CHAPTER 3

THE DEVELOPMENT OF TEACHERS' PROFESSIONAL KNOWLEDGE

On the face of it, it looks relatively easy to depict teachers' knowledge as invented or acquired, and as acquired from others or from one's experiences, but this guide has shown otherwise. What is at first disarmingly simple turns out to be endlessly complex with many conceptions, many researchers, many viewpoints, and many epistemological and moral issues each vying for our attention .... There is a tension in the different views of what counts as professional knowledge and even of how to conceptualize knowledge.

(Munby, Russell, and Martin, 2001, p. 900)

This chapter develops the premise that, although teacher candidates can and do learn from propositional forms of knowledge, understanding the ways in which teacher candidates learn from experience offers a more productive way of thinking about learning to teach. In particular, the narrative inquiry perspective (Clandinin & Connelley, 1995) and the reflection-in-action perspective (Munby & Russell, 1990) are explored with a view to challenging the epistemological assumptions advocated by purely propositional views of learning to teach. Finally, the chapter concludes with a discussion of the importance of attending closely to the development of teachers' professional knowledge from teaching and learning experiences that occur during both coursework and practicum experiences.

TEACHERS' PROFESSIONAL KNOWLEDGE

Over the past 20 years, research on the development of teachers' professional knowledge has intensified in a number of different research programs, each with its own assumptions about teachers' professional knowledge and how it develops (Cochran-Smith & Lytle, 1999; Fenstermacher, 1994; Munby, Russell, & Martin, 2001). Although the construct of teachers' professional knowledge is readily accepted by members of the research community (Loughran, Mitchell, & Mitchell, 2003), epistemological debates on how teachers come to know continue to the present day. This chapter considers research, primarily since 1990, on the broad topic of teachers' professional knowledge. In particular, I focus on issues and perspectives most relevant to the early development of professional knowledge by teacher candidates. The central tension in any consideration of teachers' professional knowledge is one of epistemology, particularly between the epistemologies of propositional knowledge (Shulman, 1987; Barnett & Hodson, 2001) and experiential knowledge (Clandinin & Connelly, 1995; Munby et al., 2001). I accept this tension as a useful perspective for organizing a review of literature on teachers' professional knowledge. In some

cases, however, this review situates literature differently than other reviews with respect to the tension between propositional knowledge and experiential knowledge. The reasons for the differences reflect not only recent developments in certain research programs, but also the fact that, as Kagan (1992) pointed out, the synthesis of any body of literature is dependent on the experiences that the reader brings to various texts.

The purpose of this chapter is to describe and interpret two major theoretical perspectives of how teachers construct professional knowledge. Although some consideration is given to empirical studies, I focus on the epistemological underpinnings of each theoretical perspective. Implicit in the review is the assumption that teachers' professional knowledge is, like other forms of knowledge, constructed partly as a way to make sense of the cultural models shared by many in our society (Holland & Quinn, 1987). Although teacher candidates can and do learn from propositions, as evidenced by the fact that they are accepted into teacher education programs largely on the basis of marks obtained during heavily propositional undergraduate degree programs, I argue that a theoretical framework of the development of teachers' professional knowledge that is based solely on propositional forms of knowing is inadequate. Learning to teach is a more intricate process than allowed for by the constructs of the epistemology of propositional knowledge because such an epistemology fails to take into account the effects of either the apprenticeship of observation or the power of learning from teaching and learning experiences during a preservice teacher education program.

The review is divided into three sections. The first section explores the propositional views of teachers' professional knowledge, such as those offered by Shulman (1986, 1987), Grossman (1991, 1995), and Barnett and Hodson (2001). The second section challenges the epistemological underpinnings of propositional views by introducing Schön's (1983, 1987) conceptions of professional knowledge. The third section builds upon the second section by describing and interpreting two distinct views of how teachers' professional knowledge is constructed from experience: those of Clandinin and Connelley (1995, 1996) and Craig (1995, 2004), and those of Munby and Russell (1990, 1992b), Russell (1993, 2005), and Munby, Cunningham, and Lock (2000). Although I divide the research programs for purposes of analysis, the divisions should be considered heuristic groupings rather than discrete categories. As an example, a case might be made that elements of pedagogical content knowledge (Shulman, 1986) could be discussed under the lens of experiential rather than propositional knowledge. Here I group the research programs in a way that reflects their essential epistemological underpinnings.

It is difficult to articulate a precise definition of teachers' professional knowledge (Munby et al., 2001). For the purposes of this book, *teachers' professional knowledge is considered to encompass the knowledge, beliefs, and values that teachers possess and create in the course of their careers as educators in elementary and secondary schools.* Although van Manen (1991) makes a strong argument that professional knowledge of teaching is constructed outside of school contexts as well as within them, such a consideration is outside the scope of this review. Putnam and Borko (2000) advocate a situated perspective on cognition and learning that guides this

review's conception of teachers' professional knowledge. Within this framework, teacher learning is considered to be a contextual, social process that occurs as a result of interactions among the individual, symbolic cognitive tools, and other people. Finally, the review is mindful of Borko and Putnam's (1996) earlier assumptions that:

1. Knowledge plays a "central role" in how teachers think, act, and learn (p. 673).
2. Learning, and hence learning to teach over the course of a career, is an "active constructive process" (p. 674).
3. Teachers interpret events based on prior beliefs, assumptions, and knowledge.

Teachers' professional knowledge as it develops and manifests itself in the school context during their careers seems best characterized as a form of situated cognition. The construct includes not only teachers' knowledge, but also their beliefs and values. Teachers' professional knowledge can be analyzed through the use of heuristic categories, which are articulated in several different research programs.

It is also important to frame the term *teachers' professional knowledge* within the context of this review. First, the word *professional* is itself a loaded term and carries for some the connotation of creating a professional knowledge base for teaching (Hiebert, Gallimore, & Stigler, 2002). The concept of a knowledge base for teaching is a contentious issue to which I return later in the chapter. Second, authors such as Shulman (1986, 1987) and Borko and Putnam (1996) append the word "beliefs" to form the construct "teachers' knowledge and beliefs." For the purposes of this book, I accept the premise that distinguishing between knowledge and belief is difficult and somewhat arbitrary (Calderhead, 1996; Fenstermacher, 1994). Thus I assume that teachers' beliefs are embedded within their professional knowledge. Third, it is important to consider the nature of the various groupings of teachers' knowledge that have been posited, such as subject-matter knowledge (Shulman, 1986, 1987), general pedagogical knowledge (Shulman, 1987), pedagogical content knowledge (Grossman, 1990, 1995), pedagogical context knowledge (Barnett & Hodson, 2001), personal practical knowledge (Clandinin & Connelly, 1995, 1996), and knowledge-in-action (Schön, 1983, 1987). Each of these groupings is ultimately heuristic in nature, and thus they should be regarded as frameworks for analysis rather than actual mental structures (Borko & Putnam, 1996). With these perspectives on cognition in mind, I turn to a consideration of those research programs advocating a propositional view of teachers' professional knowledge.

THE EPISTEMOLOGY OF PROPOSITIONAL KNOWLEDGE

Propositional knowledge, also called "paradigmatic knowledge" by Bruner (1986, p. 12), is the kind of theoretical knowledge generally assumed to be both created and taught by members of the academy. Cochran-Smith and Lytle (1999, p. 253) refer to this type of knowledge as "knowledge-for-practice" and suggest that propositional knowledge is predicated on the assumption that teaching can be improved by the transmission of research-based knowledge about teaching by university professors to teacher candidates. Learning to teach, then, is a process of applying knowledge learned in a university classroom to a practical situation, an assumption that has contributed to the use of the term *practice teaching* for practicum placements.

Teachers, like doctors, architects, and engineers, are assumed to be consumers of an established knowledge base (Cochran-Smith & Lytle; Hiebert et al., 2002). Shulman (1987) argued that teachers can elevate their professional status through the construction of a knowledge base for teaching. The improvement of teaching, according to this line of reasoning, is a matter of skilled researchers finding the best possible knowledge to transmit both to teacher candidates and teachers. The concept of a knowledge base is strongly linked to various policy efforts aimed at reforming teacher education programs, including initiatives such as teacher testing and preservice licence examinations (Hiebert et al.).

This line of research was catalyzed by Shulman (1986), who argued that the division between content and pedagogy in the academy is a relatively new development in the history of higher education. As recently as the 19th century "the defining characteristic of pedagogical accomplishment was knowledge of content" (Shulman, 1986, p. 7). Shulman referred to content as "the missing paradigm" (p. 7) in teacher education and warned of the pitfalls of focusing on pedagogy at the expense of content. Fenstermacher (1994) believed that Shulman's focus on content reflects his conception of teacher education as normative; in other words, Shulman advocated that teacher educators must concern themselves with determining what teachers *should* know and be able to do.

Shulman's (1986) perspective had a significant impact on research programs concerned with teachers' professional knowledge. He felt that teachers should understand both the content of their subject-matter disciplines (the substantive knowledge) and the way the subject matter could be organized (the syntactic knowledge). Perhaps more importantly, however, Shulman introduced the concept of pedagogical content knowledge, which he defined as the kind of knowledge that "goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge *for teaching* .... Pedagogical content knowledge also includes an understanding of what makes the learning of specific topics easy or difficult" (Shulman, p. 9). The process of learning to teach, according to Shulman, is a matter of acquiring pedagogical content knowledge such that teacher candidates have not only substantive and syntactic knowledge of their subject matter but also knowledge of common student misconceptions of subject matter.

Shulman (1987, p. 8) offered the following "categories of the knowledge base" for teacher knowledge:

1. Content knowledge
2. General pedagogical knowledge
3. Curriculum knowledge
4. Pedagogical content knowledge
5. Knowledge of learners and their characteristics
6. Knowledge of educational contexts
7. Knowledge of education ends, purposes, and values

Grossman (1990, 1995) credits Shulman's work in the late 1980s with helping to move research on teacher knowledge away from behaviourist approaches and toward cognitive approaches. General pedagogical knowledge, the "broad principles and strategies of classroom management and organization that appear to transcend

subject matter" (Grossman, 1990, p. 8), initially received the most attention in the research literature. Grossman took Shulman's (1987, p. 8) assertion that pedagogical content knowledge "is of special interest because it identifies the distinctive bodies of knowledge for teaching" and focused on the posited four distinct components of pedagogical content knowledge (Grossman, 1990, pp. 8–9):

1. Knowledge of the goals for teaching a subject at various grade levels.
2. Knowledge of the conceptions and misconceptions students are likely to have about a subject at a given grade level.
3. Knowledge of the curriculum of a subject at various grade levels and the curricular materials available to enact the curriculum.
4. Knowledge of instructional strategies, metaphors, and images for teaching particular topics within a given subject.

These four components are not easily separated when teachers' classroom practice is considered. Grossman acknowledged the highly contextual nature of teachers' environments, but asserted that context is not a major source of teachers' pedagogical content knowledge.

The focus of Grossman's (1990) research was the development of pedagogical content knowledge. She identified four sources from which teachers develop pedagogical content knowledge: their experiences as students in elementary and secondary school (i.e., the apprenticeship of observation), their undergraduate degree programs, their methods courses in teacher education programs, and their experiences in the classroom. Although Grossman acknowledged the role of professional experience in developing pedagogical content knowledge, she clearly viewed propositional knowledge as a necessary precursor to experience: "Teaching experience provides the opportunity for prospective teachers to test the knowledge they have acquired from other sources in the crucible of the classroom" (p. 15). The comparison of a classroom environment to a piece of laboratory equipment is particularly revealing; the implication is that teachers are to experiment with the degree to which various propositions can be successfully enacted in the classroom.

In contrast to Grossman's (1990, 1995) work, Barnett and Hodson (2001) make the case that pedagogical content knowledge is inextricably linked, along with propositional academic knowledge, to the contextual environments in which teachers work. Barnett and Hodson (p. 436) define "pedagogical context knowledge" as an amalgam of internal and external sources of teachers' professional knowledge. In particular, pedagogical context knowledge is constructed on the premise that teachers move between the following internal and external sources of knowledge (Barnett & Hodson, pp. 437–438):

1. Academic and research knowledge, which includes knowledge of the substantive and syntactic structures of a discipline and knowledge about how students learn.
2. Pedagogical content knowledge, which includes the types of knowledge articulated in Grossman's (1990) description of pedagogical content knowledge.
3. Professional knowledge, which includes the knowledge of teaching acquired by "unconsciously reflected experience" (p. 438).
4. Classroom knowledge, which includes the situated knowledge that teachers have of their students and classroom contexts.

Pedagogical context knowledge is founded in Barnett and Hodson's view that expert teachers "not only know more than novices, they have more accessible and usable knowledge because it is differently and better organized" (p. 440). To test their model of pedagogical context knowledge, the authors interviewed six exemplary science teachers about their views on particular curriculum units. The study concluded with the assertion that pedagogical context knowledge helps to reveal the intricacies of the knowledge that experienced teachers' access during their day-to-day teaching.

Loughran, Milroy, Berry, Gunstone, and Mulhall (2001) wished to document pedagogical content knowledge (PCK) by interviewing experienced, exemplary teachers. Initially, they concluded that:

> It is not quite so straightforward a process to recognise or articulate [pedagogical content knowledge] as we originally expected …. PCK may not be evident within the confines of one lesson or teaching experience …. Science teachers themselves do not use a language that includes (nor necessarily resembles) the construct of PCK, as much of their knowledge of practice is tacit. (p. 291)

Rather than studying pedagogical content knowledge solely by interviewing expert teachers, the researchers moved on to observe an array of factors that interact with teachers' pedagogical content knowledge. Loughran et al. coined the term "classroom windows" (p. 293) in order to critically examine a diverse array of teaching and learning situations that might reveal something about teachers' pedagogical content knowledge in addition to the interviews. In so doing, they realized that case studies of expert teachers were an insufficient way to explicate pedagogical content knowledge because cases "simply could not carry all that was necessary" (Loughran et al., p. 305) to understand the intricacies of the instances in which pedagogical content knowledge was used by teachers in classrooms. They surmised that "it is very difficult to offer an example [of pedagogical content knowledge] that is a neat concrete package …. [so] it became obvious … why there was such a paucity of concrete examples of PCK in the literature" (p. 293).

Issues and Perspectives to Consider for Teacher Candidates

The epistemology of propositional knowledge is predicated on the assumption that teacher candidates are novice consumers, not expert producers, of knowledge (Cochran-Smith & Lytle, 1999). When Shulman (1986, 1987) offered a categorical account of teachers' knowledge, he opened the door for the creation of a knowledge base for teaching that would be transmitted to teacher candidates during a preservice program. A knowledge base for teaching, ironically, makes it possible to tell teacher candidates how they should teach without paying attention to how teacher candidates learn (Christensen, 1996).

A consideration of the structure of many teacher education programs reveals some of the difficulties inherent with a purely propositional approach to understanding how teacher candidates construct professional knowledge. Teacher education programs usually require teacher candidates to complete a certain amount of coursework before having a practicum experience. The assumption underpinning this design is

that coursework can begin to transmit the knowledge base for teaching to teacher candidates. The practicum experience is then an opportunity for teacher candidates to practise applying the knowledge gained from both undergraduate course work (subject matter knowledge) and professional studies courses (pedagogical content knowledge). In addition, the practicum is an opportunity for teacher candidates (*novices*) to learn from their associate teachers (*experts*), who ostensibly have more pedagogical content knowledge than beginning teachers. In this line of reasoning, teacher educators teach pedagogical content knowledge during coursework, to be refined by teacher candidates under the guidance of an associate teacher in host schools.

Pedagogical content knowledge, the major construct in this school of thought, is an attempt to understand the intersection between academic knowledge and what Grimmett and MacKinnon (1992, p. 387) called "craft knowledge." Both Grossman (1995) and Loughran et al. (2001) admit to the difficulty of capturing teachers' pedagogical content knowledge. Grossman (1990) acknowledged the role of experience in developing pedagogical content knowledge, although she cautioned that learning from practice has pitfalls, given that one can "focus on 'what works' rather than overall goals for instruction" (p. 16). Loughran et al.'s recognition that pedagogical content knowledge is largely tacit and unexamined is of particular relevance to this theoretical framework. Although Grossman (1990) recognized the potential influence of the apprenticeship of observation on pedagogical content knowledge, she did not emphasize that the effects of the apprenticeship of observation tend to remain invisible to teachers. Thus experienced teachers may have more developed pedagogical content knowledge because they have assimilated more fully into the cultural routines of teaching and learning in schools. This assimilation occurs because the unnamed effects of the apprenticeship of observation are usually far more powerful than the effects of teacher education programs (Lortie, 1975; Zeichner & Tabachnick, 1981). The overriding assumption of this school of thought is that teacher candidates should be told theory before they have a practicum experience, where they can put theory into practice.

A recent review of science education literature reveals that research on pedagogical content knowledge remains challenging to this day (Berry, Loughran, & van Driel, 2008). Tangible examples that illustrate the development of pedagogical content knowledge remain elusive, a fact that has led some to question the value of pedagogical content knowledge as a construct. Berry et al. argue that pedagogical content knowledge remains a "seductive" (p. 1273) idea for researchers because it "was one way of opening up new possibilities for looking into, and better understanding the skills, knowledge and ability of expert teachers" (Berry et al., p. 1277). However, as Loughran et al. (2001) note, teachers typically lack the vocabulary to describe the development of their professional knowledge in a way that fits with the construct of pedagogical content knowledge, leading many teachers to dismiss the term as "jargon" (Berry et al., p. 1277).

In an interview conducted 20 years after his seminal paper that introduced the concept of pedagogical content knowledge, Shulman spoke of the genesis of PCK:

> The idea sort of grew slowly but the emphasis definitely was on this growing sense that emerged from our research that just knowing the content well was

> really important, just knowing general pedagogy was really important and yet when you added the two together, you didn't get the teacher. (Berry et al., 2008, p. 1274)

In proposing the idea of pedagogical content knowledge, Shulman and his research group were attempting to address "a gap in the field" (Berry et al., p. 1273) and provide a direction for future research. There was also, Shulman admits, a political imperative to define what teachers uniquely know about teaching their subjects to justify having subject-specific National Board exams for teaching. In his words, "we would not be able to establish the political integrity of teaching if we could not make the supportable claim that teachers knew how to do things that other people couldn't do" (Berry et al., p. 1275). Viewed in this light, pedagogical content knowledge seems more like a convenient label rather than a productive way to understand how teachers learn to teach.

It would be foolish to ignore some of the propositional ways that teachers learn, but the epistemology of propositional knowledge provides only a limited understanding of how teachers learn to teach. Pedagogical content knowledge has been an appealing construct for researchers in part because it names how difficult it is to understand the dynamic interplay between teachers' subject-matter knowledge and teachers' knowledge of pedagogy. At best, pedagogical content knowledge is a useful way to characterize the difference between expert teachers and novice teachers from a deficit perspective; expert teachers know more about how to teach subject-matter content than novices. Expert teachers have ostensibly more pedagogical content knowledge than novice teachers or teacher candidates, but the construct of pedagogical content knowledge and the epistemology of propositional knowledge tell us little about how expert teachers became experts. We are left with little understanding of how teacher candidates learn to teach.

CHALLENGING THE THEORY-INTO-PRACTICE ASSUMPTION

The idea that teacher candidates learn propositional theory in the academy, which they subsequently practise during practicum experiences, is a conceptualization of professional knowledge so firmly entrenched in our culture that Connelly and Clandinin (1995, pp. 8–9) have characterized it as a "sacred story" founded on a "rhetoric of conclusions." Connelly and Clandinin argue that the words *theory* and *practice* are inherently problematic for teachers, given that the general population conceptualizes theory as "the knowledge codified in books … [without] knowledge of the inquiry that gave rise to it" (p. 7). In this section, the sacred theory-practice story is challenged through consideration of the work of Schön (1983, 1987) and those who have considered the nature of teachers' professional knowledge in terms of the role of experience.

Schön (1983) reconceptualized the epistemology of professional knowledge (and hence teachers' professional knowledge) by critiquing what he referred to as the dominant assumptions of "technical rationality" (p. 21) inherent in professional schooling. Technical rationality assumes that "professional activity consists in instrumental problem solving made rigorous by the application of scientific theory and

technique" (Schön, p. 21). Rather than thinking about professionalism as a matter of putting theory into practice, Schön introduces an epistemology of practice founded on the concepts of "knowing-in-action" and "reflecting-in-action" (p. 54), both of which recognize that much professional knowledge is tacit. Knowing-in-action, "the characteristic mode of ordinary practical knowledge" (Schön, p. 54), allows professionals to make decisions and carry out actions in the moment, without necessarily being able to articulate either their reasoning for taking such actions or how they learned to carry out such actions in the first place. Reflection-in-action refers to the kind of thinking professionals often do in the midst of making a decision or taking an action.

Schön (1983, p. 62) notes that "a practitioner's reflection-in-action may not be very rapid. It is bounded by the 'action-present,' the zone of time [possibly minutes, hours, or days] in which action can still make a difference to the situation." A professional confronts a situation, takes action, and must continually monitor the situation as it "'speaks back' to the practitioner, demanding more reflection and further action" (Furlong & Maynard, 1995, p. 47). This is reflection-in-action. The concept of "frame analysis" (Schön, p. 309) is a useful way to help professionals interpret and act upon problems when they occur, because it encourages professionals to consider multiple frames and to "attend to the ways in which they construct the reality in which they function" (Schön, p. 310). Frame analysis can help professionals consider multiple courses of action by naming a variety of frames and by possibly reframing the situation in a way that "gives central importance to his or her own role as a learner" (Schön, 1987, p. 92). This process is, by nature, experimental although not necessarily the result of conscious decision making (Furlong & Maynard). The professional "is *in* the situation that he or she seeks to understand" (Schön, 1983, p. 151).

Schön (1983) speaks of the inherent artistry of professional knowledge, frequently drawing comparisons between professionals and jazz musicians who "manifest a 'feel for' their material … they feel where the music is going and adjust their playing accordingly" (p. 55). Just as jazz musicians improvise based on their understandings of musical situations at given moments, teachers improvise based on their understandings of unique situations within their classroom contexts. Although both jazz musicians and teachers bring prior propositional knowledge to bear on their understandings of situations, the more important issue is that both jazz musicians and teachers reflect as the situation is unfolding. As Munby et al. (2000, p. 195) note, "this concept emphasizes reflection that occurs *in the action* of teaching as a non-logical process rather than reflection that occurs in conjunction with associated control or subsequent thinking." The artistry of professional knowledge, then, is inherent both in how teachers reflect-in-action and how they frame and reframe unique and challenging situations.

The central message of Schön's argument is that the construction of professional knowledge (knowing-in-action) is not a matter of implementing propositions or putting theory into practice. Munby and Russell (1990, p. 116) state that "knowing-in-action is acquired through an interaction with experience that is non-logical and often sudden and unexpected." Teachers' professional knowledge, revealed through

the lenses of knowing-in-action and reflection-in-action, is fundamentally grounded in professional experiences. There are, however, different ways of using Schön's ideas to understand how teachers construct professional knowledge from experience. Clandinin and Connelly (1995), for example, accept the idea of knowing-in-action while emphasizing the creation of shared narratives over the construct of reflection-in-action. Munby and Russell focus on describing and interpreting instances of reflection-in-action through the use of metaphor. The next section of this chapter examines these differences in detail.

THE EPISTEMOLOGY OF EXPERIENTIAL KNOWLEDGE

There are two main strands of research that emphasize the epistemology of experiential knowledge over the epistemology of propositional knowledge. The first strand, represented by Clandinin and Connelly (1995), posited a landscape of professional knowledge that is navigated through the creation of multiple narratives. The second strand reveals a group of researchers, such as Munby and Russell (1990, 1992b), primarily concerned with how reflection-in-action leads to knowing-in-action. This group of researchers "consider it far more of a task [than researchers in the narrative tradition] to tease out precisely what knowledge is involved in action and how this knowledge is altered in subsequent action" (Fenstermacher, 1994, p. 13). Fenstermacher argued that narrative constructs are "difficult to unpack with precision" (p. 11) and that narratives alone do not warrant claims about teachers' professional knowledge. Both groups of researchers, however, believe that the epistemology of experiential knowledge deserves far greater attention in any consideration of how teachers' professional knowledge develops.

Connelly and Clandinin (1995) use two metaphors in their discussion of teachers' professional knowledge: the metaphor of the landscape to describe how teachers construct and organize their knowledge and the metaphor of a funnel to discuss how policies are poured into the landscape from school boards, governments, and universities. Connelly and Clandinin (p. 4) state:

> The professional knowledge landscape that teachers inhabit creates epistemological dilemmas that we understand in terms of secret, sacred, and cover stories. The metaphor of the professional knowledge landscape provides a way to contextualize research-based understandings of teachers' personal practical knowledge.

The notions of secret, sacred, and cover stories are particularly important to the narrative tradition of describing and interpreting teachers' professional knowledge. Sacred stories are sacred in the sense that most people are unwilling to question their status and power in our culture. Secret stories are the stories of teachers in classrooms that are largely invisible to the public eye; they remain secret because teachers tend to guard closely the stories of their classroom experiences. Cover stories are the stories that teachers tell outside of their classrooms, particularly those that help them to deal with the values imposed upon them by policymakers and stakeholders via the funnel (Connelly & Clandinin, pp. 4–5).

There is nothing in a teachers' professional knowledge landscape that is value-neutral. Teachers' professional knowledge and values are interwoven and inseparable. Teaching, characterized as a narrative experience within a vast landscape with its own history, is a process in which one constructs "personal practical knowledge" (Connelly & Clandinin, 1995, p. 4). Craig (1995) explored how this personal practical knowledge is created within the professional knowledge contexts of schools. These professional knowledge contexts are critically important to the development of new teachers' personal practical knowledge and are often safe spaces in which teachers can share their secret stories of classroom practice, which often results in the formation of important professional relationships among teachers (Craig, 2004).

Craig (2004) goes to great lengths to explicate the differences between the casual meetings of teachers in hallways and staffrooms and the meetings of teachers that allow for the creation of professional knowledge communities. These communities often serve as "a transitional narrative space—a bridging space [between the public and the private]—in which adjustments in relationships on teachers' landscapes can—and do—occur" (Craig, p. 421). Thus Craig advocates a shift away from the dominant transmission model of inservice teacher education. Instead, she suggests that teachers' professional knowledge involves a process of construction that can occur only if teachers feel safe in their contexts—contexts that are unlikely outside of a professional knowledge community founded on mutual trust. In professional knowledge communities, teachers "tentatively explore how they are making sense of situations, explain their own actions and excavate their stories in concert with others" (Olson & Craig, 2005, p. 178). These exploratory conversations provide opportunities for teachers to become conscious of the tensions between their cover stories and their secret stories, and thus more accurately map their professional knowledge landscapes (Olson & Craig).

There are, however, some epistemological problems with a narrative inquiry into teachers' professional knowledge. The constructs associated with narrative inquiry are "difficult concept[s] to unpack with precision" (Fenstermacher, 1994, p. 11). It is important to specify whether knowledge claims are made on an epistemic basis or a categorical basis, because

> [If] a researcher argues that teachers produce knowledge in the course of acting on experience, he or she could be saying merely that teachers generate ideas, conceptions, images or perspectives when performing as teachers (the grouping sense of knowledge) *or that teachers are justified in performing as they do for reasons or evidence they are able to provide* (the epistemic status sense of knowledge) [italics added]. (Fenstermacher, 1994, p. 31)

The narrative tradition can often function more in the grouping sense rather than the epistemic status sense of knowledge. In telling stories, teachers may not necessarily be able to provide evidence for *why* they constructed their narratives in a particular way. For this reason, the narrative tradition lacks a warrant for knowledge claims—what Fenstermacher (p. 34) calls "epistemic import." Clandinin and Connelly (1996) refute this characterization of their work by suggesting that Fenstermacher's argument does not take into account the contextual factors of teachers' professional

knowledge. Furthermore, Clandinin and Connelly (1996, p. 28) state that "teachers know, and it is clear that they know what they know."

Loughran (2008) provoked a similar challenge to the narrative tradition by encouraging teacher educators to move beyond personal narratives in order to differentiate between telling stories of practice and naming knowledge derived from practice. He acknowledges that "a good story can be a very powerful way of sharing practice (and perhaps) influencing the practice of others" (p. 219). At the same time, however, Loughran (2008, p. 219) cautions that "a story can carry important messages and information about teaching without specifically focussing on the *why* [italics added] of teaching." Thus stories do not *necessarily* articulate the underlying assumptions and tensions associated with practice. In constructing a narrative, teachers need not articulate the reasoning behind any knowledge claims that they make.

Although it is clear that stories are important to the development of professional knowledge about teaching and learning, an argument can be made that stories are but one stage of the process of constructing knowledge about teaching. Teachers find considerable value in sharing stories with one another, and these stories can serve as a catalyst for critical analysis of practice. Loughran (2008, p. 219) acknowledges that the "why of teaching" may be buried in the story itself. To assume, however, that knowledge of practice is automatically created through the construction of narratives is potentially dangerous. Stories have embedded within them the assumptions and power differentials that tend to result in replication of cultural phenomena, such as the routines associated with the apprenticeship of observation.

The work of Munby and Russell (1990, 1992b) pays careful attention to establishing warrants for claims about teachers' professional knowledge (Fenstermacher, 1994). In particular, Munby and Russell (1990) suggest that the metaphors used by teachers to talk about teaching provide valuable evidence of how teachers think. Munby and Russell (1990, pp. 117–120) describe two case studies in which teachers use metaphors to talk about an aspect of their practice. The initial metaphors that the teachers use provide clues as to how they frame their professional understanding of their teaching. One teacher uses metaphorical language to describe her classroom as open and student-centred, often using the word "share" (Munby & Russell, 1990, p. 118). The other teacher uses metaphorical language to describe his understanding of the scientific method in relation to teaching elementary school science.

In the first case, the teacher reframes her professional understanding during a post-observation interview while reading over the transcript of the previous interview. The teacher realized that she was not providing her students with much choice in her classroom; as a result, she changed her metaphorical language, including "more attention to individual children and less use of the sharing metaphor" (Munby & Russell, 1990, p. 118). In the second case, the teacher's metaphorical understanding of science as a product rather than a process closely resembles his understanding of pedagogy. He did not reflect-in-action but found reflection-on-action a useful way to process daily events. Munby and Russell (p. 120) state that "reflection-on-action is evidently a powerful way for him to learn, just as he believes it to be the way in which we learn by scientific process." In both cases, changes in the teachers'

metaphorical language reveal the reframing that occured as they reflect-in-action and reflect-on-action. Reflection-in-action helped the first teacher to see her classroom environment in a different way. Reflection-on-action, the more familiar of the two constructs, allowed the second teacher to attend to his reasons for his pedagogical decisions after they occurred. As Munby and Russell (p. 121) note, "careful attention to how one describes the world appears to give clues to how one constructs it." Most importantly, these metaphorical constructions serve as warrants for epistemic claims about teachers' professional knowledge and how teachers learn from experience because they are used almost unconsciously to describe situations, hence revealing more about tacit, unexamined knowledge than a narrative that is constructed for a specific purpose.

Munby et al. (2000) provide a useful interpretation of the epistemology of experiential knowledge. Teaching is not governed by a series of prescriptions for how to act in certain situations. Rather, teachers frame situations based on their understanding and reframe situations in response to experiences.

> Reframing is the process by which professional knowledge develops and it …. emphasizes reflection that occurs *in the action* of teaching as a non-logical process rather than reflection that occurs in conjunction with associated control or subsequent thinking …. Therefore, reflection-in-action leads to knowing-in-action via the process of reframing. (p. 195)

From this perspective, professional knowledge is generated by a teacher's ability to make his or her practice problematic, enact a new course of action based on a new frame of understanding, and then evaluate the new frame based on the results. Teachers' professional knowledge, then, is also based on how they reframe in response to experiences, not solely on how they enact propositions.

There are, however, barriers to creating professional knowledge via the process of reframing. Munby et al. (2000) investigated these barriers by observing and interviewing a new science teacher over a 4-month period. They discovered that providing an opportunity for a teacher to reflect on his or her practice does not necessarily lead to reframing of classroom situations. The teacher in the study "feels constrained by conventions condoned by the school institution …. by the demands imposed by the curriculum …. by her past experience, the expectations placed upon her at the school, and her interpretations of what works and what does not work in terms of her teaching" (Munby et al., pp. 204–205). Teachers work within the constraints of multiple internal and external contexts. These contexts can impede the process of framing and reframing, and in so doing impose "boundaries to the social scientific inquiries teachers might make of their teaching" (Munby et al., p. 208).

In addition to the contextual boundaries that can make it difficult for teachers to reframe their practice, there are other challenges to understanding Schön's constructs of learning from experience. One of the major obstacles to understanding how teachers learn from experience is the pervasive assumption that simply providing the experience is sufficient (Munby et al., 2001; Russell, 1993).

Russell (1993, p. 209) identifies a "ritual-practice problem in learning from experience" by considering that it is possible for those learning to teach to develop ritual rather than principled knowledge from experience. Ritual knowledge is

constructed when a teacher does things without attending to the principles underlying actions. The culture of the school consists largely of ritualized, procedural knowledge, so it is often difficult to critically examine the principles underlying teaching practice, and hence the status quo remains firmly entrenched (Britzman, 1991/2003; Russell, 1993). In fact, many teachers are "*unaware of the ways in which principled understanding of their practice* could inform and support a career that offers significant opportunity to develop new practices" (Russell, p. 210). It becomes of critical importance, therefore, to engage in discussions with those learning to teach that encourage a principled, rather than a ritualized, understanding of teaching that goes beyond merely surviving the daily requirements of the classroom.

Both Clandinin and Connelly (1995, 1996) and Munby and Russell (1990, 1992b) believe in the primacy of experience in the construction of teachers' professional knowledge. Cochran-Smith and Lytle (1999) conceptualized this knowledge as "knowledge-in-practice….[where] the emphasis is on knowledge-in-action: what very competent teachers know as it is expressed or embedded *in* the artistry of practice, *in* teachers' reflections on practice, *in* teachers' practical inquiries, and/or *in* teachers' narrative accounts of practice" (p. 262). Although knowing-in-action is central to the epistemology of experiential knowledge, the role of reframing and reflection-in-action is conceptualized quite differently in the two research programs described in this section. For the narrative school of Clandinin and Connelly, knowing-in-action is concurrent with the construction of teachers' personal professional knowledge as secret stories of classroom life. The issue is whether these secret stories become uncovered in professional knowledge communities, because "the possibilities for reflective awakening and transformations are limited when one is alone" (Connelly & Clandinin, 1995, p. 13). The research program of Munby and Russell concludes that knowledge-in-action is constructed through reflection-in-action, reframing, and reflection-on-action. Knowledge-in-action is not automatically constructed as a result of experience; it occurs "through those interactions with experience that result in the often sudden and unanticipated ways in which we come to *see experience differently*" (Munby & Russell, 1992a, p. 3). By attending to the metaphors in teachers' rich descriptions of how they viewed experiences differently, researchers are able to learn more about teachers' tacit understandings and assumptions.

Issues and Perspectives to Consider for Teacher Candidates

The epistemology of experiential knowledge contends that teachers are actively involved in the creation of their own professional knowledge. Learning to teach requires opportunities for teacher candidates to "enhance, make explicit, and articulate the tacit knowledge embedded in experience" (Cochran-Smith & Lytle, 1999, pp. 262–263). Schön's (1983) criticism of the technical rationalism that dominates professional schools was a catalyst for researchers to think about a new construct for professional knowledge—knowing-in-action. Knowing-in-action directly contrasts with propositional knowledge because it reveals the importance of knowledge that professionals gain from personal experience. According to Munby and Russell (1994, p. 92), "there is a knowledge-in-action that cannot be fully expressed in

propositions" which means that "learning from experience has its own epistemology." The implications of the epistemology of experiential knowledge for teacher education are profound, because the technical rationalist assumptions underlying most teacher education programs do not prepare candidates to learn from experience. Teacher education programs tend to be designed in ways that reinforces the sacred story of theory-into-practice by requiring teacher candidates to attend a significant number of classes to learn theory before they are permitted to have a practicum experience. This sacred story is so firmly entrenched that it is common for people to refer to practicum experiences as *practice teaching*, a term "founded on arrogance so deeply rooted that … [it implies] all our students need to do to develop professional knowledge is to practice what teacher educators have preached" (Munby et al., 2001, p. 897).

Although knowledge-in-action can arise from practicum experiences, teacher candidates often do not "master learning from experience during preservice programs in a way that gives them direct access to the nature of the *authority of experience* [italics added]" (Munby & Russell, 1994, p. 92). The experience alone is not sufficient because it does not automatically encourage teacher candidates to articulate how and why they know what they know. Russell (1983, p. 30) outlined two common kinds of authority in schools: the *authority of knowledge*, which comes from the ability to make warranted claims about knowledge, and the *authority of position*, which is ostensibly given to someone who has the authority of knowledge. Although the theoretical framework underlying schools contends that the authority of knowledge precedes the authority of position, "a teacher's position in authority makes it *possible* to present knowledge claims *without* reasons" (Russell, p. 30). The apprenticeship of observation tends to emphasize the authority of position over other forms of authority as school routines become deeply ingrained. Munby and Russell (1994) also considered the implications of the authority of experience for experienced teachers teaching at faculties of education:

> Their knowledge-in-action gives them [teacher educators] the authority of experience. But the circumstances of telling their students about teaching unavoidably commits them to the authority of being in charge, and their students are automatically placed under authority. The authority of experience gets transformed into the authority that says, *I know because I have been there, and so you should listen*. The authority of experience simply does not transfer [to teacher candidates] because it resides in having that experience. This coincides with Schön's view that knowledge-in-action cannot be transformed into propositions. (pp. 92–93)

The gap between the authority of experience of a teacher educator and the authority of experience of a teacher candidate sheds some light on the reason that the search for pedagogical content knowledge has been so challenging. *Teacher educators cannot tell candidates how to teach because the authority of experience cannot be transmitted as a set of propositions.*

The epistemology of experiential knowledge requires careful consideration of how teacher candidates learn from the authority of their own teaching and learning experiences. It is also important to disrupt the sacred story by acknowledging that

the learning experiences that occur during coursework in a teacher education program can be valuable for helping teacher candidates learn how to learn from the authority of their own experiences. There are at least two ways in which the authority of experience can be explored more fully in teacher education programs. The authority of experience might initially be expressed in the form of a secret story, until a teacher candidate feels comfortable enough to tell his or her story in a professional knowledge community. Teacher education classrooms may provide such a safe environment. Constructing a narrative, however, does not necessarily establish a warrant for knowledge claims based on the authority of experience. If narratives do not include *why* teacher candidates acted or felt certain ways, then they remain at the level of a story that, while useful to relate to other teachers, does not reveal a lot about the candidates' tacit professional knowledge.

The authority of experience seems more likely to be established through the metaphors teacher candidates use in their descriptions of teaching and learning situations. Changes in language may imply a change in the metaphors with which they understand teaching and learning situations that arise during the preservice year (Munby & Russell, 1990; 1992b). In particular, teacher candidates should have opportunities to critique their assumptions about teaching because, as Munby et al. (2001, p. 887) note, "good teaching tends to reinforce the view that teaching is effortless because the knowledge and experience surrounding it are invisible to those taught." The authority of experience must be explicitly named and interpreted with teacher candidates in order to both challenge practices ritualized by the culture of school and help candidates develop warranted claims about the development of their professional knowledge.

THE CULTURE OF SCHOOL AND ITS IMPLICATIONS FOR UNDERSTANDING THE DEVELOPMENT OF TEACHERS' PROFESSIONAL KNOWLEDGE

The powerful cultural ideas about teaching that result from the apprenticeship of observation have important implications for any consideration of how teachers construct their professional knowledge. The socializing effects of attending school result in tacit yet deeply rooted prior assumptions about how students learn, assumptions that must be addressed in teacher education programs. This chapter has considered the epistemologies of teachers' propositional knowledge and experiential knowledge, with a view to underscoring the relevance of warranted knowledge derived from the authority of experience, rather than the more familiar authorities of knowledge or position.

Three conclusions that are relevant to this research can be drawn from this review. First, teachers' professional knowledge can be conceptualized in a number of heuristic groupings that reflect underlying assumptions about what teachers know and how they learn. Each of the heuristic groupings discussed in this review speak to the situated nature of teachers' cognition. Teachers construct their professional knowledge based on a number of factors including propositional knowledge, their prior experiences as students, their interactions with other teachers and teacher educators, their practicum experiences, and their personal professional landscapes.

Teachers' professional knowledge is frequently tacit; even expert teachers are often unable to state how they know what they know about teaching and learning.

Second, Shulman's (1986) assertion that teacher education programs need to pay close attention to the role of subject-matter knowledge in the development of teachers' professional knowledge has sparked a considerable amount of research, particularly on the construct of pedagogical content knowledge. Although experienced teachers seem to have more pedagogical content knowledge than new teachers, describing and interpreting the pedagogical content knowledge of experienced teachers is not a straightforward task. There is very little research that establishes what pedagogical content knowledge is. A part of the reason for this gap in the literature may be that the construct of pedagogical content knowledge was created partially as a political move to claim that teachers have unique knowledge of how to teach their subject matter. Such claims played an important role in the development of National Board certification exams in the United States. Although expert teachers may indeed have pedagogical content knowledge, this particular heuristic grouping may function as a convenient label for researchers rather than as a productive way of understanding how teachers construct professional knowledge. Teacher candidates can and do learn from propositions, particularly about their subject matter, but the effects of the apprenticeship of observation are deeply socialized and hence unlikely to change as a result of sharing propositional knowledge alone.

Third, Schön's (1983, 1987) conception of the epistemology of professional knowledge was expressed in two major lines of research developed by Clandinin and Connelly (1995) and by Munby and Russell (1990, 1992b). Both research programs interpret how teachers construct knowledge-in-action by examining the authority of experience, although they differ in focus. The narrative perspective (Clandinin & Connelly) focuses on creating safe spaces for the sharing of teachers' secret stories, whereas the reflection-in-action perspective (Munby & Russell) attends closely to teachers' use of language to reveal how they frame and reframe their practice. Although construction of narratives has value for teachers, particularly as they navigate the competing demands of the contexts in which they teach, narratives alone do not necessarily have epistemic import. Evidence of reframing, particularly by attending to teachers' use of metaphorical language, provides a warrant with which to make epistemic claims about teachers' professional knowledge.

It is productive to consider teacher education programs in light of these competing heuristic groupings of teachers' professional knowledge. Although it has been many years since Schön's initial challenge to technical rationalism, there continue to be calls for a *new* teacher education because the old teacher education model, largely founded on propositional assumptions about how teachers come to know, is considered inadequate by many policymakers, teacher educators, and teacher candidates (Cochran-Smith, 2005; Darling-Hammond, 2000). To be clear, I am not advocating a complete rejection of propositional epistemologies of how teachers create their professional knowledge. Teachers need to be able to teach the subject matter that they learned in their undergraduate degree programs. Some teacher candidates may even find propositions offered by teacher educators, associate teachers, or their peers of some value. Knowledge-in-action, however, does not come from

propositional knowledge, nor can it be transmitted from one person to another. Teacher education programs need to pay explicit attention to the role of experience in learning to teach. As Munby et al. (2001, p. 900) observe, "although the field of teachers' knowledge is too large for mundane consideration, the evidence is that we in teacher education still proceed as if it were simple." Professional knowledge of teaching is hard-earned because it requires teacher candidates to reframe their understanding of teaching and learning gained from the apprenticeship of observation within the context of the propositional knowledge typically offered in preservice classroom and practicum experiences. Simply having an experience is not enough. Classroom and practicum experiences that are unexamined do little more than reinforce existing patterns of teaching in schools. As Lortie (1975) noted, teacher candidates may simply regard the practicum as a way to prove to themselves that they can enact familiar teaching behaviours, many of which could have been reasons for their entrance into the profession. The apprenticeship of observation is not a stimulus for change.

This book examines how teacher candidates construct professional knowledge from teaching and learning experiences that occur during both coursework and practicum experiences. Throughout the research, I frame the process of learning to teach as one fraught with tension, especially between familiar cultural routines codified in the apprenticeship of observation and the new experiences that teacher candidates acquire during their preservice education program. In the next 4 chapters we turn to the heart of the matter; an in-depth analysis of how 5 teacher candidates learned to teach in a preservice teacher education program.