

## Aspects of Research Concerning Design Education

**Professor Phil Roberts**

*Department of Design and Technology, Loughborough University, UK*

---

The objectives of the paper are to support the conduct of action research by teachers-as-researchers and, thereby, contribute towards the development of (1) design educational practice and (2) the 'ideas cultures' inhabited by teachers. The emergence of conceptual distinctions relating to design education over the past 25-30 years is indicated. These are seen as signs of significant paradigmatic shift and of a nascent language of discourse. The Design field is distinguished; attention is drawn to the status of cognitive modelling; to an academic framework that might be helpful in developing a knowledge base in Design; and to differing approaches to research inquiry. The nature, and particular appropriateness to practitioners, of action research is explored. Some 'big' topics - not always seen as having immediate relevance to everyday pedagogy - are then introduced and considered. These, were they better appreciated, are seen as being potentially beneficial to the 'ideas culture' and the pedagogic quality of the design educational community.

*Keywords: action research, teacher-as-researcher, paradigmatic shift*

---

IDATER - the title of this Conference is 'International Conference on Design and Technology Educational Research and Curriculum Development'. If we unpack this a little, the central focus is *educational research*; the key theoretic framework of that research is *the field of curriculum studies* and the *area*, more particularly, is *Design Curriculum Studies*. And there are, too, some crucial *distinctions* to observe - between *Design* (as a field of human enterprise and endeavour) and *design education* (which has distinguishable areas and levels of attention, practice, and specialist communities), and *Design & Technology* (which, in the UK, is the name given to a particular school curriculum subject in general education). Let's keep these in mind.

My objectives are these:

to support ACTION RESEARCH as a mode of inquiry and development that is especially appropriate to D&T educational practitioners;

to support the TEACHER-AS-RESEARCHER (or practitioner-as-researcher);

to support the position that action research within education (and D&T education) is intended to improve practice;

to note, therefore, that action research in education differs from other research paradigms; and

to suggest that useful connections can be made between the high level of abstraction and the experience of everyday practice.

In general, practitioners never appear very enthusiastic towards theory, (nor towards research). Yet all practice is embedded, implicitly or explicitly, in theory.

In education, the work of the past 20 or so years in Curriculum Studies has made increasingly apparent the problematic nature of curriculum phenomena and of pedagogy. Academic researchers, scholars, and practitioners working in the field of Curriculum Studies seek to contribute towards the development of knowledge and understandings as an integral and necessary strand in the development of practice. The review and development of pedagogy, necessarily, starts from the complexities that are sensed and experienced in practice. Practitioners are hence well placed to make major contributions towards the development of practice and curricula. Curriculum Studies is a practice-led field; it is not led by the problems that are within the formal theories of those disciplines that are associated with education; it is also methodologically eclectic (which is not to say idiosyncratic).

‘Design education’ may be a relatively recent addition to the professional educational vocabulary – in the past 25-30 years; D&T as a school subject tag (in the UK) is newer still. But design phenomena are not new at all; the idea of human beings having a capacity for design is not new; the idea of doing and making as central to human being is not new. The foci of attention in design education may be new; the emphases within general education have also changed. Some of the substantive questions/matters that have been addressed in the past 20-25 years in Curriculum Studies have been overtaken by the continuing conversation; others have stayed the course because they are perennial issues. Some of the matters that have been overtaken remain interesting, historically, because they may help to indicate, for instance, ‘stages’ of conceptual development or suggest the evolution of methodological approaches.

Some of those matters that have been overtaken can, now, be understood as contributions *of their time* within a wide-ranging professional conversation, and, more particularly, as attempts to contribute to the developing *language of discourse*. The idea of a professional, and alive, conversation is important in any field. It is perhaps particularly so in a time of rapid change for well established areas of practice. Other factors are also significant. Design is a large *field*. The *design educational field* is also large (as well as different); it has *levels* (primary, secondary, tertiary); it contains both specialist and general education; it has distinguishable *areas*; the field contains the several communities of practitioners, many of whom do not necessarily communicate with each other: they inhabit different paradigms and traditions, (and so see the world differently).

Fifteen years ago in the UK, the most usual conceptualisation of the secondary school curriculum would see these different areas roughly superimposed upon the curricular field of Design Education through the usage of such titles, then, as Art, CDT, Home Economics, Textiles/Fashion. The field of Design Education was commonly understood as being related strongly to such subject areas. But no single one of them – nor indeed all of them collectively – represented fully the field of Design, nor constituted the whole of ‘design education’. Further, it was not obvious that any of such subjects necessarily offered the exemplary *general* case of design educational activity (though exemplary *particular* cases might be constructed in any of them).

The nature of the relations between those curriculum subjects was not obvious either. And now, in the past 10 years in the UK, the tag D&T has emerged and, in schools, has become perhaps the dominant tag. But D&T is just one curriculum subject area; Art - nowadays Art & Design - is another. Design education (in schools) remains a larger field than can be represented by just one or two curriculum subjects; the term, Design, can represent a large dimension of the general educational curriculum; and, of course, design phenomena extend beyond the boundaries of general education anyway.

All of that might be sufficient to indicate that the well-foundedness of 'what we all know' is insecure. But further, across the different subject-based communities of practitioners, even when the subject matter is innocently considered to be 'the same', conceptions may be significantly different. This may or may not be appropriate. But it would certainly be helpful if the differing conceptions, together with the complexity that thereby arises, were to be made more recognisable and comprehensible and thereby acceptable.

Much that is problematic in the design curriculum has a fundamental and direct connection with practice. On this view, the cruder anti-theory and anti-intellectualist stances – or, put differently, the absence of a sufficiently developed language of discourse – become more illustrative of the weaknesses of the field than of its strengths. Consider a particular matter. It can be argued that the essential 'language' of design activity, as distinct from the meta-language of discourse (and, preserving the distinction, of design educational activity) is cognitive modelling. This cognitive medium, or instrument, cannot be represented in natural language: that is, the cognitive medium or 'language' of designing is distinguishable from natural language (and from mathematical notation). But acknowledging that does not imply that we should despair at our inability to 'put into words' that which cannot be presented in words. But nor does it support the adequacy of falling back on mystification or on professional folk-lore in response to those who ask questions from outside the field: that is to give up too easily. We might, for instance, acknowledge that we necessarily use natural language, in a meta-language, to talk about, to refer to, the relations between designing and other kinds of activity.

There is a need for a meta-language precisely – or, if only – because natural language is not an equivalent to the cognitive non-linguistic medium of design activity. Consider, too, issues to do with the 'content' of the design curriculum. An attitude that is reflected in the question, 'Why reinvent the wheel?' is familiar in discussion of design and design curricular activities.

Why indeed? Taken at its most simplistic, the question naively asserts the view that there is a body of knowledge susceptible to codification, which can be 'fixed' and transmitted, and which would save everyone who follows from the work of constructing (or reconstructing) that knowledge. And yet, the use of the wheel metaphor may also be seen as an illustration of the weaknesses of the field. Some kinds of knowledge may indeed be codified. But the making of meaning, the development of operational competence, the development of design cognition, are functions central to engagement in action. Not all knowledge is propositional. Much design knowledge and knowing is a function of action. It cannot be codified into

propositional knowledge. Learning and knowing of this kind is necessarily a function of the action that consists in engaging in and on the world, and everyone necessarily *makes* his/her own personal (and, to an extent, public) knowledge.

So, there's considerable scope for reflection upon practice and for systematic inquiry into that practice. There's scope, too, for considering the nature of inquiry, and the nature of theory that practitioners would feel more at ease with, (which is to say that it would be, of course, *a practitioners' theory*). There are, too, competing ideologies.

And then, there's a further interesting matter that receives very little explicit notice: a significant part of Design Curriculum Studies and its running conversation is also concerned with some of *the conceptual problems* surrounding the development of design education (and, more specifically in this context, D&T education). The conceptual problems are of two kinds, internal and external. Internal problems receive some clarification by practitioners as an integral part of day-to-day work (though they are necessarily resolved). External conceptual problems become especially apparent on the acceptance that 'design education' might represent the emergence of a substantial paradigm transformation – one that would be neither subject-bound nor subject-specific. Some might also argue that D&T is indicative of paradigm shift, having handicrafts, metal/woodwork, CDT as its precursors. Paradigmatic change inevitably brings disturbance to the taken-for-granted perspectives and rationales of normal practices. This is easy to suggest; its implications, however, are radical, and their force rarely appreciated.

For instance - but not for pursuing at the moment - the seemingly banal question, 'What is a problem?' together with the very different one, 'When is a problem?' point both to internal and external problems and disputes. The questions are indicators of quite different epistemological accounts and conceptions of the nature and purposes of design education and of D&T educational activity. The tension between differing theoretic positions and between differing existential persuasions – and, hence, curricula and practices – is made all the more sharp by the belief of groups of practitioners that *their* practices are rationally or self-evidently well-founded. The status of such rationales – often implicit rather than explicit – is matter for analysis.

A new and larger paradigm of practice would be signalled in the general acceptance and usage of new categories. A period of paradigmatic transformation is a source of confusion, disagreements, and criterial difficulties: the frequency of questions such as, 'What is design?' 'What is research?' 'What is practice-based academic research?' indicate the problematic. Further on – indeed, much further on – it is possible to glimpse at least two other salient areas of inquiry emerging. One might have as its focus of attention the cognitive status of and the functions of metaphor in relation to the act of designing and the objects of the designer's attentions. The second area would include a focus on the centrality of values, the processes of valuing, and the *making* of meaning in design educational activity: that is, *the semantic core of designing-as-learning*. But attending to the design educational curriculum is an active and necessarily participant process. Such immersion is also the basis of professional-personal development: it is this that leads to any significant curriculum development. Practice changes and develops as its practitioners change and develop.

All that was Preface. Now to the beginning proper: first, I want to revisit some notions.

## DESIGN & TECHNOLOGY EDUCATIONAL RESEARCH AND CURRICULUM DEVELOPMENT

In the 1970s, Bruce Archer offered a simple and powerful model of Design as an area of human activity and significance and argued that Design is as significant as the Sciences and the Humanities. He also distinguished it from both.

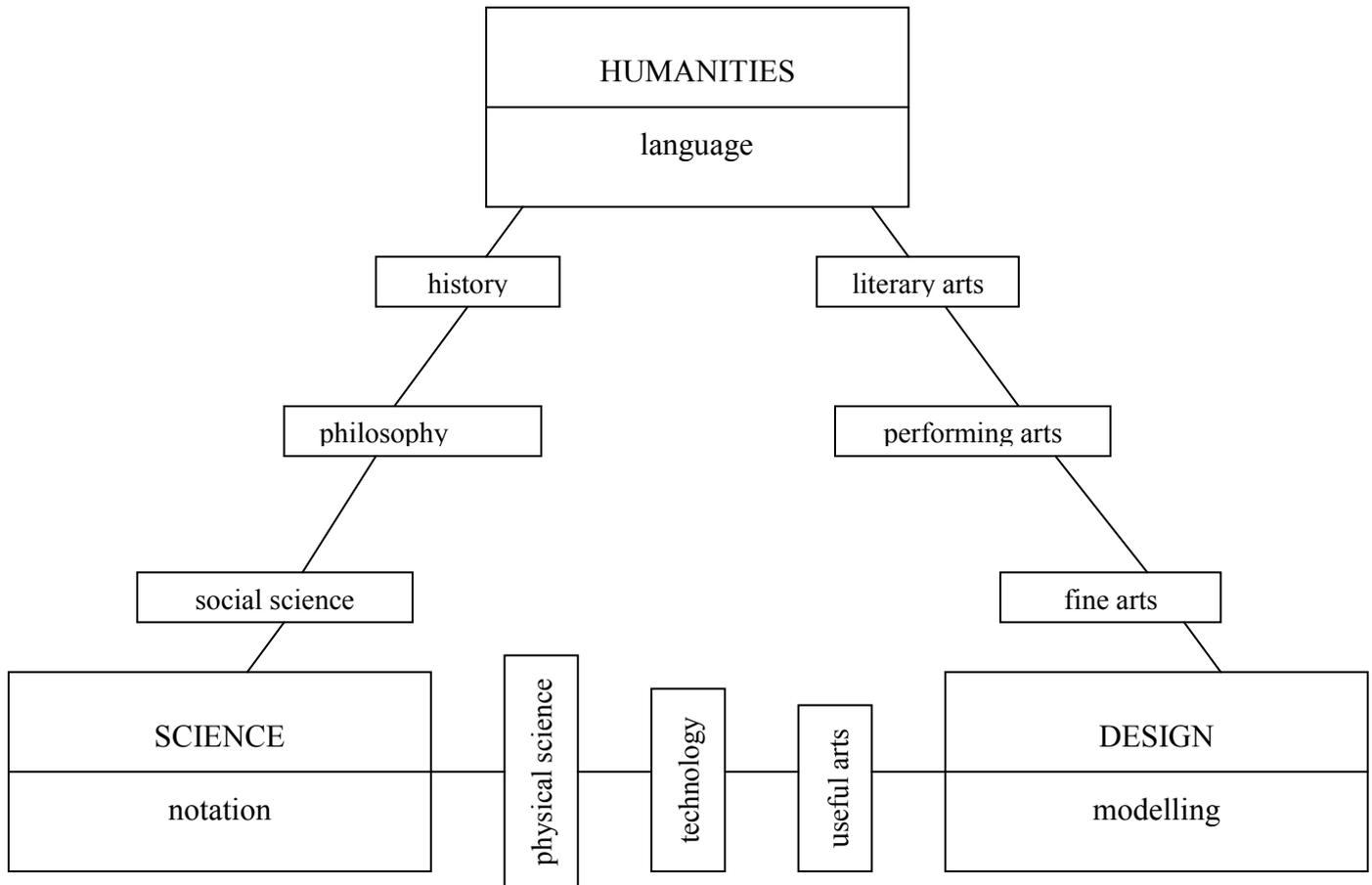


Figure 1: Design as a 'third area' [Source: Design in General Education (1976) pp15-16]

The repository of knowledge in Science is not only the literature of science but also the analytical skills and the intellectual integrity of which the scientist is the guardian. The repository of knowledge in the Humanities is not simply the literature of the humanities but also the discursive skills and the spiritual values of which the scholar is the guardian. In Design, the repository of knowledge is not only the material culture and the contents of the museums but also the executive skills of the doer and maker.

Archer distinguished Design as a distinctive dimension of human activity, and as a distinct kind of knowledge and knowing;

He identified a distinctive capacity of mind as being engaged in the act of designing, and identified the essential ‘language’ of the practice of Design and of the act of designing as being *modelling* (or *cognitive modelling*).

## WHAT DO WE MEAN BY COGNITIVE MODELLING?

The conduct of design activity is made possible by the existence of a distinctive capacity of mind, analogous with the language capacity and the mathematical capacity.

This is the capacity for cognitive modelling. A person acting in the role of designer or appraiser of designs forms images ‘in the mind’s eye’ of things and systems as they are, or as they might be, and evaluates them and transforms them so as to gain insights into their structure and into the likely quality of fit between alternative conceivable requirements.

Cognitive modelling is not limited to spatial configurations. Cognitive modelling is independent of language or symbol systems but when appropriate the concepts modelled can be translated into or supplemented by language or notational terms. The image is usually externalized through models and simulations, such as drawings, mock-ups, prototypes and, of course, where appropriate, language and notation, or it can be embodied into the construction or enactment of the emerging responses. These externalizations capture and make communicable the concepts modelled.

(Archer and Roberts (1979, pp55-56))

Why is cognitive modelling so important? What is its status?

A useful response was offered 20-odd years ago by Janet Daley:

... the capacity to envisage alternative physical realities and the representation of those alternatives in symbolic forms which are universally intelligible is a definition of design ... To present design in this way, ie as a function of the human capacity to understand a physical environment and to represent the contingencies, and possibilities of that environment in abstract ways, is to accept what one might call the intellectual status of design.

(nd, p1)

Now to design research – *academic* design research. Thirty years ago, Bruce Archer produced a framework for a knowledge base in Design (*below*). He used it, amongst other uses, to guide his own research inquiries. There are various ways of using it: as a map, or as a compass; it locates. It can be used, when clothed, to indicate gaps and strengths in our knowledge base of design.

0 design technology

1 design praxiology

- 2 design language
- 3 design taxonomy
- 4 design metrology
- 5 design axiology
- 6 design philosophy
- 7 design epistemology
- 8 design history
- 9 design pedagogy

Figure 2: A framework for a knowledge base in Design [Source: Design in General Education (1979, pp39-40)]

And, in greater elaboration:

- 0 design technology:  
The study of the phenomena to be taken into account within a specific area of design application or practice, and which, together, constitute a paradigm
- 1 design praxiology:  
The study of the design techniques, procedures, skills and judgement applied in a given area or paradigm
- 2 design language:  
The study of the vocabulary, syntax and media for recording, devising, assessing, presenting and representing design ideas in a given area or paradigm
- 3 design taxonomy:  
The study of the classification of design phenomena
- 4 design metrology:  
The study of the measurement of design phenomena, with special emphasis on the means for ordering and comparing non-quantifiable phenomena
- 5 design axiology:  
The study of goodness or value in design phenomena, with special regard to the relations between cultural, technical, economic, moral and aesthetic values, and ideologies
- 6 design philosophy:

- The study in the language of discourse of moral principles in design; and of the existential phenomena of design experience and activity
- 7 design epistemology:  
The study of the nature and validity of ways of knowing, believing and feeling in design
  - 8 design history:  
The study of what is the case, and how things came to be the way they are, in the design area
  - 9 design pedagogy:  
The study of the curriculum, principles, and practice of education in the design area

Figure 3: A framework for a knowledge base in Design

When we look at this, it's notable that it's not based on any single tertiary academic discipline; nor on any single professional design discipline or area of practice; nor on a school curriculum subject; but that it is potentially useful to a practitioner/researcher/scholar in any of these. From this, we can move to acknowledge differing approaches to research inquiry:

- 1 fundamental research:  
that is, systematic inquiry directed towards the acquisition of new knowledge, the establishment of principles or the formulation of defensible explanations
- 2 applied research:  
that is, systematic inquiry directed towards the exploration of the implications or the consequences of the application of fundamental principles in particular situations
- 3 action research:  
that is, critical reflection upon practice and systematic inquiry directed, especially, towards the development of practice, or to the resolution of difficulties or problems perceived or experienced by the teacher/practitioner-as-researcher, with the objects of developing the researcher's knowledge, understanding and competence; and/or curriculum or practice; and contributing towards a practitioners' theory
- 4 studio research:  
that is, systematic inquiry through studio/workshop activity calculated to capture and expose ideas and information having

testable validity within or beyond the work in which they are embodied

- 5 pedagogical research:  
that is, systematic inquiry directed towards greater understanding of curricular phenomena, the principles and practices of learning and teaching, skill acquisition and performance assessment in support of teaching and scholarship

Figure 4: Differing approaches to research inquiry

I want now to focus on *action research* in the context of *pedagogy*: there may be distinctions that should be preserved, but there is also an overlap so far as my purposes are concerned.

So, more on action research:

#### WHAT IS ACTION RESEARCH?

At its simplest, classroom action research relates to any teacher who is concerned with his/her own teaching: to the teacher who is prepared to question his/her own approaches in order to improve the quality of teaching and learning. Hence, the teacher/practitioner is involved in looking at what is actually going on in the classroom [or studio/workshop]. He/she seeks to improve his/her own understanding of a particular problem (or state of affairs) rather than to impose an instant 'solution' upon that unarticulated problem. It is crucial that time be taken for thought and reflection, and it is implicit in the idea of action research that there should be some practical effect of, or end product to, the research which would be based on a now-increased awareness of what actually happens in the classroom. It is, as a consequence, towards the construction of a practitioners' theory, constructed from their experience; and it would intend to be useful.

On this view, some of the characteristics of educational action research are that:

- 1 its activities and objects are concerned with the deepening of understanding of the studio, workshop, classroom, and school situation by the teacher/researcher adopting a critical, questioning stance. Its starting points are the 'practical problems' experienced by teachers, rather than the problems found within the formal theories of the 'education disciplines'.
- 2 The presentation of its reporting is in ordinary everyday language, and might well take the form of a case study or story. It adopts the action perspective of practitioners and employs their everyday language to describe and investigate its subject-matter states of affairs.
- 3 Reflection on experience is part of its processes.

Not all would agree with this, obviously simplified, characterisation of action research, and one of IDATER's functions should be to stimulate discussion about its nature and nuances.

But it's worth noting that such a position justifies and explains the apparent huge diversity of 'low level' inquiries that are pursued by practitioners; the apparent absence of large formal theory (which, from the in-field perspective of some other research tradition, might be described pejoratively as 'no research tradition'). It also makes a distinction between it and the empirical-analytic mode of hypothesis testing paradigm of inquiry - and almost, in some cases, a separation between the two.

It's worth noting several points that begin to emerge:

The borderline between (*action*) *research* and *development* is not clear cut. Educational practice can contain both research and development. It is not in the tradition of traditional empirical-analytical research: while the traditional empirical researcher hopes not to change the educational structure or process being studied, the hope of the educational action researcher is precisely that of bringing about change. This coupling together of influence, intervention, and effect, which is the trademark of action research, is largely and regrettably repudiated by some traditional empirical researchers.

In traditional empirical research, the researcher's possible influence on the phenomena is viewed as a disturbing variable that must be diminished as much as possible. But educational action research assumes an attitude of consciously attempting to break down the separation (though not the distinctions) between theoreticians and practitioners. The assumption of equality of the implicated parties – that neither of the parties rules over the other – is a basic principle for upholding what the terminology of philosophy calls 'discourse'.

Discourse is a form of dialogue in which the course, or direction, (and not just the content) undergoes argumentative trial. (Brock-Utne, (1980, p13)) The point of discourse is not that it is without course, but that the direction of the course has not already been set. Action researchers are partners in discourse; the ideology is democratic. The resulting concept, that discourse is *a key instrument of analysis in educational action research*, is a fruitful one. It is to do with the skills of linguistic philosophy (as method), as distinct from the philosophy of language (which is a subject).

The widely perceived appropriateness of action research to, first, the practitioner-as-researcher and, second, the 'problems' that are grounded in the experience of practice draws attention to the differences between *educational* and *scientific* research. Many mid-career practitioners working in advanced studies or on inquiries that lead to the award of higher degrees try (initially at least) to employ a methodological approach and a vocabulary popularly associated with notions of how research activity is thought to be pursued in the natural sciences. The commonly understood approach in the natural sciences is thought to be the proper, and the required, research approach. And yet the large majority of practitioners are deeply sceptical towards the results of educational research that is based in the natural sciences approach: the results are frequently regarded as misleading, trivial, reductive, begging the questions, or simply as wrong-headed.

I suspect that a large part of a possible explanation for the mis-match between these researchers' results and their reception by practitioners is indeed in the natural science connection.

Michael Bassey pursued the matters some years ago, exploring distinctions between *scientific research*, *science*, *educational research*, and *education* and, then, the consequences. In arriving at a notion of what educational research is, he exposed two 'ought' statements:

The first is this: all teachers ought to be constantly striving to improve their teaching. This statement raises the questions of what is meant by 'improve'; by what criteria can improvement be judged; and who is competent to make such judgements? I suggest that the only significant replies to these questions are the teacher's own replies: it is his meaning of improvement, his criteria and his judgements, that matter, for it is these which will influence his teaching behaviour. Others may suggest, advise or cajole him, but in the event it is his own judgement which causes change in his teaching.

The second is that educational research ought to be concerned with ways of improving teaching. Since the interpretation of improvement lies with the individual teacher, the function of educational research is to influence the thinking of the teacher; to challenge complacency, to question methods, to encourage self-analysis, to suggest alternative approaches, to promote creativeness, to foster self-awareness towards others.  
(1980, p17)

He went on to consider sociological, psychological, philosophical, and historical research about educational situations; and concluded that educational research (never mind educational action research) was different from the two social sciences because it has no useful generalisations, and it was different from all four modes of inquiry because of the value orientation towards improvement. (*ibid*)

All this is supportive towards the validity and propriety of action research, and towards the notion of the practitioner-as-researcher. It supports the position that would attempt to institutionalise the processes of review and development as part of being a practitioner/teacher. It is strongly supportive towards IDATER's position. That the role of the practitioner can readily encompass and institutionalise the functions of careful systematic review and development is nevertheless a minefield: it has its problems. Some of the inhabitants of this minefield maintain that their everyday professional activity is research.

That is not an area or argument we have time to attempt to disentangle now: sufficient simply to note that there is a frequent failure to distinguish between academic research (with its (usually) intended outcome of achieving an academic award) and the systematic inquiry that is part of professional everyday activity; and there is, almost invariably (and most surprisingly), no reference to the epistemological bases in any putative analyses of the distinctions between the two classes. That's a comment on the quality of analysis: more assertion than analysis.

Action research, as characterised and principled here, supports the detailed close-up activities of practitioners who are concerned to reflect upon and develop their specifically contextualised practices and understandings in a systematic and rigorous way rather than to engage in the kind of technical problems that are located in the formal theories of disciplines associated with education. It supports the diversity, the apparent lack of large formal theory, and the shift away from methods of inquiry that are associated with, especially, the natural sciences.

Back now to the framework/map: Figures 2 and 3.

I earlier suggested that this framework can be helpfully useful in showing the gaps in our knowledge; that it can help locate our particular efforts; that it can help make more coherent, and related, disparate efforts. It can alert us to the need to make and retain distinctions (such as those between design in general, professional designing, designerly activity in the curricular activities of general education, the school subject of Design & Technology, other design-related curriculum subjects, design as a dimension - not subject-based or subject-bound - of the curriculum or, well beyond that, of human experience, and so on). It can also help us, therefore, to distinguish the wood from the trees. So far so good. But I want now to look very briefly at a number of areas/dimensions/big topics that, in contrast to the low level of specificity of many practitioners' interests, are perhaps at a fairly high level of abstraction and generality, and thus, apparently, not always easy to connect to everyday practice. But they are in the 'ideas culture' of Design and, unexamined or not, they have effect. But when they are examined, they can have powerful explanatory or illuminative effect. So, here are a handful, somewhat arbitrarily chosen: there are certainly other candidates; the selection of these, rather than others, carries huge assumptions; and, inevitably, there are cartoons of big ideas, and intuitions that require unpacking.

Remember: bear in mind *the closeness, or distance from*, the everyday direct experience of educational practice.

So, in shorthand, four 'big' topics:

The idea of paradigm shift;

Multiple realities, or, a post-modern world;

Design as a capacity of mind; design as a distinct form of knowledge and knowing;  
and

Designing as the making of meaning; values and valuing; identity, meaning and values.

Taking each in turn:

## 1 THE IDEA OF PARADIGM SHIFT

In passing, the notion of paradigm shift is not one that is much in the day-to-day conversation of practising teachers.

The key reading is Thomas Kuhn, *The Structure of Scientific Revolutions*, (2<sup>nd</sup> edn), London: The University of Chicago Press 1970

The idea of there being paradigms – that is, recognisable and distinguishable communities of practitioners and established practices, together with their traditions and languages - is useful. The idea that paradigms exist in time and can change, or be changed, or fall into dis-use, or come to the ends of their useful lives, is useful. For instance, we could say (of UK schools-based practice) that a former mainstream paradigm that consisted in Handicraft gave ground to Woodwork & Metalwork, which, in turn, were somewhat transformed (if not actually overtaken) by CDT, which, in turn, may be in the process of transformation by the emergence of D&T. Such transformations are a natural event. But they can be difficult to understand and live with – especially, for instance, if the way you see the world, the way you were inducted, almost unaware, into the profession, into the world-view and ways of being a member of a practitioner community is changed by external imperatives or impositions.

A reading of Kuhn can offer insights into the nature and effects of paradigm shift; Kuhn offers the possibility of models that help produce your own models that lead to better understanding of change (and towards a sense of being in-control); a reading reinforces the view that curriculum practices change as an accompaniment of (rather than being a subsequent function of) personal growth and development; that bottom-up participant change is easier for all than imposed top-down change. For curriculum managers, Kuhn offers insights into the nature of innovation and the management of change.

## 2 MULTIPLE REALITIES: A POSTMODERNIST WORLD

Take your choice of readings. Toffler's, for instance, are popular works, and include *Future Shock* and *Learning for Tomorrow: the Role of the Future in Education*.

But Anderson's work (for example, his *Reality Isn't What It Used to Be: Theatrical Politics, Ready-to-wear Religion, Global Myths, Primitive Chic, and Other Wonders of the Postmodern World*), is a particularly 'good read'; it's also stimulating vis-à-vis practice in the workshop. It's not usual to provide long extracts from a work but, in this case, it's helpful to offer a fair amount of allusive extract in order to provide a sufficient sense of the style and the content:

... the social construction of reality: how societies created and maintained realities in the past, how postmodern ideas reveal the workings of the reality-creating machinery, how contemporary operators on the political and cultural scene create new realities before our very eyes. (...)

For Westerners, the issues are more accessible in such fields as the sociology of knowledge, cognitive science, and the body of thinking-about-thinking that has come to be known simply as 'critical theory'.

The cognitive scientists, a relatively scrutable band of explorers of the brain and mind, are struggling in new ways with the old question that occupied some of the best philosophical minds of past centuries: what is the match between *human* reality – all our history and science and systems of belief – and the objective reality of the cosmos?

The various answers to this question divide the cognitive scientists into two main camps. On one side are the objectivists, who see the human mind as capable of more or less accurately, more or less impersonally, mirroring external nonhuman reality; on the other side, the constructivists hold that what we call the 'real world' is an ever-changing social creation. (...) [The constructivists] say we live in a symbolic world, with a social reality that many people construct together and yet experience as the objective 'real world'. And they also tell us the earth is not a single symbolic world, but rather a vast universe of 'multiple realities', because different groups of people construct different stories, and because different languages embody different ways of experiencing life. So, according to the constructivist view, people may have not only different political opinions and religious beliefs, but different ideas of such basic matters as personal identity, time, and space.

(...) A mere couple of centuries ago, most societies recognized a single official reality and dedicated themselves to destroying its opposition. You could get burned at the stake for suggesting there might be more than one version of reality. Today, in some intellectual circles, you can get into trouble for suggesting there might be only one. There are, to be sure, plenty of people around who would not mind setting the torch to the constructivists and their many allies. Fundamentalists of all kinds would suppress such notions as socially dangerous, because they believe that there is no basis for social order without a fundamental agreement that some things are not just socially true but by God *cosmically* true, true for everybody and for all time.

Unfortunately for the cause of those who seek such an anchor for our wavering systems of value and belief, there is not, in most parts of the contemporary world, much of a consensus about what those truths are – if there are any – and it is rarely possible to enforce conformity in the good old-fashioned inquisitorial way. So, the constructivists and their ilk – and it is a pretty big ilk – are permitted to go more or less freely about their heretical business.

These postmodern thinkers are in one sense revolutionaries, and in another sense conservatives. You can hardly call them stormers of the Bastille, because the Bastille has already been pretty thoroughly stormed. The old epistemology that equated human beliefs with cosmic reality is now a minority report. Ancient and not-so-ancient systems of eternal truth lie in ruins everywhere around us. The mainstream of social reality has shifted. Yet, although this news is out and many people are acting on it, the full import of the change has not quite found its way into public consciousness.

Most of us in the Western world slip and slide around in the territory between the objectivist and constructivist camps, without much of a clear idea of what we think about such matters. Our everyday experience tends to be objectivist, guided by what the philosophers call 'naïve realism': we generally assume that the universe is the way we experience it. But if asked to think about it, we turn into constructivists. Sure, we say, it's all relative; time and space and identity are subjective ideas – everybody knows that.

Well, yes, probably everybody does know that. But we don't know we know it. We haven't yet quite figured out how to live with what we know, and we don't know what a curious piece of knowledge it is.

Few of us realize that to hold a *concept* of relative truth makes us entirely different from people who lived only a few decades ago, and we complacently overlook the evidence that many people living today profoundly hate the view of reality that seems so eminently tolerant and sensible to the Western liberal mind.  
(x-xii)

But how does this enjoyable participation in the culture of ideas connect to designing and to design education and to everyday D&T educational practice? It all seems very distant. It is not.

Consider, for instance, how we conceptualise 'design problems' (or those states of affairs that are so tagged in the shorthand of professional life). Have in mind the superb characterisation of 'ill-defined states of affairs' – or design problems – in Rittel's and Webber's 'Wicked Problems' (1974). And then the changing conception, over the past 10-15 years, about what constitutes a 'design problem' in the curriculum of general education – that is, the huge conceptual (and therefore operational) differences that are indicated by the two entirely different questions: 'What is a problem?' v 'When is a problem?' The former refers implicitly to artefacts as ends, and to artefacts as 'solutions' to unarticulated states of affairs. The latter refers to states of affairs, to whose resolution - not solution - artefacts may, or may not, be a legitimate and proper response. The status of artefacts is changed, from ends towards means. New conceptions can be signs of the working out, in and for practice, of 'big ideas'. Different conceptions have huge practical effect and consequence; a model of education that is based on teaching is not the same as a model of education based on learning. Changes in perception and conception can be parented by large and abstract ideas that seem distant from the day-to-day realities of operational curricular practices.

### 3 DESIGN AS A CAPACITY OF MIND, DESIGN AS A DISTINCT FORM OF KNOWLEDGE AND KNOWING

An essential matter that members of the field ought to be more clear about is the uniqueness or the distinctiveness of the capacity for design: its fundamentalness justifies the existence of design in general education vis-à-vis cognitive and personal development; a range of specialist and distinguishable communities of practitioners; and the significance of design in other contexts (not least that of economic well-being). But sloganeering - 'Design adds value' - is not an adequate making or expression of the case for design. Again, Daley indicated the significance, from various perspectives and in various frameworks, when she wrote:

... An ability to perceive spatial relationships and to envisage non-existent objects is part of the fundamental conceptual apparatus which makes it possible for human beings to understand the physical world. The relationship between the construing of a comprehensible universe and the perception of

objects is, as it happens, one of the critical issues in classical epistemology. Bringing such philosophical arguments together with research in developmental psychology on object concepts seems to offer the beginnings of a true theory of design, by which I mean a theory of how it is possible that we are able to design at all, and not a theory of *how to* design. (*op cit*, p4)

Or, take a more specific and even more unfamiliar focus: that of metaphor. Feinstein comments:

Metaphor, once regarded solely as an ornamental linguistic device, is now considered to be an essential process and product of thought. The power of metaphor lies in its potential to further our understanding of the meaning of experience, which in turn defines reality. In art and in language, metaphor urges us to look beyond the literal, to generate associations and to tap new, different, or deeper levels of meaning. (...) In this process, attributes of one entity are transferred to another by comparison, by substitution, or as a consequence of interaction.

Langer (1957) contends that metaphor is not only essential to thought, but also that art (visual, performing, literary), as a developed product of thought, is metaphor. That view may provide a basis for arguing that arts education is basic to the cultivation of human intelligence. (...) The symbol-making function is the capability to decide that one thing shall stand for another, a decision which presupposes a transformation.  
... two broad classes of symbolisation, discursive and presentational (or nondiscursive). Discursive symbolization, by definition, necessitates propositional language with a literal meaning.

Langer, however, insists that 'the limits of [propositional] language are not the last limits of experience, and things inaccessible to [such] language ... have their own forms of conception [and ways they may be presented]. (1976, p265)

Making sense of experience and its products comes about as we interact with our environment in our attempts to comprehend, construct, and convey literal and metaphoric meaning. The core of those attempts is the fundamental act of symbolic transformation.

So what?

Accepting that cognitive modelling is central and necessary to designing, you would expect to find, in curricular aims and objectives, the intention to enable students to be engaged in such experiences and activities as would enable them to make transformations between 2-d and 3-d representations of reality and, further, to enable them to use the mode of presentation and representation best suited to their purposes and audiences.

There have been some, but not many, explicit attempts to devise exercises and experiences that would indeed enable pupils and students to become more adept and competent in forms of modelling. It remains a major area for the investment of effort

by practitioners, supported by cognitive science, linguistics, and philosophy. We might expect to find such efforts central to competence-based learning.

It also draws attention to the need to develop a meta-language of professional discourse, which is beginning. Consider (not just in the UK) the notions of ‘the design loop’, ‘the design line’: the linear recipe that, in fact, served to show the absence of understanding of the status of models, the functions of models, the limits and the limitations of models. The absence of a developed meta-language can have damaging effects. For example, it has included the long-running failure to discriminate between the linearity of descriptive natural language (as used in some would-be descriptive models) and the non-linguistic phenomena (of designing, and learning) to which that language refers. It seems obvious - once stated - but no models are identical with the phenomena to which they refer.

#### 4 DESIGNING AS THE MAKING OF MEANING; VALUES AND VALUEING; IDENTITY, MEANING AND VALUES

Anderson (*op cit*) would remain a suggestive read. But in the context of designing, a paper by Frank Carruba remains interesting: 'Designing People-Pleasing Products', along with the work of Maslow, which both he and Anderson make use of.

Get the flavour, then - first from Anderson, and then Carruba:

‘To be someone; be someone – one of the deep urges of the human heart; perhaps, if we knew how to reckon such things with finality, the deepest of all. It is a need that becomes more intensely felt – and also more difficult to satisfy – as the course of history carries us all further away from the old realities that structured out identities and life experiences for us. (...) We do not, ... , have the choice about whether or not to make choices. The best you can do if you want to avoid choice making is to live your life within a cult or fundamentalist religion or a traditional society and try to persuade yourself that you have not chosen that. Yet obviously we do not have complete freedom, either, to choose who to be and how to feel.

Symbolic aspirations, symbolic needs. Abraham Maslow’s famous catalogue of human needs is top-heavy with cravings that can only be satisfied in the symbolic universe. The pressure to be an individual, to create one’s own identity and experience, is a product of the modern era.’ (*op cit*, p131, p132)

In his paper, ‘Designing People-Pleasing Products’, Frank Carruba (Executive V-P, Philips Electronics) talks of ‘a new paradigm’. He writes:

I believe that the traditional approach of striving to improve profitability through more effective product development is extremely important, but not enough. Even focusing on customer satisfaction won’t suffice, so long as it is merely seen as a way to achieve profitability. I advocate the reverse: providing a continuous stream of customer benefits is a company’s bottom-line goal and healthy profitability is the best way to get there and stay there. (...) For ultimate effectiveness, I suggest moving away from the very concept

of creating products and profits, and instead focus on creating customer benefit.

The American psychologist Abraham Maslow devised the theory of self-actualization. He sees self-actualization as the ultimate plane of human awareness, and achieving it was like climbing a ladder. At the bottom rung or lowest level were such basic needs as food and shelter. Only when individuals were secure in these would they be able to progress to a higher level, such as independence and autonomy, friendship, love and esteem. When, in turn, these had been achieved, Maslow argued, the individual could ascent to the highest level of all, self-actualization. Maslow's view of the world can also be applied to product development – the creation of relevant objects. By relevant objects, I mean products that will enable the individual to climb the rungs of Maslow's ladder. These are products that use technology to encourage the individual's cultural growth, promote the enhancement of the senses and extend the individual's knowledge.

(...) It is necessary to cease thinking of the product as an end in itself. Rather, it must be a creator and carrier of knowledge, services and emotions. In this shift towards viewing products as carriers of new qualities, design is moving from 'hard' to 'soft', from quantity to quality, Products no longer convey image, but identity.

(1993, p4, p5)

This is confirmation of a shift from seeing the artefact as the outcome of D&T activity towards seeing the artefact as a means towards a quite different end: the making of identity, values, and meanings. This is not new to the liberal and generous view of the purposes of education, (but it is remarkably uncommon in the utilitarian-instrumental world-view that is common in Design & Technology). It is possible, however, that work in product semantics could add something to this view of *design as the making of meaning*. But the concerns of product semantics are not actually new either: look outside the design research literature and practices and they've been perennial matters of long standing.

There is any number of other 'big ideas' that may appear distant from everyday educational practice but which can have dramatic effect on how we practise. We may need a map, or a compass; we certainly need to move beyond the narrow confines of specialist thinking in order to jack up the horizons of Design & Technology and develop the analysis, the theory, the practice, and the curricula of Design. None of these ideas is particularly new; none is difficult; all are easily accessible. The apparent absence of their impact, in general, on the world of Design & Technology may simply mean that ideas, anyway, take a long time to work through a culture.

To summarise what is no more than a number of starting points for further discussion and development, I've asserted

- 1 that we should support the practitioner-as-researcher: it is an aspect of being a teacher/practitioner that can have huge effect on curriculum and on teaching and learning, as well as on professional status;

- 2 that action research should be supported: it is especially appropriate to being a practitioner;
- 3 that practitioners can connect the 'ideas culture' to 'ordinary' practice;
- 4 that a new paradigm is emerging (or paradigms), signalled by the development of a running professional conversation, and in the emergence of a meta-language of discourse, and, indeed (from another perspective), in confusions; and
- 5 that IDATER is one instrument (among many) that supports the emergence of the practitioner-as-researcher, the in-field improvement of practice, and the development of (what would be) a practitioners' theory.

## References

Walter Truett Anderson, *Reality Isn't What It Used To Be*, New York: Harper Collins 1990

L B Archer, in *Design In General Education* (The report of an enquiry conducted by the Royal College of Art for the Secretary of State for Education and Science), London: Royal College of Art 1979

L B Archer, *Design in General Education (Part One: Summary and Recommendations)* (The report of an enquiry conducted by the Royal College of Art for the Secretary of State for Education and Science), London: Royal College of Art 1976

L B Archer and P H Roberts, 'Design and Technological Awareness in Education', *Studies in Design Education Craft & Technology*, Volume 12 Number 1 Winter 1979, pp55-56

M Bassey, 'Crocodiles eat children', in John Elliott and Dido Whitehead, pp16-35

Birgit Brock-Utne, 'What is educational action research?' in John Elliott and Dido Whitehead

Frank P Carruba, 'Designing People-Pleasing Products', (Paper delivered at the 9<sup>th</sup> International Conference on Engineering Design, The Hague, The Netherlands, 17-19 August 1993

Janet Daley, untitled Internal Paper, Design Education Unit, Department of Design Research, Royal College of Art (nd)

John Elliott and Dido Whitehead (eds), *Theory and Practice of Educational Action Research* (CARN Bulletin No 4), Summer 1980

Hermine Feinstein, 'Meaning and Visual Metaphor', *Studies in Art Education*, Volume 23 Number 2 1982

Thomas Kuhn, *The Structure of Scientific Revolutions*, (2<sup>nd</sup> edn), London: The University of Chicago Press 1970

Abraham H Maslow, *Toward a Psychology of Being* (2<sup>nd</sup> edn), London: Van Nostrand Reinhold 1968

Horst W J Rittel and Melvin M Webber, 'Wicked Problems', in Nigel Cross, David Elliott, and Robin Roy (eds), *Man-Made Futures*, London: Hutchinson Educational 1974, pp272-280

Alvin Toffler, *Future Shock*, London: Pan Books 1971

Alvin Toffler (ed), *Learning for Tomorrow: The Role of the Future in Education*, New York: Vintage Books 1974