Assessment, Teaching and Theories of Learning

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ASSESSMENT, TEACHING AND THEORIES OF LEARNING

Mary James

Introduction

The discussion of formative assessment practice and implications for teachers' professional learning, in chapters 1 and 2, draws attention to the close relationship between assessment and pedagogy. Indeed, the argument in both chapters is that effective assessment for learning is central and integral to teaching and learning. This raises some theoretical questions about the ways in which assessment, on the one hand, and learning, on the other, are conceptualised and how they articulate. This chapter considers the relationship between assessment practice and the ways in which the processes and outcomes of learning are understood, which also has implications for curriculum and teaching. Starting from an assumption that there should be a degree of alignment between assessment and our understandings of learning, a number of different approaches to the practice of classroom assessment are described and analysed for the perspectives on learning which underpin them. Three clusters of theories of learning are identified and their implications for assessment practice are discussed. The point is made that learning theorists themselves rarely make statements about how learning outcomes within their models should be assessed. This may account for the lack of an adequate theoretical base for some assessment practices and, conversely, for lack of development of assessments aligned with some of the most interesting new learning theory. The chapter concludes with a discussion of whether eclectic or synthetic models of assessments matched to learning are feasible. The intention here is to treat the concepts broadly and to provide a basis for more specific consideration of particular issues in the two chapters following this one, and indeed in the rest of the book. Thus chapter 4 examines the role of assessment in motivation from learning and chapter 5 focuses on the theory of formative assessment.

Alignment between assessment and learning?

The alignment (Biggs, 1996; Biggs and Tang, 1997) of assessment with learning, teaching and content knowledge is a basis for claims for the validity of assessments (see chapter 8), but the relationship is not straightforward and cannot be taken for granted. Indeed there are plenty of examples of assessment practices that have only tenuous or partial relationships to current understanding of learning within particular domains. Take, for instance, short answer tests in science that require recall of facts but do not begin to tap into understanding of concepts or the investigative processes that are central to the 'ways of thinking and doing' (Entwistle, 2005) that characterise science as a subject discipline. Nor do assessment practices always take sufficient account of current understanding of the ways in which students learn subject matter, the difficulties they encounter and how these are overcome.

Historically, much assessment practice was founded on the content and methods of psychology especially the kind of psychology that deals with mental traits and their measurement. Thus classical test theory has primarily been concerned with differentiating between individuals who possess certain attributes, or determining the degree to which they do so. This 'differentialist' perspective is still very evident in popular discourse (see, for example, Phillips, 1996). The focus tends to be whether some behaviour or quality can be detected rather than the process by which it was acquired. However, during the twentieth century our understanding of how learning occurs has developed apace. It is no longer seen as a private activity dependent largely, if not wholly, on an individual's possession of innate and generally stable characteristics such as general intelligence. Interactions between people, and mediating tools such as language, are now seen to have a crucial role in learning. Thus the assessment of learning outcomes needs to take more account of the social as well as individual processes through which learning occurs. This requires expansion of perspectives on learning and assessment that take more account of insights from the disciplines of social-psychology, sociology and anthropology.

Similarly, insofar as assessments are intended to assess 'something' i.e. some content, account needs also to be taken of the way the subject domain of relevance is structured, the key concepts or 'big ideas' associated with it, and the methods and processes that characterise practice in the field. This is an important basis for construct validity without which assessments are valueless (see chapter 8). This requirement implies some engagement with ideas from the branch of philosophy that deals with the nature of knowledge i.e. epistemology. Thus psychological, social-psychological, sociological and epistemological dimensions, all need to be taken into consideration at some level in the framing of assessment practice. This is no easy task for assessment experts and may seem far too great an expectation of classroom teachers; yet one might expect their training to provide them minimally with pedagogical content knowledge (Shulman, 1987), a basic understanding of how people learn (learning theory), and some assessment literacy (Earl et al., 2000), in order to put these things together. The difficulty, in the climate that has developed around initial teacher training over the last fifteen years, has been the reduction of teaching to a fairly atomistic collection of technical competences. This is antithetical to the synoptic and synthetic approach that teachers may need to acquire in order to align their teaching and assessment practice to their understanding of learners, learning and subject knowledge.

Teachers are not helped by the fact that formal, external assessments – often with high stakes attached to them – are often not well aligned either. Whilst exciting new developments in our understanding of learning unfold, developments in assessment systems and technology sometimes lag behind. Even some of the most innovative and novel developments, say, in e-assessment, are underpinned by models of learning that are limited or, in some cases, out-of-date. This is understandable too because the development of dependable assessments – always an important consideration in large-scale testing – is associated with an elaborate technology which takes much time and the skills of measurement experts, many of whom have often acquired their expertise in the very specialist field of psychometrics. This is especially true in the United States which has a powerful influence on other Anglophone countries (see chapter 10).

In this book we are primarily interested in classroom assessment by teachers, but research tells us that teachers' assessment practice is inevitably influenced by external assessment (Harlen, 2004) and teachers often use these assessments as models for their own, even if they do not use them directly. By using models of assessment borrowed from elsewhere, teachers may find themselves subscribing, uncritically or unwittingly, to the theories of learning on which they are based. Some teachers do have clear and internally consistent theories of learning to underpin their assessment practice, and they are able to articulate them, as teachers involved in the KMOFA Project (Black et al., 2003; see chapter 1) and others investigated by Harlen (2000) illustrate. But some disjunction between 'espoused theory' and 'theory-in-practice' (Schön, 1983) is common, as is a lack of theoretical coherence. This raises a question about whether it really matters what conceptions of learning underpin classroom assessment practices if they are deemed to 'work' well enough, and whether the need for consistency between teaching, learning and assessment might be overrated.

My view is that it does matter because some assessment practices are very much less effective than others in promoting the kinds of learning outcomes that are needed by young people today and in the future (see James and Brown, 2005, for a discussion of questions for assessment arising from different conceptions of learning outcomes). As chapter 4 will make clear, the learning outcomes of most value to enable human flourishing - as citizens, as workers, as family and community members and as fulfilled individuals - are those that enable them to continue learning, when and where required, in a rapidly changing, information- and technology-rich environment. There is a need, therefore, for teachers to have a view about the kinds of learning that are most valuable for their students and to choose and develop approaches to teaching and assessment accordingly.

Helping teachers to become more effective may therefore mean both change in their assessment practice and change in their beliefs about learning. It will entail development of a critical awareness that change in one will, and should, inevitably lead to the need for change in the other. So, for instance, implementing assessment for learning/formative assessment may require a teacher to rethink what effective learning is, and his or her role in bringing it about. Similarly a change in their view of learning is likely to require assessment practice to be modified. While the focus of this book is mainly on formative assessment, a good deal is relevant to classroom based summative assessment by which teachers summarise what has been achieved at certain times.

Examples of different classroom assessment practices

So, what might classroom assessments practices, aligned with different theories of learning, look like? Consider the following examples. They are written as caricatures of particular approaches in order to provide a basis for subsequent discussion. In reality, the differences are unlikely to be so stark and teachers often blend approaches. The focus of the examples is a secondary school teacher who has just received a new student into her English class. He has recently arrived in the country and English is an additional language for him although he speaks English reasonably well. The teacher

wants to assess his writing. If she chooses one of the following approaches what would it say about her model of knowledge, learning and assessment?

Example 1
She sits him in a quiet room by himself and sets him a timed test that consists of short answer questions asking him, without recourse to reference material or access to other students, to: identify parts of given sentences (nouns, verbs, articles, connectives); make a list of adjectives to describe nouns; punctuate sentences; spell a list of ten words in a hierarchy of difficulty; write three sentences describing a favourite animal or place; write the opening paragraph of a story. She then marks these using a marking scheme (scoring rubric), which enables her to identify incorrect answers or weaknesses and compare his performance with others in the class. As a result she places him in a group with others at a similar level and then provides this group with additional exercises to practise performance in areas of weakness. When he shows improvement she is liberal with her praise and then moves on to the next set of skills to be learnt. Learning by rote and practice are a dominant feature of this approach.

Example 2
As part of her class teaching, she has been covering work on 'genre' in the programme of study. Her current focus is narrative and especially the aspect of temporal sequencing. The class has been reading J.R.R. Tolkien's 'The Hobbit' and she used this as a stimulus for their own writing of stories of journeys in search of treasure. The students discuss the qualities of The Hobbit that make it a good story, including structure, plot, characterisation, use of language and dramatic tension (all key concepts to be understood). These they note as things to consider in their own writing. Using a writing frame they first plan their stories and then try out opening paragraphs. They write their stories over a series of lessons. At draft stages they review their work, individually, with the teacher, and through peer discussion, using the criteria they have developed. Then they redraft to improve their work using the feedback they have received. The teacher monitors this activity throughout and observes that her new student has a rich experience of travel to draw on, although some of those experiences have been negative and need to be handled sensitively. With English as an additional language he knows more than he can say and needs to be helped to acquire a wider vocabulary. He also has problems with sequencing which she thinks could indicate a specific learning difficulty or a different cultural conception of time. She makes a mental note to observe this in future activities. In the meantime she decides to provide lots of opportunities for him to engage in classroom talk to help with the first difficulty. To help with the sequencing difficulty, she suggests that he writes topic sentences on card and cuts them out so that he can physically move them round his table until he gets them in a satisfactory order. When his story is complete, the student is asked to record his own self-evaluation and the teacher makes comments on this and his work which they discuss together to decide next steps. She does not make much use of praise or numerical scores or grades because, by making learning explicit, he understands the nature and substance of the progress he has made.

Example 3
The teacher regards one of her main aims as helping to develop her students as writers. To this end she constructs her classroom as a writing workshop. The new student is invited to join this workshop and all participants, including the teacher and

any learning support assistants, are involved, on this occasion, in writing stories for children of a different age to themselves. Although their own writing, or the writing of others including established authors, is used to stimulate thinking and writing, all members in the group, from the most expert to the most novice, are encouraged to set their own goals and to choose an individual or group task that will be challenging but achievable with the help of the knowledge and skill of others in the group. There is no concept of a single, specific goal to be achieved or a performance 'gap' to be closed but rather a 'horizon of possibilities' to be reached. The broad learning goal is for all members of the group to develop their *identities* as writers. By participating together in the activity of writing, each member of the group has the opportunity to learn from the way others tackle the tasks (rather than being told how to do things). Different members of the group take on the role of student and teacher according to the particular challenges of a given activity. For example if the teacher wants to write a story for young people she might need to learn about street language from her students; thus they become her teachers. At intervals the members of the group read their work to the rest and the group appraise it, drawing on the criteria they use to judge what counts as good work. These criteria may be those shared by writers more generally (as in examples 1 and 2 above) but the dynamic of the group might allow new criteria to emerge and be accepted as norms for this group. For example, the introduction of a new student member with a different cultural background could encourage more experimental work in the group as a whole. The model is in some respects similar to apprenticeship models, although these tend to be associated with the preservation and maintenance of guild knowledge. In other respects it goes beyond this and, like the University of East Anglia's well-known creative writing course, it seeks to foster creativity. Our new student begins by being a peripheral participant in this writing workshop, observing and learning from what others do, but gradually he is brought into the group and becomes a full participating member. Assessment in this context is ongoing, continuous, shared by all participants (not just the preserve of the teacher) but linked very specifically to the particular activity. There is often less concern to make general statements about competence and more concern to appraise the quality of the particular performance or artefact, and the process of producing it. It is considered especially important to evaluate how well the student has used the resources (tools) available to him, in terms of materials, technology, people, language and ideas, to solve the particular problems he faced. The learning is focused on an authentic project so one of the most important indicators of success will be whether the audience for the stories produced (other children) respond to them positively. Their response will also provide key formative feedback to be used by the individual student and the group in future projects. The role of the English teacher is therefore not as final arbiter of quality but as 'more expert other' and 'guide on the side'. Learning outcomes are best recorded and demonstrated to others through portfolios of work, rather like those produced by art students, or through the vehicle of the 'masterpiece' (the 'piece for the master craftsman' designed to be a demonstration of the best of which the apprentice is capable – also a model for the doctoral thesis).

Each of these examples looks very different as a model of teaching, learning and assessment, yet each is internally consistent and demonstrates alignment between (i) a conception of valued knowledge in the sub-domain (writing in English), (ii) a view of learning as a process and its implications for teaching, and (iii) an appropriate method for assessing the process and product of such learning. Of course, each of these

elements may be contested, as are the theories on which they are founded. These theories are elaborated in the next section.

The theoretical foundations of learning and assessment practice

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In this section I consider three views of learning, identifying their manifestation in classroom practice and the role of assessment in each. The three examples given in the previous section were an attempt to portray what each of these might look like in the real world of schools: to put flesh on theoretical bones. In reality however, teachers combine these approaches by, for instance, incorporating elements of example 1 into example 2, or combining elements of example 2 with example 3. Thus boundaries are blurred. Similarly, the perspectives on learning considered in this section are broad clusters or families of theories. Within each cluster there is a spectrum of views that sometimes overlap with another cluster, therefore it is difficult to claim exclusivity for each category. For example, constructivist rhetoric can be found in behaviourist approaches and the boundary between cognitivist constructivism and social constructivism is indistinct. This may be helpful because, in practice, teachers often 'cherry-pick'. Whilst theorists can object that this does violence to the coherence of their theories and their intellectual roots, I will argue, in the next section of this chapter, that teachers may have grounds for combining approaches.

In the US literature (Greeno, Pearson and Schoenfeld, 1996; Bredo, 1997; Pellegrino et. al., 2001) the three perspectives are often labelled 'behavorist', 'cognitive' and 'situated' but within the UK, drawing in more of the European literature, the labels 'behaviourist', 'constructivist', and 'socio-cultural' or 'activist' are sometimes preferred. These two sets of labels are combined in the descriptions below because they are roughly equivalent. Each of these perspectives is based on a view of what learning is and how it takes place; it is in respect to these key questions that they differ. However - and this is an important point - they do not necessarily claim to have a view about the implications for the construction of learning environments, for teaching, or for assessment. This has sometimes created problems for learning theorists because practitioners and policy makers usually expect them to have a view on these matters, and if they haven't then there are others who try to fill the gap – some successfully and others less so.

The Learning Working Group, set up in 2004 by David Miliband, then Minister for School Standards in England, and chaired by David Hargreaves, noted this with respect to Howard Gardner's theory of Multiple Intelligences:

> In the case of multiple intelligences there have undoubtedly been consequences in education that Gardner did not intend, and soon he began to distance himself from some of the applications in his name that he witnessed in schools.
>
> > '…I learned that an entire state in Australia had adopted an educational program based in part on MI theory. The more I learned about this program, the less comfortable I was. While parts of the program were reasonable and based on research, much of it was a mishmash of practices, with neither

> scientific foundation nor clinical warrant. Left-brain and right-brain contrasts, sensory-based learning styles, 'neuro-linguistic programming', and MI approaches commingled with dazzling promiscuity.
>
> (Learning Working Group, 2005:15)

The theory of MI is not a theory of *learning,* strictly speaking, but a theory of mental traits, but the point is an important one because the scholarship of learning theorists is, by definition, focused on *learning per se*, and not necessarily the implications and application of their ideas for pedagogic practice. To take this second step requires applications to be equally rigorously investigated if they are to be warranted (see James et al, 2005). In Gardner's case this was the reason for his key role in Harvard's Project Zero that applied his ideas to practice.

Bearing these cautions in mind, the following account summarises, in a schematic and necessarily brief way, the key ideas associated with each of the three families of learning theories: first, how learning takes place (the process and environment for learning) and, secondly, how achievement (the product of learning) is construed. This is as far as some theories go. However, and very tentatively, I also extract some implications for teaching and assessment that would seem to be consistent with the theory, as illustrated in the examples in the section above.

Behaviourist theories of learning

Behaviourist theories emerged strongly in the 1930s and are most popularly associated with the work of Pavlov, James Watson, B.F. Skinner and Thorndike. Behaviourism remained a dominant theoretical perspective into the 1960s and 70s, when some of today's teachers were trained, and can still be seen in behaviour modification programmes as well as everyday practice. Bredo (1997), who is particularly interesting on the subject of the philosophical and political movements that provide the background to these developments, notes the association with the political conservatism that followed the end of World War I and the growth of positivism, empiricism, technicism and managerialism.

According to these theories the environment for learning is the determining factor. Learning is viewed as the conditioned response to external stimuli. Rewards and punishments, or at least the withholding of rewards, are powerful ways of forming or extinguishing habits. Praise may be part of such a reward system. These theories also take the view that complex wholes are assembled out of parts so learning can best be accomplished when complex performances are deconstructed and when each element is practised and reinforced and subsequently built upon. These theories have no concept of mind, intelligence, ego; there is 'no ghost in the machine'. This is not necessarily to say that such theorists deny the existence of human consciousness but that they do not feel that this is necessary to explain learning; they are only interested in observable behaviour and claim that this is sufficient. From this perspective, achievement in learning is often equated with the accumulation of skills and the memorisation of information (facts) in a given domain, demonstrated in the formation of habits that allow speedy performance.

Implications for teaching construe the teacher's role as to train people to respond to instruction correctly and rapidly. In curriculum planning, basic skills are introduced before complex skills. Positive feedback, often in the form of non-specific praise, and correction of mistakes are used to make the connections between stimulus and response. As for the environment for learning, these theories imply that students are taught best in homogenous groups according to skill level, or individually according to their rate of progress through a differentiated programme based on a fixed hierarchy of skill acquisition. Computer-based typing 'tutors' are paradigm examples of this although the approach is also evident in vocational qualifications post-16 (e.g. GNVQ) where learning outcomes are broken down into tightly specified components. In the early days of National Curriculum the disaggregation of attainment levels into atomised statements of attainment reflected this approach. The current widespread and frequent use of Key Stage 2 practice tests to enhance scores on national tests in England is also rests on behaviourist assumptions about learning.

Implications for assessment are that progress is measured through unseen, timed tests with items taken from progressive levels in a skill hierarchy. Performance is usually interpreted as either correct or incorrect and poor performance is remedied by more practice on the incorrect items, sometimes by deconstructing them further and going back to even more basic skills. This would be the only feasible interpretation of formative assessment according to these theories. Example 1 in the previous section comes close to this characterisation.

Cognitive, constructivist theories of learning
These theories derive from a mix of intellectual traditions including positivism, rationalism and humanism and, as with behaviourist theories and socio-cultural ones (below), this family includes theorists from both America and Europe. Noted theorists include linguists such as Chomsky, computer scientists such as Herbert Simon, and cognitive scientists such as Jerome Bruner (who in his later writing moved towards socio-cultural approaches, see Bruner, 1996). Recently neuroscientists have joined these ranks and are offering new perspectives on theories that began their real growth in the 1960s, alongside and often in reaction to, behaviourism.

Learning, under these theories, requires the active engagement of learners and is determined by what goes on in people's heads. As the reference to 'cognition' makes clear, these theories are interested in 'mind' as a function of 'brain'. A particular focus is on how people construct meaning and make sense of the world through organising structures, concepts and principles in schema (mental models). Prior knowledge is regarded as a powerful determinant of a student's capacity to learn new material. There is an emphasis on 'understanding' (and eliminating misunderstanding) and problem solving is seen as the context for knowledge construction. Processing strategies, such as deductive reasoning from principles and inductive reasoning from evidence, are important. Differences between experts and novices are marked by the way experts organise knowledge in structures that make it more retrievable and useful. From this perspective, achievement is framed in terms of understanding in relation to conceptual structures and competence in processing strategies. The two components of metacognition - self-monitoring and self-regulation – are also important dimensions of learning.

This perspective on learning has received extensive recent attention for its implications for teaching and assessment. The two companion volumes produced by the US National Research Council (Bransford et al., 2000; Pellegrino et al, 2001) are perhaps the best examples of the genre currently available. With the growth of neuroscience and brain research, there are no signs that interest will diminish. The greatest danger seems to be that the desire to find applications will rush ahead of the science to support them (see the quote from Gardner above). Cognitivist theories are complex and differentiated and it is difficult to summarise their overall implications. However, in essence, the role of the teacher is to help 'novices' to acquire 'expert' understanding of conceptual structures and processing strategies to solve problems by symbolic manipulation with 'less search'. In view of the importance of prior learning as an influence on new learning, formative assessment emerges as an important, integral element of pedagogic practice because it is necessary to elicit students' mental models (through classroom dialogue, open-ended assignments, thinking-aloud protocols, concept-mapping), in order to scaffold their understanding of knowledge structures and to provide them with opportunities to apply concepts and strategies in novel situations. In this context teaching and assessment are blended towards the goals of learning, particularly the goal of closing gaps between current understanding and the new understandings sought. Example 2 in the previous section illustrates some aspects of this approach. It is not surprising therefore that many formulations of formative assessment are associated with this particular theoretical framework (see chapter 5). Some experimental approaches to summative assessment are also founded on these theories of learning , for example the use of computer software applications for problem-solving and concept-mapping as a measure of students' learning of knowledge structures (see Pellegrino et al, 2001; and Bevan, 2004, for a teacher's use of these applications). However, these assessment technologies are still in their infancy and much formal testing still relies heavily on behavioural approaches, or on psychometric or 'differentialist' models which, as noted earlier, are often not underpinned by a theory of learning as such because they regard individuals' ability to learn as related to innate mental characteristics such as the amount of general intelligence they possess.

Socio-cultural, situated and activity theories of learning

The socio-cultural perspective on learning is often regarded as a new development but Bredo (1997) traces its intellectual origins back to the conjunction of functional psychology and philosophical pragmatism in the work of William James, John Dewey and George Herbert Mead at the beginning of the twentieth century. Associated also with social democratic and progressivist values, these theoretical approaches actually stimulated the conservative backlash of behaviourism. James Watson, the principal evangelist of behaviourism, was a student of Dewey at Chicago but admitted that he never understood him (Watson, 1961:274, quoted in Bredo, 1997: 17). The interactionist views of the Chicago school, which viewed human development as a transaction between the individual and the environment (actor and structure), derived from German (Hegel) and British (Darwin) thought but it also had something in common with the development of cultural psychology in Russia, associated with Vygotsky (1978), which derived from the dialectical materialism of Marx (see Edwards, 2005, for an accessible account). Vygotsky was in fact writing at the same time as Dewey and there is some evidence that they actually met (Glassman, 2001). Vygotsky's thinking has subsequently influenced theorists such as Bruner (1996) in

the US and Engeström (1999) in Finland. Bruner has been interested in the education of children but Engestrom is known principally for reconfiguring Russian activity theory as an explanation of how learning happens in the workplace. Other key theorists who regard individual learning as 'situated' in the social environment include Barbara Rogoff (1990), Jean Lave and Etienne Wenger (Lave & Wenger, 1991; Wenger, 1998) who draw on anthropological work to characterise learning as 'cognitive apprenticeship' in 'communities of practice'. Given the intellectual roots – deriving as much from social theory, sociology and anthropology as from psychology – the language and concepts employed in socio-cultural approaches are often quite different. For example, 'agency', 'community', 'rules', 'roles', 'division of labour', 'artefacts', 'contradictions' feature prominently in the discourse.

According to this perspective, learning occurs in interaction between the individual and the social environment. (It is significant that Vygotsky's seminal work is entitled *Mind in Society.)* Thinking is conducted through actions that alter the situation and the situation changes the thinking; the two constantly interact. Especially important is the notion that learning is a *mediated activity* in which cultural artefacts have a crucial role. These can be physical artefacts such as books and equipment but they can be symbolic tools such as language. Since language, which is central to our capacity to think, is developed in relationships between people, social relationships are necessary for, and precede, learning (Vygotsky, 1978). Thus learning is by definition a social and collaborative activity in which people develop their thinking together. Group work is not an optional extra. Learning involves participation and what is learned is not necessarily the property of an individual but shared within the social group, hence the concept of 'distributed cognition' (Salomon, 1993) in which collective knowledge of the group, community or organisation is regarded as greater than the sum of the knowledge of individuals. The outcomes of learning that are most valued are engaged participation in ways that others find appropriate, for example, seeing the world in a particular way and acting accordingly. The development of *identities* is particularly important; this involves the learner shaping and being shaped by a community of practice. Knowledge in not abstracted from context but seen in relation to it, thus it is difficult to judge an individual as having acquired knowledge in general terms i.e. extracted from practice.

These theories provide very interesting descriptions and explanations of learning in communities of practice but the newer ones are not yet well worked out in terms of their implications for teaching and assessment, particularly the latter and especially in school contexts. Example 3 in the section above is my attempt to extrapolate from the theory. According to my reading, socio-cultural approaches imply that the teacher needs to create an environment in which people can be stimulated to think and act in authentic tasks (like apprentices) beyond their current level of competence (but in what Vygotsky calls their *zone of proximal development*). Access to, and use of, an appropriate range of tools is an important aspect of such an expansive learning environment. It is important to find activities that a learner can complete with assistance but not alone so that the 'more expert other', in some cases the teacher but often a peer, can 'scaffold' their learning (a concept shared with cognitivist approaches) and remove the scaffold when they can cope on their own. Tasks need to be collaborative and students need to be involved both in the generation of problems

and of solutions. Teachers and students jointly solve problems and all develop their skill and understanding.

Assessment within this perspective is weakly conceptualised at present. Since the model draws extensively on anthropological concepts one might expect forms of ethnographic observation and inference to have a role. However, Pellegrino et al (2001: 101) devote only one paragraph to this possibility and make only one reference to 'in vivo' studies of complex, situated problem-solving as a model. In the UK, Filer and Pollard (2000) provide an ethnographic account of the way children build learning identities and the role assessment plays in this. As they show, learning can be inferred from active participation in authentic (real-world) activities or projects. The focus here is on how well people exercise 'agency' in their use of the resources or tools (intellectual, human, material) available to them to formulate problems, work productively and evaluate their efforts. Learning outcomes can be captured and reported through various forms of recording, including audio- and visual media. The portfolio has an important role in this although attempts to 'grade' portfolios according to 'scoring rubrics' seems to be out of alignment with the socio-cultural perspective. Serafini (2000) makes this point about the state-mandated Arizona Student Assessment Program, a portfolio based system, which reduced the possibilities for 'assessment as inquiry' largely to 'assessment as procedure' or even 'assessment as measurement'. Biggs and Tang (1997) argue that judgement needs to be holistic to be consistent with a socio-cultural or situated approach. Moreover, if a key goal of learning is to build learning identities then students' own self-assessments must be central. However, this raises questions about how to ensure the trustworthiness of such assessments when large numbers of students are involved and when those who are interested in the outcomes of such learning cannot participate in the activities that generate them. Clearly, more work needs to be done to develop approaches to assessment coherent with a socio-cultural perspective on learning.

Possibilities for eclecticism or synthesis

The previous two sections have attempted to show the potential to develop consistency between assessment practice and beliefs about learning and to provide a basis for arguing that change in one almost always requires a change in the other. I have noted, however, that assessment practice is sometimes out of step with developments in learning theory and can undermine effective teaching and learning because its washback effect is so powerful, especially in high stakes settings. It would seem therefore that alignment between assessment practice and learning theory is something to strive for. But is this realistic and how can it be accomplished? Teachers are very interested in 'what works' for them in classrooms and will sometimes argue that a blend or mix of practical approaches works best. They will wonder if this is acceptable or whether they have to be purist about the perspective they adopt. They might ask: Do I have to choose one approach to the exclusion of others? Can I mix them? Or is there a model that combines elements of all? These questions are essentially about purism, eclecticism or synthesis. An analogy derived from chemistry might help to make these distinctions clear.

The paradigm purist might argue that, like oil and water, these theories don't mix. A theory, if it is a good theory, attempts to provide as complete an account as possible of

the phenomena in question. Therefore one good theory should be sufficient. However, if the bounds around a set of phenomena are drawn slightly differently, as they can be with respect to teaching and learning because it is a wide and complex field of study, then a number of theories may overlap. Thus behaviourist approaches seem to work perfectly well when the focus is on the development of some basic skills or habitual behaviours. In these contexts, too much thought might actually get in the way of execution. On the other hand, cognitivist approaches seem to be best when deep understanding of conceptual structures within subject domains is the desired outcome. Thus, 'fitness for purpose' is an important consideration in making such judgements and a mix of approaches, like a mixture of salt and bicarbonate of soda as a substitute for toothpaste, might work well. Such mixing would constitute an *eclectic* approach. None the less, there are practices that contradict each other and to employ them both could simply confuse students. The use of non-specific praise is a case in point. Whilst the use of such praise to reinforce the desired behaviour may be effective in one context, in another context it can be counter-productive to the development of understanding (see chapter 4 for more discussion)

The nature of the subject domain might also encourage consideration of whether priority should be given to one approach in preference to another. For example, subject disciplines, such as science and mathematics, with hierarchically-ordered, generally-accepted conceptual structures may lend themselves to constructivist approaches better than broader 'fields' of study with contested or multiple criteria of what counts as quality learning (Sadler, 1987), such as in the expressive arts. It is perhaps no surprise that teaching and assessment applications from a constructivist perspective draw on an overwhelming majority of examples from science and mathematics (see Bransford, et al., 2000, and Pellegrino et al., 2001). Many elaborations of formative assessment do so also (Black et al, 2003) although accounts of applications in other subjects are being developed (Hodgen and Marshall, 2005) with a resulting need to critique and adapt earlier models (see Chapter 5). Most importantly, the constructivist approach, in both theory and practice, has taken on board the importance of the social dimension of learning: hence the increasing use of the term 'social constructivism'. Similarly, there is now evidence that socio-cultural and activity theory frameworks are involved in a 'discursive shift' to recognise the cognitive potential to explain how we learn new practices (Edwards, 2005). This seems to suggest possibilities for *synthesis* whereby a more complete theory can emerge from blending and bonding of key elements of previous theories. The analogy with chemistry would be the creation of a new compound (e.g. a polymer) through the combining of elements in a chemical reaction. Thus synthesis goes further than eclecticism towards creating a new alignment. Could it be that one day we will have a more complete meta-theory which synthesises the insights from what now appear to be rather disparate perspectives and which permits a range of assessment practices to fit different contexts and purposes whilst still maintaining internal consistency and coherence? Chapter 5 goes some way to meeting this challenge with respect to formative assessment/assessment for learning. Certainly, the possibility for a more complete and inclusive theory of learning to guide practice of teaching and assessment seems a goal worth pursuing.

In the end however decisions about which assessment practices are most appropriate should flow from educational judgements as to preferred learning outcomes. This

forces us to engage with questions of value – what we consider to be worthwhile – and, in a sense, is beyond both theory and method.

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