University of Wollongong
Research Online

Faculty of Education - Papers (Archive)

Faculty of Social Sciences

2008

The ontology of learning environments

G. Brown
University of Wollongong, gbrown@uow.edu.au

Publication Details

This book chapter is published as Fox, C, Learning in new times: globilisation, learning and the postcolonial condition, in Kell, P, Vialle, W, Konza, D and Vogl, G (eds), Learning and the learner: exploring learning for new times, University of Wollongong, 2008, 236p. Complete book available here.

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

Chapter 14

The Ontology of Learning Environments

Gordon L. Brown

Introduction

The learning environment is a significant focus for both educational practice and theorising. Although the term *learning environment* is used widely, it is used inconsistently and is under- or poorly-theorised. At the same time, there have been a number of interesting developments in curriculum and pedagogy, such as *authentic curriculum*, *situated curriculum*, *rich tasks*, *productive pedagogies* and *new learning*, that call for fresh and typically more complex approaches to curriculum, pedagogy, learning and organization. Recent theorizing in realist philosophy of science and social science is developing social theory in ways that provide useful insights into these matters. These insights critique behaviourist and constructivist models commonly used in education, and point to a realist, specifically a *critical realist* or what could be called a *constructivist realist*, alternative.[2] In this view, the learning environment is not merely the context of learning but, more significantly, is *the set of conditions that enable and constrain learning*. Together these elements show the classroom/excursion site to be empirically and theoretically inadequate, and ripe for a realist reconceptualisation as a broader concept, the Learning Environment.

What the Learning Environment is not

The term learning environment (henceforth LE) is commonly taken to be the circumstances or context of learning, or in many examples, some elements of that context. This meaning is problematic both in its use and its theoretical underpinning. First, the term is used imprecisely and interchangeably with other terms. For example, it used sometimes as a fancier alternative to classroom, but the four-walled classroom has reached its use-by date as a useful concept in education discourse. Classroom walls have always been more porous boundaries than centralised curriculum developers and school systems acknowledged. This is true not only of the socio-cultural contexts of schools (and other places of learning) but also that information and communication technologies increasingly link the learner to the wider world and to sources of information and data beyond the capacity and potentially beyond the control of teachers and parents. Moreover, the classroom is often poorly differentiated from other units of analysis: the LE, the student, the class or cohort of students, the teacher and the curriculum. The

[2] I take my typical reader to be interested primarily in the educational rather than the philosophical argument, and so the following argument is intended to summarise critical realist arguments rather than provide the detail of arguments available elsewhere. See Sayer 1992, Sayer 2002

classroom putatively defines spatial-temporal parameters – the first room on the left, or the room where Mr Newton teaches, or the homeroom for 4C – or physical characteristics such as size, colour and layout. Typically administrators construct and assign rooms simply as learning spaces in which learning is to be unproblematically engendered by others. However the homeroom for 4C easily becomes a proxy for the class 4C as a social entity and the curriculum and the teacher(s) assigned to that class. Teachers will then speak of 4C as a class with behavioural characteristics, expected academic outcomes and requiring certain modes of teaching. Any of the students, the class, a cohort, the teacher or the curriculum may be of interest, but the concepts of the LE and classroom are poorly defined and differentiated. We see this, for example, where a significant proportion of sites located by Internet searches concern online or web-based learning environments, and the descriptions often do not relate these to wider notions of learning environments in schools. Likewise, discussions of other specialised learning environments, such as for gifted and talented students, focus on the elements of differentiation; the notion of a generalisable concept of LE, from which specialisations can be differentiated, is implied, but not shown.

The second critique of the term LE, its theoretical underpinning, is more significant, as I hope to show in this chapter.

Some current conceptions of LEs

LEs are construed in various ways. Pieters, Breuer and Simons (1990) conceptualise the LE as both the *physical and intellectual environments that facilitate learning*. An historically popular model is apprenticeship training, typically entailing one-on-one modelling and practice on site. This has largely given way in western education institutions to classroom groups of 30 or more students instructed by a teacher imparting basic and cognitive skills that are supposed to be transferable. Pirolli and Greeno (1988) suggested a typology of three relational categories of learning environments: an *apprenticeship* model where the teacher models the behaviour then coaches students, a *collaborative* model either between students or between students and the teacher, on shared intellectual goals, and *exploratory microworlds* in which students manipulate computational objects designed to test theoretical principles. Some elements addressed in the papers included by Pieters et al are: coaching by amateur peers, students' concepts of schooling, work simulation environments, teacher enthusiasm, and teacher praise. LEs were scored on a range of physical, behavioural, interactional/relational, affective and linguistic measures. In secondary schools, truancy and drop-out measures were compared against curriculum, relational, structural and physical measures, and attempts were made to measure school effectiveness using truancy, drop-out and class-repeating scores.

More recently Arthur, Gordon and Butterfield (2003) have developed what they term an 'ecological' model of LEs which, while not explicitly defined (a point of note in itself), characterises LEs by a wide

range of concepts: behaviour, socio-cultural factors, classroom and school factors, personal factors, curriculum, instruction, nature of learning, time, physical environment, routines, communication, and management strategies.

Probably the most vigorous recent development in LEs is in student-centred LEs (Jonassen & Land, 2000a). This general approach gained significant momentum from the late 1980s and the key markers that differentiate it from what Jonassen & Land call traditional instructional LEs are summarised in Table 1.

Table 1
Indicators of shifts in approaches to LEs (from Jonassen & Land 2000b)

Aspect	*Traditional Instructional Learning Environments*	*Student-Centred Learning Environments*
Learning	Knowledge transmission; individual; process of information reception, storage, retrieval and comparison with others	Meaning making; social; process of internal and social negotiation (dialogue) and shared with others
Locus of meaning	Heads of individuals	Individual and socially negotiating minds and the discourses of the community
Contributing disciplines	Psychology	Anthropology, sociology, ethnography
Bases for conceptions of learning	Cognitivism, behaviourism, communications theory	Social constructivism, situated learning, everyday reasoning, activity theory, ecological psychology, distributed cognitions, case-based reasoning

Table 1 marks the shift from the traditional to the student-centred paradigm in terms of theories of learning, locus of meaning and contributing disciplines.

Finally, as an example of the concept in use, the Department of Education and Training in New South Wales, Australia, includes what it calls Quality Learning Environments in its Quality Teaching initiative (NSW Department of Education and Training 2003). This initiative is an example of the genre of educational approaches encapsulated in concepts such as *authentic learning*, *rich tasks*, *new learning* and *productive pedagogies*. In this model, Quality Teaching is to be achieved through Intellectual Quality, Significance, and a Quality Learning Environment, with the latter characterised by explicit quality criteria, engagement, high expectations, social support, students' self-regulation, and student direction. This model is consistent with the student-centred LEs indicated in Table 1, and I will return to it later.

Developing a generalised account of the LE

In trying to understand the LE, the practical problem is this. Experienced teachers of a sufficient calibre have an ability to establish and move between effective LEs, which suggests that there are characteristics of such environments known, even if tacitly, to such teachers. How is this so? What is it that a teacher has to know, and has to do, in order to be able to establish and teach effectively in a LE? What is involved when a teacher moves between a classroom in a disadvantaged school, for example, to

an excursion site, then to a remedial reading group, and so on? The seemingly infinite variation in LEs together with the ability of successful teachers to (usually) adapt with aplomb to fresh circumstances suggests that there are some generalisable features of LEs that these teachers have under control, rather than an infinite number of LE types that have to be learned by the teacher. What then are the features of LEs that are common to most or all (necessary features) and what ones are not (contingent features)? What is it about LEs that should be learned by student, neophyte and ineffective teachers?

My response to these questions is that there are indeed generalisable features of LEs that can inform both educational theorising and practice, and I begin with a critique of the assumptions that underpin most models. In epistemology there are three broad accounts of knowledge: that it is gained through the senses (empiricism), that it is a construct of the mind (idealism) and that it is given in an external reality (realism). We can see the empiricist basis of the traditional transmission view in Table 1 above: knowledge is communicated to and received by sensing individuals, and the corresponding LE is reflected in the multitude of traditional classrooms with their opposing chalkboards and desks. We can also see that the shift identified by Jonassen and Land, again in Table 1, is broadly a shift to philosophical idealism, whether the constructivism is individual or social. In practice individual models will be commonly a mixture of philosophical types, but this is the overall change.

However, an alternative to the empiricist and idealist traditions is found in recent work in realist philosophy of the natural and social sciences, to which I now turn. The fundamental realist position is that the objects of knowledge exist independently of our knowledge of them. Before proceeding, however, it is important to note that this statement as it stands includes shallow or naïve versions of realisms in the sense that in some way just about everybody is realist about something: even those who assert that everything is language are realist about the existence of language. A deep realism, particularly here the paradigm called critical realism as developed by Bhaskar (1996, 1998) and others (for example Sayer 1992; Collier 1994; Archer, et al 1998) asserts the existence of the world (natural and social) whether or not we have knowledge of it, that our knowledge of it is socially constructed, and that this knowledge can be subject to empirical check – that there can be rational grounds for choosing between knowledge claims. That is, critical realism asserts ontological realism, epistemological relativism and judgemental rationality, respectively. This provides a critique of models based on empiricist and idealist assumptions, and suggests a realist alternative. (Henceforth I use the term realist to mean critical realist.)

A theoretical framework

I will briefly set out here some basic concepts of realism so that the reader unfamiliar with it can appreciate its distinguishing features and claims, and the critical realist can check my application of it

against the literature. The fundamental realist position, that the objects of knowledge exist independently of our knowledge of them, means that it makes a distinction between our knowledge and what there is to have knowledge about (that is, reality). This distinguishes it at once from both empiricism and idealism, which cannot explain beyond sensations and structures of the mind, respectively. To say that everything is discourse, for example (an idealist position), arises because a view of how knowledge is gained is conflated with a view of what there is. What we can know is not the same as what is, and this is not hard to show. In the natural sciences, experiments are used to produce reliable knowledge. This is intelligible only if the properties and dispositions of the things being studied also hold outside the experimental conditions (Bhaskar 1998, p.xii). The whole point of the experiment, which is a closed system, is to identify properties and dispositions that exist in the open systems of extra-experimental reality but which cannot be readily identified there. This entails a distinction between causes, events and experiences. The properties and dispositions that cause events operate independently of whether a system is open or closed, but in open (non-experimental) systems where conditions freely vary, the multiple causes (whose effects may be conflicting) means that any one cause may or may not result in an event. In turn, any one event may or may not be experienced by an observer. The deep reality of causal properties and dispositions exists whether or not we have knowledge of it.

The differences from empiricism and idealism are clear. Empiricist models like behaviourism and transmission theories see knowledge arising from sense experiences, but see causes only as events; they are unable to explain scientific knowledge. Strictly idealist models llike situated learning and social constructivism see knowledge as mental constructions. Sometimes an external realisty is implied, e.g. in situated learning (surely the learning is situated in an external reality!), but at base it is not:

> Although operationalized somewhat differently, constructivist learning environments share key epistemological foundations and assumptions. Constructivists view reality and meaning as personally rather than universally defined. (Land & Hannafin 2000, pg 5)

For realists, meaning is personally and socially defined, but reality is not. Reality exists whether we have knowledge of it or not. Realism does share with social constructivism the individual and social construction of knowledge, but because of its realist differences is better described as a *realist constructivis*t model. The recognition of an external reality, including the meanings of texts, social relations and material objects, means that in principle we can test claims for knowledge, and this is another difference from the idealist view.

As in the natural world, the objects of our knowledge in the social world exist whether or not we have knowledge of them. Unlike the natural world, however, the social world is partly determined by human agency, so the qualification is that

> Social phenomena such as actions, texts and institutions are concept-dependent. We therefore have not only to explain their production and material effects but to understand, read and interpret what they mean. Although they have to be interpreted by starting from the researcher's own frames of meaning, by and large they exist regardless of the researcher's interpretations of them. (Sayer 1992, pg 6)

In sociology there have been two historically enduring and influential conceptions of social explanation. One tradition, following Weber, sees everywhere the actions and effects of people, what has been called humanism or voluntarism. The other tradition (structuralism), following Durkheim, sees everywhere social structure.[3] Bhaskar (1998) has argued that neither is satisfactory. One has actions but no conditions, while the other has conditions but no actions. Further, neither agents/individuals nor structures/groups are sufficiently enduring – continuous – to explain the 'autonomy' of society over time (Bhaskar 1998 pg 41). Rather, it is relations that are sufficiently enduring to meet this criterion. While the psychologist or the ethnographer might be interested in the relations between individuals, in general we are interested in the relations between 'positioned-practices': a school is characterised in part by the teacher-student relation, not by an individual teacher-student relation, not by individual teachers and students (voluntarism), and not by the school population (collectivism). Rather, people and societies are mutually dependent:

> Society is both the ever-present *condition* (material cause) and the continually reproduced *outcome* of human agency. (Bhaskar PON ppg 34-35; emphases in original)
>
> Society, then, provides necessary conditions for intentional human action, and intentional human action is a necessary condition for it. Society is only present in human action, but human action always expresses and utilizes some or other social form. Neither can, however, be identified with, reduced to, explained in terms of, or reconstructed from the other. (Bhaskar PON 1998, pp. 36-37)

An example is language. Its rules and content exist prior to and independently of us; this is a structural condition. The existence of the language only because it is used by people is structure as outcome. The use of language by speakers for their own conscious purposes, and not for the reproduction of the language, is practice as production. The learning of language by children is practice as reproduction, and the change of grammar and vocabulary over time is practice as transformation (Collier 1994, pg 146).

Reality can be thought of as being layered or stratified, where each layer has emergent properties whose causes are largely autonomous from the causal level from which it emerged. Emergent properties cannot be reduced to the causes from the lower level, and cannot be predicted from the properties of the lower level. Thus social properties are generally to be explained in terms of other social properties, not biological properties or the laws of physics, for example. Nor are emergent social properties predictable

[3] As with the philosophical argument, the reader wanting the detail of these sociological traditions is referred to the relevant literature. That detail is beyond the scope of this chapter. See Sayer 1992, Danermark et al

from biological or physical properties. However, laws from lower strata govern entities in higher strata as well: I am a social and biological being and am also subject to gravity. Social features emerge from the group that cannot be reduced to the properties of individuals, and in this way the class group and indeed the school group have properties – tendencies – that cannot be reduced to those of the individuals in those groups:

> Social reality is an emergent realm, dependent upon, though irreducible to, inherently transformative human agency, and consisting of stuff that is intrinsically dynamic, i.e. everywhere a process, highly internally related and often relatively enduring, amongst much else. (Lawson 2003, pg 44)

Again, multiple causal mechanisms and tendencies may be operating simultaneously in open systems, hence the difficulty of making predictions of events in open systems. It suggests we look for educational mechanisms in learning environments.

Finally, precisely because society is the outcome of human agency, people make decisions about what is best to do in transforming their social conditions. Such decisions are moral decisions, and so this conception of society is that it has an irreducible moral dimension.

We have, then, a distinct conception in which social reality may be thought of as structured vertically – namely causes (underlying tendencies and properties), events (such as social practices) and experiences – and horizontally, as differentiated practices (as when teachers and students are doing different things).

Towards a realist model of the LE

The critical realist project typically starts with a question of the sort: What must x be like in order that knowledge of x is possible? Applied to the present purpose, the question becomes:

A. What must the LE be like in order that knowledge of it is possible?

Briefly, the answer to be developed in the remainder of this chapter is: LEs are (1) real and relational, (2) open systems, (3) stratified and emergent, and (4) moral. The question then has to be modified and considered:

B. What must the learning environment be like in order that knowledge of the world is possible?

I will address A and B in turn.

A. The nature of the LE such that we can have knowledge of it.

(1) LEs are real and relational

LEs are real, in that their elements exist whether or not we have knowledge of them. In the natural world, rooms and chairs exist whether we have knowledge of them or not. In the social world, *relations* (like the landlord-tenant relation or the student-teacher relation) exist whether we have knowledge of them or not, as do languages, social positions, social rules, the meanings of texts and the reasons and beliefs of individuals.

> By *social reality* or the social realm I mean that domain of all phenomena whose existence depends at least in part on us. Thus it includes items like social relations, which depend on us entirely, but also others like technological objects, where I take technology to be that domain of phenomena with a material content but a social form. (Lawson 2003, pg 16; emphasis in original)

More particularly, we find 'social rules, relations, positions and institutions, amongst other things' (Lawson 2003, pg 44). Further, the agents or actors – mostly teachers, students and parents in this discussion – are causal agents in that their values, beliefs and reasons are causes of their behaviours. Importantly for the LE, meaning is also causal.

A central purpose in LEs is the creation and sharing of meaning. Archer (1998) has argued that meanings are causal and therefore are ontologically real:

> As an emergent entity the Cultural System has an objective existence and autonomous relations amongst its components (theories, beliefs, values, arguments, or more strictly between the propositional formulations of them) in the sense that these are independent of anyone's claim to know, to believe, to assert or to assent to them. At any moment the CS is the product of historical Socio-Cultural interaction, but having emerged (emergence being a continuous process) then *qua* product, it has properties of its own. Like structure, culture is man-made but escapes its makers to act back upon them …[T]he relationship between a problem and a solution … is ultimately divorced from whether anyone does understand it, though not from the capacity of some to do so … Thus if meaning can be separated from use, rather than just from the use of certain people, then meanings have to be granted ontological status. (pp.506-508)

The recognition of beliefs, values, meanings and reasons as real causes licences – indeed, obliges – the researcher to investigate these aspects of the learning environment.

(2) LEs are open systems

I made a distinction above between the closed systems in natural science experiments, and everywhere else, which comprises open systems. Social systems, including LEs, are inherently open systems. This is

so not weakly, in the sense of having porous borders, but strongly, in the sense of responding to both internal and external factors, and changing over time.

Schools often attempt to construct learning environments as closed systems. In most schools students are not free to come and go, nor are members of the public free to wander in and out; students may be differentiated from non-students by uniforms; and architects apply their minds to various designs of rooms and other 'learning spaces' to optimise various desired learning, behavioural and affective outcomes. But schools are more than these tangible things, and the decline in Britain and Australia, for example, of school-based curriculum development since the 1980s in favour of more centralised curriculum development is also an exercise in system control and closure.

Nonetheless, critical realism draws our attention to very real ways in which learning environments are open systems and must be so.

> Any type of social organization, such as the judicial system, the organization of working life, families, the education system or the health care system, are examples of … pseudo-closed systems – they are the result of a conscious striving to make society (and nature – nature's mechanisms are inevitably involved) more controllable in relation to people's different aims. The closure achieved, however, is always of a spurious kind, and far from the natural science experiment's artificial closure – change and renewal are part of human society's constituent characteristics. (Danermark et al 2002, pg 68)

An example is teacher beliefs and student beliefs, such as when they might be at odds with stipulated curriculum content. The dominant paradigm in science education research – so-called *child science* or *constructivist* research – documents a surprising array of instances where school students construct their own, alternative, meanings that are often quite at odds with what the teachers thought they were teaching and what the curriculum intended (Pfundt & Duit 1994). These instances indicate the openness of curricula – including centralised curricula – devised on the presumption that children act as recipients of knowledge from teachers (the empiricist view). Implicit in such curricula is that they are closed systems or approximations to closed systems: there is common specification of content, training of teachers, specification of school premises and so forth, and that therefore (goes the argument) there will be equality of learning opportunity.

The realist assumption of open systems represents a basic departure from assumptions that underpin centralised curriculum development, assessment and resourcing of schools, including staffing. Taking learning environments to be open systems with multiple causes operating draws attention to the variability, not the uniformity, of learners and the ways they engage with and respond to curricula, assessment tasks, teaching strategies, classroom facilities and much else besides.

(3) LEs are stratified and emergent

I have described that concepts of the stratification of reality and the emergence of properties with characteristics that are not simply described in terms of lower levels. Learning is such an emergent property, emerging from the causal powers, dispositions and tendencies that necessarily arise from the strata in the LE, which is an open system. Learning cannot be reduced to the psychology or biology of the individual learners, nor to the sociology of the class group, nor to the physical characteristics of the classroom setting or the meaning of the curriculum, although each of these elements contributes to the emergence of learning.

(4) LEs are moral

Finally, LEs are moral environments. Quite aside from the values preferences of particular parents or school systems there are two strong arguments to be made here. First is that education is inherently a value-laden exercise. The conventional wisdom is that teachers make about 1500 decisions in a working day, and these are made with the children that other adults entrust into their care. They include decisions about what is more worthwhile to teach, what strategy to use, when to make that eye contact, when to ignore that infraction, who to ask to answer the question. They also include what adults might normally think of as value decisions, such as modelling honesty and fairness, and mediating disputes. The analysis in section (1) above identifies the actors – teachers and students – as causal agents, that is, agents whose reasons, beliefs and values cause them to act in certain ways. Because education is irreducibly value-laden, there is a moral question put to teachers, school systems, academics and other education stakeholders as to how to respond to the moral character of the learning environment.

The second argument is the critical realist position that it is possible to argue from facts to values and that an emancipatory social science is not only possible but desirable (Bhaskar 1986). That is, a realist conception of learning environments and research into them can and should have an emancipatory element. This argument draws on Bhaskar's concept of the non-alienating society enabled by his model of the society/person connection:

> This conception of the society/person connection thus implies a radical transformation in our idea of a non-alienating society. For this can now no longer be conceived as the immaculate product of unconditioned ('responsible') human decision, free from constraints (but presumably not the opportunities) inherited from its past and imposed by its environment. Rather it must be conceived as one in which people self-consciously transform their social conditions of existence (the social structure) so as to maximize the possibilities for the development and spontaneous exercise of their natural (species) powers. (Bhaskar 1998 PG 217)

The two fold implication for education is (a) the learning environment *as* a non-alienating environment, and (b) education *for* a non-alienating society. Clearly (a) would be a strategy for engendering (b). Now it could be argued that a discourse of educating children for the non-alienating society does not fit the

discourse of the instrumentalist, managerialist and individualist policy paradigm that has dominated many western societies in recent years (Ruby 1991; Willmott 2002). Even if this is so, realist theory draws attention to the undeniably moral dimension of learning environments, a dimension too often unaddressed.

To summarise, *knowledge for the student is enabled and constrained in a learning environment that is an open system and is stratified, relational, changeable and moral.*

B. The nature of the LE such that it makes knowledge of the (natural and social) world possible.

To this point I have constructed a model of the LE based on (critical) realist assumptions about its possible nature in order for knowledge of it to be possible. In this respect it does not differ in principle, only in the educational examples, from other applications in the social sciences (see Lawson 2003 for an example in economics). For education, though, the particular social ontology in question happens to concern the generation of knowledge. What does this mean for the model?

If the possibilities for knowledge are found in (enabled and constrained by) the learning environment), then at least in part, the closer the approximation of the LE to the aspect of the natural or social world being studied, the greater the opportunity for enabling knowledge of that element. I will call this the approximation factor. While in particular instances other factors may be significant, such as a student's individual capacity for learning, or the need to simplify subject matter, the approximation factor nonetheless applies. This gives a definition of, and criterion for judging, concepts such as *authentic curriculum* and *situated learning*: curriculum or pedagogy is authentic to the extent the LE (including activities) approximates the element of the natural or social world being studied. In this central respect a critical realist approach is consistent with developments in curriculum, pedagogy and organization such as these.

Running the realist ruler over LE models

The purpose of this chapter has not been to jettison the existing body of work on LEs, but instead to argue that the realist approach both overcomes some problems in existing models and provides direction for fresh work. I conclude, then, by turning to each of these claims.

There are elements of both empiricist and idealist models that are of value. The realist recognises the existence of the meanings of texts that are external to the learner, for example, as in the empiricist view, and the social construction of knowledge by the learner, as in the idealist view. This is important, because the one recognises knowledges that are highly structured and tightly bounded, and the other draws attention to knowledges that are weakly structured and fluid. Moore & Maton (2001) call these

knowledge-code and knower-code respectively. This suggests that particular LEs are better suited to enable the learning of particular types of knowledge, and fits with the educators' tacit knowledge of the value of, for example, laboratories for teaching scientific inquiry.

A second point is that our knowledge of events, and our surmises about their causes, are produced through social practice:

> For better or worse (not just worse) the conditions and social relations of the production of knowledge influence its content. Knowledge is also largely – though not exclusively – linguistic, and the nature of language and the way we communicate are not incidental to what is known and communicated. Awareness of these relationships is vital in evaluating knowledge. (Sayer 1992, pg6)

This notion that producing knowledge is work is fundamental to our conception of not only LEs but to other aspects like curricula, which typically present the knowledge outcomes as unproblematic statements.

Third, the realist distinction between causes, events and experiences gives us another criterion for judgement. Here empiricism and idealism commit the fallacy of actualism – collapsing causes, events and experiences and not recognising that tendencies operate regardless of whether they are identified. The depth provided by a realist ontology of causes, events and experiences allows questions to be asked, such as the conditions affecting agency that are significant in teaching-learning interactions. Gendered attitudes, for example, can exist as tendencies or dispositions whether or not they manifest themselves in particular events or particular individuals observe the events.

Fourth is the realist social explanation, that society is both the condition for and the outcome of human agency. On this criterion we reject theories of learning, teaching and social explanation that see only agents or only structures. Instead, the LE is both the condition for and the outcome of the agency of the actors – teacher and students. Among other things, this means that the LE should be understood as a changing and self-reflexive entity, not as a set of initial conditions that are fixed. Archer has called this characteristic of social systems, and therefore of LEs, *morphenogenisis*:

> Hence my adoption of the unlovely term 'morphogenesis', to capture both the possibility of radical and unpredictable re-shaping … and the fact that the genesis of this re-shaping lies in the interplay between structure and agency – a process which can only be examined because of their temporal separability and an outcome which can only be explained by means of analytical dualism. Our open society is like itself and nothing else, precisely because it is both structured and peopled. (Archer 1995, pg 75)

Morphenogenisis captures perfectly the interplay of a group of school students, a teacher and a variety of media and symbols in a learning environment of whatever description.

We now have realist criteria for critiquing the comparison of the traditional instructional LEs (TILEs) and the student-centred LEs (SCLEs) in Table 1. Knowledge is neither simply the empiricist individual perception and transmission of the TILEs, nor the idealist construction and negotiation of the SCLEs. The social ontology is neither one of individual agents implied in the TILEs, nor one of minds and discourse as implied in the SCLEs.

I would therefore argue that student-centred LEs such as in Jonassen and Land (2000a) are promising but under theorised: the significance of the LE ontology in each case is not recognised. We find that constructivist LEs aim for 'rich, authentic learning contexts over isolated decontextualised knowledge and skill, student-centred, goal-directed inquiry over externally directed instruction, and supporting personal perspectives canonical perspectives' (Land & Hannafin 2000, pg 6). Barab and Duffy (2000, pg 49) combine social constructivist and situativity theory perspectives to construe communities of practice as ecologies of learning in which both meanings and identities are constructed through interactions. Situated cognition theories construe LEs by focusing on the 'structures of the world' (pg 59) and how they constrain and enable learning: in sociocultural approaches to situated cognition 'construction of meaning is tied to specific contexts and purposes' (pg 69) and the learners participate in the ongoing redesign of the LE. Distributed cognition (also distributed learning and distributed intelligence) theories are broadly social-constructivist theories in that they consider the learning of individuals within not just social but material contexts also. This approach, for example, readily accommodates the interactions of learners with computing and other technologies (Bell & Winn 2000).

Finally, the Quality Teaching model in New South Wales (NSW) is interesting because it represents a recent and system-wide adoption and application of the concept LE. In broad terms the model is consistent with the framework developed here, in that it addresses the conditions that enable (and by implication whose absence constrains) learning. Although the ontology is largely implicit, it is consistent with a realist social ontology of relations (such as between students and the meaning of texts and symbols, and between students and their cultural context) and the roles of meanings and beliefs and values (expectations). In many respects (such as the social construction of knowledge and students' self-regulation) the NSW model fits within the student-centred LE field identified in Table 1, and in these respects and others (the implicit relational ontology) is a fit with the realist model I have described.

Would a more thoroughgoing realist conception make any difference? This is an empirical question that requires some fieldwork to investigate, but there are clear elements of interest. The NSW model is not so much a cohesive model for a LE than the use of the LE as an organising concept. Viewed in this way, it does not purport to (and does not in practice) present a model for comprehensively understanding the LE or its central importance. It does not argue as I have argued that the LE is centrally important in the

educational enterprise because it enables and constrains learning. Implicit in the Quality Teaching model is the LE for most elements as a notionally closed system, and one would expect that it is more difficult to implement with children who have poor socialisation skills or learning difficulties. It also addresses implicitly at best the moral dimension of the LE, no doubt because the curriculum for the most part does not feature a moral dimension.

I return to the question raised near the beginning of the chapter, of what it is that experienced teachers know that enables them to establish effective LEs. I suspect that, even if tacitly, it is the characteristics covered here: the existence of events and the causes of those events regardless of whether we know of them; the openness of the LE; the emergence of causes at different layers of reality; the moral character of LEs; the structure as the condition for and outcome of human agency; and the changing character of the LE precisely because of human agency.

References

Archer, M. (1995). *Realist social theory: the morphogenetic approach*. Cambridge: Cambridge University Press

Arthur, M, Gordon, C. & Butterfield, N. (2003). *Classroom management: creating positive learning environments.* Southbank Victoria: Thomson

Barab, S. A. & Duffy, T. M. (2002). From practice fields to communities of practice, in D. H. Jonassen & S. M. Land (eds) *Theoretical foundations of learning environments*, (pp. 25-55) Marwah, New Jersey: Lawrence Erlbaum Associates.

Bell, P. & Winn, W. (2000). 'Distributed cognitions, by nature and by design', in D. H. Jonassen & S. M. Land (eds.) *Theoretical foundations of learning environments*. . (pp.123-145)Marwah, New Jersey: Lawrence Erlbaum Associates

Bhaskar, R. (1986). *Scientific realism and human emancipation*. London: Verso

Bhaskar, R. (19980. *The possibility of naturalism: a philosophical critique of the contemporary human sciences.* (3rd ed.) London: Routledge

Brickell, G., Lockyer, L., Herrington, J., Brown, G. & Harper, B (2003). *A technology supported visitation program to the Sydney Olympic Park: Learner challenges and teacher support*. Paper presented at

Collier, A. (1994). *Critical realism: an introduction to Roy Bhaskar's philosophy*. London: Verso

Danermark, B., Ekstrom, M., Jakobsen, L. & Karlsson, J. C. (2002). *Explaining Society: critical realism in the social sciences.* London: Routledge

Jonassen, D. H. & Land, S. M (eds.), (2000a). *Theoretical foundations of learning environments*. Marwah, New Jersey: Lawrence Erlbaum Associates

Jonassen, D. H. & Land, S. M. (2000b). Preface, in D. H. Jonassen & S. M. Land (eds.), *Theoretical foundations of learning environments.* (pp. iii-ix). Marwah, New Jersey: Lawrence Erlbaum Associates.

Lawson, T. (2003). *Reorienting economics*. London: Routledge

Moore, R. & Maton, K. (2001). Founding the sociology of knowledge: Basil Bernstein, intellectual fields and the epistemic device, in A.Morais, B.Davies, H.Daniels and A.Sadovnik (eds.), *Towards a sociology of pedagogy* Berlin: Peter Lang

Outhwaite, W. (1998). Realism and social science, in M. Archer, R. Bhaskar, A. Collier, T. Lawson & A. Norrie (eds.), (pp. 282-296) *Critical realism: essential readings*. London: Routledge.

Pfundt, H., & Duit, R. (1994). Bibliography Students' Alternative Frameworks and Science Education, (4th ed.) Federal Republic of Germany: Institute for Science Education.

Pieters, J.M., Breuer, K, & Simons, P.R.J. (eds.) (1990) *Learning environments: Contributions from Dutch and German research.* Berlin: Springer-Verlag

Pirolli, P.L., & Greeno, J.G. (1988) 'The problem space of instructional design'. In J. Psotka, L.D. Massey & S.A. Mutter (eds), *Intelligent tutoring systems: Lessons learned*. Hillsdale, NJ: Lawrence Erlbaum

Ruby, A. (1991). Real change or traditional advice? Policy lessons from educational reform programs, in C. Fasano & B. Winder (eds.) (pp. 16-27) *Education policy in Australia* Wollongong: University of Wollongong Press.

Sayer, A. (1992). *Method in social science: a realist approach*. London: Routledge

Sayer, A. (2000). *Realism and social science*. London: SAGE

Willmott, R. (2002). *Education policy and realist social theory: primary teachers, child-centred philosophy and the new managerialism* London: Routledge.