learning team, we shared and reflected on the incremental changes over time, the purpose for the changes, and the impact of these changes on the PSTs. It emerged that the MTE, Bragg, deepened her engagement with Barnett and Coate's (2005) curriculum model of knowing, acting and being and this strongly shaped her practice in 2018 as she began to realise the inter-relational influence between the three domains of the model for the learning of her PSTs. This insight began to inform her curriculum work and (re)design of the assessment task.

Through analysing the variations to the iterations of the assessment task, we noticed subtle changes were made in the first two sections, The Practice [Acting], and Readings [Knowing] sections. For example, in the Practice section, the group work component was changed to individual presentations of manipulatives due to a number of complaints by PSTs about some team members not "pulling their weight"; the two presentation weeks were reduced to one week to improve attendance and thereby enhance the potential for discussion of a variety of manipulatives with a critical mass of PSTs - many PSTs attended their presentation week only, thus drastically reducing the range of manipulatives shared with the whole class. Another illustration of change in the 2018 edition of the assessment task was the number of readings lowered from six to four to increase the depth of the reviews through allowing a greater word limit allocation for each review. The assignment prompts (presented in Figure 1) were designed to offer the PSTs more guidance for reviewing their selected papers. The Reflection [Being] section was (re)designed more extensively over the three iterations, and reflected Bragg's struggle with understanding how to communicate Barnett and Coate's (2005) concept of being a mathematics teacher with the PSTs. Therefore, the focus of this paper is on the changes made over time to the most challenging section of the assessment task for both the MTE and PSTs, the Reflection [Being] section.

At the time of writing this paper, the impact on the PSTs is not fully known for the 2018 iteration of the task; however, the impact on PSTs from previous years is understood, and the impact on the MTE to date is evident. Table 1a and Table 1b details the changes imposed on the Reflection Section of the assessment task from 2016-2018 to improve the PSTs reflection capabilities. These changes were based on PSTs' worksamples, and feedback from PSTs, teaching

staff, and the collaborative peer learning team of the authors. The italicised words indicate the wording of the changes implemented in the assessment task.

Tables 1a and 1b commence with the MTE's puzzlement as Bragg reflects in the action of her teaching as the PSTs respond to the assessment task and its design. The MTE's puzzlement is shared in the peer learning team to see the problem in new and divergent views and reframe the curriculum work of the assessment design to improve the PST learning experience and strengthen their reflective activity. These Tables 1a and 1b demonstrate how the strategies to improve PST reflection emerged from the puzzlement of how to improve the academic skills of reflection in 2016 and 2018 (Table 1a) and deepening the act of reflection and understanding from 2016 to 2018 (particularly in 2018 column of Table 1b).

Table 1a
Bragg's Reflections on Changes to Reflection Section (Being) of Assessment Task to Improve Reflection Capabilities of PSTs: Developing the Science of Reflection

	2016	2018
Impetus for Change (aka Schön's puzzlement)	The PSTs capability to reflect at a professional level is an ongoing issue and through implementing "cross-referencing" the hope was that the PSTs would ensure that they refer back to their thinking to inform their writing.	Providing more explicit instructions and support material for those PSTs who require it. Often the PSTs will comment that a reflection is personal and therefore does not include external references. I have attempted to clarify the difference here between personal and professional reflective writing, by emphasising the "academic" nature of this reflection.
Change: Developing the science of reflection	Included explicit statement to cross-reference to reflective notes. *Cross reference reflections from the lectures, seminars, teaching practicum experiences and any readings you completed in relation to mathematics education. Include the date and page number of your reflection entry or full citation of the reading.*	Focus on academic reflection – and link to the Deakin site to support reflection *This is a professional academic reflection and must include reference to unit materials and wider readings (i.e. beyond those provided in the unit), and have a formal, academic tone. This means your reflection is carefully crafted, where your thoughts and argument will be supported with cited literature. The reflective writing link might be useful: "The 4 Rs"*
Impact of change	It was easier to locate within the Teaching Philosophy the reflections the PSTs were drawing from to make their claims. As a marker of this reflections there was a better sense of the PSTs linking their reflections to their Philosophy. However, there was still minimal difference in these reflections exhibiting a more professional approach than the previous year.	This is newly implemented so the impact is unknown at this stage. However, there has been little request for clarification from the PSTs about this aspect of the task to date, and none of the PSTs have voiced, "but this is a personal reflection, why do I need to add references?".

Table 1b
Bragg's Reflections on Changes to Reflection Section (Being) of Assessment Task to Improve Reflection Capabilities of PSTs: Reflection Prompts

	2016	2017	2018
Impetus for Change (aka Schön's puzzlement)	Reflection time in class was added in the first assignment to encourage PSTs to attend class. I realised I was being punitive, rather than encouraging, and this was not an appropriate way to encourage participation and motivate PSTs. At times, I would forget to give the reflection prompts in some classes, which caused equity issues across the cohort groups. This process of giving reflection time and reflective prompts in class was fraught with problems. However, now that the time was removed, there was no modelling of best reflective practices.	A reduction in the number of reflective prompts was intended to reduce the cognitive load and hopefully focus the PSTs on a more productive output.	Lang assisted in developing reflective prompts that would focus the PSTs on "being". It has been clear from many of the past reflections that the PSTs require more guidance in reflection. As I [Bragg] use many "reasoning" prompts in mathematics to promote students thinking, the natural extension is to include reflective prompts.
Change: Reflection Prompts	Removed additional key reflective questions given during class time.	Removal of many prompts for reflection on lectures, seminars, and "being" a teacher. This removal of prompts was connected to the removal of the "Teaching Philosophy Reflection"	Included more reflective prompts. *Consider one or more of the following prompts for your reflection:* *How does this practical experience with the manipulatives (Acting) and your research through the readings (Knowing) inform how you think about yourself as a mathematics teacher (Being)?* *How are you bringing these different elements of acting and knowing together to shape you as being a mathematics teacher?* *What have you learnt from this experience?* *What changes have these different elements made to you, as a mathematics teacher?*

Impact of change	There was no visible improvement in the PSTs' reflections. Overall there were fewer reflections on the lectures and seminars submitted in the assessment.	While the PSTs could complete the task without the additional prompts, I felt that I was not supporting them to develop their reflection capabilities. I needed to source support materials and change my teaching approach.	Professionally, Lang sharing in the design of these prompts has given me [Bragg] more confidence in being able to teach about being a reflective practitioner. I feel as though I now possess the tools to succeed in my role. It has offered me further insights into what it is the "BE" a mathematics teacher. In our meetings to redesign this assessment task, Lang has explained the White Space Task (Jacobs, 2010), and other reflection tasks, thus deepening my knowledge of effective reflective practices. Lang's advice drawing from her "being" a teacher educator, her practice (acting) and her knowing, has led to a self-examination of my practice and how I am enacting "being" a MTE. Lang and I were sharing our secret stories of being teacher educators.

The initial changes made to the Reflection Section of the task from 2016 and 2017, were not viewed as successful in building the quality of the PSTs' reflective capabilities nor were the connections between the three domains strongly evident in their worksamples. Tables 1a and 1b illustrate the struggles Bragg and many of the PSTs had with the reflective nature of the assessment task, and this supports one possible reason underlying Clarà's (2015) stated elusive nature of building reflexivity into teacher education practice. Without guidance or effective support, reflective practice is difficult to enact. Therefore, in 2018, Bragg again sought assistance from Lang, within the structure of the peer learning team and critical collaborative inquiry of self-study methodology, to further understand and reflect upon the challenges arising in implementing this assessment task. Through the sharing of secret stories, the 'living contradictions' (Samaras, 2011, p.10) of implementing the assessment task design emerged and new possibilities for redesign were discussed.

Drawing from her own teacher education experiences and theory-building, Lang's suggestions and sharing of teaching approaches affected Bragg's willingness to build her own professional knowledge as a MTE with new theoretical perspectives. This change in teacher educator knowledge started to shape changes to her pedagogical practice (*acting*) during class and in (re)designing the curriculum (assessment task). Bragg's emerging knowledge and subsequent actions are consistent with Goos, Dole, and Makar's (2007) view of the impact of peer learning teams on curriculum reform. To facilitate positive change in the PSTs' reflection capabilities, in-class tasks were (re)designed with a mathematical focus, such as the White Space task (Jacobs, 2010) which calls on individuals to read a short passage and write a reflection in the

"white space" of page, then exchange their reflection with a partner, and reflect and respond to their partner's reflection in the partner's "white space". This process may be repeated several times with a small group or whole class. In addition, reflective prompts were (re)designed to ensure the PSTs would witness the holistic nature of Barnett and Coate's (2005) three domains impacting on *being* a mathematics teacher. For example, "How are you bringing these different elements of *acting* and *knowing* together to shape you as *being* a mathematics teacher?". These reflective prompts are an attempt to close the theory and practice gap identified by Russell and Martin (2017) through the professional learning process of Schön's (1983) reflection-in-action.

Further to the changes made to improve the reflection capabilities of the PSTs, clarifications to the assessment task were implemented to ensure the purpose and focus of the task were explicit. These clarifications, the purpose driving these changes, and their impact are detailed in Tables 2a, 2b and 2c. The goal of the task was made explicit in the 2018 version, and is detailed in Table 2a.

Table 2a
Changes to 2018 Reflection Section (Being) Assessment Task: Making the goal explicit

	2018
Impetus for Change (aka Schön's puzzlement)	In Bragg's discussion with Lang of what was still not working in the assessment design, the PSTs were not making a connection between the three areas of acting, knowing and being. This was frustrating Bragg, but she was not sure how to make it more explicit. We returned to the assessment guide and noticed that there was not an explicit purpose in the guide. Could making the purpose explicit be helpful to PSTs?
Change: Making goal explicit	Added goal to the section: *The goal of this professional reflection is to make connections between theory and practice (the unit /course content and your professional teaching experience).* *How are you drawing on your experience of using the manipulatives (Section A: Acting), your readings (Section B: Knowing) to inform you being a mathematics teacher (Section C: Being)?*
Impact of change	Impact of Change This change is newly implemented, so the impact is unknown at this stage. However, I did notice in the lecture when I described this connection, that there appeared to be a few nods of approval or maybe understanding from the PSTs [MTE, Bragg's reflection-in-action]

Table 2b
Bragg's Reflections on Changes to Reflection Section (Being) Assessment Task: Fragmenting versus coherent, holistic teaching strategies

	2016	2017	2018
Impetus for Change (aka Schön's puzzlement)	Due to the amount of effort put into developing this assessment task overall, I was hesitant to make changes to the Teaching Philosophy despite the PSTs' dissatisfaction with this section of the assignment. I felt that my teaching in class may need altering to improve the quality of the reflections. However, upon reflection, I did not support the PSTs' understanding of the reflective process. I removed the in-class support which allowed some time (no more than 10 minutes) to write a reflection to aid the PSTs learning process because I felt it took too much time from my teaching of mathematics education. Strangely, I too was undervaluing the reflective process and was too focused on the quantity of mathematical content presented in class rather than exploring more discrete aspects more fully. This undervaluing the reflective process was disappointing to note. I removed the lecture reflection prompts, because I felt I was implementing these to encourage the PSTs attendance, rather than truly engaging with the lecture content. Again, this is not effective teacher practice and was disappointing to note.	The Teaching Philosophy was addressed in the following year's unit, titled: Transition to a Graduate Mathematics Teacher. Resources and discussion prompts focused on their Teaching Philosophy. Therefore, this was a repeated assessment task.	This change to being more explicit about the linking of "acting, knowing, and being" was to emphasis a more holistic approach to the assessment task. Lang noted that the tasks were too fragmented, and by bringing all the readings and practicum experience together into the reflection, it would result in a more cohesive task. Upon reflection, I do break my assignment tasks down into smaller sections, with the goal of the students more likely to engage more fully in at least one part that they enjoy. Potentially a more cohesive output will be generated by the students. Lang has helped me to better understand and facilitate the learners' needs.

Change: fragmenting vs coherent, holistic teaching strategies	Unchanged Continued to include Teaching Philosophy Reflection.	Removed two page Teaching Philosophy Reflection.	Made the linking of "acting, knowing, and being" more explicit. Included aspects of all the readings [knowing] in the reflection. *Elements in the professional reflection: Reflect on trialling your manipulatives from the Practice [Section A: Acting] during your practicum, including how to encourage a child or children from your practicum class with diverse needs to reason and/or problem-solve. What connections were you able to make with your readings in these areas [Section B: Knowing], unit materials, and your practice?*
Impact of change	The students' response was similar to the task from the previous year. They were disgruntled about this aspect of the assignment and negative comments were made during class and on student evaluations. I felt that possibly the PSTs did not have enough experience [nor need] at this stage to write their teaching philosophy. My own teaching practices were questionable, and disappointing for someone who loves to teach and assumed they were doing a good job of it.	Resulted in severely reducing the academic rigour. The PSTs were less disgruntled and better able to access the task overall - but the [academic] challenge was reduced and quality of PST thinking was affected negatively.	This change is newly implemented so the impact is unknown at this stage.

Changes were made in the 2017 and 2018 version of the task to emphasise the need to engage with the professional discourse (see Table 2c).

Table 2c
Bragg's Reflections on Changes to Reflection Section (Being) Assessment Task: Acting to Inform Being - Engaging with Professional Discourse

	2017	2018
Impetus for Change (aka Schön's puzzlement)	The focus on "being" in the Reflections Section (Being) was reduced once the teaching philosophy was removed. Therefore, more emphasis was placed on the two key areas which directly related to the PSTs' practicum placement: the trial of hands-on manipulatives and Special Needs Child/ren. Both these areas of interest were an aspect of the Readings Section (Knowing) of the assessment task. Further, the trial of hands-on manipulatives was tied directly to the first part of the assignment, the Practice Section (Acting). Hands-on and digital manipulatives were the focus of the second assessment task during the wholly online week, and emphasised during in-class practice throughout the trimester. The emphasis in this section was now on "practical knowledge" and reflecting on the actions these practitioners take when faced with problems in-situ.	The change in professional discourse of teaching (i.e. shift from children with special needs to diverse needs) reflects current thinking in the field and broadens the scope of the task. "Labels" are socially constructed and often fall in and out of favour. While "children with special needs" may be appropriate within a current education policy context in Victoria, Australia, it has a limiting interpretation by PSTs. This issue taps into the tensions within the field of inclusive versus special needs education.
Change: Acting to inform Being - Engaging with professional discourse	Removed 2 page Teaching Philosophy Reflection. Replaced with an increased emphasis on two topics for reflection. "Trialing manipulatives" and "Special needs children"	Changed the focus from "Special needs children" to be included in the overall reflection instead of separately. The term "Special needs children" was replaced and the focus broadened to be more inclusive. *"…including how to encourage a child or children from your practicum class with diverse needs."*
Impact of change	The PSTs were able to complete the task with more detail but it still lacked an academic feel in many cases. Overall, it did not feel like the PSTs' reflections were simply "made up" to fulfil the assessment requirement – as the appendix of lecture and seminar notes had in the past. Some PSTs found it difficult to locate a "special needs" child in their class. Apparently, many classes did not have children with special needs, so this made it difficult for some PSTs to complete – thereby disadvantaging them.	The PSTs have not voiced concerns regarding not having children who fit the criteria outlined in the assignment. Therefore, this broadening of the term appears to be more inclusive and accessible for our PSTs. I appreciated Lang's input in clarifying and updating me on the appropriate socially constructed terms which reflects current thinking. There is real value in working with educators across disciplines. Small examples like this highlight the importance of being collaborative curriculum workers.

Tables 2a, 2b and 2c highlight the struggle with the suitability of implementing a teaching philosophy into the assessment task for PSTs in the third year of their four year program. At the time of making the change and based on the PST worksamples, the perception that the PSTs would be better equipped to reflect on their teaching philosophy towards the end of their program seemed a reasonable conclusion. However, the assumption that a further 18 months in the program would make the difference to the PSTs reflexivity, along with the resulting lack of rigour within the assessment task, was problematic for the authors, hence the task was reworked to find a solution. The re(designing) of this aspect of the task is consistent with Fawns' (2008) notion of re-culturing of universities; a problem was identified and a solution formed, all the while, we trusted in the people [the peer learning team] and the process [self-study and reflective practice]. As a result, reflexive practices were (re)introduced into the unit.

Much to her chagrin, Bragg realised the pedagogical action of removing allocated class time for reflection did not marry with her ideal of being a reflective educator - whether within the context of her PSTs or herself as a MTE. Her focus on developing PSTs' mathematical pedagogical knowledge was missing the opportunity in class to be reflexive (Table 2c). This living contradiction of identifying that reflective practices were being undervalued in Bragg's class through active reflecting, is not lost on the authors (Table 2b). Teachers find deep reflection challenging; it takes time to master the practice, and to effect change. Allocating in-class time for reflection was not given the space it required to flourish.

Upon noticing and experiencing the PSTs' disconnect within Barnett and Coate's (2005) knowing, acting and being domains, more explicit articulation of the focus on these domains was expressed, and the expectation of illustrating these three domains was emphasised in a holistic approach within the task (Table 2b). This renewed 2018 approach draws on the principles of Korthagen et al.'s (2001) realistic teacher education model that starts with PSTs using their experience of employing manipulatives in the classroom on practicum to think about and build their teaching philosophy of their practice which demonstrates PSTs constructing their schema and phronesis in this area of mathematics teaching. The approach better reflected the Barnett and Coate's (2005) curriculum model for professional learning in that being requires knowing and acting - thus a more holistic strategy for the (re)design of the assessment task aims to bring coherence by helping PSTs to make stronger connections between the three parts of the assessment task (e.g. Table 2a).

Supporting Samaras and Freese's (2009) research, our context of self-study with a trusted colleague to provide alternative perspectives altered Bragg's perception of her role as a MTE. Self-study within the peer learning team had a greater impact on changes to the assessment task and in-class pedagogical actions than drawing solely on Bragg's own expertise and knowledge.

Importantly, although the living contradictions (Samaras, 2011, p.10) focused on those brought by the MTE in the peer learning team, the impact of the self-study was not exclusively to the benefit of that one member. Rather, the opportunity to share our secret stories using a critically collaborative inquiry approach embedded within self-study methodology, provided a space to unpack our curriculum work as teacher educators. Working with Bragg on redesigning the unit's assessment task, reinforced, for Lang, the theoretical concepts of using Barnett and Coate's (2005) curriculum framework of acting, knowing, and being and how it may be enacted within the context of learning-to-teach. What came as a surprise (to note the connection with Schön's reflection-in-action process) to Lang, was that the curriculum framework emerged as a powerful tool to shift Bragg's development as a MTE as she broadened the theoretical frameworks that shaped her teacher education knowledge and practice.

Conclusion

In our research, self-study has shown to be an effective tool for the evaluation of the decisions impacting changes in curriculum work. In the higher education context, self-study enhanced our role as collaborative curriculum workers through interrogation of an opportunity provided to; identify concerns in the curriculum, explore strategies to overcome challenges, and, learn more about our students and ourselves as teacher educators. Self-study worked in this assessment task (re)design because critically collaborative inquiry, revealed the flaws within the task's construction and multiple iterations. Challenges and misalignments were noted between the MTE's knowing, acting and being, and called upon insights from the peer learning team's inquiry to breakdown and reconstruct what it is to be a teacher educator. From this perspective, sharing the experience co-(re)designing the assessment task through our self-study inquiry helped us to articulate the scholarship of teacher education; and thus further supports elements of Loughran's (2014) proposed framework for teacher education professional development (see Figure 1, p.272).

Importantly, the formation of the peer learning team capitalised on the expertise of both team members, thus leading to what Fawns' (2008) cast as the curriculum worker's transformation, thereby informing future teaching practice. Effective change does not occur in isolation: genuine curriculum development was achieved through collegiality (Elbaz, 1991) and reflection-in-action (Schön, 1983). Our shared knowing led to acting and being as teacher educators; hence, modelling each aspect of Barnett and Coate's (2005) three domains of acting, knowing and being for our PSTs is integral to best practice as a MTE.

This paper adds to the current body of knowledge on teacher educators' professional growth, particularly the effectiveness of collaborative reflection within a peer learning team to (re)designing an assessment task. This study seeks to answer why self-study improves our curriculum work, and offers the collegiality of the peer learning team as an effective approach towards curriculum enhancement, particularly through the lens of Barnett and Coate's (2005) curriculum framework. Furthermore, this paper explores that the process of professional learning of teacher educators occurs when there is a living contradiction or dissonance where conflicts and (re)negotiation are required to be worked through within a shared community space. In this respect, the paper empirically contributes to the work of Brody and Hader (2018) on the role that critical moments play in the professional learning of teacher educators. Lastly, and perhaps interestingly, what this self-study highlights is the advantage of creating peer learning teams that traverse disciplinary boundaries to learn from, and with, each other using theoretical concepts, strategies and frameworks that inspire reframing of old and new problems. For this reason, the call to better understand what are the knowledge demands of MTEs (Superfine & Li, 2014), might be better framed as a challenge to broaden MTE knowledge to include how the MTE contributes to teacher education acting, knowing and being.

References

Australian Institute for Teaching and School Leadership. (2011). *Australian professional standards for teachers.* Carlton South, VIC: Education Services Australia.

Barnes, D. (1998). Foreword: looking forward: The concluding remarks at the castle conference. In M. L. Hamilton, S. Pinnegar, T. Russell, J. Loughran, & V. LaBoskey (Eds.), *Reconceptualizing teaching practice: Self-study in teacher education* (pp. ix–xiv). London, UK: Falmer Press.

Barnett, R., & Coate, K. (2005). *Engaging the Curriculum in Higher Education*. Maidenhead, Berkshire: Open University Press and The Society for Research into Higher Education.

Berliner, D. C. (1987). Ways of thinking about students and classrooms by more and less experienced teachers. In J. Calderhead (Ed.), *Exploring teachers' thinking* (pp.60-83). London: Cassell Educational Limited.

Boshuizen, H. P. A., Bromme, R., & Gruber, H. (Eds.). (2004). *Professional learning: Gaps and transitions on the way from novice to expert*. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Bouckaert, M., & Kools, Q. (2018). Teacher educators as curriculum developers: Exploration of a professional role. *European Journal of Teacher Education, 41*(1), 32-49.

Bragg, L. A. (2017). Action Research on the Application of Variation Theory in Mathematics Teacher Education. *Mathematics Teacher Education and Development, 19*(1), 121-136.

Bragg, L. A. (2018). *Portfolio of mathematical evidence task.* [Unpublished] Melbourne, Australia: Deakin University.

Britzman, D. P. (2003). *Practice makes practice: A critical study of learning to teach* (revised ed.). Albany, NY: State University of New York Press.

Brody, D. L., & Hadar, L. L. (2018). Critical moments in the process of educational change: Understanding the dynamics of change among teacher educators. *European Journal of Teacher Education 41*(1), 50-65.

Byrne, J., Brown, H., & Challen, D. (2010). Peer development as an alternative to peer observation: A tool to enhance professional development. *International Journal for Academic Development, 15*(3), 215–228.

Clandinin, D. J., & Connelly, F. M. (1995). *Teachers' professional knowledge landscapes.* New York: Teachers College Press.

Clarà, M. (2015). What is reflection? Looking for clarity in an ambiguous notion. *Journal of Teacher Education, 66*(3), 261–271.

Cochran-Smith, M., Feiman-Nemsar, S., & McIntyre, D. J. (Eds.). (2008). *Handbook of research on teacher education: Enduring questions in changing contexts* (3rd ed.). New York and London: Routledge, Taylor & Francis Group and the Association of Teacher Education.

Darling-Hammond, L., & Bransford, J. (Eds.). (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco: Jossey-Bass, sponsored by the National Academy of Education.

Day, C. (1999). *Developing teachers: The challenges of lifelong learning*. London: Falmer Press.

Dewey, J. (1933). *How we think a restatement of the relation of reflective thinking to the educative process*. Boston: MA D.C. Heath & Co Publishers.

Elbaz, F. (1991). Teachers as curriculum workers: Teacher collegiality in Israel, *The Curriculum Journal*, *2*(3), 335-46.

Eri, R. (2014). Peer observation of teaching: Reflections of an early career academic. *Universal Journal of Educational Research, 2*(9), 625–631.

European Commission. (2013). *Supporting teacher educators for better learning outcomes*. Brussels: European Commission.

Fawns, R. (2008). Idealism and materialism in the culture of teacher education: The mythopoetic significance of things. In T. Leonard, & P. Willis (Eds.), *Pedagogies of the imagination*, Dordrecht: Springer.

Goos, M., Dole, S., & Makar, K. (2007). Designing professional development to support teachers' learning in complex environments. *Mathematics Teacher Education and Development, 8*(2), 23–47.

Jacobs, R. (2010). Teaching in the white spaces. [online blog] http://educationinnovation.typepad.com/my_weblog/2010/04/ teaching-in-the-white-spaces.html

Korthagen, F. (2016). Inconvenient truths about teacher learning: Towards professional development 3.0. *Teachers and Teaching: Theory and Practice, 23*(4), 387-405

Korthagen, F. & Vasalos, A. (2005). Levels in reflection: core reflection as a means to enhance professional growth. *Teachers and Teaching: Theory and Practice, 11*(1), 47-71.

Korthagen, F. A. J., Kessels, J., Koster, B., Lagerwerf, B., & Wubbels, T. (2001). *Linking Practice and Theory: The Pedagogy of Realistic Teacher Education*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Lieberman, A., & Miller, L. (1999). *Teachers - Transforming their world and their work*. New York: Teachers College Press in conjunction with ASCD.

Loughran, J. (2010). *What expert teachers do: Enhancing professional knowledge for classroom practice*. Crows Nest, NSW: Allen & Unwin.

Loughran, J. (2014). Professionally developing as a teacher educator. *Journal of Teacher Education, 65*(4), 271–283.

Loughran, J. J., Hamilton, M. L., LaBoskey, V. K., & Russell, T. (Eds.). (2004). *International handbook of self-study of teaching and teacher education practices*. Dordrecht, The Netherlands: Springer.

Lunenberg, M., Dengerink, J., & Korthagen, F. (Eds.). (2014). *The professional teacher educator: Roles, behaviour, and professional development of teacher educators* (Vol. 13). Rotterdam: Sense Publishers.

Merriam, S. (1988). *Case study research in education: A qualitative approach.* San Francisco: Jossey-Bass.
Orgill, M. (2012). Variation theory. In N. Seel (Ed.), *Encyclopedia of the sciences of learning,* (pp. 2608-2611). New York, NY: Springer.
Pickering, J., Daly, C., & Pachler, N. (Eds.). (2007). *New designs for teachers' professional learning*. London: Institute of Education, University of London.
Polanyi, M. (1966). *The tacit dimension.* New York: Anchor Books.
Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences, 4*(2), 155-169.
Russell, T., & Martin, A. K. (2017). Reflective practice: Epistemological perspectives on learning from experience in teacher education. In R. Brandenburg, K. Glasswell, M. Jones, & J. Ryan (Eds.), *Reflective theory and practice in teacher education* (pp. 27-47). Singapore: Springer.
Samaras, A. P. (2011). *Self-study teacher research: Improving your practice through collaborative inquiry*. Los Angeles: Sage Publications.
Samaras, A. P., & Freese, A. R. (2009). Looking back and looking forward: An historical overview of the self-study school. In C. A. Lassonde, S. Galman, & C. Kosnik (Eds.), *Self-study research methodologies for teacher educators* (pp. 3–20). Rotterdam: Sense.
Schiro, M. S. (2013). *Curriculum theory: Conflicting visions and enduring concerns*, 2nd ed, Los Angeles: Sage Publications.
Schön, D. A. (1983). *The reflective practitioner: How professionals think in action* (reprinted in 2006 ed.). Hants, England: Arena, Ashgate Publishing.
Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass Publishers.
Schön, D. A. (1995). Knowing-in-action: The new scholarship requires a new epistemology. *Change 27*(6), 27-34.
Shulman, L. S., & Shulman, J. H. (2004). How and what teachers learn: A shifting perspective. *Journal of Curriculum Studies, 36*(2), 257-271.
Superfine, A. C., & Li, W. (2014). Exploring the mathematical knowledge needed for teaching teachers. *Journal of Teacher Education, 65*(4), 303-314.
Tripp, D. (1993). *Critical incidents in teaching. Developing professional judgement.* London: Routledge.
Vanassche, E., & Kelchtermans, G. (2015). The state of the art in self-study of teacher education practices: A systematic literature review. *Journal of Curriculum Studies, 47*(4), 508–528.
Willis, J., & Cowie, B. (2014). Assessment as a generative dance: Connecting teaching, learning and curriculum. In C. Wyatt-Smith, V. Klenowski, & P. Colbert (Eds.), *Designing assessment for quality learning*, Dordrecht: Springer.
Wilson, A. (2013). Embedding peer observation. *Independence, 38*(2), 46.
Yin, R.K., (1984). *Case study research: Design and methods.* Beverly Hills, CA: Sage Publications.
Zeichner, K. (2005). Becoming a teacher educator: A personal perspective. *Teaching and Teacher Education, 21*(2), 117–124.
Zeichner, K. M., & Liston, D. P. (1996). *Reflective teaching: An introduction*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Authors

Leicha A. Bragg
Deakin University
221 Burwood Highway,
Burwood, Victoria, 3125, Australia
email: Leicha.Bragg@deakin.edu.au

Josephine Lang
Deakin University
221 Burwood Highway,
Burwood, Victoria, 3125, Australia
email: Josephine.Lang@deakin.edu.au