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8. PREPARING PRE-SERVICE TEACHERS FOR OPEN- PLAN UP-SCALED LEARNING COMMUNITIES

PREPARING FOR COMPLEXITY

Clark (1988, p. 9) noted that teaching is "complex, uncertain, and peppered with dilemmas." More than two decades later, perhaps this comment could be made even more emphatically (Santoro, Reid, Mayer, & Singh, 2013). How best then to prepare pre-service teachers for the differences inherent in the nuanced and multi-faceted work of teaching in open-plan learning communities? We would argue that novice teachers require preparatory experiences that afford productive participation in the culture, narrative, and community of practice of being a teacher. This chapter draws from current critical perspectives on teacher education, and ecological accounts of influences on teachers' and pre-service teachers' adaptive and interactive practices in the settings (see Greeno, 1994).

Teacher graduates are often perceived to have inadequate capacity to enable them to adapt to the diversity of contemporary learning environments and diverse student populations (Darling-Hammond, 2006; Zeichner, 2006). One means of addressing these criticisms is to improve the cohesion of preparatory experiences through building productive partnerships between university and school-based learning (Eames & Coll, 2010; Grossman & McDonald, 2008; Koc, 2011). In addition, consideration needs to be given to recent changes to the shape, form, and activities of schools and education.

Emerging technological, architectural, and sociological concepts related to the openness have influenced both the physical organisation of contemporary school buildings, and authorised a diverse set of approaches to teaching and learning (Barrett & Zhang, 2009; Deed & Lesko, in press; Gifford, 2007; Mahony, Hextall, & Richardson, 2011). As a consequence of these influences, modern school architecture in Australia and the United Kingdom favours large open-plan buildings which afford innovative educational practices (Leiringer & Cardellino, 2011). Openness also incorporates teacher and student use of virtual space through computer-supported learning environments and Web 2.0 technology (Cabitza & Simone, 2012).

Although new buildings and mobile learning technology are an obvious element of transformational change in schools, multiple factors impact on the teaching and learning equation. Teachers must adapt to new learning contexts through

V. Prain et al. (Eds.), Adapting to Teaching and Learning in Open-Plan Schools, 125–138.

dynamic interpretations of how best to enact local versions of abstract concepts like personalised learning (Alterator & Deed, 2013; Deed, Lesko, & Lovejoy, 2014; Zou, 2011). This chapter contributes to ongoing discussion concerning how to reposition teacher education in response to contemporary changes to educational space and pedagogy.

The Theory-Practice Gap

University learning is usually characterised as formal, abstract, theoretical, and unrelated to the reality of classroom work (Hammerness, 2006; Korthagen & Kessels, 1999). For instance, university lecturers may focus on theories of learning, while pre-service teachers may not be able to imagine how to apply these ideas in what appears to be a complex and noisy classroom. Yet, pre-service teachers may be more concerned with questions of what and when (enacting practice) rather than with questions of how or why (critically analysing practice).

Pre-service teachers are students at university, yet are expected to be a teacher on practicum. These are alternate narratives: one concerned with abstracting and representing rules and models; the other with intentional action and reaction. Further, the theoretical narrative positions university expertise external to the classroom, outside the practice of teaching activity (Korthagen, Loughran, & Russell, 2006). Not surprisingly, this often leads to a perceived gap between encountering abstract ideas about learning and applying these when teaching (Calderhead & Shorrock, 1997).

Teaching practice is situated in the classroom. Classroom survival is the primary concern of pre-service teachers and they tend to look to experienced teachers, or mentors, for practical tips and strategies. Teacher mentoring involves an orientation to the school and classroom, passing on practical knowledge of 'what works' by modelling and supporting the practicing of teaching strategies, including approaches to classroom management. Mentors also have a supervisory role, providing feedback and formal evaluation (Koc, 2011). Yet, while mentors have considerable practical knowledge and contextual expertise, they may also have limited or uncritical ideas about how teacher knowledge is developed or its contribution to adaptive practice (Putnam & Borko, 2000; Zeichner, 2010).

In addition, isolated workplace experiences are often insufficient to afford breadth and depth of learning (Billett, 2009). Preparatory experiences must therefore be designed so that knowledge about teaching and learning is not situated within one person or classroom but distributed over, and between, a range of contexts and experiences, including both university and school (Zeichner, 2010).

Integration, Coherence and Expertise

It is worth considering how each theoretical and practical experience constitutes different pieces of the preparatory puzzle. As noted by Billett (2009), universities and

schools each afford variable kinds of experiences leading to different but compatible learning opportunities.

Teacher educators are increasingly intent on improving the coherence of university and school-based learning experiences (Billett, 2009; Gallimore, Ermeling, Saunders, & Goldenberg, 2009). Coherence, within and between university and school-based learning, is one generally agreed principle of quality teacher preparation (Adler, Ball, Krainer, Lin, & Novotna, 2005; Darling-Hammond, 2010; Hammerness, 2006; Korthagen & Kessels, 1999; Zeichner, 2010). The extent of coherence between theoretical and practical components of a pre-service teacher preparation program impacts significantly on pre-service teachers' capacity to integrate knowledge and perspectives (Allen, 2009; Harlen, Holroyd, & Byrne, 1995; Jung & Tonso, 2006). A potentially significant way to build coherence is the design of mutual university and school experiences to develop pre-service teachers' "repertoire of practice - along with the knowledge to know when to use different strategies for different purposes" (Darling-Hammond, 2006, p. 304).

While coherence is characterised as a common framework between the university and school experience, it is pre-service teachers that have to engage with the "invitation to change" afforded by each unique learning experience and to actively integrate these into teacher practical knowledge (Billett, 2009, p. 835). The process of integration is not a simple or linear process (Putnam & Borko, 2000). Several strategies have been suggested to address this complexity, focusing on creating productive contextual learning experiences, building coherence between university and school placements, and using a frame of moving from novice to expert teacher (Deed, Cox, & Prain, 2011). This requires, as an underpinning, a meaningful relationship between teacher educators, teacher-mentors and pre-service teachers (Korthagen et al., 2006). The use of teacher inquiry into their own practice is explicated here as one effective method to achieve coherence between, and integration of, university and school-based knowledge and perspectives.

Coherence and integration can be enhanced though a shared discourse community involving pre-service teachers, mentors and teacher educators (Putnam & Borko, 2000). This implies a need to prepare pre-service teachers as classroom investigators and collaborators in order to draw on separate sets of practical knowledge that are then collated and refined by individuals to their own context (Darling-Hammond, 2006). This involves making sense of contextual challenges and new experiences that emerge during practicum and drawing upon different, including theoretical, perspectives to gain insights into implications for teaching practice (Korthagen et al., 2006). This also entails working closely with peers, rather than seeing classroom-based learning as an isolated and intensely personal experience (Korthagen et al., 2006).

Coherence and integration are concerned with developing pre-service teacher practical knowledge. Elbaz (1981) defined a teacher's practical knowledge as the complex set of knowledge that teachers draw upon and reconstitute in their day-to-day practice. Ottesen (2007) and others have made the claim that the process of

making sense of practice is relentlessly reflexive. Connelly and Clandinin (1988) conceptualised teacher knowledge as personal, emerging from past experience, and informing current and future practice. Clandinin (1985) argued that teaching practical knowledge is neither entirely theoretical nor simply practical. Rather, it is a contextually grounded dynamic blend of formal and informal knowledge (Hoekstra & Korthagen, 2011). In this way, knowledge for teaching becomes individually situated (Verloop, Van Driel, & Meijer, 2001). This would appear to be consistent with Darling-Hammond's (2010) reference to "wisdom of practice", learning, applying and refining concepts and strategies in-practice.

A common theme is that teacher knowledge provides a basis for making sense of and translating experience into subsequent action. Therefore, one means of examining university and school-based preparatory mechanisms is how these act, in complementary ways, to frame the development and refinement of pre-service teachers' teaching practical knowledge. Ellstrom (2001) suggests this requires intentional and formalised actions for coherence and integration, including common framing of planning and critical reflection processes. Importantly, pedagogical approaches learnt at university need to be applied during professional experience, and subsequently reflected on in both school and university settings (Billett, 2009). This locates practicum as a central learning experience, while making sense of the experience requires consideration of diverse (complementary and contradictory) theoretical and practical perspectives (Pridham, Deed, & Cox, 2013).

A powerful lens for conceptualising changes in pre-service teacher practical knowledge is the conceptualising of novice to expert teachers. Experts differ from novices in terms of the knowledge they apply to problems, efficiency of problem-solving, and their insight (Sternberg & Horvath, 1995). Knowledge is made up of general and practical teaching knowledge, as well as pedagogical content knowledge. Efficiency refers to the automatic use of well-learned skills and an ability to effectively plan, monitor, and adapt problem-solving approaches. Insight results in more creative re-definition of a problem and reaching ingenious, novel, yet appropriate solutions. In general, experts take a more planned, complete, and complex view of problems, generating alternative solutions; novices have a more immediate, restricted, and solution-oriented view. This approach is evident in the comment made by Sternberg and Horvath (1995, p.13) that "true experts seek progressively to complicate the picture, continually working on the leading edge of their own knowledge and skill."

Building Expertise through Inquiry

If integration and coherence are applied to the development of expertise it may be characterised as "learning to practice in practice, with expert guidance" (Darling-Hammond, 2010, p. 40). Developing expertise involves pre-service teachers controlling their own learning through in-practice inquiry: defining local problems and devising responses; drawing upon current stocks of practical knowledge and

being prepared to teach in ways markedly different to the ways in which they were and have taught (Hargreaves, 2003; Sachs, 2003; Schon, 1983). Kelly (2006, p. 509) comments that expertise is the "constant and iterative engagement in constructing and reconstructing professional knowledge using various perspectives including teacher research with the aim of conceptualising and addressing problems."

This is not to suggest that problems examined during an in-practice inquiry process can be definitively resolved. It is a reasonable starting point to ensure pre-service teachers explore a range of beliefs, values and knowledge, and seek out and engage with alternative perspectives (Louie, Drevdahl, Purdy, & Stackman, 2003). Inevitably, changes in understanding lead to further questions, leading Hammer and Schifter to comment (2001, p.456) "(inquiry) provides not an empirical finding but an analytical lens, an intellectual resource for thinking."

Pre-service teacher inquiry into their own practice contributes to a capacity to adapt to different contexts and experiences, involving constant reflective monitoring and reinvestment of learnt professional practical knowledge and skills (Matthew & Sternberg, 2009). This implies a view that expertise is developed though the relationship between an individual pre-service teacher's practical knowledge and specific contexts, moments, challenges, and reflection (Schon, 1983).

A key element of the inquiry process is that pre-service teachers "make problematic their own knowledge and practice" (Cochran-Smith & Lytle, 1999, p. 273). The investigation of practice is one means of making sense of the "uncertainty, uniqueness, conflict and confusion" of new and emerging learning environments (Cherry, 2005, p. 311). Personal, collegial, and critical reflection is a key component of pre-service teacher inquiry. Loughran (2002) makes the point that the framing and reframing of a problem is a "crucial" part of knowing about teaching. Reflecting on experience has the potential to change or clarify understanding, leading to reasoning about possible options and consequences (Boud, Keogh, & Walker, 1985).

As noted in the introduction, teaching is complex and becoming even more so with the introduction of flexible learning space and time (Alterator & Deed, 2013). Pre-service teacher inquiry involves a mindful awareness of current experience, opportunities and problems, and the reflective element makes "conscious and explicit the dynamic interplay between thinking and action" (Leitch & Day, 2000, p. 181). The reflective processes of sharing understandings about local problems, accessing multiple perspectives, and raising doubts and uncertainties about possible solutions, are the base elements of pre-service teacher inquiry (Grangeat & Gray, 2008; Yost, Sentner, & Forlenza-Bailey, 2000).

PRE-SERVICE CASE STUDY

This case study includes the four junior secondary Bendigo Education Plan (BEP) schools. Over the period 2011-2013, a total of seventy pre-service teachers were placed in these schools. Each school was characterised by their open-plan settings and a pedagogical approach that emphasised personalised learning. These dual

changes to space and pedagogy meant a change in schools' expectations about the knowledge and skills required of pre-service teachers and new graduates. In response to these concerns a practicum project was initiated. The aims of this project were to: build a productive partnership between La Trobe University and the local school cluster; develop a framework supporting flexible practicum pathways and models; and integrate university and school-based learning through the practicum experience. The project was funded by the Victorian Department of Education and Early Childhood Development's School Centres for Teaching Excellence initiative.

Project Outline

The initial 2011 iteration involved a group of 25 pre-service teachers spending up to 30 days on school placement, using a two-day a week immersion model. Pre-service teachers were placed in multi-disciplinary teams in school learning communities. Each of the four schools accepted teams of 6-7 pre-service teachers. A key element of the new practicum model was that the pre-service teachers and mentors became co-teachers. This approach was consistent with the notion of team teaching prevalent within the open-plan learning environment. Each team had to, in addition to their disciplinary teaching, combine to take part in a pre-service teacher inquiry project. A university based coordinator was appointed to liaise with schools, visit each school on a weekly basis, and support, monitor and assess the pre-service teachers.

A further group of 30 pre-service teachers participated in 2012. The second iteration was modified in response to three major issues identified in 2011: mentors and pre-service teachers struggled with the extended part-time nature of the immersion model; there was a perception that pre-service teachers were underprepared for the school-based teaching and learning models employed in the new learning spaces; and recognition that mentors lacked skills to consistently work effectively with pre-service teachers.

In response to these issues the two-day a week model was retained but commenced later in the school year. The community and multi-disciplinary components were retained, as was the university coordinator. More emphasis was placed on effective communication, planning and review processes to mediate the difficulties of the part-time model of placement. In addition, an expert mentor was selected by each school, based on an assessment of experience and capacity, in order to build mentor skills. These expert mentors created closer links between the university and school-based experiences by delivering lectures in the university program on topics such as differentiating the curriculum, personalising learning, working in team-based environments, teaching and learning in open-plan learning environments, and interdisciplinary teaching.

In 2013 changes were made to all secondary practicum placements: a 25 day practicum using a four-day a week model, preceded by three weeks of two days a week for observation and planning, was introduced in order to retain the extended nature of the immersion experience. This model was the result of a survey of schools

in the region, which preferred a longer practicum placement, but also wanted to retain a model close to the current block mode. Multi-disciplinary teams were placed in learning communities, although some single-disciplinary teams were also deployed. Expert mentors and the university coordinator were no longer funded, although there was a residual level of expertise spread across the schools that participated in the project. These included an emphasis on contemporary pedagogical approaches being used in local schools, and application of a broader definition of teaching as part of the university practicum assessment. Key features of the pre-service teacher inquiry project formed the basis for a core practicum-related subject. Ongoing changes to the teacher preparation program were influenced by the open channels of communication forged during the project between participating schools and the university.

FINDINGS

Over the period 2011-2013 the mentors of pre-service teachers were invited to complete an online evaluation of the practicum in the flexible learning spaces following the departure of their pre-service teacher. The number of completed surveys is shown in Table 8.1.

To explore the knowledge and skills that mentors believed that pre-service teachers required to complete a practicum in the new learning spaces the data were analysed using thematic analysis. The three years of data were aggregated as a set of 47 responses.

The survey questions asked: for the recent practicum conducted in the new flexible learning spaces, what additional knowledge and skills do you think are required to effectively: be a pre-service teacher (35 responses – Table 8.2); work in teams (35 responses – Table 8.3); utilise flexible learning spaces (31 responses – Table 8.4); and, use ICT (31 responses – Table 8.5).

Additional Knowledge and Skills Required to be a Pre-service Teacher

The theme of knowledge of school protocols, teaching space, school and lesson structures, mentioned by 40% of the mentors (see Table 8.2), related to the need for pre-practicum orientation visits at the school to obtain first-hand experience in the way these new flexible learning spaces operated and related student behaviour protocols. This knowledge is considered essential for the pre-service teachers to have prior to their practicum if they are to operate effectively in their practicum.

A day prior to starting at the school to be familiar so ready to go on first day. (Mentor, 2012)

Table 8.1. Number of completed teacher-mentor surveys over the period 2011–2013.

	2011	*2012*	*2013*	*Total*
Number of respondents	19	14	15	47

Table 8.2. Major themes for the question related to additional knowledge and skills required for pre-service teachers to be effective in flexible learning spaces.

Theme	*Number (and percentage) of respondents*
Knowledge of school protocols, teaching spaces, school and lesson structures (by pre-visit orientation)	14 (40%)
Knowledge in, and availability for, preparation and planning	9 (26%)
Skills in flexibility, creativity, open-minded, initiative	9 (26%)
Knowledge and skills in management issues for large groups	7 (20%)
Skills in team teaching	7 (20%)

The second additional skill required by pre-service teachers is the knowledge and availability for planning and preparation with the team of mentors. The third skill is somewhat difficult to teach – that of flexibility, creativity, open-mindedness and initiative. These mentor beliefs are shown in the following quote:

> Be flexible - come on days that suit the program (if the set days don't!) and be prepared to jump in and do stuff on short notice. (Mentor, 2011)

Additional Knowledge and Skills Required to Effectively Work in Teams

The overwhelming, and perhaps predictable, response to this question was that the mentors wanted the pre-service teachers to have developed skills in team teaching, and to a lesser extent knowledge of team teaching. It is challenging for the university to incorporate this skill development into early pre-service teacher training and assessment. As was found in the results presented in Table 8.3, the mentors believed that pre-service teachers require a professional disposition that includes flexibility and open-mindedness.

> Need to be able to work as a team member. (Mentor, 2013)

> How to plan together, how to present together, how to reflect together and how to give and receive feedback from each other. (Mentor, 2013)

Additional Knowledge and Skills Required to Effectively Utilise Flexible Learning Spaces

The thematised mentors' responses in Table 8.4 indicated that the most frequent additional knowledge required of the pre-service teachers was effective ways to use the flexible learning spaces, followed by effective teaching and learning strategies. This is exemplified by comments such as:

Table 8.3. Major themes for the question related to additional knowledge and skills required for pre-service teachers to be effective in working in teams within flexible learning spaces.

Theme	*Number (and percentage) of respondents*
Skills in team teaching	17 (49%)
Knowledge of team teaching	8 (23%)
Flexible, open-minded, willing to be mentored	5 (14%)
Available for planning and preparation meetings	4 (11%)
Able to teach across a range of methods	2 (6%)

Table 8.4. Major themes for the question related to additional knowledge and skills required for pre-service teachers to effectively utilise flexible learning spaces.

Theme	*Number (and percentage) of respondents*
Knowledge of effective ways to use, and to arrange space within, flexible learning spaces	9 (29%)
Knowledge of effective teaching and learning strategies	7 (23%)
Initial pre-visits to gain practical knowledge of flexible learning spaces	5 (16%)
Knowledge of school protocols in flexible learning spaces	3 (10%)
Knowledge and skills in differentiation and personalised learning	3 (10%)
Skills in appropriate use of voice	3 (10%)

> Knowledge of different learning styles and activity ideas. Maybe have discussed use of flexible learning spaces in university classes so students have some idea of where to start and how to use them effectively. (Mentor, 2011)

As has been discussed, the mentors considered the pre-practicum orientation visits to be essential for the pre-service teachers to gain practical knowledge of these new flexible learning spaces.

> Visit the college prior and observe them in action so as not cold to the practice. (Mentor, 2013)

Additional Knowledge and Skills Required to Effectively Use ICT

The overwhelming response (65%) to this question (see Table 8.5) was that mentors expected the pre-service teachers to be competent with ICT prior to the

Table 8.5. Major themes for the question related to additional knowledge and skills required for pre-service teachers to effectively use ICT.

Theme	*Number (and percentage) of respondents*
Competent to meaningfully use ICT	20 (65%)
– smart boards	(10)
– aware of ICT use in method area	(4)
– Ultranet	(4)
– Netbooks	(4)
– blogs and wikis	(2)
Pre-practicum visits to become aware of available technologies and be provided passwords etc.	7 (23%)
Skills to explain ICT use to students	3 (10%)
Knowledge of ICT issues/problems in the classroom	2 (6%)

practicum; the range of sub skills mentioned indicated that there were a wide range of expectations but half of those mentors were in agreement that the competent use of smart boards was required (32%). The next most common theme reinforces the need for a coordinated approach to pre-practicum visits so that the pre-practicum orientation visits cover all essential elements of the school's ICT program:

> Visit college prior. Go through the ICT used at the school. Allow the school to log them on, etc. (Mentor, 2013)

> Evidence of competency in the use of ICT is imperative..... data projectors, smartboards etc must be understood and practiced prior to practicum. (Mentor, 2012)

The Pre-service Teacher Inquiry Project

As noted previously, the pre-service teacher inquiry project afforded "learning to practise in practice, with expert guidance" (Darling-Hammond, 2010, p. 40). The purpose of the inquiry task was for an interdisciplinary team of pre-service teachers to: develop a sense of the breadth and depth of the relationship between their teaching and student learning; seek and engage with a range of perspectives about a local school issue; and collectively construct teacher practical knowledge.

The process involved: (1) identifying a local school priority related to teaching and learning; (2) exploring and generating ideas and perspectives that could inform possible solutions; (3) identifying and enacting a set of justifiable strategies; and

(4) critically reflecting on the enactment of the strategies including possible further refinement.

The following example demonstrates how pre-service teacher inquiry alters the conventions of practicum. The pre-service teachers worked collegially with academics and teacher-mentors to apply a set of collaboratively generated pedagogical principles, grounded in the school context, to their own practice. Most importantly, this process stimulated conversations about practice that aimed to build coherence and integration between university and school-based learning. These conversations were about how each inquiry project informed individual pre-service teacher knowledge about working in open-plan learning environments and incorporation of personalised learning pedagogy.

The school priority identified at Grevillea College was engaging boys through technology (discussed in chapter 5, case study 2). The pre-service teacher team (discipline mix: mathematics, mathematics/science, humanities, English/IT) met to talk about what they did and did not know about this priority, and to discuss what they wanted to achieve. They agreed to individually search for games-based learning ideas. A lecturer provided them with a set of readings about games-based learning; the expert mentor organised a survey of all students in the learning community about their use of games and why they enjoyed using games to learn. The pre-service teachers communicated via email, texting, and social media to share ideas, links, and resources.

After two weeks the pre-service teachers met with a lecturer at the university café to discuss their thoughts, and to generate a set of teaching ideas they could each apply to their teaching. They agreed on the following games-based learning properties: games are fun; the games context is captivating; games are success oriented; games broaden the learning space beyond the immediate; students invest emotionally in their game play; students control their learning/game space; and games allow for different levels of learning.

After further discussion with the expert mentor, each pre-service teacher then devised a lesson, or a series of lessons, in their discipline area based on the application of these principles. This was not additional work, as they had to plan and enact a series of lessons anyway; the use of teacher inquiry informed their day-to-day practice and framed the planning and review discussions with teacher-mentors.

After they had taught their lessons, the pre-service teachers met again to share what happened and reflectively discuss how this process had changed their practical teaching knowledge. The pre-service teachers also outlined how they would change their approach or strategies if there was a further iteration. These conversations about practice were valuable interactions that modelled a process of professional learning and adaptation. The final step was to present key findings to all staff in the school community about what they had learnt about games-based learning, through a presentation to a staff meeting.

DISCUSSION AND IMPLICATIONS

Integration and Coherence

Integration concerns how the pre-service teacher values, makes sense of, and assembles the knowledge, relationships, and interactions between university and school-based preparatory experiences. Evidence of integration can be identified in changes to pre-service teacher practical knowledge. This is not a precise formulation, as teaching practical knowledge is more correctly imagined as a narrative that is learnt, applied, and reformed based on context and experience. Knowledge as narrative is a useful frame for pre-service teachers, as it affords engagement with diverse perspectives, informs reasoning for practice decisions, and encourages complex interplay between theory and practice ideas and strategies.

Coherence is the degree to which teacher educators and teacher-mentors intentionally frame and make sense of the conceptual intersection between theory and practical knowledge. This is evident in the formal and informal discourse between these key players, and subsequent interactions with pre-service teachers.

Based on the literature and the case study, Table 8.6 identifies a number of strategies for building coherence and integration, specific to preparing pre-service teachers for the affordances of open-plan learning environments. These affordances have been identified by Deed and Lesko (in press). Each affordance is then linked to strategies that would be enacted by teacher educators, teacher-mentors, and pre-service teachers. The process of teacher preparation is about the grounding of conceptual ideas-in-play into personal practice decisions.

Open-plan learning environments, for example, can express and authorise the concept of community (Deed & Lesko, in press). This generates the possibility of teaching in a community-like environment. In a community it is possible to move from a ratio of one teacher and twenty-five students to three teachers and at least seventy-five students. Each teacher potentially becomes responsible for all the students within their community. Pre-service teachers placed into this type of school space want to make personal sense of the possibilities of the different learning environment. They want to know what works, and how this contributes to their teacher practical knowledge. The question for teacher educators is what activities can frame and structure the learning experience.

Table 8.6 suggests that placing pre-service teacher teams in a community where they are expected to plan, work and reflect relationally may improve integration and coherence. Framing this experience by the use of an inquiry project allows pre-service teachers to personalise the experience and the subsequent learning while co-constructing knowledge and practice.

Building Adaptive Expertise

Coherent and integrated teacher preparation provides the basis for building adaptive expertise. A developmental pathway allows pre-service teachers to become more

Table 8.6. Building coherence and integration in teacher education for open learning environments.

Features of open learning environments[1]	*Means of building coherence & integration*	
	University strategies	*School-based strategies*
School-less space	Identification of teaching and learning questions related to new educational space.	Identification of local school priorities, models, and strategies.
Humanism and democracy	Introduction to theoretical models and pedagogical approaches that support autonomous and active learning.	Seeking and engaging with a range of diverse perspectives and practices during practicum.
Student agency	Introduction to theories and models of agency complementary to autonomous and active learning.	Practicing teaching approaches that support autonomous and active learning.
Community	Support and scaffolding team teaching and collegial collaboration.	Team-based planning, communication, and review processes, including placing pre-service teachers in project or inquiry teams.
Flexibility	Introduction to theoretical models for learning in open-plan and virtual learning environments.	Applying a range of pedagogical approaches appropriate to flexible use of space.

[1] (categories based on Deed & Lesko, in press)

efficient and effective in their application of teaching practical knowledge. This is evident when pre-service teachers move from a restricted and solution-oriented view to taking a more planned, complete and complex view of problems, generating alternative teaching solutions. By applying the expert model (Sternberg & Horvath, 1995) to the case study data it is possible to identify the characteristics of expertise (knowledge, efficiency and insight) required for pre-service teacher adaptation to open learning environments:

— Knowledge of: local school protocols; teaching space layout and organisation; school and lesson structures; and planning models; a variety of pedagogical models; strategies for management of large student groups; team-teaching models; teaching and learning models for open-plan learning environments; and competence in use of ICT.

— Efficiency demonstrated by: a flexible orientation to other perspectives; experience in teaching across a range of disciplines and using a range of pedagogical models; experience in ways to organise and use large open-plan learning environments; team-teaching strategies, including planning, observation and discussion with experienced teachers; and ICT problem-solving skills.
— Insight demonstrated through: flexibility; creativity; initiative; open-mindedness; a sense of how to judge effective and efficient teaching and learning strategies; and a sense of how ICT can be used for learning and teaching.

CONCLUDING COMMENT

What then can be said in response to the question posed at the start of this chapter: how to prepare pre-service teachers for the differences inherent in the nuanced and multi-faceted work of teaching in open-plan learning environments?

Open-plan learning environments, technology and related pedagogies have broadened the conception of teaching and learning. One implication is that teaching is no longer a purely isolated and largely autonomous activity. Teaching now includes activities in a range of physical and virtual, formal and informal, contexts, with a range of student groupings, and in various collaborative configurations. This is evident in the context of community school spaces, and teacher preparation partnerships and related learning activities between universities and schools.

The case study showed that over three years pre-service teachers were provided with preparatory experiences that framed and focused productive participation in the culture, narrative, and community of practice of being a teacher. This was both a collective and a personalised experience, as pre-service teachers constructed personal teacher knowledge, and enacted and validated agency and practical reasoning.

In the case of preparation for open-plan learning environments, we identified that teacher-mentors, teacher educators, and pre-service teachers needed to develop additional knowledge and skills in: teaching and learning in open-plan settings; team teaching; curriculum differentiation and personalised learning; and effective use of ICT. The inter-related nature of the conceptual and practical basis for teaching adaptation to different learning environments was explored in the pre-service teacher inquiry project reported in the case study. In particular the inquiry project required an expansive view of workplace learning, calling on expertise within and beyond both the immediate school and university experience.

Overall, open-plan learning environments require a change to teacher preparation models, one where pre-service teachers project themselves as adaptive experts, simultaneously building expertise teaching knowledge and skills that can be applied across a variety of teaching and learning contexts.