

Let's get beyond community and practice: the many meanings of learning by participating

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This article is an attempt to tease out what is so often termed learning through participation. Drawing on the analysis undertaken by the Learning Outcomes Thematic Group, the use of the participation metaphor in TLRP projects is discussed. The conclusion arrived at is that its use appears mainly to focus on behaviour and engagement in practices. After looking at the cognitive potential to be found in both cultural psychology and in the work that has its origins in interactionism and developmental psychology, the article cautions against simply seeing participation as another way of looking at behaviour and how it is shaped by context. It calls for a recognition of the cognitive elements in socio-cultural and activity theory frameworks and their capacity to explain how we learn new practices. It argues that a focus on coming to know or sense making requires a discursive shift that allows a rethinking of what is meant by acquisition. The implications of these frameworks for assessment are also touched upon.

Keywords: learning outcomes; metaphors of learning; psychology; socio-cultural theory; knowledge; assessment

The participation metaphor in the Teaching and Learning Research Programme (TLRP)

It is no surprise that the analyses of TLRP projects outlined by Mary James and Sally Brown (in this issue) revealed that learning through participation was used more widely as a structuring metaphor (Sfard, 1998) in projects concerned with post-compulsory education and training than with school-based studies. Neither is it unexpected that analyses of learning in the workplace were particularly likely to draw on ideas of participation in community practices. This division perhaps reflects an apparent divergence in relationships between knowledge and learning when we

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compare formal learning settings with those where learning occurs ‘in the wild’ (Hutchins, 1995).

Rommetveit describes these differences in approaches to learning as differences between a concern with (1) ‘knowledge about’ and (2) a search for meaning (Rommetveit, 2003). We can recognize that ‘knowledge about’ currently drives formal education while in less formal settings there is more emphasis on trying to make sense and act appropriately within existing patterns of behaviour (see also McGuinness, in this issue). Rommetveit traces these differences in approach back to the origins of psychology as the science which deals with learning.

He argues that there is now an untoward emphasis on ‘knowledge about’ because the natural science view of psychology prevailed over one more grounded in the humanities. His analysis resonates with Charles Taylor who, also talking of psychology, describes two models of science, ‘one of brute data and one that admits of interpretation’ (Taylor, 1985, p. 124). Taylor goes on to argue that the more interpretative or hermeneutic version of psychology is best suited to the development of a theory of learning which explains how we make sense of, and act on, our worlds. These are sophisticated arguments about relationships between mind and world, knowledge and meaning making, and feeling and action. To reduce them to differences between the ‘either/or’ of acquisition or participation would be a gross simplification.

What is learning?

A nuanced analysis of the ways that acquisition can be understood is provided by McGuinness (in this issue). Here I will therefore attempt to tease out some of the different strands of research on learning that are so often labelled as learning through participation. But first I need to clarify what I mean by learning. My understanding of learning reflects a concern with within-person changes, which modify the way in which we interpret and may act on our worlds. Learning is therefore a change in state, which alters how we act on the world and in turn change it by our actions. So far this is a deeply cognitive definition, which recognizes changes in mental states and allows us to connect knowledge and emotion so that we see that both come into play in our responses. However, because those responses in turn impact on the world, we are both shaped by and shape our worlds. Finally, the model of mind underpinning this view of learning does not emphasize efficient knowledge storage as the be-all and end-all of learning. Rather, the mind looks out on the world, interpreting it and acting on it.

Elsewhere I have discussed core differences between what I have described as a decoding and an encoding model of mind (Edwards *et al.*, 2002). There I suggested that the socio-cultural version of mind is outward looking, resourceful and intent on decoding and responding to the world, while an information processing model of mind emphasizes encoding, knowledge storage and recall. The decoding mind, I argued, also stores knowledge but is primed to seek out patterns and to use environmental resources to support actions (see also Clark, 1997). As we shall see, the participation metaphor does not do justice to the intricacy of this relationship between mind and world or, indeed, to others so often similarly labelled.

In the context of this cognitive account of the socio-cultural mind, it does seem surprising that the analysis of TLRP projects undertaken by the Learning Outcomes Thematic Group (LOTG) shows that few projects categorized as working with the participation metaphor appeared to give weighting to either 'attainments' or to 'understanding, ideas and concepts' (see Table 2, in M. James & Brown in this issue). Instead, more of the projects that seemed to be working with the participation metaphor focused on 'using, practice, behaviours and manipulation' and 'membership, inclusion and self-worth'. M. James & Brown are driven to ask, on the basis of this analysis, whether the concept of attainment is compatible with the participation metaphor.

A possible explanation of the focuses taken by these projects is that participation is currently being taken as the non-cognitive option in the study of learning. This is an option where attention is shifted away from what learning is and from individual learners. It is, instead, placed on the capacity of the system in which they are learning to support their increasingly complex forms of engagement. This would be an interesting shift if one could also capture how the system enables the learning of something new. However, it does seem that participation, in the majority of the projects in the programme, signals, as M. James & Brown observe, a focus on learning to become a member of an existing community and working with existing practices. If that is the case, and it does seem to be so, then we are simply using participation to explain a somewhat conservative notion of apprenticeship. We are not developing an understanding of learning which can deal with knowledge creation at the levels of both individuals and the systems in which they are operating.

In this article I intend to explore the cognitive roots of much of what is so often labelled as learning through participation. In doing so I want to encourage a move from what I see as a blind non-cognitive alley in the study of learning. Ultimately I would like us to recognize the potential inherent in the socio-cultural model of mind for understanding what learning is, as well as how it might be supported. In other words, like Sfard (1998), I want to caution against some interpretations of participation. First, however, let us look at elements of the origins of the participation metaphor.

In brief, there are two broad strands of ideas which are both given the participation label. These have their origins respectively in (1) Russian cultural psychology following Vygotsky, where the emphasis is on how society or the collective is incorporated into self and in (2) the interactionist and dialogic concerns of the adaptable self found in North America (see Edwards, in press, for a more extensive overview). There are, of course, Russians (e.g. Bakhtin) who have informed interactionist accounts (see Wertsch, 1991) and North Americans whose work is in cultural psychology (e.g. Cole, 1996). I shall start by exploring the cultural psychology strand if only because it has a clearer history. Having identified key features of each strand I shall then discuss their use in analyses of learning in different contexts and consider the implications for the assessment of that learning.

Cultural psychology

There is one very clear line of work which has influenced analyses of learning. It is currently principally invoked in studies of workplace learning (Engeström & Middleton, 1996) but also has a tradition of use in some parts of special education (Daniels, in press), has potential for understanding professional learning (Edwards, 2004; Edwards & Protheroe, 2004) and, as we shall see, pupil learning. For a sound introduction see Cole (1996).

Tool-mediated action

We must start with Vygotsky's contribution. It is worth returning to the dead Russians because of the quite specific task they set themselves ten years after the revolutionary successes of 1917. The broad aim of Vygotsky, Luria and Leont'ev and those who worked with them was to create a Marxist psychology. This was a psychology which explained how the collective was incorporated into the individual through processes of mediation and which could be used to transform ways of thinking and acting to the benefit of the greater good.

Vygotsky's great contribution was to develop a dynamic unit of analysis which revealed how a child was thinking. This unit is often called tool-mediated action (see Figure 1). Thinking is revealed in the way that the tool is used to act on and change the object. A tool can be a material artefact, language or a concept and is inscribed with what is culturally important. The object is what is being worked on, i.e. it is not the objective. Rather, it is what is being shaped or transformed by the tool. A pupil in an arithmetic session, for example, might be faced with a problem which involves calculating the number of people sitting at eight tables set for four people in a room (the problem is the object). Whether she counts each person, counts in twos, adds up each group of four or multiplies the eight by four (possible tools), using fingers, paper and pencil or mental arithmetic (possible use of tools) will reveal her mathematical thinking.

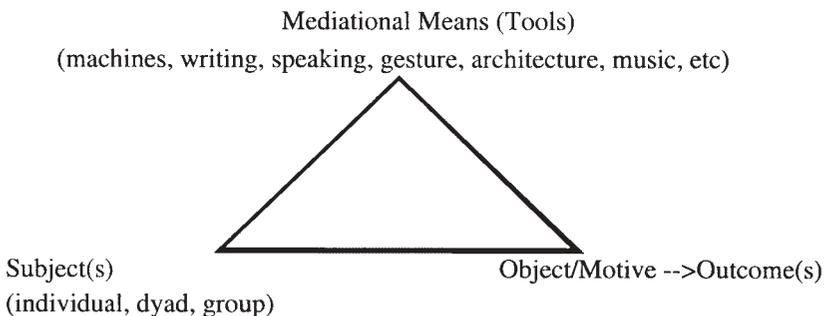


Figure 1. Vygotsky's mediational triangle

Vygotsky was a psychologist who wanted to understand intellectual development; his focus was primarily what was revealed in the use of tools. Unfortunately, he died very young, in 1934, without completing the vast agenda he had set himself (Vygotsky, 1997). However, one of the most important tools for him was language. He argued that language carries the concepts we use when acting on, and trying to make sense of, the world. The more advanced the concepts, the better able we are to act in and on our environments; multiplying is more efficient than counting on fingers. These more powerful, learnt and less situation-specific concepts, he termed 'scientific concepts'. Given the concern with language and thinking in Vygotsky's work, the paucity of attention to 'attainment' and 'understanding, ideas, concepts' in the projects analysed by the LOTG is surprising (see M. James & Brown in this issue).

Examining what is being worked on

Leont'ev was a colleague of Vygotsky's, but he had to leave Moscow in 1930 and subsequently set up his own research group in Kharkov. He and his group shifted the focus away from tool mediation and towards the object: how it was interpreted and what actions it elicited. In the above example Leont'ev's analysis would allow us to see whether the pupil interprets the object as a vehicle to reveal her numerical skills to her teacher and what made that the appropriate interpretation. He explained this with the concept of object motive, that is, objects within particular activity systems elicit behaviours that are appropriate to that object in that system.

The main thing which distinguishes one activity from another, however, is the difference of their objects. It is exactly the object of an activity that gives it a determined direction. According to the terminology I have proposed, the object of the activity is its true motive. (Leont'ev, 1978, p. 62)

Leont'ev developed the idea of an activity system alongside the notion of a leading activity. In the classroom example, if the pupil demonstrates her maximum arithmetic capability she has recognized that the leading activity is mathematics education and knows the expected patterns of behaviour and her role in them. She knows that she is in school, expected to demonstrate what the teacher expects and that singing a playful song as she counts would not be appropriate for that leading activity.

In brief, both Vygotsky and Leont'ev eroded the distinction between mind and world and argued that mind is revealed in action on the world. Furthermore, they were not simply concerned with learning how to become a member of a community, they were interested in how we might transform our worlds through our increasingly informed actions on them. For example, they both used their psychology pedagogically, particularly in the case of Vygotsky, in order to identify children's current understandings so that they might be enhanced. In this endeavour they were clearly realists rather than relativists and were working with a forward-looking modernist agenda for the improvement of post-revolutionary Russia.

Transforming understandings

Activity theory is more commonly associated with Engeström, in the UK at least (Engeström, 1999a). His work represents a move on from that of Leont'ev. Untrammelled by life in Stalinist Russia he has foregrounded the transformatory potential of Vygotsky's legacy. His is an interventionist methodology which aims at entering the system and working with participants in it to develop new tools and to transform the objects they are working on (Engeström, 1999b). Drawing on the ideas of both Marx and Leont'ev, he has elaborated a framework for an activity system which is shown in Figure 2 and which helps map relationships between, for example, tool, object and rules (or expectations).

Engeström's notion of object transformation is important to studies of learning in practice. For him, learning is evident when the object is seen as more complex by the person or people acting on it. He talks of learning by expanding and expansive learning (Engeström, 1987) to explain this. Expansive learning comes from repositioning oneself in relation to the object as a result of seeing more in it. This repositioning also shifts the system in which one is operating. Importantly, expansive learning is studied at the level of the system and is explained as an outcome of a contradiction in the system which has been recognized and responded to by the system.

Let us return to the numeracy example. If the child interpreted the task correctly as a counting in fours exercise, but in fact found that she could not complete the task in the time available, she would be faced with a contradiction between object (the problem) and tool (counting in fours). Following Engeström, as either a researcher or teacher, one would examine how the system had produced that contradiction. It might be that there was an emphasis on covering the curriculum at the expense of learning (which would be seen as a rule in Figure 2).

The analysis would then promote discussion of whether the rule (rapid curriculum coverage) was really enabling learners to work on the object, i.e. the numeracy

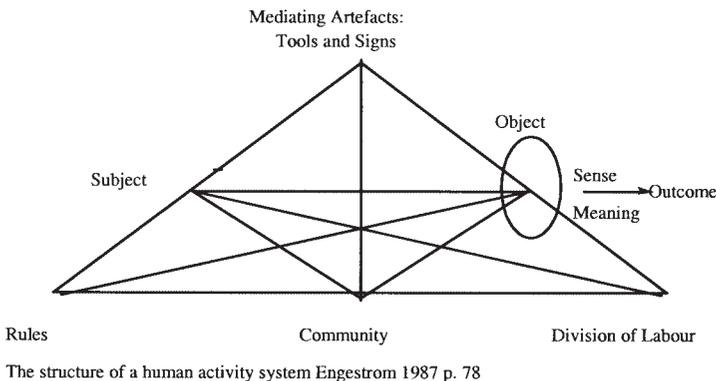


Figure 2. Engeström's model of a single activity system

problems being set. As a result of that discussion, the way the system operated would change through a change in the rules about pace of curriculum coverage, or more attention to helping learners develop more efficient tools or strategies to work on the problems.

Engeström's prime concern is interventionist research to promote systemic learning, through, for example, enabling groups of workers to question how the system is shaping opportunities for action and thinking. None the less, his framework has considerable potential for researchers who are interested in how conditions for learning are created and in what is learnt.

Summary

- Cultural psychology has strong cognitive roots, but examines learning through exploring how tools are used and objects interpreted in particular settings.
- It is, however, far from relativist in its concern with peeling away the false consciousness that masks the object in order to reveal its complexity.
- It is often able to tell us about how specific ways of engaging with the object are enabled or discouraged at the level of the activity system.
- It presents challenges for assessment of learning. But dynamic assessment (Feuerstein *et al.*, 1987; Minick, 1987) already draws on Vygotskian notions of tool-mediated action.

In TLRP we find one project, *LIW*, operating firmly in this strand (Learning in and for Interagency Work). That study is aiming at revealing changes in thinking by examining how professionals use language (the tool) and how they interpret the trajectories of young clients (the object) as they move between the different professionals who are aiming at preventing their social exclusion. The concepts that practitioners employ in their professional work are revealed in the language they use when discussing the young people's trajectories and their collaborations or otherwise with other professionals. What is distinctive about this project is that the professional learning, which is the focus of the study, is a matter of learning something entirely new. Interagency working is a new form of professional practice which requires new concepts and changes in the working environments in which these new concepts are developed through use.

The TLRP project categorized by the LOTG as both participation and dealing with understanding, ideas and concepts (see M. James & Brown, Table 2) is Eraut's study (*LINEA*) of early career learning at work in nursing, engineering and accountancy. Here the line is very much one of apprenticeship and peripheral participation in established professional practices. The study focuses on how learning is enabled by others and by the workplace itself. Here there is no emphasis on transformation; rather, the concern is learning to belong to a particular cultural group and how that learning is supported. Eraut's study, therefore, belongs more comfortably in the second strand of work that is labelled as learning through participation. We shall now turn to it.

Legacies of interactionism

This strand is much broader and encompasses the anthropological approaches of Lave (1988, 2001) as well as the cognitive arguments of Greeno (1997). Located between them we find writers whose focus is the dialogic construction of meaning such as Mercer (1995, 2000) and Wells (1999) and a raft of work from US developmental psychologists (Saxe, 1990; Resnick *et al.*, 1991; Rogoff, 1995). Like Vygotsky, they are all concerned with understanding how people come to know, and become increasingly expert participants in, their worlds and, like him, they would also argue that they are finding ways of bridging the divide between mind and world. They do not see knowledge as something that is simply acquired, stored and applied, but rather something that is discursively constructed and drawn upon. In that they are interested in learning and action they are concerned with cognition, but they look outwards to how cultural conditions, including forms of interaction, interact with the way people think and act. Because they represent the two extreme ends of this strand, yet have much in common with each other, I will focus only on Lave and Greeno.

The difference between this strand and that represented by cultural psychology is a very subtle one. It originates in the difference alluded to earlier between the two broad sets of ideas that are both given the participation label. In Russian cultural psychology the emphasis is more on how society or the collective is incorporated into self; whereas in North America the interactionist and dialogic concerns are of a self that adapts to different social situations. Lave described the challenge for her as the need for ‘a theory of the social actor in action in the lived-in world as a basis for developing a more adequate model of cognition in cultural context’ (Lave, 1988, p. 13).

This focus on the individual actor has meant that understandings of learning and action developed in the legacy of interactionism have needed to attend to the problem of transfer, that is, how patterns of knowledgeable behaviour built up in one setting are deployed in new settings as the individual moves between settings. Even though Lave’s starting point is a critique of cognitive anthropology, and Greeno’s is a critique of cognitive psychology, they have both been obliged to tackle the question of how knowing that has developed in one setting is brought into play in another (Lave, 1988; Greeno *et al.*, 1996; Greeno, 1997).

Lave’s response was to argue that when settings are very different, such as school and the supermarket, transfer rarely happens and that what is needed instead is a theory that explains how cognitive activity is structured by situations (Lave, 1988). This is certainly not a relativist’s quest; she is calling for a strong explanatory principle that works across settings. However, as an anthropologist her focus has largely been the settings and what happens in them. Greeno has stayed in the battlefield with psychologists and instead has come up with a response that has much in common with connectionist psychology. He has argued that what we need to focus on is developing a capacity to identify common patterns as we move from setting to setting (Greeno *et al.*, 1996; Greeno, 1997).

Lave is perhaps best known among educationalists in the UK for the introduction of the ideas of a community of practice and of learning through peripheral participation (Lave & Wenger, 1991). Lave's ideas as a social anthropologist are subtle and based on detailed observation and analysis of non-school settings (Lave, 1997; Lave & Holland, 2001). Her book with Wenger (Lave & Wenger, 1991) and her later edited collection (Chaiklin & Lave, 1993) were attempts to examine how thinking and action are structured by the social engagements we encounter. In all her work, therefore, she encourages us to fix our analytic lenses on the structuring environment and how it produces or allows certain ways of participating and the construction of particular identities (Lave, 2001). As a social anthropologist her concern is with how we are enabled as participants in systems.

Her notions of peripheral participation in the practices of a community, as part of a process of absorption into the community, have clearly resonated with researchers working in organizational learning and workplace learning (Wenger, 1998). Without a doubt, part of the attraction are similarities between Lave's ideas on the relationship between structuring environment and ways of being and those of Bourdieu on habitus, field and practice (Bourdieu, 1993). Thus, what she offers makes sense to those whose concern is not primarily with what learning is, but with the cultures that support it. The TLRP study of the transformation of learning cultures in FE (*TLC*) is a good example of how these ideas have been used to enable an analysis of how the conditions for learning in FE may be enhanced.

From the perspective of a concern with what learning is, there are some limitations in the view offered by Lave and Wenger. In listing them I am not criticizing that work, simply suggesting that perhaps too much has been read into it. Neither am I offering a complete critique of a community of practice approach; I am simply focusing on learning. First we need to question the idea of a community of practice. Wenger describes it as a joint enterprise, where there is mutual engagement as a social entity with a shared repertoire of communal resources that have been developed over time (Wenger, 1998). Being held up in traffic at the same bottleneck each evening might thereby produce a community of practice, as indeed might holding a department store's loyalty card. The concept needs tighter boundaries and Lave's work with, for example, Liberian apprentice tailors, does provide them (Lave, 1997).

However, that takes us to the next concern. It is not clear how the community of practice metaphor deals with learning something new. It provides a compelling account of learning as socialization into existing beliefs, values and practices, but does not offer an account of how new knowledge is produced. For that we need to turn to the ideas of expansive learning put forward by Engeström. Finally, and perhaps most importantly, it does not tell us what is learnt, only what is done.

The final point is perhaps not fair to Lave as she has produced a framework which, in similar ways to that of Vygotsky, looks to analyses of language in use as evidence of ways of thinking (Lave, 1988). However, this is not being developed by many of those who employ the community of practice metaphor. Clearly there is work to be done in refining the concept and in examining how learning may be evidenced. One challenge

to evidencing learning is the need for a dual focus on the possibilities for action offered by existing practices, and the extent to which these are taken up by those who are learning to participate in them. The *IILW* (Improving Incentives to Learning in the Workplace) Phase I network was specifically set up to problematize notions of the community of practice and to test the limits of situated cognition in understanding workplace learning. That study has tackled the concept and has produced ways of differentiating between learning environments (Fuller & Unwin, 2004) and has examined what they term ‘actor oriented transfer’ (Evans *et al.*, 2004).

Greeno, like Lave, argues that we need to recognize that cognition, as a process of coming to know, is structured by the situations in which it takes place (Greeno, 1997). However, his focus is more finely placed on learning and how it occurs. He argues that we need to understand learning better ‘by developing increasingly detailed analyses of information structures in the contents of people’s interactions’ (Greeno, 1997, p. 5). Thus, if we want to understand learning through participation in practices, we need to examine the practices and what they represent, allow and constrain together with the interactions that occur within them. If we do this, we will get a purchase on what individuals are bringing to these interactions and how they adapt as they engage in practices. This sets out an important agenda for research on pedagogy (i.e. the study of teaching and learning) as it sustains a focus on individual adaptation, yet places it within an analysis of the possibilities for action that are available within a particular set of practices.

Greeno proposes that we overcome the question of transfer of learning, which has bedevilled most critiques of situated learning (e.g. Anderson *et al.*, 1996), by starting with an analysis of practices. He suggests that educators should provide some commonality between settings.

For transfer to be possible, there must be some constraints and/or affordances that are invariant under the transformations that change the learning situation to the transfer situation. For transfer to occur, the learner must become attuned to those invariants in his or her initial learning. (Greeno *et al.*, 1996, p. 24)

He later refers to the outcome of that learning as a ‘generality of knowing’ (Greeno, 1997, p. 11) and the need to focus ‘on the consistency and inconsistency of patterns of participatory processes across situations’ (p. 12). It follows from such arguments, though Greeno does not make the point in these papers, that learning is evidenced in a capacity to recognize how one’s action might be supported in a setting and to use the resources available to take action. The idea of learning as resourceful action in and across settings allows us to examine the processes of learning as well as the outcomes and to consider how they are pedagogically supported.

Summary

- The strand of work just broadly outlined is based on critiques of versions of cognitive anthropology and cognitive psychology that do not attend to how ways of thinking and being are produced in different situations.

- None the less, it sustains a focus on cognition, seeing it as the process by which people come to know and to act knowledgeably in different settings.
- It therefore sustains a focus on individuals as they adapt.
- It requires us to look at the detail of interactions between individuals and practices as they engage in those practices.
- It suggests that pedagogy involves careful structuring of learning situations.
- It presents challenges for assessment of learning because of its focus on both the individual and practice. However, because of its emphasis on process, coming to know and resourceful action, it offers a great deal to understandings of formative assessment and how it can inform pedagogy in formal settings as well as in the workplace.

In TLRP we find a number of projects employing the idea of learning through participation and invoking the idea of community of practice. However, the analysis of projects undertaken by the LOTG suggests that the participation metaphor is often associated with attitudinal and behavioural outcomes, i.e. in relation to how learners are positioned, and how that positioning impacts on their engagement and feelings, including feelings of self-worth. They also note that there is a tendency to combine both metaphors in the research design.

There are exceptions to the focus primarily on attitudes and behaviours, including the work on professional learning by the Early Career Learning at Work (*LINEA*) project and the *InterActive* project on the use of ICT in schools. However, if the idea of learning in and through engagement in practice is to contribute to the conceptualizing of teaching and learning produced by TLRP, there is a need for even more careful teasing out of where these projects are placing themselves in the broad strand of work just outlined. There is also perhaps a need for a discursive shift which enables a move from the language, and therefore the concepts, of acquisition when trying to work with a notion of learning as coming to know in different situations. Attainment, in coming to know, is not simply a matter of having stored knowledge and then reproducing it in examination settings. It is, instead, found in a mind at grips with the world and evidenced in accomplishment of action on the world.

Moving beyond the metaphors

The participation metaphor as a way of explaining learning is not entirely helpful because it can appear to suggest that we do not need to examine what learning is in order to think about how it might be enhanced. I have argued here that the most robust research given this label is doing more than simply looking at processes of participation and the support given by different contexts (arguably a dualist approach). It is instead addressing the learning issue by proposing a different angle on cognition. It is demanding that we examine simultaneously (1) how learners interpret and act on their worlds and (2) the opportunities afforded them for those interpretations and actions. These two intertwined focuses, with a strong Vygotskian legacy, are, I suggest, the pedagogic concerns that are driving TLRP.

The angle on cognition outlined in this article also usefully allows us to recognize, for example, that reflective awareness is as much a feature of both cultural psychology and a coming to know as it is of work that is labelled acquisition. Equally, situated learning does not imply that when one is removed from the situation one ceases to call upon the intellectual resources made available there. Rather, acting in our worlds requires us to read the situation and draw on the most effective resources available in it to support our actions. These resources may well include algorithms and concepts developed in similar situations and carried in our minds in the language we use. If these are not ‘attainments’ or ‘understanding, ideas, concepts’, the difference is semantic.

The implications for an understanding of learning outcomes

One way of labelling the processes of learning outlined in this paper is to call it development of expertise, where expertise is a capacity to interpret the complexity of aspects of the world and have the wherewithal to respond to that complexity. That is, it is a process of expansive learning. Here, I am not limiting expertise to professional practice, but am applying it to learning to think and act as a beginning historian or mathematician in school, or learning how to take care of a young child in parenting classes.

This view of expertise acknowledges that there are bodies of knowledge, ways of thinking, sets of values and expectations of behaviour that are associated with particular culturally derived forms of practice and that these features of practice are themselves open to change. Therefore, attention to the authenticity of the learning situation as representative of the specific practice is important. Learning outcomes, however we choose to define them, cannot be separated from the experiences that produce them, such as the nature of the learning environment. With this premise in mind I shall now point to a few of the implications of the overview I have presented for how we might evidence learning as a form of coming to know.

Capturing knowing in context

Lessons from cultural psychology imply that activity systems provide different degrees of freedom in what might be known and how it might be known. That is, more tightly regulated systems allow more limited use of both material and conceptual tools and fewer options in the interpretations of objects. (See Valsiner, 1998, for a discussion of this in relation to the zone of proximal development rather than activity theory.) For example, in a classroom where the object is the curriculum, the mediating tool is the textbook and the rules are rapid curriculum coverage and no questioning of that rule, there will be little scope for moving beyond the narrow view of the curriculum encapsulated in the textbook. Learners in different systems, therefore, will have different opportunities for action.

Engeström’s challenge has been to tell us that we can and should question rules, how tools are used, whether they are appropriate and so on. His argument is that

public meaning making, such as the knowledge that is carried in curricula, is open to change. Different activity systems can develop new interpretations of the object and reveal new meanings through their own questioning of the histories and rules that shape them and through exploring the potential meanings inherent in the object.

Lessons for assessment. Engeström presents a challenge to researchers who are looking at teaching and learning and how it might be enhanced, rather than to those concerned only with assessing how individual learners are making sense. His argument calls for an organizational analysis alongside a focus on learners' trajectories. His concern is systemic learning, i.e. expansive learning is evidenced in a change in the activity system, and he pays relatively little attention to the individual as someone who is coming to know or making sense. The *LIW* project is aware of this weakness, hence its attention to the language used by individual professionals as evidence of their changing conceptions.

Assessing sense making

The difference between individual sense making and collective or public meaning making lies at the core of cultural psychology in Vygotsky's notion of learning, on both the intermental and intramental planes. This also resonates through Lave's work on peripheral participation in communities of practice.

In brief, learning can be seen as a process that starts with immersion in a language community where we might hear and use the terms that carry key concepts (public meaning in the intermental plane), but not understand them. We then move onto a process of increasingly making sense and refining those concepts (the intramental plane). Finally, we are able to use the concepts and engage in and contribute to the processes of public meaning making. If we are to support learning we need to be able to capture where learners are in this cycle of meaning and sense making.

Vygotsky's own work certainly tried to reveal developmental changes in sense making through his attempts to structure activities which revealed how children thought and how they used language and other cultural tools (Vygotsky, 1987). He saw learning as the interplay between everyday situated concepts and scientific transcendent concepts that were much more powerful. He wanted to be able to reveal the concepts being used in his research and to enable their development in processes of mediation and remediation.

Lessons for assessment. Arguably we need to question whether educational assessment should limit learning outcomes to knowledge of a curriculum as attainment. Perhaps it should attempt to capture more broadly the ways in which a learner is able to make sense, which may not only reflect the designed curriculum. Indeed, the increasing availability of web-based resources calls into question how we think about curriculum. Perhaps learning outcomes should be seen mainly in terms of how learners use concepts as they act on problems.

Using resources

Both strands of work outlined in this article emphasize that coming to know involves a developing capacity to interpret our worlds and the problems we need to deal with in them. They also emphasize that what marks out successful learners is the use of appropriate tools to work on these problems. Tools include conceptual tools revealed in how language or algorithms are used, but they might also be material artefacts or help from more expert others. Clark puts it clearly.

Simple external props enable us to think better and hence to create more complex props and practices, which in turn ‘turbocharge’ our thoughts a little more, which leads to the development of even better props. (Clark, 1997, p. 62)

Drawing on robotics, he argues that we control our physical surroundings in ways that alter how we interpret and act in and on them, that is, we are actively and resourcefully engaged with our world rather than passively receiving it.

There is much to be learnt from current work on the educational uses of information technologies about how learners can be helped to use resources to support their thinking (see, for example Du Bouley & Luckin, 2001). While focusing specifically on help seeking, Wood & Wood (1999) found that, for those students whose prior knowledge about an ICT-based algebra task was low, help seeking was associated with more positive learning. Also, when prior knowledge was accounted for, time spent before seeking help was also associated with effective learning.

Lessons for assessment. There are considerable lessons here for assessment. If coming to know is associated with careful interpretation of the problem and successful help-seeking strategies, one might argue that attention should be paid as much to these broad strategies as to ensuring curriculum coverage and assessing learning outcomes associated with that coverage. If we want to encourage a disposition to seek increasing complexity and resourceful responses such as help seeking, arguably we should be assessing these capacities. Again, there are clear links to work so often associated with the acquisition metaphor and particularly with metacognition (see McGuinness, this issue).

Final thoughts

Throughout this article I have attempted to expand our understanding of what is so often termed learning through participation. I have cautioned against simply seeing participation as another way of looking at behaviour and how it is shaped by context. I have called for a recognition of the cognitive potential in socio-cultural and activity theory frameworks and indicated the need for a discursive shift that allows a rethinking of what is meant by acquisition.

It is interesting to see the extent to which TLRP projects have espoused aspects of socio-cultural theory. Equally, it is perhaps disappointing that—at least in their proposals and early reports, upon which this analysis was based—they limit their

attention mainly to learning behaviours, possessing attitudes and issues of membership, inclusion and self-worth, all of which connect most TLRP interpretations of participation with the interactionist and dialogic concerns of the adaptable self found in North America and originating in the work of G. H. Mead. (Elsewhere I have argued that Mead's work was essentially conservative and predicated on the need to create homogeneity out of heterogeneity in the melting pot that was the US at the start of the last century; see Edwards, in press). Arguably we now need a theory of learning that will allow us to understand how we learn practices and ways of being that are new.

The strands of work outlined here are rooted in the idea of a mind which is outward looking, problem solving and engaged with the world. This is, I suggest, the kind of creative and resourceful mind that education needs to be developing. As assessment is so powerful a tool in education, perhaps it is time for us to identify what kinds of learners we need, look to a theory of learning that might enable their development, and identify the learning outcomes we want to encourage and assessment tools which might do justice to them. It will be a shame if the cognitive potential of socio-cultural and activity theory approaches to learning remain untouched by TLRP, with the result that the subtle challenges offered by these approaches to analyses of learning are not taken up.

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