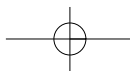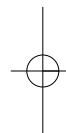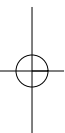# Section 1

Mind and Learning

1

Curriculum: The Case for a Focus on Learning

Robert McCormick and Patricia Murphy

Introduction

'Curriculum' is understood in many ways and has been the subject of study from a number of perspectives. Three levels of analysis have become evident over the years, namely that of the *specified*, the *enacted*, and the *experienced* curricula. Early perspectives focused on the aims and content of what was to be taught; the *specified curriculum*. This focus on the specified curriculum led to analyses that sought to establish the relationships between educational knowledge and the social and economic interests of a society. These analyses have since been expanded to consider the socio-historical influences on the production and validation of the knowledge specified in curricula. More recently this has focused attention on how knowledge is selected, organised, transmitted and evaluated (Bernstein, 1971); and the extent to which worldwide processes are at play in this, in terms of the emergence of standardised models of society and of education (Benavot et al., 1992). These developments had a twofold effect; they extended the context of the curriculum debate in relation to the mediating influences that were identified. They also, and importantly, extended the levels of study of curriculum to include the arena of the 'classroom', i.e. the *enacted curriculum*. In this sense curriculum and instruction were seen as inseparable, reflecting Goodson's concept of curriculum as 'constructed, negotiated, and re-negotiated at a number of levels and in a number of arenas' (Goodson, 1994, p. 111).

Implicated in this shift of perspective were changing views of pedagogy, and of teachers' roles within it, based on developments in understanding about the nature of human action and learning, which led to a focus on a further level of curriculum definition: that of the learners and the curriculum they experience. The *experienced* curriculum has largely been ignored in curriculum debates and it is our contention that this reflects the limited understanding about learning of those involved. If learners are the passive receivers of the enacted curriculum, then the received and the enacted curriculum correspond. What distinguishes these levels is the ability of the learners to learn or receive. If, however, learning is a social process and if learners' agency, like teachers' agency, is recognised, then what is experienced is determined by the participants and the nature of their participation in the arenas in which curricula are enacted; for example, the learning activities and associated assessment. Furthermore, as Murphy (1990) argued, theories of how students learn and develop help determine: *what* is selected for inclusion in the curriculum; *how* it is

taught, including which classroom resources, organisation and pedagogical strategies are judged to be appropriate; and the *nature* of the teacher's role and relationship with learners (Murphy, 1990, p. 35), i.e. all three levels of curriculum definition.

To understand curriculum then, it is necessary to consider the mediating influences and their effects at all three levels of curriculum negotiation; the specified, enacted and experienced. Furthermore, central to these influences are views of learning and associated views of knowledge.

There has been an international trend towards legislating for curricula in schools (Skilbeck, 1990), though this is not universal; with some countries such as France going in the opposite direction (i.e. allowing more local control of the curriculum). The focus in the early 1990s, in those countries where legislation existed, was therefore on the specified curriculum. However, these curricula were invariably accompanied by assessment systems that *enacted* national proposals. This appeared to leave curriculum considerations at the level of policy-makers, with the job of teachers only to follow prescriptions. Work on curriculum change has, however, made it clear, even at policy level, that there is no mere transmission from proposals to classroom activities. Teachers' agency is reflected in their views about the curriculum, about learning, knowledge and pedagogy, and these all affect the way curricular proposals and assessment systems are implemented and valued. The enacted curriculum is consequently unlikely to correspond to the specified curriculum. […]

New understandings about learning have made possible a more profound analysis of the curriculum than hitherto. We shall argue that this understanding affects all levels and elements of curriculum considerations and, paradoxically, emphasises the enacted and experienced curriculum to an extent that the specified curriculum is less important; teaching and learning take centre-stage. This serves as the justification for the involvement of teachers in curriculum discussions at a time when it appears they have least say. It also implies that policy-makers need to have a more explicit and justified view of learning than is usually evident in their pronouncements on curriculum issues. Furthermore, assessment systems need to reflect these views of learning and learners, and the systems' limitations as a consequence made explicit. […]

We shall argue that […] our understanding of learning has transformed how we should consider the curriculum. This transformation links learning, culture, knowledge, assessment and pedagogy in a way that requires us to rethink our views of the curriculum […]

There have been significant developments in our understanding of learning, not just since the days of Dewey or early twentieth-century behaviourism, but since the 1960s and 1970s, when issues of learning were being explored for their implications for the curriculum. Our current understandings have, in our view, great significance for contemporary views of the curriculum. […]

When we examine the curriculum considerations and issues, we shall try to show how the interrelationship of the specified, the enacted and the experienced curriculum is achieved through a focus on learning.

Contemporary views of learning: two approaches to mind

Bruner's […] book sets the scene of his consideration of learning by sketching out two views of mind; computational and the cultural (Bruner, 1996). Others have characterised

these as *symbol-processing* and *situated* views of the mind (Bredo, 1994). The symbol-processing view, as the name suggests, sees the mind as a manipulator of symbols. These symbols are learned and stored in memory; when confronted with a problem, a person searches the memory for symbols to represent the problem and then manipulates them to solve the problem. There are, of course, different views of how these symbols are learned, i.e. of what constitutes the learning process. At one end of the spectrum is the information-processing view, where the learner is a passive processor of information. But the most widely held view sees learning as a knowledge construction process, i.e. learners make meaning from experiences. This places learners in an active role and problem-solving as a central process in knowledge construction. Bredo (1994) characterises symbol-processing in terms of three dualisms: language and reality; mind and body; and individual and society. Under the first (language and reality), symbol-processing sees the symbols as mirrors of reality and, as such, these representations are transmitted to, or at least acquired by, learners. The mind–body dualism from a symbol-processing approach sees thinking as separate from the actions the body takes, while the individual–society dualism sees thinking as an individual process. There are, however, variations between the different theorists in how the knowledge construction process is understood and what are its ends.

Through the latter part of the twentieth century, there were those theorists who focused increasingly on the social aspects of knowledge construction and the social nature of knowledge, and hence minimised the individual–society dualism. These led to a group of theories labelled as social constructivist, a label which itself has many variations. What is common to this view of learning is the role of others in creating and sharing meaning. All constructivist approaches have some social element in the construction process. Thus Piaget, although focused upon individual internalisation of knowledge, saw a role for peer interaction to produce cognitive conflict that would result in a change in the thinking of the individual, leading to the internalisation of a concept or idea. By challenging the role of others in the construction of knowledge, social constructivists to varying degrees challenged views of the nature of knowledge and of culture. (Bruner (1986, p. 65) describes culture as the 'implicit semi-connected knowledge of the world, from which through negotiation people arrive at satisfactory ways of acting in given contexts'.)

A more radical challenge to constructivism has emerged in the last two decades from theorists who view learning as a process of participation in cultural activity. This approach to learning has been labelled as 'situated', and is contrasted with a symbol-processing view by Bredo (1994), although he includes all social constructivists under this label. However, those who take a situated approach see a different role for the interactions with others where 'participation' is a central process. This approach stems in part from Vygotsky and action theory (Bredo, 1997; Lave, 1996). Meaning is created through participating in social activity. In this sense there is no individual notion of an idea or concept, but a distributed one. Rather than seeing learning as a process of transfer of knowledge from the knowledgeable to the less knowledgeable, we have engagement in culturally authentic activity. Such activity is part of a 'community of practice'. To learn to be a doctor is not just to learn the requisite physiology, anatomy, etc., but to enter into the community of practice of doctors. A novice starts on the outside of the community and, as understanding increases, moves towards a more central participation in that community of practice, eventually taking part in its transformation; what Lave and Wenger (1991) rather inelegantly termed a movement from 'legitimate peripheral participation' to central participation. Mutual understanding, or 'intersubjectivity' comes through this participation (Rogoff,

1990), and with it a transformation of identity. A situated approach to learning also brings with it a particular view of how to analyse learning. Just as we have argued that curriculum needs to be understood at different levels of negotiation and definition, so too does learning from a situated approach.

Participation can therefore be understood in different ways, depending upon the level of analysis. Rogoff (1995) identifies three interrelated perspectives on learning associated with three planes of analysis. The three planes are 'community', 'interpersonal' and 'personal'; the view of the learning process associated with each of these is *apprenticeship, guided participation* and *participatory appropriation*. Lave and Wenger (1991) focus on the community level and hence the idea of the community of practice, with apprentices 'learning the trade'. At the interpersonal level, the process of guided participation focuses attention on the interpersonal activities that are 'managed collaboratively by individuals and their social partners' (Rogoff, 1995, p. 146). For both levels the role of the 'expert' is important in the collaboration that takes place, with the learner and the expert involved in joint problem-solving. Nevertheless, at the interpersonal level all participants in communal activity are significant. Participatory appropriation is the process 'by which individuals transform their understanding of, and responsibility for, activities through their own participation' (Rogoff, 1995, p. 150). Rogoff uses this term, rather than the symbol-processing idea of 'internalisation' (i.e. the individual construction of knowledge), to emphasise the interrelationship of the person and the social context. What is central to a situated view of learning is that all three planes of analysis have to be considered in developing understanding of any one plane.

To view learning as a transformation of identity and enculturation into communities of practice also requires a quite different conception of knowledge to that held by cognitivist or symbol-processing views of mind. In symbol-processing, 'concepts' are objects to be internalised (stored in memory); in situated learning 'the activity in which knowledge is developed and deployed is not separable from or ancillary to learning and cognition' (Brown et al., 1989, p. 32). […]

From this view of situated learning comes a central focus on collaboration (between peers and others) and problem-solving. Unlike the symbol-processing view, problem-solving in a situated view is a shared activity, even when it is undertaken with an expert; expert and novices jointly solve problems. Problems emerge from activity. Thus they are not given (the assumption in most teaching situations) but experienced. Likewise the solutions to problems emerge from actions in resolving experienced dilemmas. The idea of a dilemma is important: 'a problem is a dilemma with which the problem solver is emotionally engaged' (Lave, 1988, p. 175). A dilemma has no unique or stable resolution and there may be no entirely satisfactory solution (Lave, 1988, p. 139). It is these dilemmas that become the *emergent problems* as the activity progresses. Collaboration is at the heart of this situated view, and the development of intersubjectivity. Intersubjectivity between participants arises from the 'shared understanding based on a common focus of attention and some shared pre-suppositions that form the ground for communication' (Rogoff, 1990, p. 71). (We shall return to some of these ideas when we consider 'group work'.)

In summary, to reflect on the situated view, we see that in taking such an approach, all three of Bredo's dualisms (Bredo, 1994) lose their distinctions: there is no mind–body dualism, nor is there a simple separation of individual and society, nor of language and reality, [rather they form a unity].

This leaves one important idea of learning, namely, *metacognition*. This is seen a including knowledge about cognitive resources (which would include concepts) and

self-regulatory mechanisms (Duell, 1986). Knowledge about cognitive resources is seen as a form of reflection on learning. How metacognitive knowledge is understood is determined also by the view of learning that obtains. In a symbol-processing approach, planning precedes action. Metacognition is an element of this planning through self-regulation. (Self-regulation involves planning what to do next, checking outcomes of strategies, and evaluating and revising strategies.) In a situated approach to learning, planning is a dynamic process that both precedes and is a consequence of action. Central to this view of planning is a view of reflection that von Glasersfeld (1989) refers to as 'operative knowledge'. 'Operative knowledge is not associative retrieval of a particular answer [as in symbol-processing views of mind], but rather knowledge of what to do in order to produce an answer [a solution]' (von Glasersfeld, 1989, p. 12). If an individual is to be able to reflect on her cognition, then this requires further knowledge than she apparently has; you can't know what you don't know. In the situated approach to learning collaboration and the need for intersubjectivity provide the means by which operative or metacognitive knowledge can be both deployed and developed. We are, however, straying into a discussion of the nature of knowledge.

Views of knowledge and views of learning

[…]

The nature of knowledge

The two dominant views of learning we have been considering take different views of knowledge. Table 1.1 takes the two views of mind and compares them on the three dualisms identified by Bredo (1994).
[…]

   Participation, in the situated approach, is more than just a social affair: activity takes place in a social *and* physical world. In contrast to the symbol-processing view, knowledge guides action, and action guides knowledge. Knowledge is integrated with activity, along with the tools, sign systems and skills associated with the activity. A classic study illustrating the interrelationship of knowledge and activity was of dairy workers (Scribner, 1985). One part of the study looked at how what they did in their various jobs (clerical, delivery or warehouse) affected how they thought about the dairy products, compared for example with consumers. Most consumers thought of the products in terms of 'kinds' (e.g. milk and cheese), whereas drivers thought about 'kind' and 'size' (e.g. quart), and warehouse workers in terms of 'kind', 'size' and 'location'. Each of the groups of dairy workers had their thinking organised by the kinds of activity in which they engaged. But their knowledge also guided action. When warehouse workers made up an order from an order form, they would group the items on the list to be brought for central loading in ways that reduced journey distance. They used the accumulated social knowledge that went into the layout of the warehouse, and individual knowledge that reflected the current stacking arrangement. Observations showed that they would take very efficient travel distances, and would group items on the order form in ways that aided this efficiency. Looking at this from the point of view of learning (i.e. to be a dairy worker), Scribner concludes that 'What you learn is bound up with what you have to do' (1985, p. 203).

Table 1.1 Ideas about knowledge as depicted by symbol-processing and situated cognition

Dualism	Symbol-processing	Situated cognition
Language and reality	Objective reality	Knowledge is not a mirror of reality
Mind and body	Knowledge in the head	Knowledge related to action
Individual and society	Knowledge as individual property	Knowledge as social

An increasing sense of identity is what it means to become a part of a community of practice, but not as an 'explicit objective of change' (Lave and Wenger, 1991, p. 112). Lave and Wenger claim that 'the development of identity is central to the careers of newcomers in communities of practice' (ibid., p. 115). They equate the outcome of learning (knowledge) with the process of learning (participation), because they state that 'learning and a sense of identity are inseparable', i.e. they equate learning and identity. The formation of a sense of identity is learning, and the identity itself is knowledge.

Identity and self-esteem are seen by Bruner as one of the nine tenets of what he calls a psycho-cultural approach to education (Bruner, 1996). These tenets reflect a situated view of the nature of mind and of the nature of culture. For him cultural learning lies at the intersection of these two. He considers identity and self-esteem as two elements, with agency leading to 'the construction of a conceptual system that organises … a "record" of agentive encounters in the world' (ibid., p. 36). In the formation of identity, the agency of an individual builds up skills and know-how based upon successes and failures. For a young person, school will be an important institution that defines criteria for these successes and failures, through, for example, assessment. The second element, self-esteem, stems from such evaluations, and if schools do not nurture this self-esteem, other parts of life will, as various forms of disaffection with schooling show (for example, groups of truants, street gangs and drug users). These kinds of issues are not just applicable to the education of young people, although it is evident that the early years are formative in the creation of identities. Nurses (or doctors) will be forming an identity as 'carers', 'efficient professionals', 'upholders of life' or whatever may be the ethos that is part of the profession. (At the same time they may have and be forming other identities as student, wife, father or 'responsible adult'.) When individuals move into a new situation where they join a company or group, they may (or may not) want to become part of that and share the identity of those who belong. Developing an identity is thus the subject matter of all learning, and is therefore on the face of it 'knowledge'.

The identities that individual learners bring to learning activities will position them, and they will be positioned by them, in ways that will influence their participation and hence the experienced curriculum. A situated view of learning makes identity central to the study of curriculum, including the assessment of its outcomes. […]

Implications for views of the curriculum

The discussion of learning and knowledge in the previous sections gives rise to some implications on how we should approach central curriculum considerations. We shall

therefore examine these considerations through knowledge, assessment and pedagogy. For each of the considerations we shall show how learning addresses and interrelates the specified, enacted and experienced curricula.

Knowledge

We have already argued that a focus on learning gives a different approach to the analyses that are necessary to view knowledge in the curriculum, either as an 'input' to the (specified) curriculum or as a consideration in the enacted and experienced curricula. The 'disciplines of knowledge' are superseded by the idea of communities of practice in the situated approach. Philosophical analyses have always tried to reflect knowledge that is culturally valued, but took a narrow view of what represented culture in terms of educational goals. The idea of *cultural authenticity* remains important; a critical idea in engaging in a community of practice is that activity is authentic. This means it is coherent, meaningful and purposeful within a social framework – the ordinary practices of the culture. Thus learning activities must allow students to engage in this authentic activity. However, there is a second sense in which authenticity needs to be considered, that of *personal* authenticity; i.e. that is personally meaningful. Without this second element no construction of knowledge or participation, which will lead to learning, can take place. These two aspects of authenticity are interrelated but they can be thought of distinctly. They are distinct in that personal authenticity relates to the view of the learners and not to the view of knowledge, which is what cultural authenticity refers to. This means that the experienced curriculum is bound to decisions about the specified curriculum through the enacted curriculum. In making a task that is set as a 'problem' personally meaningful, students must be involved in the context of the problem. They must also be given significant decisions to make, which allow them to create solutions. Thus, in making bridges between school learning and everyday experience, it is not essential that the situations in which school activities are set are 'real'. The central requirement is that they afford the students authentic dilemmas that, in Lave's words, 'furnish opportunities [to the students] to improvise new practice [i.e. to learn]' (Lave, 1992, p. 85).

We therefore have the two kinds of authenticity coming together to provide a focus for the specified curriculum (communities of practice representing cultural authenticity) as a selection from culture, linked to the experienced curriculum (learners engaged with dilemmas that have both personal and cultural authenticity). The enacted curriculum must in some sense mediate the other two levels. This can be done for particular elements of the enacted curriculum, such as a set of learning activities or more holistically through a complete pedagogic strategy, for example, by adopting a 'community of learners' approach (we shall return to this in the consideration of pedagogy).

A movement away from disciplines as the source of knowledge for education (i.e. as an input to the specified curriculum), requires a more universal term than the 'subject' that is so often the focus of knowledge issues in the curriculum. Using a philosophical analysis of disciplines, a domain will be seen in terms of concepts, procedures, skills, etc., that relate together in a way that can be characterised as having some identity. Yet a community of practice is also a domain. Terms that might be used to characterise a domain, such as 'bodies of knowledge', 'practices' and 'ways of organising our experience', encapsulate views of the nature of learning and knowledge. Whatever way we think about the idea of a domain, we much be clear that it has many guises. Glaser, taking a symbol-processing

[…] approach, has a vision of a domain that is not just a subject. He talked of 'chess configurations, functional interpretations of circuit diagrams or representations of anatomical abnormalities in x-rays' (Glaser, 1992, pp. 64–65), and said that the structure and organisation are 'tied to the goal structure' of the problems that experts meet (ibid., p. 67). In this sense we are seeing the domain knowledge as situated, and hence it must be related to action and hence to practices. […] When we think of a domain as a subject, we also tend to think of it only in cognitive terms, i.e. devoid of affect. Greeno et al. (1997) indicate that it is not as straightforward as this. In the cognitive (or symbol-processing) approach there are 'beliefs', and in the situated approach there seems to be no separation of cognitive and affective aspects of knowledge (e.g. identity is made up of both).

The specified curriculum is therefore affected, not just by a philosophical or cultural analysis, but by a consideration of learning and associated views of mind. Again we are simultaneously engaging with the specified and the experienced curriculum, with the former not just being an 'input' to the latter. Philosophical analyses of the nature of knowledge, or even anthropological ones of how knowledge is produced by say scientists (e.g. Latour and Woolgar, 1979), provide but one element of analysis at the global level (parallel to Rogoff's community level noted earlier). We also need to see the interrelationships of the discussion at the interactional and the individual level, to see how this knowledge is constructed through participatory appropriation or internalisation (depending upon the view of learning). […]

Thus we have a level of analysis relating to the experienced curriculum […] that has profound implications for how we consider the specified curriculum (particularly 'domains') and the enacted curriculum (how these domains are treated in the classroom).

Assessment

In spite of attention to the role of assessment in the development of curriculum, only rarely have assessment systems been analysed from a perspective on learning. Increasingly the specified curriculum is enacted to a degree in national assessment systems, yet seldom are the educational purposes and values of such systems considered in conjunction. It is common, for example, for constructivist rhetoric to underpin the specified curriculum, but to be noticeably absent from assessment of the curriculum (Murphy, 1996). The tensions that this creates are then manifest at the levels of the enacted and experienced curricula.

In recent debates the view of knowledge and of learning underpinning most assessment practice has been challenged (Black and Wiliam, 1998; Gardner, 1992; Gipps, 1994; Murphy, 1995). Typically, assessment systems reflect the psychometric tradition that had its roots in views of mind that saw ability as an innate trait that could be measured. At its most extreme, this led to unidimensional views of ability encapsulated in notions of general intelligence. The 'measurement' approach tried to distinguish students according to ability, usually to match a 'normal' statistical distribution of such ability that was supposed to exist in the population. Thus the task was to separate students, so they could be selected for curricula that would suit them, or for jobs that they would be able to perform. Challenges to assessment, derived from a Vygotskian perspective, have emerged through the 1980s and 1990s, but have tended to focus on the assessment of learning *in situ*, rather than on national systems; for example Brown and Ferrara (1985), Newman et al. (1989) and Lunt (1993). Analyses of national, large-scale assessment based on situated views of knowledge have been rare and have tended to focus on equity in relation to gender

(Murphy, 1995) and on social class (Cooper, 1992). It is only recently that more general critiques have emerged, but these have typically been associated with subject perspectives, rather than assessment perspectives *per se*; for example, mathematics (Boaler, 1997) and science (Roth, 1997). […]

[A] situated view of learning requires a radical rethink of assessment that would encompass, for example, shared understanding. At the very least it would make group assessment a central issue, rather than an issue of continual conflict with national assessment systems that overwhelmingly reward individual, rather than group, achievement (despite the apparent calls from those outside education for the opposite approach). […]

Nature of tasks

If we take a symbol-processing view of learning, then an assessment tasks will have a stability that allows responses to be evaluated against an accepted 'answer'. The response will show an understanding of a concept or procedure that can be matched against an accepted view. A constructivist version of this sees learners on their way to understanding, and various responses could exemplify misconceptions that they have and indicate how future learning could be adjusted to confront these misconceptions and arrive at an accepted one. From a situated view, then, the stability of the task is an issue. Newman et al. (1989) refer to a task as a 'strategic fiction'. When a teacher sets a 'problem', then what is actually problematic is at issue. Also, what the student sees as salient in the information given can vary, not just depending upon their 'level of understanding' (what the task is trying to assess), but depending upon the qualitative differences in the communities in which they participate. For example, gender and race locate learners in different communities, and their interpretations of tasks reflect the qualitative differences between these communities (e.g. for gender see Murphy, 1991; Gipps and Murphy, 1994). […] Numerous examples of these differences in views of salience, and the consequences for what tasks students perceive and the solutions they judge to be appropriate, have been demonstrated in assessment situations (Boaler, 1994; Cooper, 1992; Murphy, 1991). That these same effects obtain in learning situations has also been demonstrated (Murphy and McCormick, 1997).

The dynamic nature of tasks means that interpretations of responses are made problematic, i.e. the central issue of validity in assessment. Furthermore, such a view leads one to anticipate variation in response from an individual to demands in assessment tasks, irrespective of the theoretical construct assumed. Consequently the traditional notion of reliability is under threat in a situated approach to assessment. The implications of this for assessment methods are demanding, and beyond the scope of this chapter, but it will be evident that we must be more modest in what we think assessment is able to achieve, and at the same time more creative in the practices we implement. The need to expand the kinds of evidence that are used in assessment is obvious, to accompany the move to authentic assessments (such as work-based assessment). Thus interpreting student responses to tasks can be seen in the context of the community of practice; it may imply more interrogation of the student to establish the context of response, along with the kind of evidence gained from such things as process-folios ('instruments of learning … [that] contain full process-tracing records of a student's involvement in one or more … works' (Gardner, 1992, p. 103)). The broader the range of assessment used to illuminate a

complex achievement or performance, the better will be the understanding of the student. However, assessment information provides only an understanding of achievement, or an indicator of it, not actual achievement. Thus, how we use assessment to monitor progress in the experienced curriculum, or to determine the outcomes of the specified and enacted curriculum, depends crucially on how we understand learning and learners.

Self-assessment

As with many curriculum initiatives, the advocates of self-assessment may be driven by an ideology such as child- or student-centred approaches. Thus self-assessment is seen in terms of empowering and valuing the students' view and the criteria they may bring to their learning. Our discussion of views of learning gives another and more powerful rationale. Metacognition, with its operative and self-regulatory elements, requires students to develop an awareness of learning, and to achieve this they need an involvement in reflecting upon their learning. Without some element of self-assessment this awareness cannot be developed. Self-assessment, present in for example peer assessment (where students assess each other), is central to the development of a strategic approach to their learning. This is the constructive aspect of operative knowledge that is best demonstrated, according to von Glasersfeld (1989, p. 12) 'where something new is generated, something that was not already available to the operator'. Thus, learning to solve problems requires knowing when to solve them, or recognising particular kinds of problems, and when it is appropriate to use particular solutions. Children may be taught how to carry out a 'fair test' as a form of scientific investigation but, if they are unaware of when a fair test should be carried out, they will be unable to use this test without a teacher to tell them (Murphy et al., 1996).

Self-assessment is also a prerequisite for students learning the norms of a community of practice. Schoenfeld (1996) advocates conducting undergraduate mathematics classes in a way that is true to what he and other mathematicians do (Lave et al., 1988; Schoenfeld, 1996). Students, for example, have to convince each other about what constitutes a solution to a mathematical problem (as mathematicians do), not just produce 'right answers' (that is 'right' according to the teacher's judgement). In a similar vein, in critical literacy approaches, students are encourages to examine texts to understand how identities are constructed in various discourses (Moss, 1996). Whether this constitutes a good model for other areas of the curriculum is of course a point for debate.

Validity

Finally we turn to the notions of validity of assessment that might flow from different views of learning. These different notions give different views of knowledge and hence of domains, as we have already argued. But such views of knowledge also imply that validity cannot come directly from how we see subjects or domains. Face and content validity are derived from teachers' or experts' views of a subject; for example, an assessment is judged valid if it reflects the content of a subject. If we are to take seriously the ideas on interpretations of tasks by students, and hence some caution in interpreting their responses, then we cannot judge validity only in terms of content. Messick (1989) argued strongly for the overarching importance of construct validity. This requires both a view of the theoretical construct (what is the model of achievement in the domain) and the empirical data of performance on the assessment instrument, upon which to judge the construct validity.

Messick did not argue this in terms of views of learning, as we would, but nevertheless his stance is an accepted one among assessment theorists. What is less evident, however, is the operationalisation of the theoretical constructs that are sensitive to different views of learning. Greeno and his colleagues (1997) laid out such theoretical constructs to reflect both the symbol-processing (what they called the 'cognitive') approach and the situated approach. Further, they outlined these for both literacy and mathematics. This we see as ground-breaking work, particularly with respect to the situated approach, and we hope that other domains could be elaborated, and assessment procedures implemented, that tried to assess achievement against these constructs.

Each of these three issues (nature of tasks, self-assessment and validity) reflects the different levels of analysis of the curriculum:

- validity draws on the specified curriculum through its articulation of the theoretical construct, and the experienced curriculum through the empirical data of students' responses to the assessment based upon the construct.
- the nature of tasks is central to the determination of the enacted curriculum, yet requires a view of learning drawing together the specified level of communities of practice and experienced curriculum in the interpretation of tasks.
- the discussion of self-assessment started with the experienced curriculum in terms of its role in student learning, yet with the example of encouraging students to participate in a community of practice (of mathematicians) we have this level feeding through to the other two levels.

Pedagogy

We have argued that changing views about the nature of learning and of knowledge have focused attention on the experienced curriculum. We have shown how, in many ways, the agency of learners and of teachers can lead to a diversity of meanings being constructed within any one curriculum level. We have also argued that, as a consequence, a situated view of learning creates new roles for assessment to enable the progression and diversity of these meanings to be monitored in order to support students' learning. What we consider here is how the teaching and learning process is understood in a situated view and the implications of this for understanding the curriculum. […]

So why have we chosen to use [the term pedagogy]? The term 'teaching methods' carries with it a view that a teacher does things to learners (teaches them), and hence may have a connotation that these methods exist outside a view of learning and of learners. It is not just that particular teaching methods may only suit particular learners, but that they encapsulate particular views of learning. If we think that giving lectures is a way of teaching, then we must have some kind of view of learning as information-processing if the learner is not allowed an active role. On the other hand, the lecture might achieve such an active role in learners through controversial statements and tasks to be followed up with other kinds of activities. This starts to broaden to a consideration of a number of issues, including the role of the learner and the teacher, the kinds of learning activities that are provided, and the nature of the assessment of the learning. If we then put together these features with that of views of learning and knowledge, we have a pedagogic *approach*, or a pedagogic *strategy*. For governments to focus on teaching methods in isolation, as in the UK government's concern to increase 'whole-class teaching' (Reynolds and Farrell, 1996),

is to ignore the other pedagogic dimensions that mediate the implementation of this method. A teacher who sees the learner as agentive (Bruner, 1996) would use such whole-class methods to engage students in interactions with one another and herself, to reflect the view of learning associated with the method. A teacher adopting a symbol-processing approach to learning may find the implementation more difficult, as the notion of the sharing of understanding is less important than the individual internalisation. Indeed, such a teacher may ironically (given the association of whole-class teaching with 'traditional' views of learning) have more difficulty with this approach!

The crucial notion of a pedagogic approach then, is the coherence and consistency that exist among the dimensions of the pedagogy. […]

1   goals of learning;
2   knowledge that is the focus of learning;
3   learning and assessment activities;
4   the teacher–student roles and relationships;
5   'classroom' discourse. […]

Implications for curriculum issues

Transfer

The assumption of transfer of knowledge underlies much of schooling and indeed all education associated with educational institutions, at whatever level. The specified curriculum typically assumes that general-purpose knowledge is learned for use at another time and in another context. This assumption permeates many aspects of how we view curriculum. For example, we assume that students who learn mathematics in the mathematics lesson can use this in the geography lesson; that is, we make the assumption that knowledge learned in one part of the curriculum is available for use in any other part. This implies a particular organisation and enactment of the specified curriculum. Yet teachers and researchers will testify to the continual failing of this assumption, and our own investigations of classrooms have provided empirical evidence of this for some areas of the curriculum (Davidson et al., 1998; Evens and McCormick, 1997; McCormick et al., 1998). To take the view of 'transfer of learning' is to adopt a symbol-processing view of mind; symbols stored in memory are abstracted knowledge that can then be used when confronted with a problem in any context. We have already indicated that those who hold a situated view of mind reject this view, and in particular reject the idea of abstract knowledge devoid of context (Lave and Wenger, 1991); they hold a quite distinctly different view of generalised knowledge. Indeed, transfer lies at the heart of the dispute between the symbol-processing and the situated views. For those who support the idea of transfer, there is a certainty about the process, while others harbour doubts about the empirical evidence. For example, Lave (1998) reviews many of the studies of transfer and concludes that the evidence fails to show that the concept of transfer is a helpful one. Those who believe that we store in our minds symbol representations that we recall for use in particular situations dismiss this kind of argument and claim that there are many examples of transfer established in the literature (Anderson et al., 1996). The arguments between the two sides are extensive and continuing. […]

Ultimately the argument comes down to which view of learning is supported. However, there are two important points that come out of this argument. The first is that the conditions under which transfer will take place depend on a match between the situation where the learning took place and the situation where the knowledge is used. This doesn't look much like transfer ('transportation' might be a better word). The second point Anderson et al. (1996) make is that we need to pay more attention to the cues that signal the relevance of skill (or knowledge), i.e. the crucial issues are where and what the cues are. […] Under these circumstances learning the salience or the 'cues', as Anderson et al. (1996) describe it (or 'affordances' as Clancey (1993) puts it), is what should be the focus and not, in our view, transfer.

This argument is not merely academic, but it reveals some common elements about how transfer can be supported (Murphy et al., 1999, pp. 94–95):

- providing a bridge between novel and new contexts;
- enabling tacit and explicit communication using experts and peers who serve as resources in collaborative settings;
- using analogies to identify similarities between situations;
- explicit treatment of the features in a situation to point up alternative views of salience;
- teachers act as partners, coaches, modelling practices;
- self-monitoring of learning processes (i.e. develop metacognitive awareness).

But underlying the common strategies is the argument of whether the mechanism sees the transfer of the same knowledge between situations or an engagement in new learning.

The curriculum implications of this argument we have discussed are (a) that the teaching of abstract knowledge for later use may be flawed and (b) that the use of knowledge across the curriculum and hence the curriculum organisation may similarly be based upon an incorrect premise about the nature of that knowledge. […]

Group work

This final issue is often seen as a question of which teaching method to adopt, perhaps for reasons only associated with classroom management (e.g. the amount of teaching resources available). We have chosen to use the term 'group work' because this is often how it is dealt with in the curriculum. However, we see underlying this the central issue of *collaboration*, which depends on intersubjectivity. This terms stems from views of learning, both as a *means* and as an *end* of learning. As a means, i.e. collaborating to learn, it stems from the views we discussed earlier, where the development of intersubjectivity was central, at least in the situated view. Even Piagetian approaches see symmetrical collaboration among peers as a prerequisite for knowledge construction through cognitive conflict and hence change. Collaboration is thus a central part of learning mechanisms. What a situated view brings to this is, however, the need for collaboration to be seen not only among peers, but also between experts (e.g. teachers) and learners. The collaboration from this approach is not just about purely cognitive issues (in the terms Piaget might have seen it), but also about relations among people, as the participation metaphor emphasises.

That, of course, relates to our second curriculum view of collaboration, namely as an end in itself. Here it is important for students to learn how to collaborate so that they will be able to identify and share common reference points and models of the situation. For collaboration

to take place, students must engage in each other's thinking. But it also means that the tasks should enable this. The idea in the use of the term 'group work' is that it is a way of carrying out a classroom task, without there necessarily being any implication for the nature of this task. We would dispute this; tasks must give students the opportunity to share. Students inevitably reformulate tasks, and alternative perceptions of purposes and salience emerge. Collaboration is often gendered territory, and there is evidence that girls and boys not only bring different views of salience to activities, but collaborate differently (Murphy, 1999). Some argue that central to all collaborative activity is exploratory talk (Mercer, 1995). Thus, tasks must give opportunities for talk, including the sharing of information, joint planning, presenting of ideas to the group, joint reasoning, evaluation and decision-taking. If collaboration is also learning to participate, this talk cannot be separated from what is being talked about; the community of practice will have a language that reflects the domain of the practice. This kind of view of collaboration, with the need to learn skills (including collaborative talk), places great demands on teachers and learners, and is more complex than the mere arrangement of students into groups. Murphy (1999) provides a summary of the factors necessary for effective collaboration:

- a 'true' group task;
- a requirement to plan, record, act and communicate as a group;
- teacher support for both skills for collaboration as well as collaboration for learning;
- teacher provision of tools for making thinking explicit, including forms of the representation of tools, equipment, etc.;
- student autonomy;
- monitoring by the teacher of the dialectic between the students, and students and tasks;
- encouragement of reflective discourse between students;
- students' explicit awareness of the agenda in relation to the subject and to collaboration.

However, any changes to the way collaboration is supported through the nature of tasks and other features of pedagogy listed above, need to be accompanied by changes to all elements of a pedagogic approach, particularly assessment. Many of the developments in national curricula that have included assessment systems, have focused almost exclusively upon individual assessment. This means that the focus of tasks that include an element of assessment will detract from any collaborative effort. Further, there still seems to be a lack of routine assessment techniques that allow assessment of participation (and hence collaboration), despite the development of models of achievement for the situated approach indicated earlier (Greeno et al., 1997). A renewed focus on learning in relation to both assessment and collaboration may spur this development. […]

References

Anderson, J. R., Reder, L. M. and Simon, H. A. (1996) 'Situated learning and education'. *Educational Researcher*, 25(4), 5–11.

Benavot, A., Cha, Y.-K., Kamens, D. H., Meyer, J. and Wong, S.-Y. (1992) 'Knowledge for the masses: world models and national curricula, 1920–1986'. In J. Meyer, D. Kamens, A. Benavot, Y.-K. Cha and S. Wong (eds) *School Knowledge for the Masses. World Models and National Primary Curricular Categories in the Twentieth Century*. London: Falmer.

Bernstein, B. (1971) 'On classification and framing of educational knowledge'. In M. F. D. Young (ed.) *Knowledge and Control*. London: Collier-Macmillan, 47–69.

Black, P. and Wiliam, D. (1998) 'Assessment and classroom learning'. *Assessment in Education*, 5 (1), 1–75.

Boaler, J. (1994) 'When do girls prefer football to fashion? An analysis of female underachievement in relation to realistic mathematics contexts'. *British Educational Research Journal*, 20 (5), 551–564.

Boaler, J. (1997) 'Alternative approaches to teaching, learning and assessing mathematics'. Paper presented at the 7th Conference of the European Association for Research in Learning and Instruction held in Athens, Greece in August.

Bredo, E. (1994) 'Reconstructing educational psychology: Situated cognition and Deweyian pragmatism'. *Educational Psychologist*, 29 (1), 23–35.

Bredo, E. (1997) 'The social construction of learning'. In G. D. Phye (ed.) *Handbook of Academic Learning: Construction of Knowledge*. San Diego: Academic Press.

Brown, A. L., and Ferrara, R. A. (1985) 'Diagnosing zones of proximal development'. In J. Wertsch (ed.) *Culture, Communication, and Cognition: Vygotskian Perspectives*. New York: Cambridge University Press.

Brown, J. S., Collins, A. and Duguid, P. (1989) 'Situated cognition and the culture of learning'. *Educational Researcher*, 18 (1), 32 –41.

Bruner, J. (1986) *Actual Minds, Possible Worlds*. Cambridge, MA: Harvard University Press.

Bruner, J. (1996) *The Culture of Education*. Cambridge, MA: Harvard University Press.

Clancey, W. J. (1993) 'Situated action: A neuropsychological interpretation response to Vera and Simon'. Cognitive Science, 17, 87–116.

Cooper, B. (1992) 'Testing National Curriculum mathematics: Some critical comments on the treatment of "real" contexts for mathematics'. *Curriculum Journal*, 3, 231–243.

Davidson, M., Evens, H. and McCormick, R. (1998) 'Bridging the gap. The use of concepts from science and mathematics in design and technology at KS3'. In J. S. Smith and E. W. L. Norman (eds) *IDATER 98 – International Conference on Design and Technology Educational Research and Curriculum Development*. Loughborough: University of Loughborough, 48–53.

Duell, O. K. (1986) 'Metacognitive skills'. In G. D. Phye and T. Andre (eds) *Cognitive Classroom Learning: Understanding, Thinking, and Problem-Solving*. Orlando: Academic Press, 205–242.

Evens, H. and McCormick, R. (1997) *Mathematics by Design: An Investigation at Key Stage 3* (Final Report for the Design Council). Milton Keynes: School of Education, The Open University.

Freire, P. (1970) *Pedagogy of the Oppressed*. Harmondsworth: Penguin.

Gardner, H. (1992) 'Assessment in context: The alternative to standardized testing'. In B. R. Gifford and M. C. O'Connor (eds) *Changing Assessment: Alternative Views of Aptitude, Achievement and Instruction*. London: Kluwer.

Gipps, C. V. (1994) *Beyond Testing: Towards a Theory of Educational Assessment*. London: Falmer.

Gipps, C. and Murphy, P. (1994) *A Fair Test? Assessment, Achievement and Equity*. Buckingham: Open University Press.

Glaser, R. (1992) 'Expert knowledge and processes of thinking'. In D. F. Halpern (ed.) *Enhancing Thinking Skills in the Sciences and Mathematics*. Hillsdale, NJ: Erlhaum, 63–75.

Goodson, I. F. (1994) *Studying the Curriculum*. Buckingham: Open University Press.

Greeno, J. G., Pearson, P. D. and Schoenfeld, A. H. (1997) 'Implications for national assessment of educational progress of research and cognition'. In R. Glaser and R. Linn (eds) *Assessment in Transition: Monitoring the Nation's Educational Progress. Background Studies*. Stanford, CA: National Academy of Education, Stanford University.

Latour, B. and Woolgar, S. (1979) *Laboratory Life: The Construction of Scientific Facts*. Princeton, NJ: Princeton University Press.

Lave, J. (1988) *Cognition in Practice: Mind, Mathematics and Culture in Everyday Life*. New York: Cambridge University Press.

Lave, J. (1992) 'Word problems: A microcosm of theories of learning'. In P. Light and G. Butterworth (eds) *Context and Cognition: Ways of Learning and Knowing*. London: Harvester Wheatsheaf, 74–92.

Lave, J. (1996) 'The practice of learning'. In S. Chaiklin and J. Lave (eds) *Understanding Practice: Perspectives on Activity and Context*. Cambridge: Cambridge University press, 3–32.

Lave, J. and Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Lave, J., Greeno, J. G. Schoenfeld, A., Smith, S. and Butler, M. (eds) (1988) *Learning mathematical Problem Solving*. (Report No. IRL88–0006) Palo Alto, CA: Institute for Research on Learning.

Lunt, I. (1993) 'The practice of assessment'. In H. Daniels (ed.) *Charting the Agenda: Educational Activity after Vygotsky*. London: Routledge, 145–170.

McCormick, R., Murphy, P., Davidson, M., Evens, H. and Spence, M. (1998) *The Use of Mathematics in Science and Technology Education*. Symposium at the British Educational Research Association annual conference, September, Queen's University, Belfast.

Mercer, N. (1995) *The Guided Construction of Knowledge: Talk amongst Teachers and Learners*. Clevedon, UK: Multilingual Matters.

Messick, S. (1989) 'Meaning and values in test validation: The science and ethics of assessment'. *Educational Researcher*, 18 (2), 5–11.

Moss, G. (1996) 'Negotiated literacies: How children enact what counts as reading in a different social setting'. Unpublished PhD thesis. Milton Keynes: Open University.

Murphy, P. (1990) 'Learning and the curriculum'. In M. Lawn, B. Moon and P. Murphy (eds) *Curriculum, Learning and Assessment (E819). Study Guide*. Milton Keynes: Open University Press, 35–36.

Murphy, P. (1991) 'Gender and practical work'. In B. Woolnough (ed.) *Practical Work in Science*. Milton Keynes: Open University Press.

Murphy, P. (1995) 'Sources of inequity: Understanding students' responses to assessment'. *Assessment in Education: Principles, Policy and Practice*, 2 (3), 249–270.

Murphy, P. (1996) 'Integrating learning and assessment – the role of learning theories'. In P. Woods (ed.) *Contemporary Issues in Teaching and Learning*. London: Routledge, 173–193.

Murphy, P. (1999) 'Supporting collaborative learning: A gender dimension'. In P. Murphy (ed.) *Learners, Learning and Assessment*. London: Paul Chapman, 258–276.

Murphy, P. and McCormick, R. (1997) 'Problem solving in science and technology education'. *Research in Science and Education*, 27 (3), 461–481.

Murphy, P., Scanlon, E. and Issroff, K. with Hodgson, B. and Whitelegg, E. (1996) 'Group work in Primary Science – emerging issues for learning and teaching'. In K. Schnack (ed.) *Studies in Educational Theory and Curriculum*, vol. 14. Copenhagen: Danish School of Educational Studies.

Murphy, P., Moon, B., McCormick, R. and Leach, J. (1999) *Learning, Curriculum and Assessment* (E836 Study Guide). Milton Keynes: Open University Press.

Newman, D., Griffin, P. and Cole, M. (1989) *The Construction Zone: Working for Cognitive Change in Schools*. Cambridge: Cambridge University Press.

Reynolds, D. and Farrell, S. (1996) *Worlds Apart? A Review of International Surveys of Educational Achievement Involving England.* (Ofsted reviews of research.) London: HMSO.

Rogoff, B. (1990) *Apprenticeship in Thinking: Cognitive Development in a Social Context.* New York: Oxford University Press.

Rogoff, B. (1995) 'Observing sociocultural activity on three planes: Participatory appropriation, guided participation and apprenticeship'. In J. V. Wertsch, P. del Rio, and A. Alverez (cds) *Sociocultural Studies of Mind.* Cambridge: Cambridge University Press, 139–164.

Roth, W. M. (1997) 'Situated cognition and assessment of competence in science'. Paper presented at the 7th Conference of the European Association for Research in Learning and Instruction. Athens, Greece.

Schoenfeld, A. (1996) 'In fostering communities of inquiry, must it matter that the teacher knows the answer?' *For the Learning of Mathematics,* 14 (1), 44–55.

Scribner, S. (1985) 'Knowledge at work'. *Anthropology and Education Quarterly,* 16 (3), 199–206.

Skilbeck, M. (1990) *Curriculum Reform: An Overview of Trends*. Paris: OECD.

Von Glasersfeld, E. (1989) 'Learning as constuctive activity'. In P. Murphy and B. Moon (eds) *Developments in Learning and Assessment*. London: Hodder & Stoughton, 5–18.

Young, M. F. D. (1998) *Curriculum of the Future: From the 'New Sociology of Education' in a Critical Theory of Learning.* London: Falmer.