'Education Is the New Philosophy', to Make a Metadisciplinary Claim for the Learning Sciences

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Abstract

This chapter explores the marginal position and at times methodologically narrow focus of the discipline of education today. It suggests as a counterpoint that a much broader claim can be made for the significance and scope of education. Indeed, as the discipline which explores how humans come to know, and as the discipline deployed to initiate novices into every other discipline, education could make a claim – much as philosophy did until it slipped into practical irrelevance – that it is the discipline of disciplines, or metadiscipline. The chapter explores the implications of this move at a number of levels, from a strategic level in which education plays a pre-eminent role in the formation of 'knowledge society', to its implications for the pragmatics of pedagogy.

Keywords

Pedagogy • Disciplinarity • Epistemology • Knowledge Society • Science

Introduction

This chapter explores the nature and status of education as a discipline.[1] We ask these questions, in this succession: what does disciplinarity mean, and particularly for education – at first glance, a messy amalgam of other disciplines? What would coherently integrated cross-disciplinary inquiry look like? Taking a step beyond cross-disciplinarity, however, could – and perhaps should – we recast education in order to position it as a uniquely all-encompassing metadiscipline? Could it be understood, in some senses, as a 'science of sciences'? What then would this entail?

We argue that such moves require: a redefinition of education as a peculiarly expansive 'science', the establishment of a broad agenda for 'knowledge' in the work of this science, a reconceptualisation of the connections of 'knowledge' with 'learning', a definition of pedagogy in terms of its design processes, and an extended understanding of education as intellectual endeavour and social practice.

The contours of our argument are as follows: the chapter ascends in its level of generality through the concepts 'disciplinarity' and 'interdisciplinarity' to make a case for education as 'metadiscipline', then descends into progressively more programmatic detail by discussing what this means for 'science', 'knowledge', 'learning', 'pedagogy' and 'education'. Along the way, we weave between the 'is' and the 'ought', the realities of education as an area of scholarly and pragmatically engaged focus, as well as what, on the basis of these realities, it could possibly be. This is a peculiarly apt time to be thinking along these lines, given the changing nature of knowledge, the expanding modes of its production, and broader expectations of learning's effects.

[1] This chapter reworks and extends ideas begun in our *New Learning: Elements of a Science of Education*, 2008.

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Disciplinarity

An academic discipline is often understood to imply a distinctive way of making knowledge. But it can mean much more than this. It can imply a field of deep and detailed content knowledge, a community of professional practice, a form of discourse (of fine semantic distinction and precise technicality), an area of work (such as an academic department or a research area), a domain of publication and public communication, a site of learning where apprentices are inducted into a disciplinary mode, a method of reading and analysing the world, an epistemic frame or way of thinking – even a way of acting and type of person.

In the first of these meanings, particularly – 'a distinctive way of making knowledge' – that education appears at best to be a hybrid, drawing upon a variety of methodologies including those of psychology, sociology, history, philosophy and management, to name a few. 'Discipline' is used here to denote boundaries to an intellectual community, with concomitantly distinctive contexts, practices and methodologies (or constellations thereof) for particular areas of rigorous and concentrated intellectual effort, and the varying frames of reference used to interpret the world. Education does not seem to need to be a distinctive discipline insofar as it is practice-oriented, of primarily instrumental value in the training and accreditation of teachers. It presents itself as a diffused and amorphous practice, providing as it does, support in the induction of neophytes into every other discipline – learning to become a scientist, an economist, an historian and the like. Education is thus regarded as a fellow traveller with all the other disciplines, and for that tends to be confusingly regarded as both 'natural' and lacking a distinctive disciplinary identity beyond the pragmatics of a service-learning role.

Interdisciplinarity

Can we, however, strengthen education's claim to a coherent, cogent, deliberative and distinctive intellectual place by articulating the intersections and co-dependencies that constitute its interdisciplinarity? Learning – as a set of actions and dispositions – is a broad, complex and difficult area of inquiry, which by its very nature needs to be conceived in peculiarly interdisciplinary terms. Perhaps, then, interdisciplinarity can save us from education's ambiguity of identity. But if that were to be achieved, what would this peculiar interdisciplinarity mean?

To clarify an at times over-used and ill-defined concept first, interdisciplinary work is grounded in the historical practices of more than one discipline, and consciously crosses disciplinary contexts and boundaries. This seems to be happening more nowadays, when old discipline boundaries prove too constraining as we address the large tasks of our time, and when new, hybrid disciplines emerge. We need to become interdisciplinary for pragmatic reasons, in order to see and do things that can't be seen or done adequately within the substantive and methodological confines of a single discipline – things as big these days as 'sustainability', or 'globalisation', or 'inclusion', or 'knowledge'. A broader view of an intellectual or practical challenge may prove to be more powerful than a narrower one, and even the more finely grained within-discipline views may prove all-the-more powerful when contextualised broadly.

The deeper perspectives of disciplinary work need to be balanced with and measured against the broader perspectives of interdisciplinarity. Interdisciplinary approaches also need to be applied for reasons of principle, to disrupt the habitual narrowness of outlook of within-discipline knowledge work, to challenge the ingrained, discipline-bound ways of thinking that produce occlusion as well as insight. If the knowable universe is a unity, disciplinarity is a loss as well as a gain, and interdisciplinarity may in part recover that loss. Interdisciplinary approaches also thrive in the interface of disciplinary and lay understandings. They are needed for the practical application of disciplined understandings to the actually existing world. Robust applied knowledge demands an interdisciplinary holism: the broad epistemological engagement that is required simply to be able to deal with the complex contingencies of a really-integrated universe. Much intellectual and practical work at some point requires disciplinarians to become interdisciplinarians. Education is a clear case in point.

Yet education is also the domain of how humans come to know. This is a question of such breadth and profundity that it can only be addressed in a truly interdisciplinary way. Here are some of the disciplinary strands we may discover we need to tie together: The connections between knowing and learning may need to be grounded in the theoretically fraught philosophical domain of epistemology. While as we deal with humans in their deep diversity, we need an holistic understanding of the sociology and anthropology of difference in inequality. We might also have to acquaint ourselves with territories considered to be part of the natural sciences, such as the latest brain research – not the doubtful empiricist inferences of certain strains of cognitive science or the populist simplicities of brain hemispheres, but difficult recent neurobiology which seeks to find the neurological correlates to consciousness (Koch 2004). We may need to consider once again the stuff of human nature, where physical anthropology meets palaeontology meets the study of primate evolution (Donald 2001). No doubt we need to

study the natural history of this strangely symbolic species (Deacon 1997) and the historical linguistics of the shift from oracy to literacy as modes of representation of the world (Goody 1977; Ong 1982). And we may soon discover that we take a globalist, pan-human view, equally concerned to understand Indigenous, Buddhist, Confucian and Islamic ways of knowing as those of classical Europe and the Western Enlightenment. These are only glimpses of some aspects of what should be education's hugely ambitious interdisciplinary agenda.

We can add to these the range of disciplinary content areas and contexts – teaching mathematics, literacy, science, or ethics – and the range of cross-disciplinary issues that might cross-cut these – learning about the environment, diversity, equity, or ethics – such that you have a interdisciplinary matrix of great complexity, no matter how particular your point of reference at a specific moment.

The foundational place of learning in all other disciplines, the immanence of learning in every moment and aspect of life, its position at the interface of lay and disciplinary understandings, and the necessarily mulitperspectivalism of its humanistic and physiological subject matter (at once psychological, bodily, brain-cognitive, sociological, managerial, and so forth) makes education a discipline which is in its intrinsic character interdisciplinary. At this point, might we abandon our anxieties of disciplinary identity and say that education is always, and necessarily, a site of interdisciplinary rather than disciplinary work? Yes, we could, but no, perhaps we should go further.

Metadisciplinarity

Perhaps education's interdisciplinarity is peculiarly necessary and peculiarly expansive, to the extent that it points to something broader and deeper than other interdisciplinary practices?

Education as we find it in universities, colleges and schools today – this being the point from which we begin in our discussion of disciplinarity – seems to be less rigorous and derivative, its disciplinary base pragmatic and its methods drawn from other, apparently more foundational disciplines: epistemology, the cognitive science of perception and memory, developmental psychology, the history of modern institutions, the sociology of diverse communities, the linguistics and semiotics of meaning, and the substantive knowledge of various subject areas such as literature, science or mathematics, to name several of its sources. This appearance, however, may also be read as a sign of education's metadisciplinarity. Education – or the science of learning – for the same reasons that it appears to be derivative of everything and in support of anything, could also be framed as the source of all other disciplines. Maybe education could be conceived as a more expansive reference point from which the meaning of other disciplines can be derived, rather than a composite, recomposed from the residual shreds and patches of other disciplines? The interdisciplinary sourcer becomes the source, and so becomes more than merely interdisciplinary.

What, then, would education-as-source do? The metadiscipline of education inquires into learning, or how we come to know and be. Education-as-metadiscipline explores knowing and being, and how people and groups learn and come to be what they are. As such, it is an especially expansive exploration of knowing: knowing how knowing happens and how capacities to know develop, and knowing what being is and how being becomes. (Later in this chapter, as we become more specific, we will discuss what 'knowing' might encompass, more than the conventional stuff of mind and cognition, extending as far as being.)

We want to make this special claim for education for some strategic as well as principled reasons. Too often education is regarded as a poor cousin of other disciplines in the university: the natural sciences, the humanities, and the other professions, for instance. It is regarded as something that enables other disciplines, rather than a discipline in its own right. This is reflected in lower levels of research funding, student entry requirements, and the destination salaries of graduates.

The low status of education, and the reasons why it often sets its intellectual sights so low, can be located in part in its professional and practical orientation and the view that learning is 'natural'. 'Teacher training' it is often called and as such it is often aptly named (rather that teacher education, even), when one surveys the narrowly instrumental intellectual horizons of education programs and courses. The pragmatism of its focus – the mechanics, job practices, and accreditation – prevents education from appearing and becoming a discipline proper, let alone a rigorously interdisciplinary practice or even a metadiscipline. The consequence is that the intellectual profession par excellence, grounded as it should be in this discipline of and for all the disciplines, is reduced to narrow proceduralism. Education's graduates, instead of becoming innovators and forward thinkers, become people who are wedded to the familiar, heritage institutions of schooling and their processes. They become deeply conservative, in their orientation to social institutions, even if not by and large in their political stance understood in the conventional sense.

This might have been a workable outcome until recently. It might have been enough to produce good systems people, administratively speaking. Not only did education's graduates 'get' the tricks and tropes of institutional schooling to have made it over the accreditation bar. They must

also have liked these oft-times strange games enough to dedicate the rest of their lives to those same institutions. What, then, could we expect teachers to be, other than defenders of a certain kind of teacherliness into which they have grown from a very early age? Yet the habits which make for institutional inertia are now reaching a crisis point: we face deep structural challenges to heritage educational practices presented by the forces of globalisation, new technologies, differentiated identities, distributed knowledge systems, and a shift in the balance of agency away from hierarchical and towards participatory cultures. Maybe it's time to broaden our horizons of intellectual and practical interest. Maybe, even, we will have to.

How could education become a metadiscipline: a discipline of disciplines? Could education become intellectually adventurous, a disciplinary leader rather than an enabler of other disciplines, which does little better than draw haphazardly on bits and pieces of other disciplines for its priorities, methodologies and content?

Here is what is unusual about education, reasons why it could be a pivot point for all other disciplinary endeavour: The intellectual and practical agenda of education is no less than to explore the bases and pragmatics of human knowledge, becoming and identity. Education asks this *ur*-disciplinary question: How is it that we come to know and be, as individuals and collectively?

If this is education's central question, surely then we can argue that it is the source of all other disciplines? It is the means by which of all other disciplines come into being. The metadiscipline of education is greater than the conventional stuff of the institutions of schooling and their processes. It deserves more than practices which draw eclectically and opportunistically for its work on the tools other disciplinary trades. Much more ambitiously, it is about the foundational and expansive question of knowing and becoming. It used to be philosophy which claimed a cross-domain position of this order, but philosophy may have lost this place for having become too disengaged from other disciplinary practices, too arcane and word-bound, too disconnected from lived or practical experience.

More than the equal of other disciplines, education is the soil in which all the other disciplines grow. You can't do any of the other disciplines in a university or college except through the medium of education. No other discipline exists except through its learning: an individual learning the accumulated knowledge that has become that discipline, and the social learning represented by the whole discipline itself and its community of practitioners. Education is about knowing and becoming, and knowing is the foundational question for all intellectual and much practical work, and hence, becoming.

Education is the new philosophy.

Science

What, then, are the processes of the metadiscipline of education? Is it a science? And if it is, in what sense? What does it mean to be a metadisciplinary science, as distinct from 'normal' science?

One response to education's disciplinary identity crisis is to retreat into method for self-definition, and narrowly circumscribed method at that. In the case of Federal educational research funding during the Bush II regime in the United States, that method of choice was the 'gold standard' of randomised controlled experimentation, legislated in the No Child Left Behind Act. This idea is represented in its clearest and most influential form in the report of the US National Research Council, *Scientific Research in Education* (Shavelson and Towne 2002). The drift of the report is to assert that only a certain kind of empirical research and controlled experimentation – x initiative leads to y measurable results – is worthy of the name 'science'. Like the medical scientist, we might give some learners a dosage of a certain kind of educational medicine and others a placebo to see whether a particular intervention produces better test results. This, the report calls 'evidence-based research', rather too ambitiously insofar as there are surely other roads to empirical knowledge, and not just one which is templated upon clinical medical research.

The Department of Education is explicit about its agenda here: "Unlike medicine, agriculture and industrial production, the field of education operates largely on the basis of ideology and consensus. As such, it is subject to fads and is incapable of the cumulative progress that follows from the application of the scientific method and from the systematic collection and use of objective information ... We will change education to make it into an evidence-based field" (Quoted in Erikson and Gutierrez 2002: 22). So, in this conception, the intellectual task of education is to measure various classroom inputs in relation to learner test outputs in an empiricist and instrumentalist way without critically examining the broader frame of reference of the classroom in a changing society and the relevance of the outputs. For its methodical proceduralism alone, this variant of the discipline of education calls itself science. But what if it turns out to be a science that is attempting minor re-engineering of a pedagogical system which might be in need of a more thoroughgoing overhaul?

One possible rejoinder to the elevation of randomised controlled experimentation as the beginning and end of educational science, is that education can never be like a science: the model of controlled experimentation offered by laboratory natural science is unachievable in education and if anything unethical (Popkewitz 2004: 67–68). We're dealing with human beings with interests, desires, identities and

agency, not just cognitive entities and clinically isolatable pedagogical moves.

Another rejoinder is that the natural and technological sciences are themselves more 'ideological' – more subject to contestation around axes of human interest – than the narrow understanding of science proffered by the proponents of 'evidence-based' research seem to be able to comprehend. Whether it be bioethics, the politics of climate research, the debates around Darwinism and 'intelligent design', or the semantics of computer systems, questions of politics and ideology are bound closely with the ostensible evidence. There can no longer be any faux empiricism, not even in the natural and technological sciences. Nor can there be narrowly unambitious apolitical horizons. Maybe there's something fundamentally wanting in the institutional inheritance that is today's schools?

Meanwhile medical scientists are trying to tackle problems that are seemingly impossible and, much of the time, ethically contentious. They're doing something bigger than randomised controlled experimentation. Their ambitions are high. Their risks great. They are trying to come up with things that are fundamentally new, radically innovative, shockingly transformative. Any such ambitions are way beyond the bounds of a narrowly 'evidence-based' view of education science, methodologically and in practice.

The understanding of science that underlies this definition of education's disciplinarity reflects a semantic narrowing of the word that is peculiar to English. In English, 'science' seems to apply more comfortably to the natural world, and only by analogy to some of the more systematic and empirically-based of the human sciences. It connotes a sometimes narrow kind of systematicity: the canons of empirical method, an often less-than reflective acceptance of received theoretical categories and paradigms, formal reasoning disengaged from human and natural consequences, technical control without adequate ethical reflection, the elision of means and ends, narrow instrumentalism and techno-rationalism, a pragmatism without a broader view of consequences, and conservative risk aversion. These are some of the occupational hazards of activities that name themselves 'sciences' – social, natural or applied. However, it's not enough simply to have a rigorous empirical methodology without a critical eye to alternative interests and paradigmatic frames of reference, and without a view to human-transformational potentials.

By counterposition, humanistic methodologies often take charge of the social, distancing themselves from the perceived narrownesses of scientific method. But this move may at times leave science stranded, separated from its social origins and ends. The natural and technological sciences are subject to greater contestation around axes of human interest than a narrow understanding of science would admit. A reconstructive view of the social, natural and applied sciences needs to be more holistic, attempting to avoid the occlusions of narrow methodological approaches. It would also be more ambitious, intellectually and practically.

We might, perhaps, consider a broader view of science as disciplinary practice, and in particular the kind of science we might deploy in the intellectual and practical work of education, an area of work we are now claiming has an unusually metadisciplinary character and responsibility. What can we mean by this 'science'?

The English word 'science' derives from the Latin 'sciens', or 'knowing'. The meaning of 'science' has been narrowed in English to mean empirical method applied to the natural or human world without the minimisation potentially prejudicial subjective interest (Chalmers 1976). In this narrow English definition, philosophy and the study of literature are not sciences; they are 'humanities'. And where is education in this narrow understanding of the term 'science'? The answer is ambiguous, half way between the sciences and the humanities, perhaps. Or narrowly in an adaptation of empirical methods from clinical medicine if one wants to find a methodological 'gold standard'.

Return to the expansiveness of 'science' in its etymology, and the study of human learning must have claim to the word at least equal to the other social sciences and the natural sciences. The root, however, is perhaps too expansive to describe the contemporary practices of science. Not all knowing deserves to be called 'science'. To be all-encompassing would rob the word of the capacity to make some important distinctions between scientific work and the knowing that happens in ordinary, everyday experience. Broader than empirical work alone, the meaning of science we want to propose implies an intensity of focus and a concentration of intellectual energies greater than that commonsense, vernacular or lay knowing. It relies on the ritualistic rigour and accumulated wisdoms of disciplinary practices.

Wherever science is to be found, it involves a kind of systematicity that does not exist in casual experience. Husserl draws the distinction between 'lifeworld' experience and what is in 'transcendental' about science (Husserl 1970; Cope and Kalantzis 2000). The 'lifeworld' is everyday lived experience. It is a place where one's commonsense understandings and actions seem to work instinctively: not too much conscious or reflective thought is required. The 'transcendental' of science is a place above and beyond the commonsense assumptions of the lifeworld. In counterdistinction to the relative unconscious, unreflexive knowledge in and of the lifeworld, science sets out to comprehend and create designs which are beyond and beneath the everyday, amorphous pragmatics of the lifeworld. Science is focused, systematic, premeditated, reflective, purposeful, disciplined, and open to scrutiny by a community of experts. Science is

more intensive work and harder work than the knowing in and of the lifeworld.

Here are two big openings for the practice of educational science if we conceive education to be a metadiscipline. The first is to think broadly and deeply about the conditions of our knowing and learning, to strengthen the theories, the research methodologies, the epistemologies and the practices needed for a science that is the grounding for all disciplines which purport to address the social world and the relation of the social to the natural world. Its foundational question is, how can we know in ways which in any way transcend the ordinary knowledge of the lifeworld? Education exists at the interface of the lifeworld and science. Its focus, no less, is how one comes to know in ways that are more than unconsciously and unreflective embedded in the lifeworld. This is big science and deeply significant science, in the service of all disciplines.

The second opening is pragmatic and inventive. Intellectual work is more than an act of observation. It is also an act of imagination and design. At its best, it is ambitious, risky and world-transformative. If the medical sciences can have big human ambitions, then the social sciences can have ambitions as large as to settle the relation of humans to the natural environment, the material conditions of human equality and the character of the future person. There's no knowing what we can do to address any of these issues without a science of education, broadly conceived. Indeed, perhaps our conception should be as broad as this.

Education is a science for all sciences.

Knowledge

The metadiscipline of education – this science of sciences – focuses on the theories and practices of how humans come to know and be. What do we mean by 'know', and how is 'know' connected to 'be'?

We can start narrowly, linking knowledge to cognition, conventionally understood. Everyday semantics tells us that knowledge is stuff in one's head. It is information or things one knows. It also involves 'understanding', or the capacity to work things out for oneself on the basis of logic and the patterns which underlie information.

Knowledge however is a lot more that just what's in one's head, or how one's head perceives and what it figures to be in the outside world. Head is in dynamic interrelation to body, and body is a thing in and of the physical world. Mental experience is in one's body, and body is a part of the world of physical existence. One's mind's thinking is connected to the body's feeling, and these feelings are extensions of the body into the sensuous world – the sights, sounds, smells and tastes that comprise or everyday experience. Our whole bodies, not our minds alone, are gripped by emotion – happiness, sadness, love, hatred, fear, anger, surprise or curiosity – and these emotions are part of our deeply ingrained knowing processes (Damasio 1994). Our bodies are also engaged in the business of representation or meaning. The mind cannot mean anything, either to others or to itself, without the body and its connections with the sensuous world. In this sense, knowing is not just what you think. It is what you do and how you are in the sensuous world. Knowing is a process of becoming. Human being is its outcome.

Knowing is a set of capabilities, not just a set of mental capacities. A set of mental capacities exists in order to do things in the world: to hammer a nail or build a bridge, to cook a meal or fly to the moon, to solve a small problem or imagine a better future. Mental capacity is one part of the equation, but mental capacity is empty and meaningless without the capability to do something with it. In this sense, knowing is not just what you can think; it is what you can do and who you can be in the context of an inseparably interlinked 'outside' world. Knowing is constitutive of being.

Another kind of 'outside' is the intrinsically social character of knowledge: the things you know because you have been told, things that you rely on other people to know and things that you can find out when you need to. When we make knowledge, we rely heavily on these outside knowledge resources. We connect with these in the form of knowledge handed on to us by other humans from their accumulated experiences, stored in social practices and representations of the world: their ways of categorising things, their ways of making logical connections and the conclusions they have come to about the nature of the world. These are given to us in the form of already-constructed and always-ready-to-be-shared meanings: *linguistic* (a language which helps us make sense of the world), *visual* (the imagery of our surroundings and our culture), *audio* (from alerts to music which evokes emotion), *gestural* (bodily meanings), *tactile* (sensations of touch, smell and taste) and *spatial* (bodily positions such as teacher in relation to learner or shopkeeper and customer, and architectonically-shaped meanings) (Cope and Kalantzis 2009a, b). These meanings are the raw materials of human society and culture. They are the stuff of beliefs, values, rules, ideologies and identities. These meanings constitute our being.

This then, is the scope of the metadiscipline of education. If we are to address how we come to know, our subject matter is no less than thinking, feeling, body, action, the natural and constructed world, representation and sociability: the sum total of being. There is little or nothing else we need to think about or act upon. This is why the science of education is so much broader than 'normal' science.

So, if knowing is a kind of action that can be this ordinary, how do we distinguish everyday knowing from deeper knowing? This is a key question for the discipline of education. It is akin to the lifeworld/science distinction which we need in order to define science more precisely than all of knowing. What is the capability of deeper knowing that is 'knowledge-ability'? What is the product of that capability, to be 'knowledgeable'? What is expertise, and how does one become expert?

Knowledge-ability is the product of deliberate knowledge design work, special efforts put into knowing something. It entails a peculiar intensity of focus and specific knowledge-making techniques, working at the interface of everyday life and specially designed efforts to elicit deeper knowledge. As a consequence, others are able to rely upon a person who is knowledgeable, and that person is better able to trust their own knowledge. In a society of hugely expansive knowledge, we can trust our knowledge in some areas, but need to rely on the expert knowledge of our fellow humans in other areas, hence the engineers, or doctors, or teachers, or mothers, or experienced hikers, for instance. Not only do we rely on these others because they have become knowledgeable. We also respect their knowledge-ability, and the domain-specific techniques they have used to become knowledgeable and continue to use as they encounter new problems and challenges. We rely on the work they have put into knowing, their education. Knowledge is grounded in the specially focused things one does which distinguish everyday, common-sense knowing from an organised, ordered, socially and historically constructed knowing. Such knowing is regarded as trustworthy because of its practical effectiveness, its authoritative sources, and its openness to critique and refutation.

The unknowing understandings of the lifeworld may, by contrast, consist of: casual impressions that are fleeting, observations that are superficial, perceptions that turn out to be illusions, conclusions that prove to be erroneous, emotions that cloud sound judgment, intuitions that are ill-informed, wishful thinking when you really want something were the case but later come to the realisation that it is not, opinions based on personal prejudice, ideologies which represent narrow self-interest, statements that can be shown to be illogical, perspectives that are based on limited experience and which are inappropriately applied beyond their parochial source, or lore and rule which has been handed down from sources of institutional power and authority and accepted unquestioningly, true to relations of power but not more broadly true.

By contrast, deeper and broader knowledge is the result of things people have done which makes their understanding more reliable than casual lifeworld experience. To become critically knowledgeable about phenomena of the embodied lifeworld, and in ways of knowing beyond taken-for-granted experience, requires systematic observation, the application of strategies for checking, questioning and verification, immersion in the culture of the way of knowing under examination and the use of multiple sources of information.

More rigorous knowledge making strategies include: corroborating perceptions with others who have seen the same thing and which can be further tested and verified by others, applying insight and awareness based on broad experience to emotions and feelings, justifying opinions and beliefs to oneself and others (including others whose judgment is to be respected based on their expertise), taking into account ideologies which represent interests broader than one's own and with a longer view than immediate gratification, statements whose logical consistency can be demonstrated, developing perspectives based on in-depth and broad experience and which are broadly applicable, grounding principles in critical reflection by oneself and others, and forming intelligence in the light of wary scepticism and an honest recognition of one's own motives. The knowledge that is founded on these kinds of knowledge-making practices, purposeful designs for learning-engagement in and with the world, help form a person who may be regarded as knowledgeable, a person who has puts a particularly focused effort into some aspects of their knowing.

Knowledge worthy of its name consists of a number of different kinds of action which produce more trustworthy, more insightful and more useful results. We have to concentrate on our ways of knowing to achieve this greater depth or expertise. We have to work purposefully, systematically and more imaginatively at it. What, then, are some of the things we can do to know? What do we do which means that our knowledge transcends the everyday understandings of the lifeworld? What do we do when we do science?

Science consists of a variety of forms of learning-action or knowledge processes. It is not simply a process of thinking or a matter of understanding in the cognitive sense. Rather it is a series of performatives: acts of intervention as well as acts of representation, deeds as well as thoughts, types of practice as well as forms of contemplation, designs of knowledge action and learning-engagement in concept as well as action. The deeper and broader knowledge that is the object of study of the science of education consists of the kinds of things we do (knowledge-abilities) to create out-of-the-ordinary knowledge.

How, then does one come to know? Fazal Rizvi's talk of 'epistemic virtues' alludes to this terrain, discerning these as markers of practices in creating reliable knowledge (Rizvi 2007). But what is the range of knowledge-making actions that one could take to create out-of-the-ordinary knowledge? How does one develop deeper capacities for knowing that we have called science in the broader sense?

We want to suggest four-by-two main types of engagement with knowing or knowledge processes which may constitute a knowledge repertoire (Kalantzis and Cope 2005; Kalantzis and Cope 2008). These are the kinds of

things you can do to know. Each of the four is no more than a rough grouping. In the real life of knowing, several of these modes of knowledge engagement may be found to be indistinguishably connected. In this sense, they are orientations to knowledge rather than neat categories of knowledge-making activity. These are some of the out-of-the-ordinary learning-actions or knowledge processes that might be taken as markers of more reliable knowledge and justify use of the word 'science'.

Experiencing

(i) Science has a basis in *lived* experience. This experience may be grounded in direct personal intuition of the already-known, on interests integral to the lifeworld, on the richness of life fully lived. But it involves a concentrated focus on the ground of experience and methods for its reading which are beyond casual immersion. This kind of knowledge process might involve protocols for listening to voice, feeling the sensual, recognising the embodied, framing the performative, accounting for the complex layers of the lifeworld, explaining the politics of identity or understanding the intuitive. These are the virtues of poststructuralist social science. Their occupational hazards are excessive subjectivism, an agnostic relativism and a distancing, identity-driven politics (Blackburn 2005).

(ii) Science also has an *empirical* basis, or the experience of moving into new and potentially strange terrains, deploying the processes of methodical observation, carefully regulated experimentation and systematic reading of experience. This kind of knowledge process uses systematised routines of observation, testing, recording, measurement, quantification and description. Taken to one-sided excess, it creates narrow empiricism such as characteristic of the 'No Child Left Behind' vision for educational science.

Conceptualising

(i) Science uses *categorical* frames of reference based on higher levels of semantic distinction, consistency and agreement within a community of expert practice, than is normal in everyday discourse. Using this knowledge process, we may make knowledge by grouping like and unlike on the basis of underlying attributes, and we may abstract, classify and build taxonomies (Vygotsky 1962). The danger in such categorical work is rigidity and overly simplified either/or dualisms.

(ii) Science puts concepts to work in *theories* which model the world and build explanatory paradigms. The danger of excessive emphasis on theory is unreflective acceptance of received theories and poorly grounded epistemological idealism.

Analysing

(i) Science develops frames of reasoning and *explanation:* logic, inference, prediction, hypothesis, induction, deduction. Amongst the occupational hazards of this kind of knowledge work is to develop systems of formal reasoning disengaged from human and natural consequences, that create systems of technical control without adequate ethical reflection; that elide means and ends, and that promote a narrow functionalism, instrumentalism or techno-rationalism.

(ii) Strong science also analyses the world through the always cautious eye of *critique,* interrogating interests, motives and ethics that may motivate knowledge claims. It promotes, in other words, an ever-vigilant process of metacognitive reflection. However, the dangers of these kinds of knowledge work include disengaged criticism and supercilious inaction without design responsibility, political confrontation without constructive engagement, academic fractiousness without apparent need for negotiated compromise.

Applying

(i) Science is also application-oriented. It is *pragmatic*, designing and implementing practical solutions within larger frames of reference and achieving technical and instrumental outcomes. What purpose has knowing, after all, other than to have an effect on the world, directly or indirectly? This kind of knowledge process involves practical forms of understanding and knowledge application in a predictable way in an appropriate setting. Its dangers may be narrow instrumentalism and uncritical, technicist pragmatism.

(ii) In its most *transformative* moments science-in-application is inventive and innovative: redesigning paradigms, and transforming social being and the conditions of the natural world. This kind of knowledge process may be manifest as creativity, innovation, knowledge transfer into a distant setting, risk taking, self-enablement, and the attempt to translate emancipatory and utopian agendas into practical realities. Its occupational hazards are voluntaristic overconfidence that leads to a naive lack of pragmatism and a misreading of practical circumstances that produces failure.

Less important than the specifics of this grouping, however, is the idea that purposefully deploying a broader range

of knowledge processes can produce more cogent knowledge than a narrower, unreflective and more ad hoc range. So, for instance, a careful empiricism is all the more powerful if balanced with a cautious eye to interests and agendas. Applied knowledge work will be more powerful if it is founded on clarity and coherence of categorical precision and theoretical framing. Science, in other words, is likely to be stronger when we use a balance of alternative knowledge moves or acts of knowing.

When its processes of knowing are more partial, reliable science is aware of its partiality and able to justify it. Disciplines may prioritise one or more knowledge process or kind of scientific move over others, and this may be the source of their strength as often as they are also potential points of weakness – for instance, reflections on lived experience and critique in literary analysis, or categorical frames of reference and logical reasoning in elementary particle physics – though no substantive domain of knowledge could every be completely resistant to one or other of the knowledge processes.

Science can be distinguished from lifeworld when any or all of these knowledge processes are put to work. Education as metadiscipline, however, must use them all, for all are needed to understand the sources, dynamics and transformative energies of knowing and learning. Education is, uniquely, not just a user of the knowledge processes, but a metadiscipline whose concern is all of these knowledge processes: what they are, why we use them and their knowledge-learning effects.

This is why education is the science of sciences.

Learning

Learning is the way a person (ontogenetically speaking) or a group (phylogenetically speaking) comes to know and be. Learning happens anywhere and everywhere, anytime and all the time in our everyday experience of the lifeworld. It happens naturally in the sense that it is integral to our character as a species. Much of the time, we learn effortlessly and thus without conscious attention. Indeed, learning is embedded in the world with such pervasive subtlety that, much of the time, we are barely aware it is happening. After the event, we may be surprised by what we come to realise we have learnt. This becomes the stuff of judgment and intuition that lends strength to our convictions.

The casual learning of the lifeworld is endogenous – intrinsic – arising from within and to be found throughout. This kind of learning is sometimes called 'informal'. It does not require pedagogy, or curriculum, or social settings that might be called 'educational'. It is amorphous. It happens in a haphazard way. It is an unorganised process, incidental and accidental. Sometimes this learning happens in roundabout ways, where, in retrospect, you realise you could have learnt something quicker and more directly if you had been directly instructed. This learning is often so endogenous, so embedded in the lifeworld, that you barely realise you have learnt. It is organic, contextual, situational. The things you come to know this way mostly take the form of tacit, passive or background knowledge.

Education, by comparison, is more conscious and structured. It is relatively formal insofar as it is deliberate, systematic and explicit. It sets out to be a more efficient way of becoming knowledge-able and acquiring specific knowledge. To this end, it is structured and goal-oriented. It involves deliberate and deliberative design and is thus more analytical than everyday learning: abstracting, generalising, and creating knowledge which will not only work for the setting in which it is found, but perhaps also be transferable from one context (the curriculum) to one or more other contexts (in the world). Education also happens in a peculiarly focused kind of representational space or learning community, whose role, relationships and rules are directed in the first instance to learning, and only secondarily to the ends of this learning in the wider world.

Education, most importantly, is a particular form of learning which consciously creates an outside (the lifeworld) separate from the inside (the extra effort that is put into premeditated knowing). In these senses, it is grounded in the broad foundations of science-work. In fact, education makes knowledge moves that parallel those of science.

Of course, the lifeworld of informal learning is intimately connected by lines of reference to the educational processes of formal learning. But there are things about education which make it a different kind of learning process to everyday or casual learning in the lifeworld. One of the more obvious differences is tangible: we're in this learning space (inside) speaking about the world or another space (outside). Another is the mode of speaking: an externalised reference to speak in a necessarily abstracting way about general phenomena for which there may be numerous instances. (In the lifeworld, we're mostly interested in the instances that stand before us.) It is, moreover, necessarily explicit. You can't simply say 'look at that' because the mountain stands before you as an awesome presence. Instead you have to name or picture or simulate what you are talking about explicitly, precisely because your referent is not there with you. This requires a particular form of imagination (McGinn 2004). The key to education is how you bring the outside inside, and their modes of interconnection. Through these connections there arise specific educational roles, relationships, (teacher/learner) and rules of engagement.

Today, the nature of the inside/outside distinction that defines education is changing. In the past, education was institutionally, spatially and temporally defined: a

characteristic teacher-learner relationship, architectonic arrangement and timetable. By contrast, education today is becoming ubiquitous (Cope and Kalantzis 2009a, b). A learner may be at home, engaged in an e-learning program. Or they may be involved in a mentoring program at work. Or they may be learning how to use a piece of software using a help-menu or tutorial that is built into the software. The sites may be more dispersed, the times more flexible and the teacher-learner relationships transformed, but there's something about the knowledge authority-novice relationship, about scaffolded learner activities, and about the mode of inside-to-outside reference, that still makes even these diffused modes of learning relatively formal, consciously designed and thus specifically educational.

Informal learning occurs without conscious educational design. Formal learning or education is a process of learning by design. Learning communities and modes of representation which are specifically designed for that purpose may range from a traditional classroom, to a mentoring relationship built into a workplace, to an online program, to a school or a whole education system. They are unlike communities and representational modes in which learning incidentally happens to occur, and this is because they establish specifically educational relationships between people and between people and knowledge.

Pedagogy

Pedagogy consists of the microdesigns of learning, the action sets that are constitutive of knowing and so, being. A journey of sorts, pedagogy's plans, circumstances, effects and traces can be told in narrative form. Pedagogy is constituted through the actions one takes to build out-of-the-ordinary knowledge, as a person or in a group.

We mean 'out of the ordinary' in two of the possible senses of this phrase. In one meaning, we literally mean 'out of', for knowledge is inevitably grounded in the ordinary. Education's reference point is to an ordinary world on its outside. It necessarily connects with this outside world, which it both reflects and transforms. Education is built from the ground of the lifeworld. However, educational spaces have a peculiar manner of being in the world, both formal institutions with physical locations and other sites or moments of time in which we do things that we might call 'educational'. They are about and for the world without quite being of the world. Their primary reason for being is outside of themselves. Pedagogy, for instance, refers to the world: now mountains, then great deeds, then things to be enumerated. Education also shapes human capacities which can be used in the outside worlds of work, citizenship and community life.

We call this 'exophoric' reference. An exophoric reference points out at something. 'Look at that', we might say in words, when we're both experiencing the sight of the mountain, an unexceptional lifeworld experience. The words mean very little without the shared experience, without our common understanding of what the sentence is pointing out to. In education, we are forever referring to things in text or image which exist beyond the room or the page or the screen. This is one of the peculiar things about education. It never exists for itself. It always exists for purposes beyond itself. It points out at the world. And across the range of educational experiences, there is nothing in the world to which some bit of education does not point, or could not conceivably point. In these respects, there is nothing else quite like education. Of all the sciences and professions, education is uniquely 'other-worldly' and uniquely all-encompassing.

However, when we say that pedagogy is 'out of the ordinary' we also mean to say that it is extra-ordinary, to play to another meaning of this ambiguous phrase. It is deliberate and designed. One aspect of this is an unusual degree of explicitness. Exophoric reference needs to be more explicit simply to be intelligible. Education does not have the benefit of shared experience that can be taken-for-granted for the simple reason that world to which it refers is not immediately present. And education is extra-ordinary for another reason: just like science, pedagogy deploys characteristic moves in order to create knowledge that is deeper and broader than ordinary knowledge in the lifeworld, ordinarily and informally learned. So, the metadisciplinary science of education is about the deliberate and focused ways of coming to know which distinguish science, and the ways these can be translated into effective designs for learning.

Pedagogy is the design of learning activity sequences, localised in time and space, and with a narrative structure (orientation, journey, destination). It is a scaffold for learner performances of knowing.

Pedagogy is learning-by-design.

Following is a translation of the four-by-two knowledge processes we suggested for science, into four-by-two knowledge processes for pedagogy. This is how the characteristic moves of science might be translated into a pragmatics of pedagogy. The choices made constitute in the domain of pedagogy, constitute designs for learning. Learning by design needs to be deliberative, purposeful and reflective in order to ensure that goals align with the performance outcomes and aspirations of learners.[2]

[2] Our Learning by Design project is an attempt to frame these concepts in pedagogical practice. See L-by-D.com.

Experiencing

Experiencing is a knowledge process in which learners develop knowledge through immersion in the real, everyday stuff of the world: personal experience, concrete engagement and exposure to evidence, facts and data. Experiencing occurs as an unexceptional matter of course in the lifeworld – and the learning that is its consequence tends to be unconscious, haphazard, tacit, incidental and deeply endogenous to the lifeworld. By comparison, the experiencing that occurs in pedagogy in its nature tends to be far more conscious, systematic, explicit, structured and exophoric. It assumes a stance in which the experiencing refers to a place outside of the educational setting: by means of textual, visual or audio representation, by simulation or by excursion, for instance. We propose two, quite distinct ways of experiencing:

(i) *Experiencing the Known* is a knowledge process which draws on learner lifeworld experience: building upon the learning resource of the everyday and the familiar, prior knowledge, community background, personal interests and perspectives and individual motivation. Human cognition is situated. It is contextual. Meanings are grounded in real world of patterns of experience, action and subjective interest. Learners bring their own, invariably diverse knowledge, experiences and interests into the learning situation. These are the subjective and deeply felt truths of lived and voiced experience. Cazden and Luke call these pedagogical 'weavings', such as between school learning and the practical out-of-school experiences of learners (Cazden 2006).

(ii) *Experiencing the New* is a knowledge process in which the learner is immersed in an unfamiliar domain of experience, either real (places, communities, situations) or virtual (texts, images, data and other represented meanings). The 'new' is defined from the learner's perspective: what is unfamiliar to them, given their lifeworld origins. To make sense of the new in a way which is adequate to productive learning, however, the new at least has to have some elements of familiarity: it has to make at last half sense, and it must make overall intuitive sense. For learning to occur, it also needs to be scaffolded: there must be means for the parts that are unfamiliar to be made intelligible (with the assistance of peers, teachers, textual cross-references or help menus, for instance). The result is a journey away from the lifeworld along a horizontal axis of expanding knowledge, taking a cross-cultural journey of one sort or another. Experiencing the New entails immersion in new information or situations, careful observation, and reading and recording of new facts and data. Learners encounter new information or experiences, but only within zone of intelligibility and safety, of what Vygotsky calls a 'zone of proximal development', sufficiently close to the learners' own lifeworlds to be half familiar but sufficiently new to require new learning (Vygotsky 1978).

Conceptualising

Conceptualising involves the development of abstract, generalising concepts and theoretical synthesis of these concepts. In this knowledge process, the learner moves away from lifeworld experience along a vertical axis of deepening knowledge: examining underlying structures, causes and relationships, many of which may be counter-intuitive and challenge commonsense assumptions. Conceptualising occurs in two ways:

(i) *Conceptualising by Naming* is a knowledge process by means of which the learner learns to use abstract, generalising terms. A concept not only names the particular; it also abstracts something general from that particular so that other particulars can be given the same name despite immediately visible and situational dissimilarities. In child development, Vygotsky describes the development of concepts in psycholinguistic terms (Vygotsky 1934/1986). Sophisticated adult thinking equally involves naming concepts (Luria 1976). *Conceptualising by Naming* entails drawing distinctions, identifying of similarity and difference, and categorising with labels. By these means, learners give abstract names to things and develop concepts. Expert communities of practice typically develop these

kinds of vocabularies to describe and explain deep, specialised, disciplinary knowledges based on the finely tuned conceptual distinctions. Conceptualising is not mere a matter of teacherly or textbook telling based on legacy academic disciplines, but a knowledge process in which learners become active concept-creators, making the tacit explicit and generalising from the particular.

(ii) *Conceptualising with Theory* is a knowledge process by means of which concept names are linked into a language of generalisation. Theorising involves explicit, overt, systematic, analytic and conscious understanding, and uncovers implicit or underlying realities which may not be immediately obvious from the perspective of lifeworld experience. Theorising is typically the basis of paradigmatic schemas and mental models which form the underlying, synthesising discourse of academic discipline areas. *Conceptualising with Theory* means making generalisations and putting the key terms together into theories. Learners build mental models, abstract frameworks and transferable disciplinary schemas. In the same pedagogical territory, a didactic-mimetic pedagogy would lay out disciplinary schemas for the learners to acquire (the rules of literacy, the laws of physics and the like). In contrast, active *Conceptualising with Theory* requires that learners be concept and theory-makers. It also requires weaving between the experiential and the conceptual. This kind of weaving is primarily cognitive, between Vygotsky's world of everyday or spontaneous knowledge and the world of science or systematic concepts, or between the Piaget's concrete and abstract thinking.

Analysing

Analysing is a knowledge process involving the examination of constituent and functional elements of something, and an interpretation of the underlying rationale for a particular piece of knowledge, action, object or represented meaning. This may include identifying its purposes, interpreting the perspectives and intentions of those whose interests it serves, and situating these in context. Analysing takes two forms:

(i) *Analysing Functionally* is a process of involving the examination of the function of a piece of knowledge, action, object or represented meaning. What does it do? How does it do it? What is its structure, function, connections and context? What are its causes and what are its effects? *Analysing Functionally* includes processes of reasoning, drawing inferential and deductive conclusions, establishing functional relations such as between cause and effect and analysing logical connections. Now learners explore causes and effects, develop chains of reasoning and explain patterns.

(ii) *Analysing Critically* is a process of interrogating human intentions and interests. For any piece of knowledge, action, object or represented meaning we can ask the questions: Whose point of view or perspective does it represent? Who does it affect? Whose interests does it serve? What are its social and environmental consequences? This is the characteristic orientation of critique or critical pedagogies. *Analysing Critically* involves critical evaluation of your own and other people's perspectives, interests and motives. In this knowledge process, learners interrogate the interests behind a meaning or an action, and their own processes of thinking.

Applying

Applying is a knowledge process in which learners actively intervene in the human and natural world, learning by applying experiential, conceptual or critical knowledge – acting in the world on the basis of knowing something of the world, and learning something new from the experience of acting. This is the typical emphasis of the tradition of applied or competency-based learning. Applying occurs in unexceptional ways in the everyday realm of the lifeworld. We are always doing things and learning by doing them. We learn by application in the lifeworld in ways which are more or less unconscious or incidental to the process of application, in ways which, in other words, are endogenous to that lifeworld. Application in pedagogy is a process in which knowledge it taken out of an educational setting and made work beyond that setting. It translates exophoric reference into real-world or simulated practice. Applying is about as real as education gets, albeit not as endemically real as the unconscious applications that are of the lifeworld itself. Applying can occur in two ways:

(i) *Applying Appropriately* is a process by means of which knowledge is acted upon or realised in a predictable or typical way in a specific context. Such action could be taken to meet normal expectations in a particular situation. For instance, objects are used in the way they are supposed to be, or meanings are represented in a way which conforms to the generic conventions of a semiotic or meaning-making setting. Never does *Applying Appropriately* involve exact replication or precise reproduction. It always involves some measure of transformation, reinventing or revoicing the world in a way which, ever-so-subtly perhaps, has never occurred before. *Applying Appropriately* entails the application of knowledge and understandings to the complex diversity of real world situations and testing their validity. By these means, learners do something in a predictable and expected way in a 'real world' situation or a situation

that simulates the 'real world'. This pedagogical weaving brings learners back to the world of experience, but a world into which they have transferred understandings developed in other knowledge processes.

(ii) *Applying Creatively* is a process which takes knowledge and capabilities from one setting and adapts them to quite a different setting: a place far from the place where that knowledge or those capabilities originated, and perhaps a setting unfamiliar to the learner. In this knowledge process, learners take an aspect of knowledge or meaning out of its familiar context and make it work – differently perhaps – somewhere else. This kind of transformation may result in imaginative originality, creative divergence or hybrid recombinations and juxtapositions which generate novel meanings and situations. *Applying Creatively* involves making an intervention in the world which is truly innovative and creative and which brings to bear the learner's interests, experiences and aspirations. It is a process of making the world anew, applying fresh and creative forms of action and perception. Now learners do something that expresses or affects the world in a transformative way, or transfers their newly acquired knowledge into a new setting.

This is a list of the kinds of things teachers and learners can do. They are the kinds of things that one does to know, in the premeditated reflective way that distinguishes the embedded knowledge of the lifeworld from knowledge deserving of the word 'science'. They are things you do which distinguish the pervasively everyday reality of informal learning from the relative formality, systematicity and focused nature of 'education'. Science and pedagogy alike are agents in knowledge-journeys which create 'out-of-the-ordinary' knowledge, knowledge which is simultaneously grounded in the lifeworld but deeper and broader and thus more trustworthy and reliable than knowledge gained from commonsense living in that world.

In this conception, pedagogy is a process of deliberate and purposeful shunting backwards and forwards between different acts of knowing, calibrating their insights against each other. Education is a business broadening not just learners' knowledge, but their repertoires of knowledge-making action. Pedagogy is the design of knowledge-action environments: choosing activity types, sequencing activities, transitioning from one activity type to another and determining the outcomes of these activities.

In the everyday practicalities of pedagogy, talk of knowledge repertoire becomes a way for the teacher or learner to say explicitly, 'now I am using this particular way to know, and, now I am using that other way, and here is the reason why I did this, then that'. By the end of a learning experience, both learner and teacher are able to say, 'this is what we have done to know, the journey we have taken through a range of knowledge processes', and 'this is the knowledge we have acquired and the knowledge-abilities we have developed'.

The idea of a knowledge repertoire is the basis for a purposeful, deepened and broadened conception of science (what are the conditions of the more resilient knowing that we would call 'science'?), of pedagogy (how do we come to know in ways which are peculiarly educational?), and of a metascience as the foundation for a metadiscipline of education (how do we know how we come to know?).

Education

Education is learning that has been consciously and purposefully designed. It concerns us with the localised action sequences of pedagogy, the curricular designs based on disciplinary schemas or domains of practical action, and the institutional, architectonic and discursive field.

Education teaches us how to work at our knowing and shape our being. The science of education explores the sources and outcomes of deeper and more discerning ways of knowing than are possible in casual, lifeworld experience, and how they are acquired. Learning is coming to know and to be. Education is the science of how we come to know and be. Doing education as a discipline and as a profession, we come to know how we come to know and come to be how we become. This is why education is a metadiscipline, the science of sciences.

Speaking practically, the profession of education has a special place, too, as the intellectual profession par excellence. Its business is knowledge in all of its forms, in every domain of human experience and the natural world, and at every stage in life's journey. There is nothing known that can't be learnt, and nothing unknown that might not be learnt, personally or collectively. This makes education a peculiarly meta-profession, consistent with its being a metadiscipline which uses a metascience for its tool of trade.

Why, then, are the fruits of the academic field of education so often so intellectually disappointing, and so socially unimaginative? A sociologist might warn that education is one of the key sites of socialisation and social control, and this in part explains its narrow instrumentalism. It might seem dangerous to allow that education be otherwise. The instrumentalism of 'teacher training' means that the discourses, institutions and architectures of education are the stuff of tacit understanding, of silently shared and unquestionable assumptions rather than explicit exegesis, critical analysis or experimental innovation.

Our times, however, may not allow education to remain a quiet intellectual backwater and a site of social quiescence. We face huge challenges: of environment, inequality, globalisation, unprecedented technological change, human diversity, more distributed knowledge systems, and

changing patterns of agency which portend a more participatory culture (Kalantzis 2006; Cope and Kalantzis 2007). These forces threaten profound disruption of education's heritage institutions and discourses. Education may find itself with little alternative but to rise to these new occasions. Today, education needs to be as big as the fundamental challenges of our time if it is to live up even to a part of its expanded intellectual and practical promise.

Our times, indeed, may insist that we think in this broadly. Knowledge systems are more distributed than ever, and we rely for our knowing and learning on the scaffolds of collective intelligence. New sensibilities of agency and participation, amongst younger people particularly, are increasingly likely to resist the heritage routines of schooling which cast them as comparatively passive receptors of knowledge. Learner diversity creates an insistent demand that conventional schooling with its one-size-fits-all curriculum, is abandoned for pedagogies and institutions that are more inclusive. There are also increasing expectations that education should demonstrate that its pedagogies work: crudely through today's testing regimes, but perhaps these demands and their accompanying politics will become more sophisticated, and more consonant with the logistics of a society that values innovation, creativity and initiative rather than pat repetition of correct answers.

Our times also offer us a strategic opening in the form of the emerging 'knowledge society', now widely regarded as a key to our manifold contemporary challenges (Peters 2007). Even if the rhetoric sounds overblown at times, this is a strategic opportunity for us. The future of employment will be in the knowledge dimension of work and the deepened value of 'human resources'. The future of the planet will be ensured by the frugal use of natural resources and physical capital complemented by a generous investment in knowledge resources and intellectual capital. The destiny of nations will lie in their capacities to compete in the global 'knowledge economy'. The fate of organisations will be determined by their success in 'knowledge management'. The life chances of persons will be determined by their capacities to draw upon and contribute to collective intelligence, their proclivities to creativity, their willingness to take risks, their abilities to innovate and their propensities to collaborate.

These are all good reasons why education can, and now should, make the move to intellectually higher ground and take on practically more ambitious goals. Education's agenda is no less than human-transformative. It is learner-transformative (the enablement of productive workers, participating citizens, and fulfilled persons). And it is world-transformative as we interrogate the human nature of learning and its role in imagining and enacting new ways of being human and living socially: shaping our identities, framing or ways of belonging, using technologies, representing meanings in new ways and through the new media, building participatory spaces, and collaborating to build and rebuild the world.

These are enormous intellectual and practical challenges for education. They are big enough to justify a claim by education to be a metadiscipline.

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References

Blackburn S (2005) Truth: a guide. Oxford University Press, Oxford

Cazden CB (2006) Connected learning: "weaving" in classroom lessons. In: Pedagogy in practice 2006 conference, University of Newcastle, Newcastle

Chalmers AF (1976) What is this thing called science? University of Queensland Press, St Lucia

Cope B, Kalantzis M (eds) (2000) Multiliteracies: literacy learning and the design of social futures. Routledge, London

Cope B, Kalantzis M (2007) New media, new learning. Int J Learn 14 (1):75–79

Cope B, Kalantzis M (2009a) 'Multiliteracies': new literacies, new learning. Pedagogies Int J 4:164–195

Cope B, Kalantzis M (2009b) Ubiquitous learning: an agenda for educational transformation. In: Cope B, Kalantzis M (eds) Ubiqutous learning. University of Illinois Press, Champaign, pp 3–14

Damasio AR (1994) Descartes' error: emotion, reason and the human brain. Penguin Putnam, New York

Deacon TW (1997) The symbolic species: the co-evolution of language and the brain. W.W. Norton, New York

Donald M (2001) A mind so rare: the evolution of human consciousness. W.W. Norton, New York

Erikson F, Gutierrez K (2002) Culture, rigor and science in educational research. Educ Res 31(8):21–24
Goody J (1977) The domestication of the savage mind. Cambridge University Press, Cambridge
Husserl E (1970) The crisis of European sciences and transcendental phenomenology. Northwestern University Press, Evanston
Kalantzis M (2006) Changing subjectivities, new learning. Pedagogies Int J 1(1):7–12
Kalantzis M, Cope B (2005) Learning by design. Victorian Schools Innovation Commission, Melbourne
Kalantzis M, Cope B (2008) New learning: elements of a science of education. Cambridge University Press, Cambridge
Koch C (2004) The quest for consciousness: a neurobiological approach. Roberts and Company, Englewood
Luria AR (ed) (1976) Cognitive development: its cultural and social foundations. Harvard University Press, Cambridge
McGinn C (2004) Mindsight: image, dream meaning. Harvard University Press, Cambridge
Ong WJ (1982) Orality and literacy: the technologizing of the word. Methuen, London
Peters MA (2007) Knowledge economy, development and the future of higher education. Sense Publishers, Rotterdam
Popkewitz TS (2004) Is the National Research Council Committee's report on scientific research in education scientific: on trusting the manifesto. Qual Inq 10(1):62–78
Rizvi F (2007) Internationalization of curriculum: a critical perspective. In: Mary H, Levy D, Thompson J (eds) Handbook of international education. Sage, London, pp 390–403
Shavelson RJ, Towne L (eds) (2002) Scientific research in education. National Academies Press, Washington, DC
Vygotsky L (1934/1986) Thought and language. MIT Press, Cambridge, MA
Vygotsky L (1962) Thought and language. MIT Press, Cambridge, MA
Vygotsky LS (1978) Mind in society: the development of higher psychological processes. Harvard University Press, Cambridge