



Essay

## Assessment of Workplace Learning: A Framework

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When used as an educational, rather than vocational strategy, work placements and internships are expected to provide for learning outside the classroom or lecture hall. Evaluation of work placements often become evaluation of programs or operational outcomes with little focus on evaluation of what learning has actually occurred. In this paper we present a framework for the assessment of workplace learning. This model is based on sociocultural theories of learning and draws upon experiences and theoretical underpinnings used in the education literature for socially-situated learning environments. The author's argue that all learning is socially-mediated and thus assessment of learning must take into account the context, environment and objectives of the learning experience for individual learners. (*Asia-Pacific Journal of Cooperative Education, 2003, (1), 9-18*).

*Keywords:* New Zealand; science; technology; assessment; framework; sociocultural

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Assessment of workplace learning is seen internationally as a substantial challenge. Previous reports in the literature suggest that the teaching and medical professions offer some useful insights into workplace assessment (Booth, Hargraves, Bradley & Southworth, 1995; Coll, Taylor & Grainger, 2002). In this paper we present a theoretical framework for the assessment of workplace learning that is derived in part from a model proposed for the evaluation of the implementation of school curricula (Carr, 2002; Carr et al, 2000). The framework draws on a teaching-based model and proposes that the enactment of workplace assessment, like workplace learning, is mediated by key individuals: supervisory teachers in the case of the teaching practicum, and industry supervisors, in the case of industry-based work placements. The implications of this framework are discussed using an example from a science and technology work-based learning program.

In our view assessment procedures in work-based learning situations need to take into account the following factors (based on Coll, Taylor & Grainger, 2002):

1. What is the purpose of work based learning - to achieve technical competence alone or to take into account other non-technical competencies?
2. What are the achievement objectives for work placements and do these link to a widely recognized schedule of benefits for students?
3. How can faculty and industry staff work collaboratively to assess student learning outcomes, and is this measurable in terms of externally referenced criteria?
4. How does context impact on student learning and how should this impact on assessment criteria?

The framework we propose considers the learning process as a whole and incorporates all aspects of learning: program objectives; pedagogies; teaching and learning; features of good learning and good learning environments; learning outcomes; and, the social mediation of learning (Figure 1).

### Program Objectives

In order to decide what it is important to assess, we first

must consider the program objectives (Figure 1). Here we are talking about the degree (or other) program as a whole and not just the co-op or work experience component. Typically the institution is solely responsible for on-campus activities such as lecture, practical classes and the like. Such activities tend to deliver content knowledge and are generally seen as being limited in the provision of practical experience (but some may occur in laboratory classes for example). So, for example, students learn about chemistry or physics theory in lectures, and conduct some practical work in a laboratory but this latter experience is limited compared with the co-op placement experiences.

In a given co-op program, comprising on-campus and off-campus activities, there are three parties, each with differing views as to what constitutes desirable learning outcomes. The value of co-op for students in terms of operational outcomes (e.g., better jobs, more rapid advancement, etc.) is well established and well studied (e.g., Wessells & Pumphries, 1995, 1996) and research suggests that these rather pragmatic outcomes are important to students (Freeland, Marini & Weighart, 1998). However, much less is known about the educational processes and what actual learning occurs during co-op, which is of interest to faculty (Eames, 2002, 2003). Given the name (i.e., cooperative education), one might expect that co-op is about *education* and thus learning. But what exactly do students learn? Eames (1999) has pointed out that students learn different things (e.g., content knowledge and technical competencies, as well as about the workplace culture) and learn in different ways. Here we propose that students learn a variety of competencies, in a variety of educational settings, by variety of means, from variety of individuals and communities. The literature suggests that some of these competencies are more valued by faculty and others by employers (Burchell, Hodges & Rainsbury, 1999, 2000).

These competencies form what we see as *institutional, employer and student expectations* (Figure 1). Another underlying, non-explicit outcome is what we shall refer to as acceptable *community practice*. This latter concept is derived from sociocultural views of learning (see below) and from Eames's (1999, 2000, 2003) work, which shows that students as well as learning how to do things (i.e., skill acquisition), also learn about workplace culture; norms of practice, what is acceptable behavior and what is not, by a process of enculturation into a workplace context. While there are many innovative, campus-based programs that incorporate elements of simulated practice in the classroom, they cannot replicate the full complexities of the workplace. It is our contention here, that as reported elsewhere in the literature, that the placement part of a co-op program is the best means of developing certain competencies, particularly the non-technical competencies or so-called soft skills (see, Coll, Zegwaard & Hodges, 2002).

### *Pedagogies*

Co-op assessment needs to be situated within the whole program; hence we have included aspects on on-campus and off-campus learning and assessment (driven and enacted by the institution) as well as work place assessment. We propose that content knowledge is mostly gained during

taught courses combined with placements or internships (Figure 1). On-campus courses may involve a variety of activities such as lectures, tutorials and some disciplines in, for example, science and technology, a practical component that may include laboratory work, fieldwork and other off-site learning activities.

### *Learning Outcomes*

Burchell Hodges and Rainsbury (1999) and Rainsbury, Burchell and Hodges (2000) suggest that employers value all competencies in students and graduates including both technical competencies (i.e., hard or cognitive skills) and non-technical competencies (i.e., soft or behavioral skills). Hence, any assessment of the work placement should address all skills gained rather than focusing just on skills that are perceived as easy to measure. Research suggests that the skills employers value - the so-called soft skills such as interpersonal skills and communication skills - are more readily developed within the workplace (Coll, Taylor & Grainger, 2002).

### *Teaching and Learning: Features of Good Learning and Good Learning Environments*

Recent inquiry in teaching and learning has attempted to take into account the nature of the student and his or her learning environment (see, e.g., Tobin & Tippins, 1993); much of this thinking is based on constructivist views of learning that have it that learners construct knowledge in their own minds; such construction mediated by the students' current knowledge and prior learning experiences (Wheatley, 1991). Constructivist ideas have been developed further by taking into account the social component of the learning process - resulting in so-called social-constructivist views of learning (Tobin 1994). The authors believe that an individual's constructs are influenced by prior knowledge, are subject to influence by peers, contextual experiences, and social interactions within their particular learning environment (Good, Wandersee & St. Julien, 1993). We accept that beliefs are personal in nature and that mental construction of beliefs is a personal cognitive process, however, we feel that previous work has not adequately addressed the sociocultural component of knowledge and belief construction. If we wish to develop an understanding of how students learn (and thereby how they might be assessed) we need to recognize that these processes are inherently socially-situated within the context or environment in which the learning is conducted. To develop this approach we have drawn on Vygotsky's (1986) views of learning that suggest past research about learning (in any environment) has not paid enough attention to the *social mediation* of mental construction even in social constructivist-based studies. Wertsch (1991) summarizes: "The basic tenet of a sociocultural approach to mind is that human mental functioning is inherently situated in social interactional, cultural, institutional, and historical context. Such a tenet contrasts with approaches that assume, implicitly or explicitly, that it is possible to examine mental processes such as thinking or memory independently of the

sociocultural setting in which individuals and groups function” (p. 86).

Features of good learning thus refer to how teaching and learning is contextualised and constructed. As detailed in Figure 1, this process of learning and mental construction is socially-mediated. This mediation includes a variety of elements including: workplace culture and norms; student culture, background and beliefs; students’ social skills; students’ physical, mental and emotional attributes.

### *The Assessment of Work Placements*

In the view of the authors (based on their experiences in own their institutions and in dealing with employers), there is a mismatch of what employers value and what institutions are keen to assess. This we propose may be due, in part at least, to the difficulties associated with the assessment of work experience (Cameron-Jones & O’Hara, 1994). Indeed this view is supported by research that reveals that employers of, for example, new teachers “display a clear preference for ‘evidenced’ comments over ‘predictive’ comments” (Cameron-Jones & O’Hara, 1994. p. 213). Hence, it seems that faculty and some employers wish to see ‘rigorous’ assessment procedures that can be backed up with ‘solid’ evidence, whereas others are keen to see evaluation of non-technical competencies (see, Coll, Taylor & Grainger, 2002).

The danger with workplace assessment we posit, is that it is easy to see how the assessment of work based learning based only on well referenced competencies and standards (as in, e.g., Preece, 1993), can *claim* a kind of rigor which may be misleading (Grainger, 2001a,b). Assessors need to be wary of tending to assess the more easily identified technical competencies (Polanyi, 1969; Rubin, 1985; Schon, 1983, 1987). The authors thus argue that defining what is to be assessed and the purpose (i.e., in terms of learning outcomes) of the work-based learning is paramount (see above).

The authors argue that the danger of too much emphasis on technical competencies (by technical competencies we mean the itemized micro-skills of learning or work - every discipline will by definition have its own micro-skills of practice), is that it can overshadow characteristics such as the tacit knowing (Polanyi, 1969), intuition (Rubin, 1985) and artistry (Schon, 1983, 1987) of the professional practitioner, and so ‘rigor’, if it is in fact achieved at all, comes at too high a price. The workplace settings in which students conduct their placements are highly complex environments full of unpredictable variables such as student needs, backgrounds, social skills and physical, mental and emotional attributes. Thus to itemize out the skills of students in a way which divorces them from the infinitely variable context in which they work, is to miss the essence of what it is to be a learner.

The way forward for the assessment of experiential learning including work placements, according to some authors, is to replace summative assessment with formative assessment - something many teachers, for example, already feel comfortable with (see, e.g., Calderhead & Shorrock, 1997; Dunne & Harvard, 1993; Stones, 1994). In this mode

of assessment student and faculty focus on learning rather than accountability, and emphasize growth and development over ‘final judgment’. The development of an individual capable of reflective practice (Schon, 1983, 1987) and diagnostic evaluation of their own strengths and weaknesses as a practitioner in whatever field they are engaged in (Stones, 1994), will likely be of more long-term benefit than assessment based on a rather spurious mark or grade that is based, at best, on a sampling or snapshot of a students’ ability on the day or days in which it was conducted. Instead of leaving their program of study with a ‘pass’ for their work placement, novices can leave with a profile or portfolio of their abilities. This also will enable future employers to ascertain if these individuals possess the skills and attributes desired.

### **Models for Assessment of Work Placements: A Case Study for Science & Technology**

Stones (1994) laments any attempts to see assessment as anything other than the complex task that it is: “The flawed nature of assessment should be recognized and the ... common practice of awarding finely graded assessments be abandoned” (p.239). We agree and such a view is consistent with other author’s views about the complexity of assessment. However, if one were to propose that a simple pass/fail system as an alternative to a ‘fine-graded’ system’ we see two potential difficulties. First, the awarding of grade provides for a measure of incentive and reward. Students like to get a higher grade or mark when they expend more effort. The second issue is related to lowering of standards. Research in the UK, for example, has shown that with a pass/fail system, most trainee teachers in the UK system are given a passing grade and few in fact fail their teacher training courses (Stones, 1994; Stones & Webster, 1984).

Many tertiary students in New Zealand complete some form of work based experience as part of tertiary qualifications (Eames, 2000), and has been part of educational strategy for many years worldwide. Such programs tend to have great diversity amongst practitioners despite research undertaken in these areas. The assessment of these work based placements is seen as an essential part of the placement as it would gauge the students’ performance with an applied environment of their field of study. The process of evaluation has varied greatly as has the weighting for this assessment as part of the overall grade, if any, given to the student (Coll, Eames & Zegwaard, 2002). Assessments have varied from a holistic approach, to the determination of performance of set individual tasks. Recent research has shown a remarkable commonality yet a holistic view of desirable graduate competencies amongst science and technology employers. Employers value both technical competency and the so-called soft skills such as communication and ability and willingness to learn (Coll, Zegwaard & Hodges, 2002). In the view of the authors, it makes sense for assessment, and therefore learning outcomes, to be based on employers’ desires. However, deciding the weight given to employers’ views is one of the greatest challenges facing placement coordinators.

We propose three models above for the assessment of work placements derived from the framework described above. The first model is based on employers' views of desirable competencies; the second is based on the negotiation of placement objectives; and, the third consists of a portfolio approach to assessment. It is important to note at this point that these are *proposed* models, based on our theoretical framework although two of the models - the assessment based on placement objectives and portfolio approach - have been trialled in pilot studies (Coll, unpublished work; Coll & Taylor, 1998). We do not for example, attempt to specify the grading mechanisms that might be employed (e.g., a simple pass/fail or stepped grading scheme). Nor do the models attempt to specify the weightings an institution might attach to them and how co-op coordinators might interpret their meaning into student marks/grades. The models can be used in different ways. For instance, the first two models could be used separately, by employers, academics and students, as a basis for discussing and finalizing the agreed outcomes/assessment marks. There could also be some mixing and matching between the first two models, such as including some additional, negotiated learning goals to the employer-focused first model. Both models could also be supported by other assessment methods such as reflective essays.

#### *Identification and Ranking of Graduate Competencies*

The first model is based on previous research which investigated science and technology employers' ranking of a series of work place competencies (Coll, Zegwaard & Hodges, 2002). Employers top ranked competencies were: *ability and willingness to learn, teamwork and cooperation, initiative, analytical thinking, computer literacy, concern for order, quality and accuracy, and written communication skills*. These competencies are provided in the form of a template and employers are asked to rank student performance part way through the placement and at the end of the placement (Figure 2). A similar template, with employers ranking split into two components; technical or hard skills and soft skills, can also be used.

A key feature of this model is that it is based on research into the employers *within the context* in which the placements occur. Hence, here the competencies used in the assessment process are those that have been determined by the researchers to be important to the employers of students from their co-op program. The intention of the model in Figure 2 then is that employers and students (perhaps facilitated by placement coordinators) would negotiate the meaning of 'very competent' 'competent', 'limited' and 'deficient' in their education context of the workplace setting.

#### *Assessment Based on Placement Objectives*

In the second model, sample placement objectives – specific to the workplace – are negotiated at the beginning of the placement between the student and employer (Figure 3) (in the study, a whole complement of placement objectives were negotiated and enacted during the duration

of a nine month placement, Coll, unpublished work). In the example provided, the employer and student negotiated the objectives detailed in Figure 3 along with the a shared meaning for the terms 'very competent' 'competent', 'limited' and 'deficient', in the education context of the workplace setting. These were moderated by the subject placement coordinator and agreed levels of competency thus were in effect negotiated by the three parties; this was deemed appropriate given that all three parties are part of a co-op educational program. In both cases, formative assessment also proved possible, in that the model was applied during and at the end of the placement.

Hence, our proposition here is that other co-op partners could develop similar models, based on specific placement objectives in their education settings using this tripartite model for co-op assessment, in a manner that is clearly socially-situated. This model has the unusual advantage of allowing for some student input into assessment.

#### *A Portfolio Model for Assessment*

Final summative assessment can also be based on a third model, a portfolio model which can also serve as the basis for a student profile and subsequent employer reference. A student portfolio can be based on model two above, and the employers' rating of student competence can be used as part of the student portfolio. Other assessment items such as placement reports (or parts thereof) can also be included in the portfolio. There are a number of ways portfolios can be managed. The placement coordinator can set minimum requirements (e.g., placement reports, evidence for technical and non-technical competencies), but like model two above, there is enough flexibility to allow some student choice of what can go in. This should include a variety of items including exemplars of the students' work. The portfolio concept, therefore, can offer insights into the 'soft skills' discussed in the introduction, and help to solve the mismatch between what employers value, and providers find difficult to assess, because it allows individuals to reflect the attitudes and values that underpin their professional artistry.

Importantly, it enables students to express what they believe they have learned in their own way, and to capture and document their unique learning experiences with a much broader array of evidence. This method also provides students with a powerful tool to help them gain enriched meaning and construct new knowledge from their workplace experiences. The portfolio is both formative and summative, that not only encourages reflection and development for students, but also provides compelling evidence of achievement for academic assessors.

#### **Conclusions**

We do not especially endorse any of the three models proposed here, but suggest that co-op placement coordinators and other co-op professionals consider which model might be appropriate for their educational context. We would argue strongly that for co-op placement assessment to be meaningful, it must take into account the complexity of the placement process and the situated nature

of the learning environment, and not focus solely on easily identifiable technical competencies that are seen as easy to measure.

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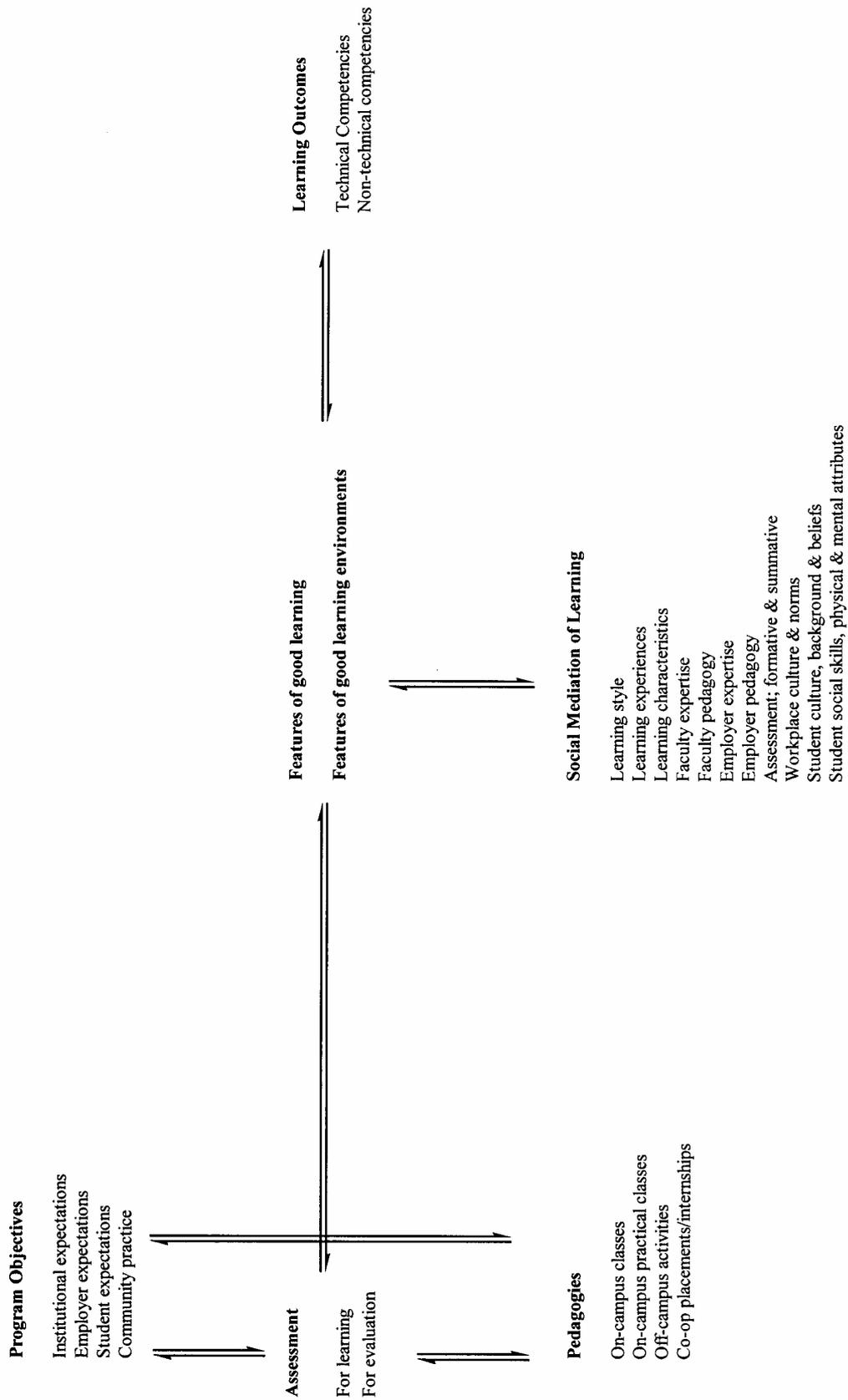
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**Figure 1**  
A model for the assessment of work-based learning



**Figure 2**  
Sample model for workplace assessment based on survey of employers' ranking of work place competencies

	Very Competent	Competent	Limited	Deficient
<b>Ability and willingness to learn</b> (desire and aptitude for learning, learning as a basis for action)				
<b>Teamwork &amp; cooperation</b> (fosters group facilitation and management, conflict resolution, motivation of others, creating a good workplace climate)				
<b>Initiative</b> (bias for action, decisiveness, strategic orientation, proactive, seizes opportunities, self motivation, persistence)				
<b>Analytical thinking</b> (thinking for self, reasoning, practical intelligence, planning skills, problem analysing, systematic)				
<b>Computer literacy</b> (able to operate a number of packages and has information management awareness)				
<b>Concern for order, quality &amp; accuracy</b> (monitoring, concern for clarity, reduces uncertainty, keeping track of events and issues)				
<b>Written communication</b> (relevant skills/appropriate use of emails, internal memos, internal and external reports, letters to clients)				
<b>Very Competent</b>				
<b>Competent</b>				
<b>Limited</b>				
<b>Deficient</b>				

**Figure 3**  
Sample model for workplace assessment based on negotiated placement objectives (Level: Technician)

	Very Competent	Competent	Limited	Deficient
<b>Technical Objectives</b>				
<i>Instrumentation</i> High Performance Liquid Chromatography (HPLC): -instrument familiarity -instrument operation -instrument competence -instrument expertise	Able to identify instrument failure and make appropriate remediation of faults	Recognizes instrumental failure and proposed possible solutions for faults	Recognizes instrumental failure	Unable to recognize instrumental failure
<i>Formulation Chemistry</i> Competence in formulation chemistry: -make up formulations under supervision -make up formulations independently -modify formulations independently -design formulations independently				
<b>Non-Technical Objectives</b>				
<i>Interpersonal Communication</i> Competence in Interactions with Other People: -keeps clear readable records of laboratory work -Initiates written/oral communication with fellow workers in technical group -Initiates written/oral communication with workers in other technical groups as appropriate - Initiates written/oral communication with management staff - Initiates written/oral communication with outside people/organizations	Fosters group facilitation and management, conflict resolution, motivation of others, creating a good workplace climate	Communicates actively within work place, and to some extent with external parties, contributes actively to group work	Able to communicate within workplace, and contributes to group work when supervised closely	Fails to communicate and fails to contribute to group work