Chapter 10
Cooperative Education: Integrating Classroom and Workplace Learning

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Abstract Cooperative education (co-op) is a strategy of education that combines academic learning in the classroom with real-world practice in a relevant workplace. To provide this mix of learning opportunities, co-op involves collaboration among students, educational institutions, and employers. Real-world experience for students in the form of work-based placements or internships can serve to provide entry for learners into a particular community of practice. Theorising and research into student learning through cooperative education has focussed on the experiential nature of the learning opportunity, and more latterly through sociocultural views of learning. These latter views help us to understand that cooperative education exposes students to worlds of learning that are different but complementary. These complementary worlds have different sociocultural dimensions that afford different learning opportunities to students. Clearly defined integrative pathways are required that allow students to make sense of the learning that they are afforded. The real strength of cooperative education as a strategy of practice-based learning is not that students gain opportunities to learn in the classroom and in the workplace, but that these opportunities are integrated to create learning that is more than the sum of the two parts.

10.1 Cooperative Education as a Model of Practice-based Learning

Cooperative education (co-op) is a strategy of education that combines academic learning in the classroom with real-world practice in a relevant workplace. To provide this mix of learning opportunities, co-op involves collaboration among students, educational institutions, and employers. Real-world experience for students in the form of work-based placements or internships can serve to provide entry for learners into a particular community of practice. This experience, undertaken as part of an educational programme, aims to ease the passage of students into their vocation, upon graduation. It is predominantly practised at the tertiary education level, at a point where development of occupation-specific knowledge and skills are most pertinent. The co-op model began in the USA in the 1900s and has since been adopted in over 40 countries. Originally trialled in the engineering discipline, co-op has since been offered through the sciences,

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business, the arts, social sciences, law, and technical disciplines. It has a natural allegiance with traditional apprenticeships, and to programmes that adopt internship-like arrangements such as in medicine, nursing, and teaching. More recently, the co-op model has also become known as *work-integrated learning* to strengthen the recognition that co-op requires more than simply combining academic and work experiences. Instead, it refers to an integration of learning between the classroom and the workplace to secure the kinds of knowledge and skills that graduates will need, and to recognise its connections to other work-based learning strategies such as internships, practica, and industry-based projects.

This chapter elaborates the co-op model of learning by examining the traditions that have led to the current understandings about cooperative education as a practice-based model of learning. It begins with a discussion of the institutional context in which co-op has evolved, and then critically examines the organisational milieu and pedagogical theorising which has both enabled and constrained its development. Using examples from a science and engineering-based programme, the chapter discusses how effective co-op requires clear recognition that the classroom and the workplace both offer opportunities for planned learning, but that these sites differ in their intents, purposes, and outcomes. The chapter concludes with an exploration of the challenge to explicitly integrate these opportunities to maximise the learning that can be achieved for the development of workplace practitioners.

10.2 The Development of Cooperative Education

The cooperative education movement is regarded as having its foundations in 1906 when an engineering professor, Herman Schneider, at the University of Cincinatti, USA, 'became convinced that many professional concepts and skills could not be learned effectively in the classroom [alone], but required practical experience for their understanding and mastery' (Sovilla & Varty, 2004, p. 4). This blending of theoretical learning with practice has historical antecedents in fields such as nursing and many technical occupations. Nevertheless, this initiative was perhaps the first deliberate attempt to design such a learning programme in a university. Schneider's emphasis on formal integration of learning between the classroom and the workplace necessitated the student spending time in both settings, and there was an expectation that learning would occur in each (Cates & Jones, 1999). However, there was little theorising about how this learning would happen in the workplace, nor how it would integrate with classroom learning. The popularity of cooperative education programmes grew slowly until the US government brought in a funding strategy for new programmes in the 1960s. This saw a dramatic rise in the number of programmes until the mid-1990s (Howard, 2004), but theoretical development of the model did not keep pace (Sovilla &

Varty, 2004). From this previous emphasis on quantity, many in the field are now seeking to reorientate towards quality and justification of the educational strategy.

Cooperative education spread gradually from the USA into many other countries, as success of the strategy became more widely known. A programme began at the University of Waterloo, Canada, in 1957 (Barber, 1968), and developed as sandwich education in the UK (Tucker, 1969). Today, it is practiced in more than 40 countries (World Association for Cooperative Education, 2009) and examples of co-op have recently been described from countries in other regions of the world such as Australia, Asia, and Africa (Campbell, 2009; Chen, 2006; Cullen, 2007; Spowart, 2006). Programme offerings have diversified from the original base in engineering to a multitude of fields such as accounting, police studies, sport management, hotel management, information technology, and science (Abeysekera, 2006; Campbell, 2009; Coll, 1996; O'Shea & Watson, 2007; Spowart, 2006; Venables & Tan, 2009). More recently, the reconceptualisation of co-op as part of a broader work-integrated learning philosophy has led to recognition of synergies with other learning-through-practice programmes such as internships in nursing (Fujimoto-Ikuma & Ishida, 2008) and the teaching practicum (Allen & Peach, 2007). A consistent finding across these reviews is the need to balance theory and practice and enhance connections between learning in the classroom and in the workplace. The development of co-op and its integration of learning settings has been both enabled and constrained by the organisational milieu within which it operates. That is, the kind of educational environment in which it acts is central to its prospects of being successful. This salient issue is discussed next.

10.3 The Organisational Milieu of Cooperative Education

The provision of cooperative education involves a three-way partnership between an educational institution, the participating students, and the organisation that will employ the students. Our understanding of the purpose of this partnership has evolved from Schneider's early conception of combining classroom and work opportunities (Cates & Jones, 1999), to an understanding that nonscholastic work should be incorporated into the educational curriculum (Wilson, 1970), through to our present-day thinking that learning in the workplace and in the classroom should be fully integrated (Coll et al., 2009). Co-op involves a student undertaking relevant and productive work in one or more placements that is formally recognised as part of a student's academic qualification (Groenewald, 2004; New Zealand Association for Cooperative Education, 1995). Co-op is also recognised as a strategy that is different from workplace learning (Billett, 1998; Boud & Garrick, 1999), although these two approaches to supporting learning share some similar goals. The vast majority of co-op programmes are based in an educational institution and incorporate a work component, but the term could also be applied

to programmes based in workplaces that integrate a formal classroom component in an educational institution. Co-op generally occurs at the higher or tertiary education level, due to the requirement for the student to be engaged in meaningful and productive work, but programmes are also possible at secondary levels of schooling.

Cooperative education has been proposed as an ideal response to calls from the world of work to make education more relevant to the workplace (Bates, Bates, & Bates, 2007). Well integrated programmes can produce graduates who have the best of up-to-date theoretical knowledge and applicable skills, as well as an understanding of how the world of work operates. It has been argued that opportunities to spend time with experienced professionals can begin to enculturate a student into a community of practice (Eames & Bell, 2005) and provide learning in what have been called soft skills (Coll, Zegwaard, & Hodges, 2002; Hodges & Burchell, 2003), those skills such as communication and time management, which are not often taught in the educational institution.

As noted above, most cooperative education programmes are initiated by an educational institution. Imperatives for this initiation have included a desire to balance theory and practice in students' education, to build partnerships with local employers, and to provide students with income whilst they are studying. Benefits to the institution that have been espoused include enhanced student recruitment into desirable programmes with high employment rates, feedback on workplace practices to inform curriculum planning, development of relationships between academics and workplaces leading to consultancies and research contracts, and financial benefits resulting from enhanced income streams (Weisz & Chapman, 2004). On the other hand, there are certain costs associated with co-op programmes. Institutions have generally facilitated their programmes through the use of a placement coordinator (Coll & Eames, 2000) who may be responsible for organising placements and maintaining institutional relationships with employers, as well as a range of broader tasks (Lazarus & Oloroso, 2004), and co-op programmes often involve faculty in the process of monitoring and assessing student placements, with varying degrees of commitment (McCurdy & Zegwaard, 2009). This involvement of staff is important in enhancing the integration of learning between the two settings but is a cost on the institution in terms of staff time, and some institutions have preferred to have students locate and manage their own placements, with consequent issues of placement relevance and lack of pathways to ensure integration of learning occurs. As Bennett (2008) has argued, any cost-benefit analysis of running a work-integrated learning programme must be able to address the worth of the learning integration that occurs for students for the true value of the programme to be assessed.

Models of placement structure within an educational qualification differ between institutions with many large North American universities running programmes that alternate placements with in-class semesters (Wilson, 1985). However, British institutions often favour a sandwich of a whole year on placement between years in class (Tucker, 1969), capstone courses (Fleming &

Eames, 2005), and variations on these themes (e.g., Coll, 1996). A recent study by Fenster and Parks (2008) offered some evidence that both alternating (a semester of classroom study followed by a semester of work) and parallel (part-time work and part-time study simultaneously) placement structures offered significant, but not necessarily the same, benefits. How these different models support student learning is the subject of some debate (Branton et al., 1990; Fenster & Parks, 2008).

The issue of learning through cooperative education has been a major area of concern for educational institutions, with perceptions that out-of-class learning does not constitute learning that belongs in an academic qualification, and uncertainties as to what educational outcomes are achieved through work placements (Cutt & Loken, 1995; Van Gyn, Cutt, Loken, & Ricks, 1997; Wilson, 1973). Criticisms have stemmed from a belief that co-op placements *train* students to do tasks rather than engage in the higher order thinking thought to be the domain of academia, and critics have pointed to a lack of theorising about learning on, and assessment of, work placements (Eames, 2003a). Certainly, educational institutions should consider more deeply the curriculum and pedagogical processes that underpin co-op (Bates et al., 2007) and we would argue that this is key to facilitating the integration of student learning between the classroom and the workplace. This issue has attracted much recent theoretical and research attention, which is discussed further in the next section. Indeed, much of the early research into co-op focused on what could be termed operational outcomes and these tended to be premised upon students' success in finding a placement, value of money earned during placements, and enhanced prospects for finding a job post-qualification (Wessels & Pumphrey, 1995). These studies have found evidence for such outcomes, as well as personal benefits such as enhanced self-confidence and increased initiative (Weisz, 2000), career benefits such as career clarification (Weston, 1986) and improved starting salaries for graduates (Gardner, Nixon, & Motschenbacker, 1992), and work skill benefits (Calway & Murphy, 2000). Recently, a stronger emphasis on viewing placements as learning opportunities has reorientated theorising and evaluation of co-op back towards learning outcomes (Dressler & Keeling, 2004). Some research evidence has been found for academic benefits such as increased motivation to study and application of theory into practice (Van Gyn et al., 1997). Achievement of these benefits can be influenced by matching employer and student expectations of placement outcomes, the provision of quality supervision and mentoring in the workplace, and encouraging reflection on the learning opportunities afforded by placements (Van Gyn et al., 1997; Van Gyn, 1996).

Benefits for employers participating in cooperative education programmes have also been identified. It has long been touted as a 'try before you buy' opportunity for employers, which offered significant benefits, but also some costs. A number of studies have described benefits for employers in terms of the aforementioned screening of potential new employees, the short-term employment of enthusiastic students, productive interactions with educational institutions, cost savings due to

hiring relatively cheap student labour to undertake tasks, and the completion of projects (Braunstein & Loken, 2004). Some employers might view taking a student on placement as a social service, and on the negative side, there is a cost involved in supervisory time for the student whilst on placement. However, Braunstein's (1999) study appeared to show that these were relatively minor concerns for employers.

The three-way partnership that is cooperative education has potential benefits for all three parties involved, and realisation of those benefits can be influenced by the organisational structure of the co-op programme. Sound facilitation of the integration of the learning opportunities between the classroom and the workplace may rely on the beliefs about learning that participants hold. Theoretical ideas about learning on placements are discussed next.

10.4 Theorising Learning in Cooperative Education

A range of theoretical ideas have previously been used to explain learning in cooperative education. These include the cognitive development ideas of Piaget (Cates & Jones, 1999; Van Gyn, 1994); the experiential learning views of Dewey (Heinemann & DeFalco, 1990; Jabs, Jabs, & Jabs, 1978; Saltmarsh, 1992) and Kolb (Cates & Jones, 1999); reflective practice (Van Gyn, 1996); self-efficacy (Coll, Zegwaard, & Lay, 2001; Linn & Ferguson, 1999); the view that there are multiple intelligences (DeFalco, 1995; Williams, Sternberg, Rashotte, & Wagner, 1992); and sociocultural views of learning. A full review of the contribution of these ideas to theorising learning in co-op is not possible here, but we provide some further discussion on three sets of ideas that are important for integration of learning between the classroom and the workplace, namely experiential learning, reflective practice, and sociocultural views of learning.

There has long been a natural inclination towards theorising cooperative education through the lens of experiential learning (Branton et al., 1990; Heinemann & DeFalco, 1990). The opportunity to learn from experience on placements fits this model easily, although as Dewey cautioned, not every experience is educative of itself (Dewey, 1938). That is, experiences should be relevant to, valued by, and reflected upon by the learner for them to lead to learning. Dewey espoused a laboratory model of education in which experience evolved into learning, and in which the artificial dualism of academic and vocational education is eliminated (Heinemann & DeFalco, 1990). He advocated a connection between theory and practice that created meaning for students in their learning, and that knowledge should be valued for what you can do with it. Branton et al. (1990) note that the Wilson and Lyons study of 1961 may have been the first published attempt to link cooperative education with educational theory around experience. Since then many authors have explored these links (Heinemann & DeFalco, 1990; Jabs et al., 1978; Van Gyn & Grove White, 2004).

Saltmarsh (1992) noted the strong transformative emphasis that Dewey (1916) placed in his educational philosophy, and argued that if co-op was to be true to Deweyan ideals it should go beyond Schneider's original intentions to promote education for social change. This educational goal, Saltmarsh (1992) argued, would truly situate workplace learning as an educational process worthy of integration with academic studies. A more recent advocate of experiential learning, Kolb (1984), has followed these ideals in defining learning as the 'the process whereby knowledge is created through the transformation of experience' (p. 38). This process, in which Kolb views experience leading to theory-making through a process of reflection, has been argued to be the most relevant learning theory to underpin co-op (Cates & Jones, 1999). The coupling of experience to theory-making appears a sound explanation for how learning in the two settings of a co-op programme could occur.

As Dewey (1938) noted above, experience may not always lead to desirable learning, but the use of reflection has been argued to enhance the likelihood that it would (Raelin, Glick, McLaughlin, Porter, & Stellar, 2008; Van Gyn, 1996). Therefore, cooperative education programmes should regularly build in a requirement for reflection on practice in which students are encouraged to look back upon their placements to consider what they have learnt. Raelin et al. (2008) argue that reflection-in-action (whilst on placement in the workplace) is potentially even more powerful as a promoter of learning, being capable of 'real-time' learning that allows students to both draw from and give back to their work colleagues, and make sense of experiences that are both individual and collective. These perspectives make a valuable contribution to our understanding of learning in cooperative education in emphasising the roles that experience and reflection can play in integrating theory and practice between the classroom and the workplace, and acknowledge the importance of the contributions of the physical and social settings in which the learning takes place. Early theorising in these perspectives tended to see the student as an individual learning in a social context. More recently, it has been recognised that contexts have social, cultural, and historical dimensions that are important in learning.

These sociocultural dimensions provide another useful way of looking at learning through practice in co-op programmes (Eames & Coll, 2006). A variety of conceptions of learning have become known as sociocultural views of learning. These ideas draw on the influences of earlier theorists such as Vygotsky (1978) and Piaget (1950), who tended to view learning as an individual process in a socially mediated environment (Piaget, 1950; Vygotsky, 1978; Wertsch, 1991). However, more recent theorising by Lave and Wenger (1991) viewed learning as a social process occurring in a community of practice, and by Rogoff (1991, 1995) saw learning as occurring through participation with others. Within these sociocultural perspectives, three ideas can be identified: (i) learning as a situated activity occurring through participation; (ii) learning as distributed cognition; and (iii) learning as mediated action. These three conceptions are now discussed as a means to explore the integration of learning in co-op programmes.

The first of these conceptions depicts learning as a situated activity within a community of practice (Lave, 1991; Lave & Wenger, 1991; Wenger, 1998). Lave (1991) defines situated learning as emphasising 'the inherently socially negotiated quality of meaning and the interested, concerned character of the thought and action of persons engaged in activity' and 'that learning, thinking, and knowing are relations among people engaged in activity *in, with, and arising from the socially and culturally structured world*' (p. 67). The emphasis on social negotiation of meaning highlights the interactional mode of learning in which participants share knowledge and understanding to reach a joint construction of their knowledge for engaging in collaborative problem-solving activities. Students on co-op placements may undergo a kind of experience that has been described as cognitive apprenticeship (Brown, Collins, & Duguid, 1989) through working alongside practicing professionals and participating in authentic activities (Billett, 1994). The key qualities of this kind of apprenticeship is that it is held to potentially develop more strategic learning outcomes and processes than if the apprentice learns by observation and imitation alone. In this way, the students learn through their participation (Rogoff, 1995), gradually adopting the culture of the workplace in a process of enculturation (Brown et al., 1989; Hennessy, 1993), but also importantly engaging in thinking and acting with a more experienced other who can provide access to knowledge that the learner might otherwise be unable to learn.

A second conception of learning that underpins sociocultural views of knowledge construction is that cognition (e.g., learning) is distributed across a community of practice. The notion of distributed cognition suggests that learning is seen to involve not only the person, but the person-plus (Perkins, 1997), being the person plus the surround. In this way cognition (and learning) is seen to be located outside individuals' heads, and jointly composed in a system of people and artefacts (Salomon, 1997). For example, a student on a chemistry placement may develop knowledge of how to use a particular analytical instrument through being trained in its use by a colleague, and come to appreciate how the data the instrument produces play a role in the practice of the community. A community of practice, such as a workplace, can then be conceived of as having learning distributed across its people and artefacts in a social world of activity within a cultural medium (Cole & Engestrom, 1997). The distribution of cognition and learning across a community is seen as being stretched over, rather than divided up amongst participants (Salomon, 1997). Therefore, more than participation alone, it is the kind of participation in activities in the particular workplace setting that afford opportunities for the student to learn the practice of the community.

A third concept that contributes to sociocultural views of learning is that human action is mediated by tools and signs (Bell & Cowie, 2001; Vygotsky, 1978; Wertsch, 1991). This concept draws on the work of Vygotsky (1978), and mediated action considers that human action such as learning is effected by tools and signs, which are themselves situated in the social and cultural environment in which they exist (Wertsch, 1991). However, Wertsch, del Rio, and Alvarez (1995)

separated the mediational means into technical tools (such as instruments and computers) and psychological tools (such as language and counting systems). Two key ideas arise from consideration of the influence of mediational means. Firstly, they are used in social interaction, particularly in the case of language. Secondly, they are 'products of sociocultural evolution, and are inherently situated in sociocultural context' (Wertsch, 1991, p. 91). For instance, most workplace communities engage in the use of specific language such as jargon and acronyms, and the gradual learning of this language allows students to increase their participation in, and understanding of, their community. Additionally, all students in co-op placements are likely to be required to use some form of instrument or other tool that could mediate the actions they take in the course of their participation in the community of practice. These ideas can also be seen in activity theory, which posits that learning occurs in an activity system that is a dynamic, artefact-mediated environment (Engestrom, 2001), such as where students might find themselves in work placements.

Using these theoretical perspectives, learning in cooperative education occurs through participation in two distinct, but connected forms of social practice: that of the educational institution and that of the workplace. Each of these social practices is likely to represent different kinds of situated activity, have different kinds and distributions of social forms and artefacts, and have different opportunities for mediation of individuals' learning through their engagement with these forms and artefacts. Consequently, studying in a co-op programme allows the student to move between the two distinct kinds of social practices, crossing the border between subcultures of related practice (Aikenhead, 1996). If learning is seen as mediated through the use of tools and language, distributed across the community in all directions, situated in the context of each of these settings, and assessed as increasing participation within that practice, their connected, but distinct, contributions stand as being key qualities of cooperative education experiences. Seen from this perspective, the integration of these experiences is, we would argue, imperative to maximise student learning. The final section of this chapter examines this important issue with examples drawn from a science and engineering programme.

10.5 Integrating Classroom and Workplace Learning

As noted earlier, scholars now firmly believe in the critical importance of ensuring integration of classroom and workplace learning through a cooperative education programme. A key feature of co-op programmes is thus the notion that they must involve the *integration* of knowledge and skills gained in the educational institution and the workplace. It is this feature that distinguishes co-op from workplace learning (i.e., what someone learns in the workplace) (Billett, 1999; Boud & Garrick, 1999). Integration here means how the student takes what they

have learned in the classroom into the workplace, and how a student's learning in the workplace becomes related to, or incorporated into, the next phase of their academic learning.

Despite the claims of its centrality to cooperative education, the literature on integration in co-op programmes is sparse. Any mention of integration typically does not address this issue explicitly. For example, Van Gyn et al. (1997) and Parks (2003) report that students *say* their co-op placement experiences allow them to see how to put theories learned in the classroom into practice when in the workplace. Likewise, Eames (2003b) reported a student saying that he learned about the theory underpinning the use of chemical instrumentation in classroom experiences and, subsequently, found this theory essential when trying to use, and do trouble-shooting when using, scientific instruments in the workplace. Even less seems to be known about transfer of knowledge and experiences from the workplace back into the classroom. Wong and Coll (2001), for example, report that a student learned the use of a discipline-specific statistical package, which was subsequently found useful upon return to study.

So whilst a few reports about how students report integration occur in the literature (e.g. Fink, 2001), there have been a number of calls for more integration of on-campus and off-campus learning (Grollman & Tutschner, 2006; Stenstrom et al., 2006). Any reports of integration are in fact typically descriptions of current programme practice rather than *research* into the integration of knowledge and skills between settings (e.g., how it is or might be better facilitated). A number of possible outcomes of cooperative education have been identified in the literature as areas likely to be integrated. These are, as might be expected, generic skills such as the application of theory (Furco, 1997), increased discipline thinking (Cates & Langford, 1999), problem-solving (Burchell, Hodges, & Rainsbury, 2000), behavioural skills (Carrell & Rowe, 1994), time management (Parks, 2003), and teamwork and cooperation (Burchell et al., 2000; Weisz, 2000). Such generic skills are more likely to be able to be integrated because the diversity of placement contexts means more specific topics are less likely to be generally applicable.

The only other literature that offers insights into integration in cooperative education is based on the notion of critical reflection (Coll et al., 2009). As discussed, this has been argued to be important in enhancing learning in co-op, rather than in directly fostering integration. However, examination of the research on reflection indicates that it can foster integration. As an illustration, Gray (2007) talks of facilitation of learning in the workplace using critical reflection tools such as reflective metaphor, reflective journals, and critical incident analysis. It seems such tools work because they help students to engage in metacognition.

Our work in cooperative education in science and engineering has begun to illuminate this key facet of learning through practice. Eames (2003a) conducted a longitudinal study of 22 university science and engineering co-op students as they moved between their classroom and work placement experiences, and reported that many students believe they can apply at least some of their university-learnt

knowledge and/or skills in work placements. This is perhaps not surprising. It might be expected for a chemistry student to use chemistry knowledge during a placement when working in a chemistry laboratory. However, the students reported learning in their placements in a different way to learning at university. They found that learning at university was abstracted from application and motivated by an emphasis on process. In contrast, they described learning at work as very applied and highly contextual and motivated by process and outcomes. This distinction may prove a hindrance to integration unless students can be shown how to, and be given the opportunity to, navigate between the context/intention worlds of the classroom and workplace (Billett, 2008).

Furthermore, integration appears to be very domain-specific (i.e., specific to a particular domain of practice, such as geology), and there is a need to improve our understanding of whether, and if so how, students are able to carry over ideas from one domain to another. Paku and Lay (2008, p. 3) reported such transfer can occur, but noted this occurred only to a limited extent:

> Where students have been in placements unrelated to their field of study, they were still able to make links between theory used [in industry] and [those] that [they were] taught at university. For example, Adam [a pseudonym] was completing a materials degree and did a placement with an electricity company. He found that the principles behind electricity theory were very similar to processing concepts such as mass balances; the equations were similar but needed different numbers, units and symbols. This reflected the student's ability to see the similarities between mass and electricity theory.

What this suggests is that some transfer seems to occur naturally, but there is then the possibility that this might be enhanced if there is some way transfer is better facilitated. From a sociocultural viewpoint, integration in this learning could be seen to be mediated by the tools of the community, in this case, the tools being the equations used in working out mass balances. Other examples in Eames's (2003a) study included the use of scientific instrumentation common to both the classroom and the workplace, and, critically, the use of language in mediating learning in particular domains. It would, for example, be difficult for students to learn from their workplace mentor if that mentor did not understand the scientific terminology (or equations) used in that particular workplace.

We have found some evidence that students feel their learning on placement can influence their learning upon returning to the classroom. Eames (2003a) cites examples such as students reporting that learning a specific technique or use of a particular scientific instrument at work was useful in later papers in the classroom, with this learning tied tightly to the domain-specificity of the workplace. But, more commonly, students reported learning generic aspects such as a more positive attitude to study, more efficient study skills/habits, better time management, and some insights into the practice of science in the educational laboratory being different to that of the workplace (Eames, 2003b). So learning on placement can be integrated with classroom learning, but probably not to the extent we would wish. This finding leads to a stronger acknowledgement of the different identities of the two communities of practice (Wenger, 1998) within

which a student learns in a cooperative education programme, and a clearer emphasis on providing an integrative pathway for students to move successfully between these two communities (Billett, 2008). Recent work by Coll et al. (2009) supports this emphasis. Their study comprised a three-sector investigation into the integration in co-op programmes and concluded that:

> It is evident from this project that despite coming under an umbrella term, *work-integrated learning* [WIL], most programs do relatively little to formally drive the integration of knowledge between the HEI [Higher Education Institution] and workplace and vice versa. Whilst there is some logic in suggesting the student has ultimate responsibility for his or her own learning, WIL practitioners argue they are *educators* or at least that they should be considered educators … in which case we argue here they must accept ultimate responsibility for the integration through WIL. In doing so, they need to draw upon their training as educators, their personal experiences and research. (Coll et al., 2009, p. 32)

So it seems integration can and does occur, but in a fairly ad hoc manner unless explicitly encouraged. Coll et al. (2009) were able to make a number of recommendations to help move the integration agenda forward. Firstly, they say that programme leaders should formally state that their cooperative education programmes must involve the integration of knowledge, and set this as an explicit learning objective (Billett, 2008). Secondly, integration can be driven by reflection, in a variety of ways – reflection-*on*-action, reflection-*in*-action, and reflection-*before*-action. These three models of reflection, Coll et al. (2009) argue, are all necessary if integration is to occur in both directions (viz., to and from the workplace). Thirdly, they argue that co-op educators need to draw upon their educational background, and work with employers to help develop workplace-based pedagogies that will enhance workplace learning, believing that much workplace learning is accidental or ad hoc in nature.

10.6 The Real Value of Cooperative Education

Cooperative education has been a recognised strategy for learning through practice for over 100 years. It provides an opportunity to expose students to worlds of learning that are different but complementary. These complementary worlds have different sociocultural dimensions that afford different learning opportunities to students. We argue that these complementary settings for learning are equally valid in providing the type of holistic education that Schneider may have envisaged in 1906. What are required to achieve this education are clearly defined integrative pathways that allow students to make sense of the learning that they are afforded, and that which they also contribute to the settings of the classroom and the workplace. This places greater emphasis on all three parties to understand the mediational means that afford learning in these settings, to recognise their differences and their similarities, and to structure cooperative education programmes that enhance integrative opportunities for learning in both settings.

Support in this emphasis is required for the role of the co-op educators who facilitate the movement of students between the settings, and encourage development of the reflective capability that will provide the students with the lifelong skill of managing their own learning. The real strength of cooperative education as a strategy of practice-based learning is not that students gain opportunities to learn in the classroom and in the workplace, but that these opportunities are fostered and integrated to create learning that is more than the sum of the two parts. This helps the learner to find their place in the world and to understand how to shape the future, which are true measures of education.

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