



Prospective teachers development of adaptive expertise[☆]



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H I G H L I G H T S

- Developing adaptive expertise evident in shift of focus from self to students.
- Adaptive expertise evident in developing understandings of complexity of teaching.
- Building formal theories of practice by engaging in everyday theories.
- Practice-based pedagogies supported development of adaptive expertise.

A R T I C L E I N F O

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A B S T R A C T

This article responds to calls for graduating teacher standards that reflect a vision of teachers as adaptive experts. Drawing on prospective teachers' reflections of their learning within a mathematics classroom inquiry course, we examine the development of expertise as characterized by shifts in teacher focus from self to student and from simple to increasingly complex understandings about teaching and learning. We argue that the instructional dynamics linked to practice-based pedagogies within our teacher education program, inclusive of opportunities to experiment, risk-take, and engage directly with learner outcomes, supported the development of prospective teachers' professional stance aligned to adaptive expertise.

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1. Introduction

Seen by policy makers as both the cause of and a solution for education problems, teacher education is frequently criticized for not producing teachers of sufficient quality while simultaneously being viewed as “an ideal site for increasing teacher quality, providing it is subject to reform” (Ell & Grudnoff, 2012, p. 79). In many parts of the world, the desire to ensure the preparation of ‘quality’ teachers has prompted “unprecedented and politicized attention to teacher preparation/certification and the policies and accountability systems that govern them and measure their effectiveness” (Cochran-Smith & Villegas, 2015, p. 10). In reference to graduating standards, we, like others (e.g., Fairbanks et al., 2010; Griffiths, 2013), ask what is necessary and possible beyond knowledge and skill sets? Discussions in the New Zealand context

are currently informed by Aitken, Sinnema, and Meyer's (2013) proposed *Teaching for Better Learning* model that details a set of graduating standards structured around “a series of inquiries designed to establish learning priorities and teaching strategies, examine the enactment of strategies and their impact, determine professional learning priorities, and critique the education system” (p. 4). Envisaging graduating teachers as “inquiring professionals who are focused on better learning for themselves and their students” (p. 30), Aitken et al. (2013) argue that standards must “emphasise the context-dependent nature of effective teaching and, therefore, adaptive expertise as the hallmark of a professional teacher” (p. 4). For mathematics education particularly, where reforms demand significant shifts towards inquiry-based mathematics learning communities (Hunter & Anthony, 2011), adaptive expertise is viewed as essential in order to minimize the possibility of beginning teachers' socialisation to the more familiar transmission modes of mathematics teaching.

However, despite agreement that adaptive teaching expertise is a worthy goal of teacher education (Hammerness, Darling-Hammond, & Bransford, 2005) little is currently known about expectations of adaptive expertise capabilities for beginning teachers,

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nor about ways to develop adaptive expertise within initial teacher education contexts (Soslau, 2012). In seeking to add to current understandings this paper explores two prospective teachers' (PTs') professional learning associated with expertise as marked by shifts in beliefs and values concerning learners/learning and teachers/teaching. Responding to Thames and Zoest's (2013) call for more research that “deliberately presses into the instructional dynamic” (p. 585) associated with teacher learning, we examine the mediating influences of our instructional design and teacher educator pedagogy. To that end, we build on the work of others (Grossman, Hammerness, & McDonald, 2009; Lampert et al., 2013) who advocate teacher education reforms that feature “teaching as a central element to learning to teach” (McDonald et al., 2014, p. 500).

We begin by reviewing the literature on expertise with a view to understanding the nature of adaptive expertise that we might reasonably expect of graduating teachers. With reference to the extant literature on practice-based teacher education, we discuss key components of our mathematics education program—with a focus on a Classroom Inquiry (CI) course—designed to support PTs' development of expertise. Utilizing Timperley's (2013) distinction between shifts towards routine and adaptive expertise (see Section 2), we provide exemplars of what counts as evidence of the development of expertise. We conclude with a review of PTs' perceptions of instructional design features of the Classroom Inquiry (CI) and the implication for supporting PTs' development of adaptive expertise.

2. Teacher expertise—routine and adaptive

Defining expertise in teaching is a longstanding challenge. As noted by Ainley and Luntley (2007), attempts to describe the knowledge base of teachers may “offer tools for analysing particular aspects of practice, but fails to provide an adequate account of what is required to function effectively minute by minute in the classroom” (p. 4). In today's classrooms, teaching expertise demands skilful balancing of varied content and pedagogical knowledge alongside “consideration of the contingency of pedagogical relations connected to the embodiment of both teachers and students, and of the sociocultural context of a classroom” (Griffiths, 2013, p. 223). Importantly, expertise in this sense is not directly related to teaching experience—the traditional novice versus expert division—but rather, considered as a component of professionalism.

A useful distinction when applying descriptions of expertise is the contrast between ‘routine’ and ‘adaptive’ expertise (Hatano & Inagaki, 1986). The focus for the routine expert is on applying a core set of skills and routines with improved fluency and efficiency. Routines capture the certainties within teaching, and as such can be anticipated and can become part of a knowledge base for learning how to teach. For example, PTs' learning can include knowledge of typical misconceptions around learning mathematical concepts and patterns in students' responses to tasks that embody these concepts. Such knowledge ensures that performance is “highly competent, as long as the issues the individual deals with fall within the realm of the familiar” (Schoenfeld, 2011, p. 332). However, when learning the work of teaching, graduates need more than competency that involves being fluent with routines; they need competency that enables them to “innovate when necessary, rethinking key ideas, practices, and values in order to respond to nonroutine inputs” (Lampert, 2010, p. 24). Signifying adaptive expertise, they pursue the knowledge of why and under which conditions certain approaches have to be used or new approaches have to be devised.

Characterized by flexible, innovative, and creative competencies, adaptive expertise can be viewed as a psycho-social construct that includes dimensions of concern, control, curiosity, and confidence (Savickas, 2005). Koh, Hong, and Seah (2014) added the competency of commitment—the propensity to experiment with new and different activities so that new possibilities can be generated. These constructs are captured in Timperley's (2013) depiction of adaptive teachers as driven by a “moral imperative to promote the engagement, learning and well-being of each of their students” and who “engage in ongoing inquiry with the aim of building the knowledge that is the core of professionalism” (p. 5).

To illustrate the trajectories of developing routine and adaptive expertise, Timperley (2013) proposes a framework that highlights shifts that PTs might make on their learning journey. The first shift—a focus from self to students—concerns the interrelated issues of identity, efficacy/agency, and normality (see Table 1). For example, Timperley contends that indicators of PTs' shift in focus from self as a learner towards the enactment of effective learning environments is an example of professionalism associated with routine expertise. Moreover, PTs who shift in focus towards the teacher as one who promotes valued outcomes for each learner exhibit aspects of professionalism associated with adaptive expertise.

The second shift concerns PTs' understandings of teaching, including ideas about knowledge, interactions and responsibilities, and the location of learning. As summarized in Table 2, coming to appreciate the complexity of teaching routine expertise involves the recognition that “what students learn is filtered through their personal frames of reference, and they take account of this when constructing classroom environments” (Timperley, 2013, p. 8). In developing adaptive expertise, PTs come to view teaching as the co-construction of knowledge that involves responsive, reciprocal power-sharing relationship with their learners and their learning communities.

In defining markers of developing expertise, Timperley (2013) takes care to note that these shifts are not mutually exclusive. While it is important that PTs master routines, what distinguishes adaptive teachers is their constant attention to the impact of teaching and learning routines on students' engagement, learning, and wellbeing. In mathematics education, teaching approaches associated with adaptive expertise have been variously described as “ambitious,” “dialogic,” “reform-oriented,” “responsive” (Stylianides & Stylianides, 2014), and “responsible” (Ball & Forzani, 2011).

In the next section we attend to how teacher education can support the development of such expertise, with an overview of the current turn toward practice-based teacher education (Zeichner, 2012) and the contextual background of our study.

3. Supporting adaptive expertise in practice-based teacher education

As far back as the 1980s, Hatano and Inagaki (1986) argued that to avoid the ‘halt’ in expertise growth, the development of professional expertise required a balance between the development of effective routines and the development of conceptual understanding. However, while there is agreement that adaptive expertise entails the basic components of routine expertise (Stylianides & Stylianides, 2014), recent studies challenge the necessity of a developmental sequence from a routine expert to adaptive expert, arguing that “adaptive expertise should be understood as a fundamentally different conception of professionalism” (Timperley, 2013, p. 9). Bohle Carbonell, Stelmeijer, Könings, Segers, and van Merriënboer's (2014) review of adaptive expertise studies across workplace settings noted that training activities that stimulate

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