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Chapter 10

Reframing Teacher Professional Learning: An Alternative Policy Approach to Strengthening Valued Outcomes for Diverse Learners

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This chapter engages in the debate about what counts as professional knowledge from the perspective of improving outcomes for diverse learners. We begin by highlighting the importance of assumptions about appropriate roles for teachers and how those assumptions have shaped the debate about what teachers need to know. Then we consider some myths and evidence about teacher agency that have contributed to a recent international shift in policy attention to the importance of teacher knowledge and, more particularly, how to develop teacher agency and capability.

The main focus of the chapter is on a policy approach to building a multidisciplinary evidence base in education that both identifies the kinds of teacher knowledge that has a positive impact on a range of student outcomes and, at the same time, develops that knowledge through a national collaborative knowledge-building and knowledge-use strategy. The approach described is the New Zealand Iterative Best Evidence Synthesis (BES) Programme, which deliberately and systematically draws on and develops a rich multidisciplinary knowledge base in education. We situate our account of this program within (a) a comparison of a range of international policy approaches to strengthening the evidence base informing what teachers need to know, (b) a vision of the role of teaching as responsive to diverse learners and the evolving challenges of the 21st century, and (c) a touchstone of effectiveness as defined by impacts on a range of valued learner outcomes. We present the findings of a new synthesis of the evidence from 97 empirical studies that identify the development of the kinds of teacher knowledge that have a demonstrated positive impact on outcomes for diverse learners. The

findings of the synthesis are exemplified through an in-depth case study of effective professional development designed to support student learning, teacher learning, teacher-educator research, and policy learning.

In conclusion, we highlight the potential of such multidisciplinary collaborative approaches to building the kinds of professional knowledge needed to change outcomes for diverse learners in our schooling system. We also discuss the challenges for both policy and research to engage in such transformational knowledge building.

TEACHER ROLE AND TEACHER KNOWLEDGE

As far back as the writings of Plato, there has been advanced a view of the role of teachers as one of maintaining inequalities in society by educating children of different classes differently. In Plato's "myth of the metals," education is the way by which those who are born "gold" are afforded the greatest honor and power and given very different opportunities to learn than the restricted opportunities for those who are born "brass" or "iron" (Plato, 1968 trans., p. 141). Plato explained that education could be a useful and peaceful alternative to a military regime in maintaining differential status and access to material wealth in society.

Different views about the role of teachers as desirably maintaining or challenging social inequities have persisted across centuries to the current day, leading in turn to very different views about the knowledge needed for teaching. In the *Handbook of Research on Teacher Education*, W. Doyle (1990) explained persisting conflicts about what counts as educational knowledge as arising from fundamentally different views of the proper role of teachers. For example, when the view of teachers is one of "good employee" prepared to maintain the prevailing norms of school practices, then appropriate knowledge for teacher education is essentially experiential and technical, sometimes involving a teacher in implementing prescriptions of practice.

An alternative view advanced by W. Doyle (1990) is one of teachers as "reflective professionals" able to draw on an integrated knowledge base to constantly improve practice through knowledge and inquiry:

The knowledge base for the preparation of reflective professionals includes personal knowledge, the craft knowledge of skilled practitioners, and propositional knowledge from classroom research and the social and behavioural sciences. Within this framework, research and theory do not produce rules or prescriptions for classroom application but rather knowledge and methods of inquiry useful in deliberating about teaching problems and practices. (p. 6)

The debates about what teachers need to know, and the potential of research to inform teacher knowledge and practice, are not new. At a time when teaching was widely considered a craft practice, Winch (1911), a school inspector, joined with professorial colleagues at Cambridge University in explaining the hope for strengthening teaching through using research to inform pedagogy in the newly established *Journal of Experimental Pedagogy*. The vision of the journal was not one just of teachers as recipients of research but of teachers as researchers contributing to professional knowledge building and exchange (Reaney, 1911).

Despite such hopeful beginnings, the relationship between teacher education and research has been vexed by the uncertain and fragmented status of initial teacher education in (and out of) universities. W. Doyle (1990) attributed the low status in the United States in part to tensions between disciplinary and professional knowledge: "Professors in academic departments identify with their disciplines rather than teacher preparation and are frequently antagonistic towards teacher education programs and students" (p. 7). In some jurisdictions, policymakers have turned to other approaches to the development of teacher knowledge, such as school-based apprenticeship models, alternative certification routes, and an open market model for initial teacher education.

TEACHER IMPACT MATTERS

Before directly addressing the evidence about the impact of teaching, it is important to note that there is compelling evidence that poverty, nutrition, health, family processes, and wider social, community, and family influences, such as violence, media, and drug use, affect educational outcomes and children's well-being (Biddulph, Biddulph, & Biddulph, 2003; Mayer, 2002). Although the focus of this review is on our BES focused on teacher knowledge, the Iterative BES Programme has a continuing focus on family and community influences and has provided advice to government about giving priority to matters such as child poverty and early undiagnosed hearing loss. Our consideration of teaching as the *key system influence* complements rather than abnegates evidence about and wider policy implications arising from the impact of families and communities on valued outcomes for children and young people.

Since the outset of our new century, there has been a substantial shift in interest across jurisdictions in the development of teacher knowledge as new evidence about the influence of teaching on student outcomes has become apparent. In the 1960s and '70s, influential reports on the impact of schooling on inequality (Coleman et al., 1966; Jencks et al., 1972) painted a grim picture of schools making relatively little difference to student achievement. Coleman and his colleagues (1966) found that only about 10% of the variance in student achievement could be attributed to schools. However, Coleman's analysis averaged the effect of schools and failed to differentiate the effects of different teachers. Preservice teachers in university courses in the sociology of education in many Western educational jurisdictions encountered the legacy of both this influential research and the neo-Marxist theoretical literature that provided a compelling case that teachers were implicated (albeit unknowingly) in the reproduction of a class society (e.g., Bowles & Gintis, 1976). For some prospective teachers, these arguments became a foundation for a sense of little agency and an "informed" view that their influence could never be significantly equitable or transformational.

The more recent use of multilevel models to estimate the magnitude of variance in students' achievement outcomes that include effects at the class and teacher levels has increasingly highlighted the marked impact teachers can have on differences in achievement. The first *International Handbook of Educational Change* (Cuttance, 1998) signaled a marked shift in thinking about the potential for agency in education

partly informed by the evidence emerging from the new multilevel modeling studies capturing both school- and class-level impacts on outcomes:

Recent research on the impact of schools on student learning leads to the conclusion that 8–19% of the variation in student learning outcomes lies between schools with a further amount of up to 55% of the variation in individual learning outcomes between classrooms within schools. In total, approximately 60% of the variation in the performance of students lies either between schools or between classrooms, with the remaining 40% being due to either variation associated with students themselves or to random influences. (pp. 1158–1159)

Some of the strongest evidence of the effects of quality teaching informing this view is derived from the Australian longitudinal study known as the Victorian Quality Schools Project, where teacher influence on variance has been particularly high in upper secondary subjects (Hill & Rowe, 1996; Rowe & Hill, 1998).

In the United States, Nye, Konstantanopoulos, and Hedges (2004) analyzed the experimental data collected for the Tennessee Class Size Experiment and reported that teacher effects were much larger than school effects, much larger in low-socio-economic-status schools, and "certainly large enough to have policy significance" (p. 253). They found that "the effect of one standard deviation change in teacher effectiveness is larger than, for example, that of reducing class size from 25 to 15" (p. 254) and concluded that intervening to improve teacher quality would be cost-effective compared to class-size reductions. Similarly, from the British research, Muijs and Reynolds (2001) highlighted, "All the evidence that has been generated in the school effectiveness research community shows that classrooms are far more important than schools in determining how children perform at school" (p. vii).

Although different methodological designs, different definitions of what constitutes residual variance, and the different schooling levels, contexts, and outcomes of studies have made this a difficult research literature to come to grips with, there is now good evidence that the impact of teaching and classroom differences on variances in student outcomes are substantial in such countries as the United States, Australia, Sweden, Finland, New Zealand, Canada, Israel, France, and Scotland (Bransford, Darling-Hammond, & LePage, 2005; Scheerens, Vermeulen, & Pelgrum, 1989). The policy importance of this finding has been compellingly articulated.

The results of this study will document that the most important factor affecting student learning is the teacher. In addition, the results show wide variation in effectiveness among teachers. The immediate and clear implication of this finding is that seemingly more can be done to improve education by improving the effectiveness of teachers than by any other single factor. Effective teachers appear to be effective with students of different achievement levels regardless of the level of heterogeneity in their classrooms (Wright, Horn, & Sanders, 1997, p. 63).

In a range of reviews, Darling-Hammond (2000) made evident the link between the impact of teaching and the influence of teacher education:

The effect of poor quality teaching on student outcomes is debilitating and cumulative. . . . The effects of quality teaching on educational outcomes are greater than those that arise from students' backgrounds. . . .

A reliance on curriculum standards and statewide assessment strategies without paying due attention to teacher quality appears to be insufficient to gain the improvements in student outcomes sought. . . . The quality of teacher education and teaching appear to be more strongly related to student achievement than class sizes, overall spending levels or teacher salaries. (p. 3)

The importance of this new evidence base has become even more compelling for policymakers given the growing awareness of associated economic, social, and cultural implications. A new Organisation for Economic Co-operation and Development (OECD; 2007) project, Understanding the Social Outcomes of Learning, has been established to develop systematic ways of measuring the impact of education on health and social cohesion. The findings of a wide range of research and development about teaching demonstrate ways of strengthening social cohesion among diverse student populations while also supporting better academic outcomes (Alton-Lee, 2003). Examples include effective uses of structured cooperative groups; reciprocal learning; performing arts; pedagogies that interweave care, respect for cultural identity, and academic challenge; and other approaches that support students to manage conflict productively, optimize peer supports for learning, exercise interpersonal respect, and build learning community (E. Cohen, 1994; Colwell, 1999; Hohepa, Hingaroa Smith, Tuhiwai Smith, & McNaughton, 1992; Palincsar & Brown, 1984).

The case has also been made for a relationship between academic outcomes from schooling and economic growth. Hanushek's (2005) policy brief for the International Academy of Education reports, "One standard deviation on test performance (international mathematics and science tests) was related to one percent difference in annual growth rates of per capita GDP" (p. 4). He concluded, "Governmental investments should focus on school quality because they have such powerful economic impacts. . . . The most likely way to improve student performance is to improve the quality of teachers" (pp. 9, 14).

By 2005, the growing international agreement about the new evidence base informed the landmark OECD (2005b) report, "Teaching Matters." In the influential OECD (2005a) "Indicators Report," the new policy importance of both pedagogy and professional development were highlighted: "At the level of the education system, professional development of teachers is a key policy lever" (p. 20).

EVIDENCE-BASED POLICY AND TEACHER KNOWLEDGE

Ironically, as the importance of teaching and teacher knowledge gained a much stronger profile with policymakers, research on teaching was not appearing to offer a sufficiently helpful knowledge base for practitioners. The editor of the *Handbook of Research on Teaching* (4th ed.), Virginia Richardson (2001), provided a challenging commentary on the state of the field and suggested a need for researchers to move beyond radical methodological swings and attend to the importance of teaching action and questions of practitioners. Recent American Educational Research Association (AERA) meeting themes have been sensitive to heightened media and political concern about public-good interests of expenditure on research. In addition, concerns about the

state of knowledge with regard to the effectiveness of both initial teacher education and professional development has been a prominent theme in recent publications by the AERA, the U.S. National Academy of Education, and the National Research Council (Bransford, Brown, & Cocking, 2000; Cochran-Smith & Zeichner, 2005; Darling-Hammond & Bransford, 2005; Hammerness et al., 2005). Although Hanushek (2005), for example, headlined the importance of teacher quality, he rejected in-service teacher education as the key policy lever because "despite some success in general they (professional development programs) have been disappointing" (p. 19), and "existing evidence on in-service programs gives insufficient means for selecting a program that is likely to yield significant gains in teaching performance" (p. 19).

One research approach designed to address this problem of limited impact has been to evaluate interventions for the magnitude and consistency of their influence on outcomes. The Institute of Educational Sciences in the United States designed the What Works Clearinghouse (WWC), funded since 2001 "to provide educators, policymakers, researchers, and the public with a central and trusted source of scientific evidence on what works in education" (Boruch & Herman, in press). The emphasis is on scientific standards for randomized trials and quasiexperimental design of interventions. The reports available to teachers on such topics as beginning reading or mathematics provide evidence about specific packages or commercial programs.

Another approach has been to bring together rigorous reviews of disparate evidence about what works around a theme of importance for teachers, educational leaders, and policymakers. The Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI) began at the University of London in 1993 "with the aim of developing and promoting participatory and user-friendly systematic reviews addressing important questions in policy, practice and research in the public interest" (Gough, 2007; Oakley, Moore, Burford, Fahrenwald, & Woodward, 2005). The EPPI and its linked enterprise, the Centre for Research Evidence in Education (CUREE), increasingly seek to involve practitioners, including teachers, and use their questions in knowledge development. An influential contributor to the English approach to systematic review has been Pawson (2002), whose advocacy of realist synthesis has emphasized the importance of theory development to explain particular findings to inform their use and adaptation in different contexts.

A more sustained approach has been explained by Niemi (2007; personal communication, July 2006), who attributes the world-leading Finnish performance in the first two Programme for International Student Assessment (PISA) surveys to a 40-year policy to enhance equity and quality through the use of research evidence. She cites the decision to raise primary school teacher education to master's level (including the requirement that preservice students understand and engage with research activity), the discontinuation of streaming, and the orientation of the educational research sector to the improvement of education as examples of a tradition of primacy afforded to the use of research evidence in informing teaching and educational policy in Finland.

The most systemic new approach to evidence-based policy focused on teaching is the multidisciplinary, multilevel, and longitudinal approach adopted in Singapore. In 2002,

S\$48 million was set aside to establish the Centre for Research on Pedagogy and Practice (CRPP) in Singapore, "a comprehensive research programme that would provide the evidence for evaluating reforms to date and enable the Singapore Ministry of Education to plan medium and long-term policy interventions" (Luke & Hogan, 2006, p. 176). The goal is "education policy that attempts to steer . . . [from] a multilayered empirical data base on teachers' and students' work, everyday lives and interaction in classrooms" (p. 178). The emerging evidence from this investment in research and development is becoming not only a Singaporean but also a global resource for knowledge about teaching and teacher learning.

THE ITERATIVE BES PROGRAMME

In New Zealand, an alternative approach to those identified in the previous section has been adopted. This approach has involved collaborative knowledge building across policy, research, and practice by identifying and building the evidence around the kinds of influences that have impacts on valued outcomes for diverse learners. Within this program, the series of syntheses on the major influences on student outcomes is being progressively developed (Aitken & Sinnema, in press; Alton-Lee, 2003; Anthony & Walshaw, 2007; Biddulph et al., 2003; Farquhar, 2003; Mitchell & Cubey, 2003; Robinson, Hohepa, & Lloyd, in press; Timperley, Wilson, Barrar, & Fung, in press). The wider program draws on a multidisciplinary evidence base, and the syntheses emerging from it have been funded by government to inform educational policy.

The syntheses selectively filter evidence from research and development linked to valued learner outcomes from international and New Zealand research. These outcomes and what has contributed to them have become the touchstone for reframing knowledge. Many researchers and teachers have engaged in educational research and development with remarkable impacts on these outcomes. With rare exceptions, however, such knowledge has been transitory, likely to be named as the work of researchers rather than teachers, inaccessible to other teachers, siloed in academic subdisciplines, and lost amid a plethora of fads or low priority within academic hierarchies of knowledge and reward systems. The BES iterations bring this valuable resource together while excluding studies without an outcomes link.

The initial BES iterations were published in 2003. The approach informed national guidelines (Alton-Lee, 2004) for subsequent BES development. The guidelines were developed in consultation with three national advisory groups in New Zealand. The approach is rigorously eclectic, gives particular weight to local context, uses effect sizes or other ways of evaluating the comparative magnitude of impact, and involves a realist synthesis approach that foregrounds theoretical coherence. Unlike the work of EPPI or WWC, BES requires the use of vignette and case to exemplify the findings in ways that are useful for practitioner users of the BES, whether teachers, teacher educators, or educational leaders. The integral role of practitioners and other users in the process of BES development is taken up later in this chapter.

FOREGROUNDING A RESPONSIVENESS-
TO-DIVERSITY FRAMEWORK

There are new challenges for education systems in knowledge societies. It is no longer sufficient for education systems to follow Plato's myth and sort learners into those who pass and those who fail. There are moral, economic, social, equity, and practical cases that can be made for this position. Some of the most effective professional development identified in our synthesis results in more than 3 times the expected gain over the same time period for students who do not typically achieve well (English & Bareta, 2006; Parr, Timperley, Reddish, Jesson, & Adams, 2006). Even Plato's "iron" craftsmen would need the capabilities of philosopher kings to negotiate the challenges of technology in many societies in today's world. From a policy perspective, the economic arguments can be most persuasive; however, rapidly changing demographics, and the wider benefits for all of social cohesion, are also compelling for policymakers. Others point out that we should be considering all of these arguments simultaneously. McNulty and Daggett (2007), from the International Center for Leadership in Education, argue that the four megatrends of global, demographic, technological, and cultural issues "facing America today cannot be ignored. The factors described above give credence and forewarning to a quietly approaching perfect storm" (p. 8). Governments across the globe are looking to education systems to rise to the challenge to be more responsive to the diversity of their learners and to meet the higher expectations and future focus required by knowledge societies (Froumin, 2007).

The PISA studies show marked differences among education systems in how well 15-year-old students are able to apply their learning in mathematics, science, and reading literacy (OECD, 2001; 2005a). They also show marked differences in disparities between groups of students within countries. New Zealand, for example, has high mean scores, performing in the second-highest band of countries across the PISA studies. But New Zealand's results show relatively high disparities in achievement, particularly in reading literacy, that are stratified by comparison with most OECD countries. Despite high achievement by many Maori and Pasifika learners, there is a pattern of poor outcomes, particularly for Maori who have been underserved in New Zealand schooling. As in many other Western countries, it is these groups that show rapidly growing demographic profiles, highlighting the urgency for systems to become more responsive to all learners.

Because the context for this work is New Zealand, all BES developments are informed by, and inform, educational practice in both Maori and English-medium education. Maori have a treaty relationship with the Crown that protects Te Reo (Maori language) and *tikanga Maori* (Maori culture) and guarantees Maori the same educational opportunities as non-Maori. However, the published BES iterations provide substantial evidence across some decades of inequitable teaching of Maori learners: fewer teacher–student interactions, less positive feedback, underassessment of capability, mispronounced names, and so on (Benton, 1986; Carkeek, Davies, & Irwin, 1994; Cazden, 1990; Clay, 1985; Millward, Neal, Kofoed, Parr, Kuin Lai, & Robinson, 2001; St. George, 1983; Thomas, 1984). Although Maori-medium

education has been only a very recent system provision in New Zealand, and despite resourcing challenges in a language revitalization context, early cohorts of students emerging from continuous Maori-medium education have performed more highly than Maori students in English-medium contexts (Murray, 2006).

For many countries, population projections show increasing diversity by ethnicity and multiple cultural heritages. Over and above cultural heritage, classrooms and other educational groupings of students are always characterized by diversity or heterogeneity to some extent. Diversity is a feature of the varied experiences the students bring to their learning of particular topics and their previous achievement levels in relation to the topic or skill area, whether high, average, low, or gifted. What students bring to the classroom is in turn influenced by their gender, families, and wider affiliations and heritages and the extent to which these become resources for their in-school learning. There are substantial numbers of reports in the research literature that show aspects of learner identity and background to be integral to educational achievement or failure, particularly when there are cultural mismatches between home and school (e.g., Alton-Lee, 2003; Beecher & Arthur, 2001; Dilworth & Brown, 2001; Heath, 1982, 1993; McNaughton, 2002; Moll, 2001; Nuthall, 1999; G. Phillips, McNaughton, & MacDonald, 2004).

Difference is salient in education, albeit in complex and context-specific ways. Our approach is to put difference at the center of our knowledge-building work through a responsiveness-to-diversity framework. Because difference is a characteristic that all learners share, the approach allows for a "universalising discourse of difference" (Britzman, 1995; Town, 1998) as a way of moving forward. This approach moves away from "norm" and "other" distinctions that have constrained mainstream educational thinking to focus on the homogeneous and the "mean" and seeks to strengthen our evidence base about what works for all learners. The approach does not downplay, but rather requires, ongoing and systematic attention to groups of learners who are being disadvantaged or underserved for equity purposes, without stereotyping individual students in ways that fail to reflect the complexity of individual identity.

The daily and complex challenge for teachers is that they need to be working effectively and simultaneously with diverse students. This is where the evidence can be particularly helpful, because it identifies evidence-based strategies and approaches that have enabled teachers to be effective with all students in their classes.

THE LINK TO VALUED LEARNER OUTCOMES AS A TOUCHSTONE

In taking an outcomes-linked approach, the BES attends to a range of desired outcomes, including academic, social, well-being, learning, metacognitive, identity, and other outcomes valued by communities, including those from indigenous communities. The search strategy for each BES actively attends to seeking research for a range of outcomes so that the knowledge generated does not unduly focus on only a narrow band of achievement. The approach recognizes that in a democracy, desired outcomes from an education system are and should be subject to a contested and evolving discourse about what parents and wider communities want for all our learners.

Part of the rationale for the incontrovertible concern with impacts on diverse learners is the compelling evidence across studies that well-intentioned, caring, and experienced teachers and teacher educators can unknowingly teach in ways that have impacts counter to their own goals. Bossert (1979), for example, revealed ways in which teacher management of tasks and interactions with students created negative impacts on peer relationships and social outcomes.

W. Doyle (1983) revealed how well-meaning teacher strategies to make learning safer undermined the intellectual demands of tasks and could heighten rather than lessen the risk of failure. Emerging work at Newcastle in Australia is indicating that when teachers pay attention to cultural relevance, scaffolding, and intellectual quality in task construction, Aboriginal and Torres Strait Islanders can achieve comparably with non-Aboriginal students; but they found also a pattern where well-intentioned Australian teachers attempted cultural relevance without attending also to the intellectual quality of tasks, inadvertently undermining these students' achievement (Amosa, Ladwig, Griffiths, & Gore, 2007; Gore, Ladwig, Griffiths, & Amosa, 2007).

The concern for impact on outcomes is similarly critical for well-intentioned policy settings and initiatives that can also have impacts counter to their goals and do harm—for example, policy initiatives related to drug education that inadvertently exacerbate rather than combat illegal drug use (Biddulph et al., 2003).

An outcomes-linked approach can reveal which widely used educational practices can have little or even negative impacts particularly on those students traditionally underserved in schooling. A report by the New Zealand Education Review Office (2003), for example, showed that the learning styles inventory matching approach is widely used in New Zealand (as a result of a wave of professional development). This approach has been found to be problematic in international reviews of effectiveness (e.g., Irvine & York, 1995) and linked to less effective instructional experiences for Maori and Pasifika than for other learners in junior-class mathematics in New Zealand (Higgins, 2001). In this latter study, Maori and Pasifika learners were classified as kinaesthetic learners and encouraged to work with blocks, whereas other learners focused on metacognitive strategies, for which there is, by contrast, evidence of positive links to higher achievement (e.g., Cardelle-Elawar, 1995; Marzano, Pickering, & Pollock, 2001).

Attending to the link to outcomes is important for another reason. As Nuthall (2004) explained,

The professional knowledge base that is most needed to improve the quality of teaching and teacher education is knowledge about the ways in which classroom activities, including teaching, affect the changes taking place in the minds of students. . . . At the heart of the problem teachers face in the classroom is knowing what is going on in the minds of the students. . . . This is not all that teachers need to know, but it is at the core of what they need to know and what should be included in teacher education and professional development programs. (p. 295)

This poses a problem for teachers and researchers because what is going on in a child's mind is essentially unobservable, and many of the clues teachers take to be

signals of what is occurring in students' minds are unreliable or even misleading. Unless teachers are aware of the links between pedagogy and students' learning processes, teaching can bring about student "learning" that is counter to curriculum goals. For example, in one study, despite the teacher's intentions, students became less concerned, rather than more concerned, about the plight of endangered animals (Alton-Lee, 1983, 1984). Having learned that milk comes from cows, wool from sheep, and so on, the children's patterned schema for learning about animals as being for human use and consumption was inadvertently activated and prevailed. The proactive inhibition caused by the children's learned schema became evident when most of the class wrote they were concerned that if elephants died out, their skins would not be available for clothing.

In another study tracing the link between teacher intentions and student learning, the teacher concerned explained how, despite his best intentions, he unknowingly triggered and exacerbated peer racism in a social studies unit designed to increase tolerance of cultural differences (Alton-Lee, Nuthall, & Patrick, 1993). The teacher used New York City as a learning context. Data gathered using broadcast microphones revealed that the New Zealand teacher's unconscious identification with the European settlers in New York effected (Maori) Ricky's exclusion from the European *we* in the enacted curriculum. Ricky's peer, Joe (European heritage), picked on the exclusion and exploited it as an opportunity to engage in racist abuse and kicking. It was Ricky, however, and not Joe, whom the teacher admonished for causing a disturbance through misbehavior:

> Teacher: Because White people . . .
> Joe (talking to Ricky): Honkies.
> Ricky (talking to Joe): Shut up!
> Teacher: Europeans, we were . . .
> Joe (talking to Ricky): Nigger!
> Teacher: Watch this way please, Ricky!—were often wanting to get things . . .
> Joe (talking to Ricky): Black man! Samoan!
>
> <div align="right">(Alton-Lee, Nuthall, & Patrick, 1993, p. 77)</div>

Joe went on to kick Ricky, but it was Ricky who was again reprimanded and later excluded from class lessons for disruptive behavior. What was evident in the transcripts, however, was that the teacher's inadvertent exclusion of Ricky from the *we* of the classroom community *we, Europeans* was the trigger for verbal and physical abuse that Ricky experienced from, and then directed back at, his classmates. Furthermore, our quantitative analyses showed a negative relationship between long-term learning outcomes and racial abuse for both the givers and the receivers of the abuse (Alton-Lee & Nuthall, 1990). John Patrick, the teacher, explained that these research findings were

heart-rending because I would have liked to have thought that I was tuned in to what was happening in the class . . . I just didn't know . . . Prior to doing this research I would've said "Yes, you know, I'm fully

aware of these things. It comes as a real blow to find that in actual fact you're not necessarily doing things that are line with what you believe. I believe that (the outcomes) are extremely positive because they've increased my level of awareness. They've altered my action . . . It's altered the things that I think are important when I'm devising a curriculum . . . It's altered the way I treat other people too. (Alton-Lee et al., 1993, p. 80)

Such findings of social studies inadvertently occasioning or exacerbating racism have also been identified in Seixas' (2001) review. These kinds of findings provided the background for the motivation to identify what kinds of professional learning and development situations are most effective in promoting teacher learning in ways that promote student learning. When undertaking this search, it became apparent that counterproductive outcomes were not restricted to classroom teaching. Some professional development interventions also resulted in lowered student achievement and social outcomes (Timperley et al., in press). The remainder of this chapter, therefore, describes the theoretical and methodological approach together with the results of this BES iteration of professional learning and development (Timperley et al., in press).

THEORETICAL UNDERPINNINGS OF THE SYNTHESIS

The kinds of learning opportunities provided to teachers depend to a large extent on what providers believe the purpose of education to be. If, as proposed by Plato (1968 trans.), it should be a sorting process, then very different professional learning opportunities are likely to be provided than in those situations concerned about social justice for all students. Many professional development approaches appear to be based on the teacher-as-good-employee view in that they have assumed teachers can learn and implement what they need to know in relatively short bursts of delivered knowledge from those with superior expertise. The National Staff Development Council (2001), for example, documented the predominance of single-day workshops for teachers in the United States. Sparks (2004) highlighted in the *Handbook of Research on Raising Student Achievement* how such workshops typically delivered the wisdom of administrators and others' expertise to teachers, not necessarily in ways that interested them.

For far too many teachers in the United States, staff development is a demeaning, mind numbing experience as they passively "sit and get." That staff development is often mandatory in nature . . . and evaluated by "happiness scales." As one observer put it, "I hope I die during an in-service session because the transition between life and death would be so subtle." (p. 247)

Others who have come from an assumption that goals of social equity cannot be met by this kind of approach have advocated for developing greater professionalism among teachers rather than treating them as technicians whose responsibility it is to implement others' prescriptions of practice (Cochrane-Smith & Lytle, 1999). The desired impact on student outcomes as a result of teacher engagement in these kinds of opportunities to learn, however, were usually assumed rather than verified empirically. More recently, questions have been raised about whether promoting this kind

of teacher learning really does have the desired impact, with an increasing number of researchers advocating that the links need to be tested rather than assumed. Typical of these calls is one by Camburn (1997), who reminds us, "Our public school system is ultimately in the business of educating students not teachers" (p. 60). Guskey (2000) gave considerable impetus to this focus on students in his five-stage evaluation model, which moved beyond teachers' reactions, self-identified learning, and changes in behavior to judging effectiveness in terms of its impact on student learning outcomes. The empirical evidence about what teachers needed to know and the conditions under which they learned best, however, inevitably lagged behind these researchers' advocacy for taking them into account.

To identify the kinds of teacher knowledge that were associated with improved student outcomes and the conditions under which it was best acquired, the BES on teacher professional learning and development justified all its conclusions in relation to the evidence of the impact on valued outcomes for diverse student learners. Given the relative strength of the theoretical compared to the empirical literature, we developed an approach that drew on these strengths while at the same time tested their premises. In undertaking this task, our first challenge was to understand the process of influence, beginning with the professional learning opportunities for teachers and progressing to outcomes for students. Much has been written about the "black box" between acts of teaching and student outcomes (Black & Wiliam, 1998) because there is no direct relationship between a particular act of teaching and what students learn. How students interpret and use the opportunities to learn particular understandings and skills depends on a number of other influences, such as their prior learning, the conceptual and social resources they bring to the task, and their cultural heritage. Both the theoretical and empirical developments in this field, however, are making progress in unpicking this black box for a range of outcomes (e.g., Aitken & Sinnema, in press; Alton-Lee, 2003; Anthony & Walshaw, 2007; Brophy, 2001; Evertson & Weinstein, 2006; Luke & Hogan, 2006; Rex, Green, & Dixon, 1997).

In the professional learning situation, a second black box is added to the sequence, that between professional learning opportunities and outcomes for teachers and is depicted in Figure 1. How teachers interpret and use the available understandings and skills is also a complex process. Teachers, like their students, have prior learning experiences and bring different conceptual and social resources that are influenced by their cultural heritages to the learning experience. To make a difference to their students' learning, however, we have assumed that the content of what teachers learned needed to result in some changes in their practice, because it is teaching practice that influences the learning opportunities for students.

This very basic conceptual model was then unpacked further by analyzing both the theoretical and empirical literature to identify the aspects of teacher learning and development that were purported to make a difference to outcomes for diverse student learners. Eighty-four separate characteristics were developed into a multidisciplinary theoretical map, identified in Figure 2. The basic premises of this framework
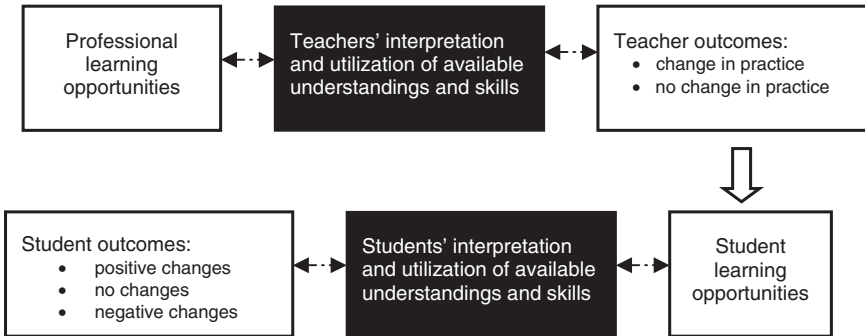
FIGURE 1 The Black Boxes of Teacher and Student Learning

was discussed and shaped by a collaboration between the authors, the national providers of teacher education, the teacher unions, and policy representatives. Our aim was to use this theoretical map to identify from the empirical literature what kinds of teacher knowledge, and the conditions under which it was developed, promoted the learning processes that enabled teachers to change their practice in ways that had a positive impact on student outcomes.

All categories identified in the framework were given equal attention in terms of coding the empirical literature. There were two, however, that discriminated those conditions that were associated with better outcomes for students. These were the content of the professional learning opportunities and the learning processes engaged. For this reason, and those of space, we will elaborate on only these two categories.

Framework Analysis 1: The Content of Professional Learning Opportunities

Given the focus of this chapter on the content of professional knowledge that makes a difference, we have further unpacked this particular part of Figure 2. The first two attributes constituted discipline and curriculum knowledge. There is considerable debate about the relationship between these two kinds of knowledge, with the recognition that curricula are typically structured around discipline knowledge bases but that their content is different. The subject matter of the discipline is transformed into the subject matter of school subjects at particular grade levels to form the curriculum (C. S. Doyle, 1992). In our analysis of the content of the professional learning opportunities, therefore, we distinguished between discipline and curriculum knowledge.

Shulman (1986, 1987) argued for specialized subject matter for teachers comprising pedagogical content knowledge that enabled teachers "to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by students" (Shulman, 1987, p. 15). We adopted Shulman's definition and had as our third attribute pedagogical content knowledge. To qualify for this category, however, the professional
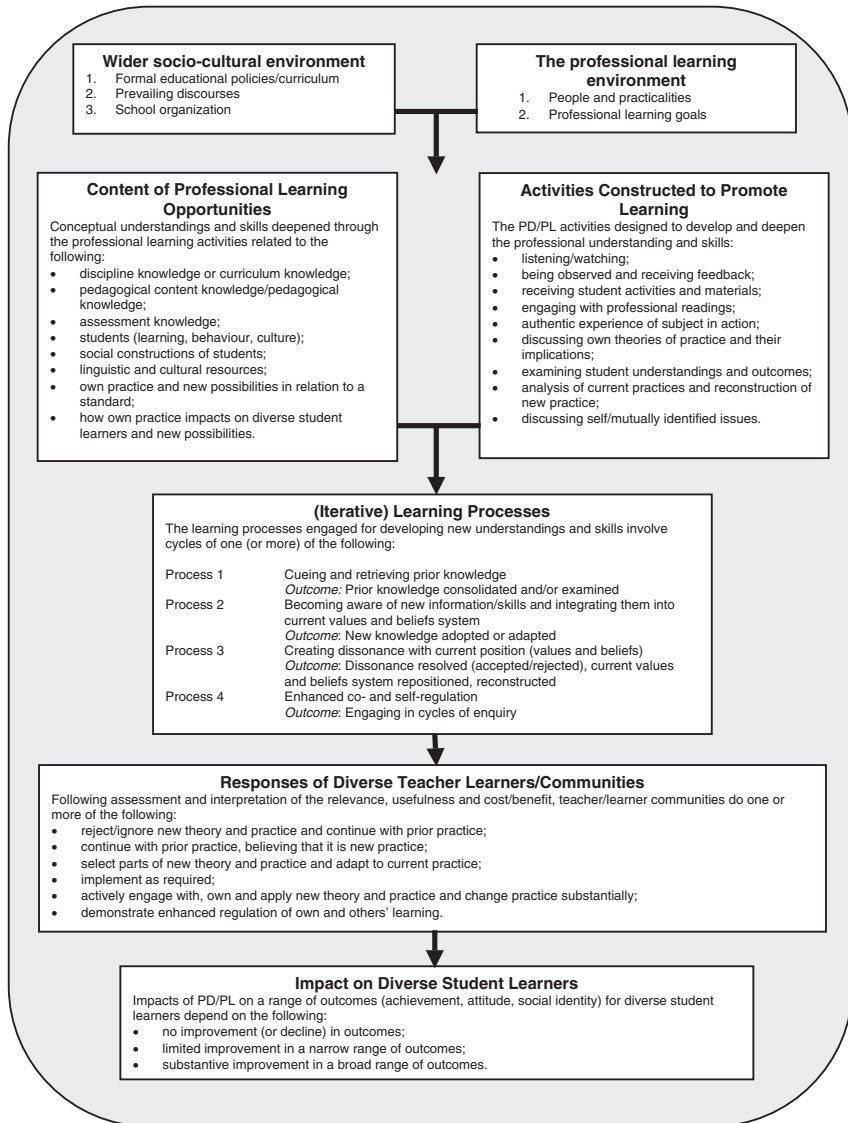
Wider socio-cultural environment
1.   Formal educational policies/curriculum
2.   Prevailing discourses
3.   School organization

The professional learning environment
1.   People and practicalities
2.   Professional learning goals

Content of Professional Learning Opportunities
Conceptual understandings and skills deepened through the professional learning activities related to the following:

*   discipline knowledge or curriculum knowledge;
*   pedagogical content knowledge/pedagogical knowledge;
*   assessment knowledge;
*   students (learning, behaviour, culture);
*   social constructions of students;
*   linguistic and cultural resources;
*   own practice and new possibilities in relation to a standard;
*   how own practice impacts on diverse student learners and new possibilities.

Activities Constructed to Promote Learning
The PD/PL activities designed to develop and deepen the professional understanding and skills:

*   listening/watching;
*   being observed and receiving feedback;
*   receiving student activities and materials;
*   engaging with professional readings;
*   authentic experience of subject in action;
*   discussing own theories of practice and their implications;
*   examining student understandings and outcomes;
*   analysis of current practices and reconstruction of new practice;
*   discussing self/mutually identified issues.

(Iterative) Learning Processes
The learning processes engaged for developing new understandings and skills involve cycles of one (or more) of the following:

Process 1   Cueing and retrieving prior knowledge
          Outcome: Prior knowledge consolidated and/or examined
Process 2   Becoming aware of new information/skills and integrating them into current values and beliefs system
          Outcome: New knowledge adopted or adapted
Process 3   Creating dissonance with current position (values and beliefs)
          Outcome: Dissonance resolved (accepted/rejected), current values and beliefs system repositioned, reconstructed
Process 4   Enhanced co- and self-regulation
          Outcome: Engaging in cycles of enquiry

Responses of Diverse Teacher Learners/Communities
Following assessment and interpretation of the relevance, usefulness and cost/benefit, teacher/learner communities do one or more of the following:

*   reject/ignore new theory and practice and continue with prior practice;
*   continue with prior practice, believing that it is new practice;
*   select parts of new theory and practice and adapt to current practice;
*   implement as required;
*   actively engage with, own and apply new theory and practice and change practice substantially;
*   demonstrate enhanced regulation of own and others' learning.

Impact on Diverse Student Learners
Impacts of PD/PL on a range of outcomes (achievement, attitude, social identity) for diverse student learners depend on the following:

*   no improvement (or decline) in outcomes;
*   limited improvement in a narrow range of outcomes;
*   substantive improvement in a broad range of outcomes.

FIGURE 2   Framework for the Analysis of the Effectiveness of Professional Learning Experiences

Note. PD/PL = professional development/professional learning.

learning opportunities needed to combine a deepening of curriculum content knowledge with particular teaching approaches. Pedagogical content knowledge was distinguished from the fourth category of pedagogical knowledge and practice, which

focused on new approaches to teaching alone and did not attempt to deepen curriculum knowledge. This distinction proved to be important for some curriculum areas.

A fifth area of knowledge was that of assessment of student learning. Our reason for its inclusion is that the burgeoning international literature on formative assessment (Black & Wiliam, 1998; Earl & Katz, 2006) convincingly demonstrates that developing teachers' knowledge of how to investigate students' current understandings for the purpose of identifying what needs to be taught next can have a powerful impact on student learning.

The sixth attribute to which we attended focused on improving teachers' knowledge of students in a more generic sense, including their development, their learning, their behavior, and their cultural backgrounds. A related, seventh attribute was teachers' social construction of the students they taught. In this category, we included attributes such as the ways in which teachers' expectations of students affected student learning, because there is a developing acknowledgement of the impact of such expectations on outcomes for students, particularly for those with backgrounds and experiences different from their teachers' (Reyes, Scribner, & Scribner, 1999; Reynolds & Teddlie, 2000).

Linguistic and cultural resources formed the eighth attribute and arose from consulting the literature on education in indigenous communities (Bishop & Glynn, 1998; Smith, 1999). The process of colonization and language loss has led, in many cases, to the need for teachers in these communities to develop this kind of knowledge to connect with and promote the development of particular cultural understandings for their students. Threats to these understandings have been particularly pronounced when Western concepts for which there are no direct indigenous equivalents need to be incorporated into the curriculum for students from indigenous communities (Trinick, 2005).

The next two attributes of the content of the professional learning opportunities had a different orientation in that they focused on developing teachers' understanding of current practice and new possibilities in relation to some external criterion. The ninth attribute examined whether the professional learning opportunities focused on an analysis of current practice and new possibilities in relation to a particular standard of practice, for example, professional standards. The tenth examined how teachers' current practice affected diverse student learners and new possibilities for this relationship and impact. These two attributes were based on the literature related to the place of teachers' current theories of practice in engaging with, overassimilating, or rejecting new theories of practice (Hammerness et al., 2005; Robinson, 1993). The reason for these varying reactions reflects both the differences between teachers as learners and the complexities of teaching itself (Kennedy, 1999). Making sense of change messages is a complex process involving interactions between an individual's existing cognitive structures (knowledge, beliefs, and attitudes), the situation in which they practice, and the providers' messages (Putman & Borko, 2000; Spillane, Reiser, & Reimer, 2002). Decontextualized messages about how to teach in new ways do not take this interplay of influences into account. When analyzing these

empirical studies and deciding on whether these attributes formed part of the professional learning opportunities, we noted the extent to which teachers were assisted to understand their personal theories underpinning their current practice and how the new possibilities for practice related to or challenged those theories.

When coding the presence or absence of any of these attributes in the analysis of the empirical studies, we simultaneously considered the depth to which the particular content was addressed. Was the curriculum content unpacked at a deep level of theoretical understanding, or was an approach more consistent with one of "curriculum coverage" adopted? Did teachers understand the curriculum theory underpinning a particular assessment tool, or was the professional learning focused on procedures and categorizing students by test scores? Was the analysis of the impact of current practice on student learning undertaken through testing a range of competing theories, or was it a more superficial analysis?

Framework Analysis 2: Learning Processes

The other categories in Figure 2 (wider social and professional learning contexts and activities in which teachers engaged) were deconstructed in a similar way, but the only other part of the figure that we will unpack further is that relating to learning processes because of the influence they had on student outcomes. The knowledge and skills teachers acquired through participating in the professional learning experience and the learning processes engaged provided the strongest explanations for differential impact on students.

When identifying the learning processes, we accepted Bransford et al.'s (2000) argument that adult learning is fundamentally similar to that of students. In assuming this similarity, we did not intend to discount the obvious differences between adult and student learning situations, such as the richer life experiences on which adults draw, the learning contexts in which they occur, and the greater demand adults place on the relevance of learning to engage. We identified four learning processes to explain particular outcomes. The first process involved cueing and retrieving prior knowledge with the outcome of consolidating it or, alternatively, examining it for its adequacy. It was assumed that cueing prior knowledge on its own was unlikely to result in changed practice, but if it resulted in examination of its adequacy then this could form the basis for change.

The second process involved becoming aware of new information or skills and integrating them into current values and belief systems, with the outcome that new knowledge is adopted or adapted. This process could involve a very superficial level of acquisition of new knowledge or much deeper learning. Most professional development situations described in the empirical literature appeared to be based on the idea that teachers needed to learn "new things" rather than to examine how these new things related to existing knowledge. The problem of overassimilation (Hammerness et al., 2005), where teachers believe they are enacting new practice but represent this practice in only superficial ways, however, is well documented (e.g., Firestone, Schorr, & Monfils, 2004; Spillane, 2000).

The third process involved creating dissonance with current beliefs, attitudes, or knowledge of effective practice. Some authors advocate that such dissonance is a requirement of substantive change, because to realize any proposed reform, teachers will have to unlearn much of what they believe, know, and know how to do (Ball, 1988), but it also runs the risk of rejection of key messages if teachers dismiss new possibilities as impossible in their situation (Coburn, 2001). Resolution of dissonance may, therefore, involve current values, beliefs, and knowledge as reconstructed in ways consistent with the change messages. Alternatively, they may be rejected altogether.

The final process was based on the literature of co- and self-regulation (Butler & Winne, 1995) and examined the extent to which the professional learning opportunities promoted processes of inquiry into the adequacy and improvement of teaching practice. Although there are many theoretical approaches to self-regulation (Zimmerman, 2001), we adopted a position consistent with that of Butler and Winne (1995), in which self-regulated learners are those who "judge performance relative to goals, generate internal feedback about amounts and rates of progress towards goals, and adjust further action based on that feedback" (p. 258). It is, in their view, a deliberate, judgmental, adaptive process. However, we have adapted this original conception of self-regulation to include co-regulation to acknowledge the importance of the social situatedness of learning (Putman & Borko, 2000) and that developing collective responsibility for these self-regulatory processes is more powerful in promoting positive student outcomes than leaving that responsibility to individuals alone (Newmann, 1994). This concept is similar to that of Cochran-Smith and Lytle (1999), who argue for the value of teachers' adopting a deliberate inquiry stance in relation to their own practice where they treat their own work as sites for systematic and intentional inquiry.

MAPPING THE EVIDENCE

All the components of Figure 2 formed a theoretical map against which the empirical studies were analyzed. Each attribute in every category was treated as neutral with regard to its impact on teachers or students until it was tested against the empirical evidence. To do this, a search of the international literature was undertaken using an iterative and "knowledgeable search" (Alton-Lee, 2004) strategy using electronic database searches, hand searches of relevant journals, relevant handbooks, and a network of informants to identify those studies of teacher professional learning and development that reported student outcomes. The application of standard methodological criteria identified 72 individual and groups of related studies of independent interventions with a total of 227 effects (J. Cohen, 1988) that reported quantitative outcomes (46 from the United States, 4 from the United Kingdom, 16 from New Zealand, and 7 from other countries). Effect sizes were not all able to be computed using J. Cohen's (1988) formula, because results were reported in the form of *t* tests, *f* values, *r* coefficients, proportions, and normal curve equivalents, so alternative formulas were used to calculate effect sizes in these cases (Hattie, 1990, 1992; Lipsey & Wilson, 1993; Tallmadge, 1977). Given the substantial difficulties in developing equivalence in effect sizes, they were treated categorically and were not

ranked, as is common in a meta-analytical approach. In addition, qualitative studies that met appropriate standards of methodological adequacy were included in the analysis. Some studies providing rich descriptions of the professional learning opportunities but reporting no change in practice by the participating teachers were also used as contrasting examples, because it was assumed that these interventions were unlikely to result in changed outcomes for students.

Our reporting of this list so clinically belies the complexity of the task of locating studies in which the student outcomes could be attributed to teachers' professional learning experiences with some level of confidence. Typically, authors reported details of the professional development with no reference to outcomes, or they reported student outcomes providing only sketchy details of the teachers' learning opportunities. In many cases, we had to refer to groups of linked studies to obtain an accurate picture. It is also probably true that teachers learn a great deal in undocumented after-school meetings and in interaction with their colleagues. This learning is more incremental, with its impact rarely measured.

The reported attributes of the professional development in all studies were then mapped onto the theoretical framework summarized in Figure 2 to identify what kinds of teacher knowledge and the circumstances under which it was acquired were associated with benefits to students.

THE IMPACT OF PROFESSIONAL LEARNING AND DEVELOPMENT ON STUDENT OUTCOMES

From the set of studies analyzed, it appeared that teachers' professional learning opportunities were associated with mostly positive, but at times variable, outcomes for students. A summary of the range and mean effect sizes for all effects are presented in Table 1 (Timperley et al., in press). As can be seen from this table, most categories included some negative effects as well as very positive effects. Academic outcomes had higher means than personal or social outcomes. The high mean effect sizes for literacy were influenced by the inclusion of several studies focused on students with special learning needs whose low starting points resulted in very high effects. In science, the effects were influenced by the large number of studies that used researcher-developed rather than standardized assessments. Not surprising, those studies that used control groups had lower effects than those using within-group comparisons, particularly when objectively scored, standardized instruments were used.

In the remainder of this section, we will briefly describe the situations that were least effective, then report in more detail on those situations that were more effective, with the main focus on what it is teachers need to learn and what learning processes need to be engaged to make a difference to student outcomes.

Characteristics of Professional Learning Opportunities Associated With Limited Impact on Student Outcomes

The circumstances of professional learning and development that appeared to be least effective fell at two extremes, both of which are portrayed as effective by some of

TABLE 1 The Range and Mean Effect Sizes for All Effects

	N	*M*	*SEM*	95% CI	Median	*SD*	Min	Max
Total	227	0.60	0.06	0.24	0.34	0.83	–1.01	5.31
Outcome				$F = 3.30; p = .001; \eta^2 = .13$				
Mathematics	62	0.50	0.12	0.48	0.31	0.94	–1.01	5.10
Reading	44	0.34	0.04	0.16	0.26	0.26	–0.01	1.11
Literacy and								
language skills	27	1.18	0.24	0.96	0.55	1.27	0.09	5.31
Attitudes toward								
Subject	21	0.34	0.21	0.84	0.11	0.95	–0.73	4.27
Science	18	0.94	0.19	0.76	0.68	0.80	0.16	2.85
Writing	16	0.88	0.11	0.44	1.06	0.45	0.06	1.34
Self-efficacy	11	0.17	0.06	0.24	0.11	0.21	–0.07	0.68
Other academic								
skills	10	0.76	0.18	0.72	0.55	0.57	0.22	2.09
Social outcomes	7	0.36	0.11	0.44	0.34	0.29	–0.11	0.86
Cognitive								
processing	6	0.85	0.18	0.72	0.87	0.44	0.17	1.46
Other personal								
outcomes	5	0.46	0.10	0.40	0.53	0.23	0.08	0.64
Class of outcome				$F = 3.25; p = .041; \eta^2 = .03$				
Academic	183	0.66	0.06	0.24	0.39	0.85	–1.01	5.31
Personal	37	0.30	0.12	0.48	0.12	0.73	–0.73	4.27
Social	7	0.36	0.11	0.44	0.34	0.29	–0.11	0.86
Grade level								
grouping (*n*)								
Elementary	172	0.61	0.07	0.28	0.34	0.90	–1.01	5.31
Junior high	23	0.36	0.06	0.24	0.27	0.30	0.05	1.27
Secondary	20	0.60	0.14	0.56	0.45	0.61	0.06	2.85
All	9	0.97	0.32	1.28	0.64	0.95	0.08	2.68
Country (*n*)								
United States	143	0.48	0.07	0.28	0.27	0.80	–1.01	5.10
New Zealand	68	0.87	0.11	0.44	0.53	0.90	–0.14	5.31
Canada	4	0.79	0.44	1.76	0.43	0.88	0.23	2.09
The Netherlands	4	0.48	0.22	0.88	0.36	0.44	0.09	1.12
United Kingdom	4	0.53	0.13	0.52	0.49	0.27	0.29	0.85
Israel	2	0.26	0.01	0.04	0.26	0.01	0.25	0.26
Other country	1	0.31	—	—	0.31	—	0.31	0.31

(continued)

TABLE 1 (continued)

	N	*M*	*SEM*	95% CI	Median	*SD*	Min	Max
Number of participants (*n*)								
<100	20	0.84	0.13	0.52	0.64	0.57	0.21	2.68
100–999	83	0.69	0.11	0.44	0.42	0.96	−0.73	5.10
>1,000	56	0.69	0.13	0.52	0.32	1.00	−0.03	5.31
Type of control	$F = 5.18$; $p = .02$; $\eta^2 = .02$							
Control	138	0.50	0.07	0.28	0.31	0.81	−1.01	5.10
Baseline	89	0.75	0.09	0.36	0.45	0.85	0.04	5.31
Type of instrumentation	$F = 18.76$; $p = .000$; $\eta^2 = .143$							
Objectively scored	119	0.40	0.05	0.20	0.28	0.51	−0.14	4.27
Researcher	80	0.62	0.10	0.40	0.38	0.92	−1.01	5.10
Verified judgment	28	1.39	0.22	0.88	1.27	1.15	0.16	5.31

Note. CI = confidence interval.

their advocates. The first is that teachers should be considered self-regulating professionals who, if given sufficient time and resources, are able to construct their own learning experiences and develop a more effective reality for their students through their collective expertise. Unfortunately, we found little evidence to support the claim that providing teachers with time and resources is effective in promoting professional learning in ways that have positive outcomes for students. Rather, the evidence pointed to the contrary (Lipman, 1997; Saxe, Gearhart, & Nasir, 2001; Timperley & Parr, 2006). Part of the reason for the failure of these kinds of situations to affect student outcomes arose because they typically did not develop teachers' current knowledge and practice or challenge problematic attitudes. Indeed, in some cases, they served to entrench discriminatory beliefs and practices (e.g., Lipman, 1997).

The alternative extreme occurred when outside experts developed recipes for teaching (typically based on research about what kinds of pedagogies work for improving student outcomes), then presented prescribed practices to teachers with an underpinning rationale and follow-up monitoring to ensure implementation integrity (e.g., Borman et al., 2005). The overall evidence is that these processes can be effective in changing teaching practices and have greater impact on student outcomes than the other extreme of leaving teachers to develop their own solutions, but it is either short-lived (Robbins & Wolfe, 1987; Stallings & Krasavage, 1986) or relatively limited compared to other kinds of professional development (Borman et al., 2005; Datnow, Borman, Stringfield, Overman, & Castellano, 2003). The main reason we propose for this finding is that experienced teachers do not approach professional learning or teaching situations as empty vessels but rather as people who have rich theories about how

students learn, how best to teach them, and what constitutes desired content and outcomes. Those who sought to build professional knowledge by prescribing particular teaching behaviors without engaging existing beliefs or understanding the constraints of their practice situation typically failed to take this complexity into account. In some cases, when teachers were closely observed to ensure implementation of particular teaching behaviors, student achievement improved, but once the monitoring was withdrawn, they reverted to previous practice with concomitant losses in student outcomes (Robbins & Wolfe, 1987; Stallings & Krasavage, 1986).

Characteristics of Professional Learning Opportunities Associated With Improved Outcomes for Diverse Learners

Those situations in which the greatest gains were evident in substantive rather than narrow curricula areas were those that sought to deepen teachers' foundation of pedagogical content and assessment knowledge within coherent conceptual frameworks that could then serve as the basis for decisions about practice. Similar patterns were evident in both the elementary and secondary schooling sectors. The synthesis identified that professional learning opportunities that focused on the acquisition of discrete pieces of knowledge independent of a more coherent theory were useful only for the development of discrete skills for students, such as phonemic awareness (Baker & Smith, 1999) or map-reading (Fishman, Marx, Best, & Tal, 2003), and not the more generic understandings, such as reading comprehension or mathematical understandings.

The reason for the integration of pedagogical content and assessment knowledge was that interpreting assessment information allowed teachers to understand in detail what their students knew already and what it was they needed to learn next. This knowledge of how and what to assess was not restricted to test results but included close observation of student learning, examination of student work, and student interviews. For example, in the studies involving cognitively guided instruction (CGI) in mathematics, Fennema, Franke, Carpenter, and Carey (1993) cited a teachers' response to the professional development:

"CGI is really strong and powerful for me because I can get a handle on all my children, from the lowest to the highest . . . I feel that I can know what they are doing and challenge them where they are and help them to feel successful where they are and where they get to." (Fennema et al., 1993, p. 580)

In some instances, more formal assessments played a key part in identifying what students knew and needed to learn. McNaughton, Lai, MacDonald, and Farry (2004), for example, used a reading assessment to assist teachers to understand the strategies used by their upper elementary students from low socioeconomic communities. They found in a cloze test, in which students were required to fill in missing words, the students were not using contextual information from the whole paragraph

to identify the correct word to insert into the spaces. They used the meaning of the sentence up to the point of the missing word but not beyond it. Classroom observations of teaching practice identified the teaching strategies that were contributing to the problem. Through a process of negotiating the meaning of both the observations and achievement data with the participating teachers, teaching approaches changed and the students' comprehension improved.

Knowing what students can or cannot do, however, served to shape teaching practice in ways that promoted deep student learning only if teachers had sufficient depth of pedagogical content knowledge on which to base teaching decisions. Otherwise, the learning analysis remained at a superficial level. In the above study by McNaughton et al. (2004), the researchers were able to assist the teachers to develop the necessary knowledge and teaching skills once the problem had been identified. In most of the studies with substantive effect sizes, there was an underlying assumption that students should be taught content at deep conceptual levels rather than more superficial factual-type knowledge. Indeed, in many of the mathematical and science studies, the shift from factual mastery to conceptual inquiry-based knowledge was particularly evident (see, e.g., Adey, 2004; Cardelle-Elawar, 1995; Carpenter, Fennema, Peterson, Chiang, & Loef, 1989; Cobb et al., 1991; Confrey, Castro-Filho, & Wilhelm, 2000; Fennema et al., 1993; Higgins, Irwin, Thomas, Trinick, & Young Loveridge, 2005; Kahle, Meece, & Scantlebury, 2000; McClain & Cobb, 2001; Palincsar, Magnusson, Marano, Ford, & Brown, 1998; Parke & Coble, 1997; Raghavan, Cohen-Regev, & Strobel, 2001; Saxe et al., 2001; Schorr, 2000; University of Hawaii Curriculum Research and Development Group, 2002; Wood & Sellers, 1996).

All studies with high effect sizes also focused on assisting teachers to translate the pedagogical and assessment knowledge into teaching practice, through coaching, workshops, and participation in communities with colleagues. This translation was not left to chance. With one exception (Bishop, Berryman, Powell, & Teddy, 2005), a focus on teaching practices without the accompanying curriculum content knowledge was less successful in achieving substantive student outcomes than those studies that combined both. The relatively low impact of these studies could be an artifact of the intervention approach of many of those studies focusing on teaching practice alone, because they typically involved experts' telling teachers how they should teach, followed by observations to ensure compliance (e.g., Stallings & Krasavage, 1986; Van Der Sijde, 1989). Bishop and colleagues (2005), on the other hand, worked with mainstream secondary school teachers in more collaborative ways to develop interactive and discursive relationships with students from New Zealand's indigenous Maori communities. A combination of 3 days of negotiating the meaning of students' reported reactions to particular teaching approaches, working with indigenous facilitators on how to teach in ways that the students had identified as effective, and follow-up school-based activities served to change teaching practices sufficiently to raise these students' outcomes in mathematics. The school-based activities involved observations and feedback together with participation in teacher

meetings that focused on both teaching practices and how these practices were affecting student outcomes.

INTEGRATING NEW KNOWLEDGE AND LEARNING PROCESSES

The acquisition of new pedagogical content and assessment knowledge in the majority of these studies, however, was not the whole picture, and it is here that we bring into consideration the interplay between developing knowledge and the learning processes that appeared to be engaged in most of the interventions. It needs to be stated that in most studies, we have inferred the learning processes from the descriptions provided because they were rarely addressed or described explicitly. In many of the effective interventions, there was a sense of purpose for engagement, typically through identifying a problem to be solved. For example, J. Phillips (2003) describes how the principal of a charter school with high average achievement challenged her teachers to address the learning needs of all their middle school students. She created the catalyst for their engagement by deconstructing students' achievement profiles by subgroups with the teachers. As a result of this process, they could not escape the conclusion that the very low achievement of their local students was masked by the high achievement of students from out of the area. The principal worked with the teachers to review their teaching practices and introduced a more innovative curriculum designed to better meet the needs of all students. The students' achievement improved as a result.

In an earlier review of the professional development literature, Wilson and Berne (1999) noted that the rationale for engagement in professional development experiences is typically not shared between those providing them and the participating teachers. Most professional development providers expected the teachers to change beliefs, practices, or both. Teachers, on the other hand, usually participated with clear ideas of what kinds of knowledge were most helpful and relevant to their ongoing learning but seldom assumed that their views or knowledge of subject matter or student learning needed to change. In many of the effective learning situations included in the current synthesis, this problem did not appear to arise because, as in the study by J. Phillips (2003), a compelling rationale to change became apparent for the participating teachers prior to or in the early stages of engagement. Establishing this kind of rationale to engage involved cueing and retrieving prior knowledge for the purpose of examining its adequacy. Such examination provided the rationale for further engagement.

The second learning process of becoming aware of new information or skills and integrating them into current knowledge systems was more evident in curriculum areas in which teachers were less confident of their knowledge, for example, mathematics, science, and writing in elementary schools rather than reading. In the literacy and numeracy strategies in England and Wales, for example, teachers were more likely to seek new knowledge in numeracy, a curriculum area in which they felt less confident, than in literacy, where they felt more confident of their knowledge and skills (L. Earl, personal communication, October 20, 2006).

Assuming congruence between existing cognitions and new knowledge, even when teachers seek new knowledge, can be a risky assumption that appears to be made by

many of those providing professional development for teachers. The problem of dissonance is rarely mentioned. An exception by Coburn (2001) provided a rich description of teachers' reactions to the introduction of literacy reforms in California. Teachers with different theories constructed different understandings of the same messages. In one example, teachers in two groups came to different understandings about what it meant to use assessment to inform instruction. The first group understood reading instruction to be a particular sequence of skills. Using assessment to inform instruction, therefore, meant knowing where in the sequence a child was at and planning and teaching accordingly. A second group working on the same question believed that skills should be taught in response to students' needs rather than in a set sequence. They constructed their understanding of this concept as developing lessons in response to the particular needs of a student, no matter what the sequence.

In more informal settings, these teachers sought like-minded colleagues to negotiate meanings of the reform. These meanings were strongly influenced by existing theories and were far more influential in decisions about which of the reform messages to pursue in classrooms. Many teachers rejected the basic tenets of the reform as impractical and in opposition to what they believed effective reading teaching to be.

One area in which creating dissonance with teachers' current positioning was particularly difficult, yet very important, occurred in relation to teachers' social construction of students, particularly, their expectations of students traditionally underserved by our education systems. An evaluation of the Teacher Expectations and Student Achievement (TESA) program (Kerman, Kimball, & Martin, 1980), purported to be the one most frequently used in the United States, is a case in point. As a result of teachers' participating in the professional development designed to raise their expectations, no improvement in outcomes relating to student achievement, academic self-concept, and attachment to school were evident. The more robust measures actually indicated a negative effect. The rationale provided for these volunteer teachers to participate was a generalized finding that low teacher expectations could disadvantage low-achieving students. Whether the participating teachers did, or did not, disadvantage their students in the ways assumed was never established. In the absence of this analysis, there was no immediate problem to solve. Rather, the teachers were presented with a set of discrete teaching techniques they were expected to implement. Despite the name, teachers' expectations of students were not addressed directly or indirectly, nor was the need to think about their expectations and the impact they may have had on their students addressed.

The more successful projects addressed expectations less directly. One such intervention is described by Timperley and Phillips (2003) for teachers of beginning readers from low-socioeconomic communities. Early in the intervention, teachers were shown and discussed the implications of a video of alternative ways of teaching students from similar backgrounds who demonstrated more rapid progress in learning to read text than their own students. Immediately, cognitive dissonance was created for these teachers, who mostly believed that their students were progressing as fast as they were able. Through a series of other inquiries, they discovered that their

own students knew more than they realized because they had not known how to access that information. As they developed their content knowledge in early literacy acquisition, together with the skills of teaching the alterative approach, their students began to make more rapid progress. Through this cyclical process, they began to feel more self-efficacious, and their expectations of themselves and their students increased. Their mean self-ratings of their changed expectations of the progress students could make in their 1st year of schooling was 7.6 on a 10-point scale where 1 represented *no change* and 10 represented *a great deal of change*.

This study demonstrates some of the elements of the fourth of our identified learning processes, which related to developing co- and self-regulation. Of concern is that documentation of these processes was relatively rare yet appeared to be essential to sustaining ongoing improved student outcomes once external providers had withdrawn from directing the professional learning experiences. In the few cases for which student outcomes continued to be reported (Alton-Lee et al., 2000; Carpenter et al., 1989; Datnow et al., 2003; Fennema et al., 1993; Higgins et al., 2005; McNaughton et al., 2004; Robbins & Wolfe, 1987; Stallings & Krasavage, 1986; Timperley, 2005), sustainability appeared to be dependent on teachers' developing a strong theoretical pedagogical content knowledge base that was able to serve as the basis for principled changes to practice together with the skills to inquire into the impact of teaching on student learning. This latter skill became particularly important when students' thinking showed problematic assumptions. Teachers also needed to be working in situations where the organizational conditions provided for collective, evidence-informed inquiry with ongoing opportunities to improve pedagogical content and assessment knowledge. In these studies, continued engagement was motivated by teachers' and leaders' continuing to take responsibility for identified problems with student outcomes together with the belief they had the capability to solve them.

The above analysis led us to develop a model of inquiry (Figure 3) that combines the different elements into a co- and self-regulatory learning cycle, the fourth learning process identified in our initial theoretical framework presented in Figure 2. By co- and self-regulation, we mean that through the inquiry process, teachers collectively and individually identify important issues, become the drivers for acquiring the knowledge they need to solve them, monitor their impact, and adjust practice accordingly (Butler & Winne, 1995). The key claims in the figure are also aligned with the work of Donovan, Bransford, and Pellegrino (1999) in that it integrates their propositions about how people learn. These include their engagement of prior understandings and preconceptions about how the world works, a deep foundation of factual and conceptual knowledge organized in ways that allow its retrieval, and a metacognitive awareness that allows them to take control of their own learning by defining learning goals and monitoring their progress in achieving them.

When developing co- and self-regulatory processes, goals are central, and in this model, teachers' learning goals are grounded in those for their students, as shown in Inquiry A, identifying student learning needs. To make a difference to student outcomes, these goals must also be informed by knowledge of the diversity of students
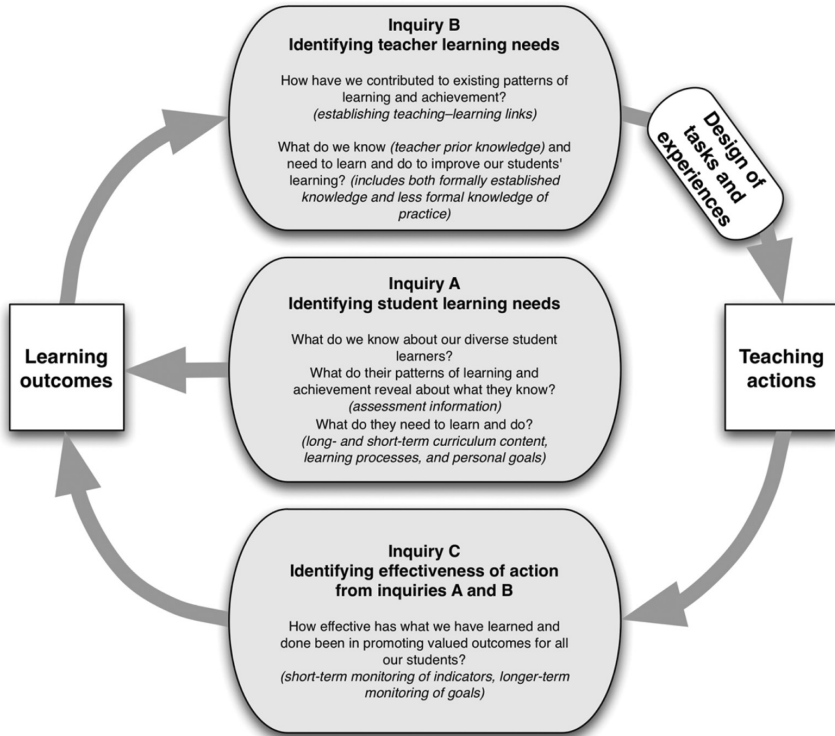
FIGURE 3   Inquiry Cycles for Developing Teacher Knowledge and Effectiveness

in a given teaching situation, what they already know, and what they need to know. To undertake Inquiry A, teachers need to have sophisticated assessment knowledge together with a variety of assessment tools that can be flexibly applied to meet situational demands. This assessment knowledge can then be used as a basis for planning when answering the question, "What do the students need to learn and do?" In this way, instruction becomes more evidence informed and targeted to student needs.

Inquiry B is focused on identifying teacher learning goals. This inquiry demands much more of teachers than using assessment information to inform planning, because it asks them to reflect on how their particular approaches and teaching emphases have contributed to existing patterns of student learning and achievement. This requires a collective rather than individual analysis, because students are taught by more than one teacher in the course of their education, and the evidence from the synthesis indicates that participation in mutual inquiry is a necessary (but insufficient) condition for promoting professional learning that has an impact on students. Inquiry B begins by focusing teachers on existing teaching—learning links and the outcomes for students.

Having identified these links, it then asks teachers to understand what it is they need to learn and do to promote the students' learning. An essential element of Inquiry B is that teachers see themselves as agents of change for their students and their own learning. Learning cannot be co- or self-regulatory in the absence of this condition, and in most of the studies showing sustained outcomes, these conditions were reported.

Inquiry C involves identifying the effectiveness of action from Inquiries A and B and is central to the co- and self-regulatory processes. Having established student and teacher learning goals and enacted appropriate teaching strategies, it is then important to monitor effectiveness in terms of their impact on students. Inquiry C is essential if the inadvertently negative outcomes for students from well-meaning teaching activities that were described in the introductory sections of this chapter are to be averted. Enacting Inquiry C may involve teachers' creating their own inquiry tools, such as observations and questioning students as well as analyzing achievement information over time.

In situations where this monitoring shows problematic student outcomes, improvement is likely to require adjustment to some other part of the process. This adjustment may include the goals, the plans, or their enactment. Thus the inquiry process cycles back to Inquiry A.

Throughout the process, co-construction of the meaning of the assessment information and the implications for practice of new pedagogical content knowledge is integral to the process. It is not possible to develop co- or self-regulatory learning in the absence of this deep understanding. At the same time, the sophistication of the analyses required during the inquiry cycle is likely to require high levels of expertise in the particular content areas. Part of the challenge is to find out whether existing knowledge is adequate or inadequate. Given that it is difficult for any individual to identify what he or she does not know, it is unlikely that these co- and self-regulatory processes will achieve this without organizational support and external expertise. The evidence from the synthesis indicates this to be the case, because all situations in which substantive outcomes for students were achieved have involved this support. It must be noted, however, that external experts were also involved in ineffective professional development. It is not, therefore, the presence of experts that makes the difference; rather, it is the way they assist in promoting teacher learning. School leaders can be highly influential in the process. In the synthesis on leadership currently in progress, for example, one of the highest effect sizes is associated with leaders promoting and participating in teacher learning and development as a leader, a learner, or both (Robinson et al., in press).

AN ILLUSTRATIVE CASE

This case describes how many of the conditions identified in the analysis above were evident in a project designed to promote professional learning and development. This project was part of a national initiative on the part of the New Zealand Ministry of Education to address its problematic profiles of achievement (English & Bareta, 2006; Parr et al., 2006) as described in the first part of this chapter. The projects' first 2 years of operation involved 91 elementary schools from throughout the country,

with half opting for a focus on writing and half focused on reading. The effect sizes for writing were 1.27 on average with a greater effect ($ES = 2.05$) for the lowest 20% of students whose achievement was the primary target of the initiative. For reading, the effect size for the group as a whole was 0.87, but this was depressed as a result of a ceiling effect on the assessment employed. A more accurate reflection of its impact was the effect size of 1.97 for the lowest 20% of students. In this case description, only the writing aspect of the project will be described for reasons of space, although the approach to the professional development was similar for both curricular areas.

The project was focused on outcomes since its inception. The primary requirement of the contract between the Ministry of Education and the providers was evidence of improved student achievement. The other three contract requirements were those believed to promote student achievement. These were evidence of improved teacher content knowledge, evidence of improved transfer of understanding of literacy pedagogy to practice, and evidence of effectively led professional learning communities.

The project providers appointed a team of 25 visiting facilitators and organized training in approaches to professional development involving knowledge building and inquiry. Schools volunteered to be part of the project, but it was highly variable as to whether staff were given any say about their participation. Two researchers worked alongside the project in both a consultancy and formative research capacity. The consultancy part of the role focused on building the knowledge of the project leadership and facilitator team. The research focused on 13 of the 91 schools. In these schools, the researchers analyzed the student achievement data and teachers' responses to a scenario of a classroom lesson designed to assess their pedagogical content knowledge and attitudes toward their responsibility for student learning, undertook classroom and meeting observations, and interviewed school leaders and teachers. Later in the project, they also observed facilitator-led workshops and the feedback facilitators gave to teachers following classroom observations. These events were audiotaped and the transcripts were used to judge progress. These tools and events formed part of the project in all schools, but their analysis in the nonresearch schools was the responsibility of the schools and visiting facilitators.

Consistent with Figure 3, the project began in each school by identifying student learning needs using an assessment tool (Ministry of Education & University of Auckland, 2001) that allowed teachers to analyze students' understanding of both surface and deep features of writing for particular communicative purposes. At the same time, the teachers' writing lessons were observed, and all completed the lesson scenarios. Together, these tools helped to develop an integrated picture of teaching–learning influences. Even in these initial stages, the need for Inquiry B, identifying teacher learning needs, became apparent. Few teachers, for example, were able to score the students' writing assessment accurately, because their theories of writing did not include an understanding of the deeper features of writing for particular communicative purposes. A carefully analyzed situation of three teachers within one school where achievement was particularly low, for example, showed that their writing lessons were dominated by motivating students to write particular content but that the teaching of

writing itself was limited to surface features. Not surprising, interviews of students during the lesson by the researcher indicated that they did not know what they were supposed to be learning about writing in the lesson beyond the surface features of punctuation, spelling, neatness, and length. Through the process of negotiating the meaning of these data, the teachers became aware of their own learning needs. They identified these as needing to improve their pedagogical content knowledge through facilitated readings and learning how to mark and level students' writing samples. Inquiry B was directly related to the information that became available through Inquiry A.

Not all schools in the project were so expertly facilitated or so willing initially to identify their own learning needs; however, all who were involved began with analyzing the profiles of student learning and identifying those students achieving least well together with assessing their own levels of pedagogical content knowledge through the analysis of the scenario responses. Initially, few were able to undertake the analysis of the students' writing in the absence of expert assistance. Although it is difficult to provide a normative measure of teachers' pedagogical content knowledge because standardized assessments and comparative data are not available, student progress for a sample of classes in the research schools significantly correlated with this measure of pedagogical content knowledge, $r(15) = .642$, $p < .01$.

An emphasis of the project was to encourage teachers to plan and execute more deliberate acts of teaching specifically aligned with what students needed to learn. The ability to do this, however, was dependent on deepening knowledge; otherwise, these acts were limited to the more surface features of writing with which they were already familiar. During the 2nd year of the project, when teachers were more familiar with the inquiry processes, each developed professional learning goals with the visiting facilitators based on their analysis of their own learning needs.

The processes of Inquiry C began in informal ways during the 1st year of the project. Teachers were encouraged to interview their students, for example, to find out how well they understood the learning aims of the lessons. A more formal process was undertaken at the end of the year, when the students were reassessed using the same writing assessment tool. Through discussion of moderated writing samples and comparison of beginning- and end-of-year results, the teachers and their leaders were able to analyze the students' patterns of progress and begin a more formal process of Inquiry C. Through this process, they were able to identify the effectiveness of changes in their teaching in response to Inquiries A and B. This reflection led into more a more focused Inquiry A that became possible through more sophisticated pedagogical content and assessment knowledge. Thus, an iterative process was set in train.

As a result of engaging in these inquiry processes with school leaders and teachers, ways in which the project itself needed to become more inquiry oriented became apparent. Policy officials realized that to reach the project goals, more than 1 year that was initially planned was needed, so they adjusted budget priorities to include a 2nd year. Project leaders became aware through school-based observations that in

some areas, the national facilitators' pedagogical content knowledge was inadequate to engage in the depth of inquiry needed, so formal opportunities were provided to improve this knowledge. A more unexpected need was revealed through research observations of the facilitators' work in the schools. Although some understood the co-constructed nature of inquiry, many who were more entrenched in a "delivery mode" of professional development did not. Through a series of workshops that included an analysis of transcripts of their interactions in the schools and questionnaires to gauge teachers' reactions to their facilitation efforts, they became more skilled in conducting conversations in which meanings were co-constructed and inquiry focused.

A random sample of 15 schools were visited a year after the facilitators withdrew their support to determine whether student achievement gains were being sustained and the in-school processes that were associated with those gains continued. Preliminary analyses indicate that improved student achievement gains continued in those schools that maintained these inquiry processes and systematically aligned other aspects of the schools' operations with the principles of the project to create cross-curricula coherence in their teaching approaches.

IMPLICATIONS FOR TEACHER EDUCATION
RESEARCH AND POLICY

In this chapter, we have provided an overview of the findings from a first-iteration BES of the international literature about professional learning and development that improved valued outcomes for the students of the participating teachers. As illustrated in the above case, the impact on the learning of some of our most underserved students can be accelerated by 2 to 3 years in the period of a year through professional development. The findings of this BES are further reinforced by the outcomes-linked findings emerging from other BES iterations (e.g., Anthony & Walshaw, 2007; Robinson et al., in press). The parallel Educational Leadership BES, for example, has identified the promotion of, or participation in, effective professional development as the single-most influential leadership practice in strengthening student outcomes (Robinson et al., in press). School leaders who involve themselves or others in leadership roles to ensure that the organizational conditions of the school support effective teacher learning can make substantive differences to student outcomes compared with leaders in similar schools who do not give precedence to teacher learning. Professional development for teachers is clearly a powerful policy lever.

Yet these claims appear to contradict the reservations about the potential of professional development to make a systemic difference to student outcomes expressed by the practitioners, policymakers, and researchers we quoted in the introduction to this chapter. The evidence from the synthesis on professional learning and development (Timperley et al., in press) has identified that it is not professional development per se that is the problem; rather, it is the way it is typically undertaken. Provision needs to recognize the complexity of professional practice and bring capable and effective expertise to supporting teachers to better meet the needs of diverse learners in

changing times, particularly for our most underserved children. Such expertise needs to engage rather than bypass teachers' theories and provide and exemplify alternative visions and practices. Teachers need to have a problem to solve, to have multiple opportunities to learn relevant pedagogical content and assessment knowledge in ways that integrate theory and practice, and to maintain a constant focus on how teaching affects students. Better outcomes for students are sustained when the organizational conditions support ongoing evidence-informed inquiry into the impact of practice on students. Take any of the ingredients out, and its impact is likely to diminish.

This BES is part of the New Zealand Ministry of Education's Iterative BES Programme, which seeks to do more than identify particular educational conditions that lead to particular outcomes. It has sought also to build capability across the education sector and to create conditions where the relevant knowledge is owned and used by the whole sector, rather than remaining within a project or the property of individual researchers. The approach has been to engage stakeholders, especially those who actually teach, throughout the process, because the evidence can ultimately make a difference only through the actions of practitioners. To achieve this end, the New Zealand Ministry of Education has enacted a collaborative brokerage model to generate all the syntheses (Alton-Lee, 2005) that put into practice the sentiments described by Ginsburg and Gorostiaga (2003):

Our preference is also based on the belief that in the long run dialogue and participation by a wide range of stakeholders produce better and more relevant educational research, policy and practice. . . . Certainly, it may be easier—and, in that sense, more efficient—for researchers, policy makers, and practitioners in education to engage in action (or even in praxis) in isolation of members of the other groups. However, the decisions that are made and the actions that are pursued are likely to be less effective. This is the case not only because the quality of judgements may be lower but also because the activities of one group may detract from or cancel out those of other groups. (p. 10)

The results of this approach have been the development of a partnership with the teacher unions, as described by an advisory officer:

PPTA (Post Primary Teachers Association) regards itself as a partner in the BES programme. As the policy adviser at PPTA specialising in professional issues, I have been closely involved with the Best Evidence Synthesis work ever since 2003.
    I believe that the BES programme is absolutely committed to promoting social justice, and for that reason our union, like NZEI [primary teacher union], has committed itself to working alongside this research programme. (Judie Alison, advisory officer for professional issues, personal communication, February 23, 2006)

This partnership has contributed to stakeholder ownership of the new knowledge generated by the synthesis and the inclusion of the Teacher Professional Learning and Development BES in a teacher union industrial claim (PPTA, 2007).

In the remainder of this section, we examine more closely the implications of the teacher professional learning and development BES iteration for research, teacher education, and policy.

Implications for Research and Teacher Education

The outcomes-linked evidence about effective professional learning poses challenges to researchers and teacher education scholars in relation to the approach taken both to knowledge building in this field and to providing professional development. It is timely to reflect on the moral purpose of education in taking research and development forward in the field of professional development and teacher knowledge. If we accept that our schooling systems are ultimately in the business of educating students, not teachers (Camburn, 1997), then we must use outcomes for students as the criteria for effectiveness of our various improvement efforts.

There are now numerous journals dedicated to teacher education. Even a superficial search of studies on the Educational Resources Information Center (ERIC) for the past 40 years yields more than 11,000 studies for professional development and a further 17,000 for in-service teacher education. That this literature is largely self-referential to the perspectives of the adults and not to the benefits for children is apparent in how small the literature is that includes systematic attention to student outcomes. In the interests of both children and their teachers, there needs to be far more attention to the nature and the outcomes for both teachers and students of professional development, and the links between these, in this research field. There are major gaps in the research knowledge about capability development in teacher education.

Although initial teacher education is outside the scope of this synthesis, and therefore, this chapter, this issue of research focus applies as much to the area of initial teacher education as it does to promoting ongoing professional learning. Given the limited attention this research literature has given to the circumstances that have a positive impact on learner outcomes, it would be difficult to undertake a similar synthesis in this area. It is likely, however, that the conditions identified in this synthesis that promote professional learning for those already practicing would apply in a modified form to those learning to teach.

Implications for Educational Policy

The implications for policy were well articulated by Knapp (2003) in a landmark chapter in a previous volume of this journal: "Professional Development as a Policy Pathway." Knapp called for attention to structures and supports, the development of sufficient expertise, more attention to content, and a shift to new norms concerning ongoing professional development. He called for serious reconsideration of investment in professional development as a policy pathway and attention to building and maintaining political support for professional development from outside the education system. The findings of this BES signal also the need for attention from policy to the time needed to allow the multiple opportunities for professionals to learn new knowledge and skills if deep change is to occur.

An immediate challenge for policy is to attend to situations where teacher professional development may be doing harm or wasting investment through undermining

rather than optimizing educational opportunities for students. Several published studies were located that showed no or negative impact on student outcomes (e.g., Kerman et al., 1980; Stallings & Krasavage, 1986; Van Der Sijde, 1989). Given publication bias toward success rather than failure, there are no doubt many more such situations.

Perhaps the biggest challenge for policy is scale. Systemic responses are needed from different jurisdictions whether at national, federal, state, or regional levels. These are critical for sustainable rather than siloed and transitory development in education. Coburn's (2003) consideration of the evidence about the effectiveness of school reform suggests the success of policy interventions is likely to be dependent on the extent to which the conditions of depth, breadth, ownership, and sustainability are achieved. Such conditions require the development of systemic infrastructure, capability and expertise in research and development in teacher professional learning, and solutions that are available to all schools.

Policy jurisdictions need to recognize also the value and potential of cyclical research and development for contributing to educational development. The findings of the synthesis illuminate the potential of outcomes-focused research and development as a resource for strengthening teacher knowledge. A recent OECD (2003) review shows expenditure in research and development in education to be very low in many jurisdictions, particularly when education is compared with other engines of social and economic development, such as industry, technology, and health. The value of such research and development should not be underestimated as a contribution to the public good. Given strategic investment and valued outcomes as a touchstone, research and development can be a critical lever for enabling our schools not only to navigate the challenges and opportunities facing our education systems but also in providing the conditions for systemic transformation such challenges offer.

Although the Iterative BES Programme is a strategy to strengthen policy access to trustworthy research, there are challenges in the uptake of research findings by policymakers (Walter, Nutley & Davies, 2005), particularly in democratic systems where more than the research evidence inevitably influences decisions. For policymakers, however, the findings confirm the importance of professional development as possibly one of the highest impact policy levers in education, with potentially transformational effects on both social and academic outcomes from the education system.

As a first-iteration synthesis that illuminates the links between professional development and desired student outcomes, the BES foreshadows the significance of this kind of knowledge building to address the evidential gap identified by Hanushek (2005). Given the promise of addressing that gap, there is a foundation for policymakers to progressively have confidence in making investments in the kinds of professional development that, given the conditions of effective ongoing professional inquiry, evaluation, and development, can make a difference to the success and well-being of all of our children, our wider communities, and societies.

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