

Introduction

Drawing to think

People use drawings in a whole range of contexts; even people who say they never draw. Many adults make use of sketches in the course of their everyday lives, quite apart from the work-place use of plans and diagrams for buildings, electrical circuits, flow charts of productivity or traffic movement, or for layout and product design, for example:

- sketch maps are frequently drawn to give directions
- people can be seen walking around do-it-yourself (DIY) stores clutching sketches of ideas and diagrams of room sizes
- drawings are frequently used to aid explanations, of how to make or mend something
- doodling, especially when on the phone or in meetings
- demonstrating abstract relationships (for example, the new management structure).

Many people in all walks of life use drawings as a way generating, developing and communicating ideas. Such drawings are place-markers: they act as an anchor for evolving thoughts as they move towards a partially perceived end. These are staging posts on a journey of discovery as each idea unfolds into an externalized record of a blurry inner image as it gradually comes into focus. Drawings may be waymarkers on a journey towards understanding or resolution of a problem. Drawings may be springboards, place-marking, thought-holders, dynamic, evolving, informing and developing thinking.

But these drawings rarely get seen beyond their immediate context. They are redundant once they have served their purpose and, apart from professional designers who might want to keep them for future reference, these functional drawings are discarded. Even a genius like Leonardo da Vinci, whose drawn output was prodigious, scribbled drawings and jotted notes all over any odd piece of paper lying about and did not keep them in any order. However much we value these wonderful drawings today, it is clear that they were, for him, only a way of helping him think and jot down ideas about current or future projects, or just doodling and playing with ideas. It is possible at Tate Britain to request to view Turner's sketchbooks, which he kept as a personal visual library, but most of these are not on view to the general public, who see only the finished works hanging in the gallery.

The focus of this book is the way in which drawing can be used actively and dynamically to support, generate, develop and expand thinking and enhance

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learning. Often, those who have studied children's drawings have viewed them as finished products, statements of completed thought, crystallizing a frozen world view, detached from the context, physical, mental and emotional, that produced them. The aim of the book is to celebrate and explore the multiple forms of drawing which children do and can use in order to develop and record their thoughts and creative ideas, and to enable adults (especially teachers) to encourage and enable children to do so. The book aims to widen teachers' understanding of drawing and to equip them to enable children to use graphics as a powerful learning, thinking and communication tool.

This book does not attempt to say everything about drawing as a process for thinking and learning. It cannot: the subject is too vast, even limited to considering its use within the school curriculum for the 5–11 age group. Neither does the book give direct instructions on how to teach any specific techniques or drawing skills. There is some discussion on the tools of drawing, and a little advice on which tools to use and how to use them. The aim of the book is to provide starting points for thinking about the use of drawing of all kinds to generate, model, develop and communicate thought across the curriculum. The book aims primarily to do what drawing itself can do: to contain ideas that are taken on a journey of discovery; a journey whose end is not contained within the medium yet has enough packed into it to kick-start the creative process by making inner thoughts explicit and forming the basis for further thought, discussion and learning.

Defining drawing

A basic definition of drawing as a form of purposeful and meaningful mark-making would satisfy many people, but beyond that opinions divide. The obverse of this statement, however, that purposeful and meaningful mark-making is drawing, would be contested by many, since writing, mathematical notation, musical scores and other visual symbolic systems constitute marks made for and containing purposeful meanings, which are not 'drawings' in the usually accepted sense. Some thinkers and researchers would place handwriting, especially calligraphy, closer to drawing than a typescript, whereas artists who use drawing for recording ideas and observations which they ponder over, return to, interact with and use for preparatory thinking might find the inclusion of road signs in the same category as their deeply personal sketch books plainly offensive.

The word 'drawing' is one of those action words which can describe both a *product* and a *process*. 'To draw' is to purposefully make a mark; a 'drawing' is the result of that mark-making. The word 'purposefully' is important. Random dots, lines and squiggles that do not originate from human intention cannot really be classed as drawings. Children's scribbling is purposeful; they are exploring the effect of crayon on paper and developing their hand-eye coordination. Even doodling can be included, as it subconsciously helps maintain emotional equilibrium and reflects a concealed psychological state (compare your doodles in a boring meeting to those when you are getting cross about the issue).

The distinction between 'a drawing' and 'a painting' is hotly debated. Apparently, in judging the Jerwood Prize for Drawing, the judges are frequently drawn into discussion over what constitutes drawing in order to decide whether a particular entry is or is not a drawing. One judge's contention was that a drawing had a dialogue with the space on which it was executed, such that the areas left unworked formed part of the finished form. A painting, in contrast, he asserted, was completely covered with paint.

But where does drawing come from? Is it innate or learned? All infants scribble and make marks, often in places where parents would rather they did not. One family had to live for some time with a red biro line tracing a route all around the whole house. The word 'He-man' appeared mysteriously in pencil on my fireplace soon after my son started school. This desire to make a mark, to declare our presence can be seen in the caves of France and Spain. Whatever the true significance of the cave art of Lascaux and other places, the people of the Upper Palaeolithic were declaring 'We Are Here' in a way that the Neanderthals who lived there for millennia before them never did. The cave artists were homo sapiens. To draw is part of what it is to be human. It is ubiquitous, multi-purpose, multi-faceted, multimedia, multicultural and multi-meaningful:

the human mind is predisposed to seek similarities within and between its accumulating conceptions, and to assign these to categories ... (plus) the predisposition to assign symbols to represent conceptions, categories and relations. The use of symbols permits abstraction in inner thought, and the externalization of thought for recording or communication purposes. (Archer, 1992: 5)

Drawings express relationships. These relationships may be physical (size, scale, position in space), abstract (expressing theoretical concepts) or analogue (the London Underground map). Drawings are not the same as pictures, although the two overlap.

Drawing comes from within, from an image held in the human mind. Even when engaged in observational drawing of an object placed directly in front of our eyes, our minds act as a filter:

Man is an animal that has developed symbolic functions. However, the map is not the territory. Both physiologically and mentally, our inner maps, like sieves, only allow a part of the available exterior information to filter through. They present it to us as corrected proofs of a partial approximation. They are very diverse and divergent, from one person or from one group to another. (Fèvre, 2004: 47, my translation and italics)

This predisposition towards use of symbolism emerges early in life. The requisition of objects to accompany the fantasy role play of small children (an infant sitting in a clothes basket pretending to row it across the kitchen, for example) is foundational to the abilities which underlie the manipulation of symbols, including drawing. Those children who engage in rich imaginative play are good at visualization and hence are one step ahead on activities that rely on manipulation of symbolic ways of thinking. Those who do not play so imaginatively and

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make one thing stand for another do not manipulate symbols so readily, and so experience difficulties in imaging multiple solutions:

Drawing on the imagination

Although we may not be able to draw what we can imagine, we certainly cannot draw unless we can imagine. Humans actively construct alternative worlds, whether in our private daydreams or public storytelling, a quick sketch of the shelf for the bathroom or the design for the Pompidou Centre:

The imagination: What is it? The mind actively constructing the not-here; the not-now, the not-me. The mind actually constructing actual worlds inhabited by actual others, others who breathe and bleed, think and feel. The mind constructing possible worlds inhabited by possible others. The mind constructing and furnishing the interior of one's own sensibility. (Emig, 1983: 177)

Drawings are visual representations of our inner images. As well as standing alone or beside other forms of meaningful mark-making, drawings may be placed over the top of or lie beneath other forms of visual representation. Drawings are not necessarily made on a flat surface. They may decorate a sculpture, or be graffiti on a railway bridge.

Architects frequently use drawing, not just as a means of symbolic representation, but to actively generate ideas (Goldschmidt, 1994). Their preferred mode of thinking often seems to be through drawing fitting words around the drawings or even on Post-it notes stuck on top of the drawings. The indeterminacy, the woolliness inherent in drawing (missing lines, multiple contours), grants a level of perceptual ambiguity which, in turn, allows the mind to play with the drawing and seek out not only alternate readings, but alternative meanings that are allowed to continue to exist through the ambiguities of form. Artists do it too. The cartoon for Leonardo da Vinci's *Virgin and Child with St. Anne* (in the British Museum's Print and Drawing Room) demonstrates how Leonardo seemed to be trying out several different resolutions of the placement of the two women's legs in relation to each others'. He seems almost to be more at ease with the ambiguity than with the final resolution (on view at the Louvre, Paris). Perhaps making a commitment about the final form of the product was difficult for the Renaissance's 'ideas man' par excellence.

By occupying this middle ground between the imagination and the real world, even drawings of minimal clarity can be discussed and explored as if they were real. They extend and make visible the inner thought processes of their creator. By objectifying inner thoughts and images, the drawing enables these to be observed by the thinker. The imagination becomes visible and takes form. Changing and developing ideas now have something tangible on which to work, allowing review and reflection, return another day and with other ideas both new and old, which can be incorporated with the ideas recorded. The common thread is the need to record visually and graphically that which could not be considered, manipulated or communicated by words alone.

Drawing can be seen as a means of objectifying an inner image, as part of the interaction between the inner world of our mind's eye and the outer reality of the environment. It is more than just the product of a process, it is also part of the process. When we look at the role of drawing for designing, we are looking at a process whose interim stages are rarely preserved or valued except by the practitioner as a resource for future ideas.

There is a distinction between drawing as *product of thought* and drawing as *process of thought*. The first describes an artefact; the second a process. The first brings closure to the activity on the completion of the act of drawing; the second describes a way of recording thoughts in action. They frequently occur together, especially in the action of designing. Several completed drawings may form a chain of products which together map out the path that thought has taken. It is not an 'either/or' dichotomy, rather a 'together/and' interaction, which supports thinking in process and, through the creation of visible products, enhances reflection and evaluation of thoughts and ideas.

The Container/Journey metaphor

This metaphor forms the theoretical framework and conceptual underpinning of the book and, indeed of my understanding of the role of drawing for learning and thinking, as *container* for ideas which are taken on a *journey* across a surface (Hope, 2001). This model is adapted from Lakoff and Johnson's (1980) book *Metaphors We Live By*. The central tenet of their position is that new ideas and concepts are not just built from previously stored ones, but from the metaphors in which prior concepts are couched. The book centres on language and the way new concepts are built from previous constructs. Their main example throughout the text is the word 'Argument' for which they produced the diagram shown as Figure 0.1.

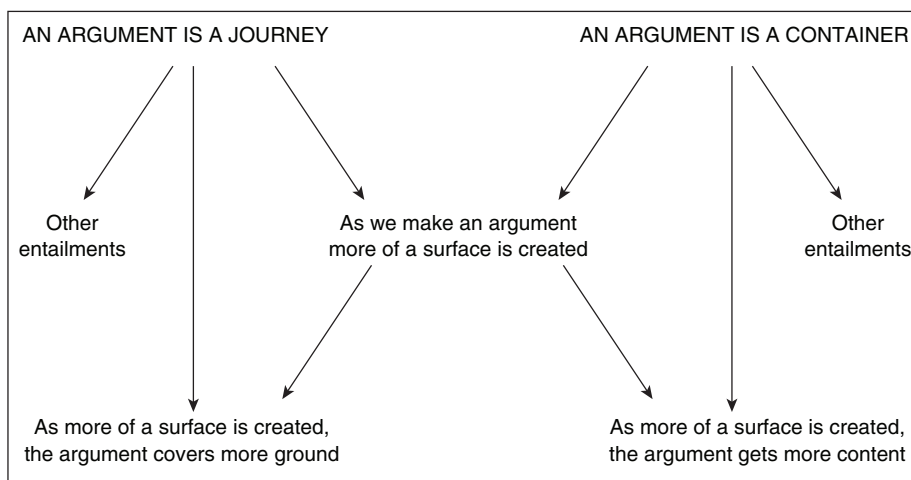


Figure 0.1 Extrapolation A of Lakoff and Johnson (1980: 96)

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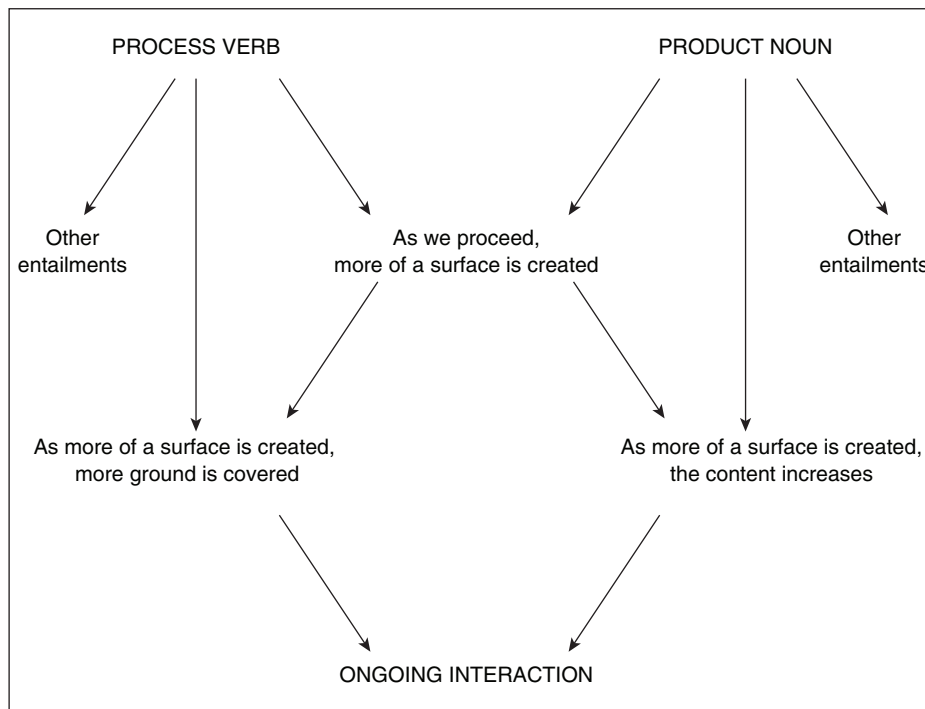


Figure 0.2 Extrapolation B of Lakoff and Johnson (1980: 96)

This model, with its specific metaphors of Journey and Container can be generalized to include all *process verb/product noun* pairs, for example, work, plan, draw, design, and so on (as shown in the Figure 0.2). Some of these verb/noun pairs do not share exactly the same word, but the metaphorical connection remains. For example, the verb 'make' has no directly attached noun, but the process of making and the object that is made have the same Journey and Container metaphors entailed in them. In making an object, we undertake a *journey* of thinking and planning and doing. The object we make *contains* all those thoughts and plans and actions.

The word 'drawing' fits neatly into the pattern (Figure 0.3). 'To draw' is a process which is a creative *journey* which we undertake. 'The drawing' is the thing that *contains* our ideas and perceptions. When we use drawing as a tool for thought, we take our thoughts, along with our pencil, on a *journey* and produce 'a drawing' which is then the *container* for those ideas.

In my development of Lakoff and Johnson's thought (Figure 0.4), I have reversed the relative positions of the two metaphors, because it is conventional to read from left to right, and I believe that in practice people begin to make a drawing that contains their initial ideas and then move off on a thought journey as they draw, changing and developing interactively as ideas develop, sparking off new ideas as existing ones take shape, and incorporating new ideas that emerge or are gleaned from other people and other sources.

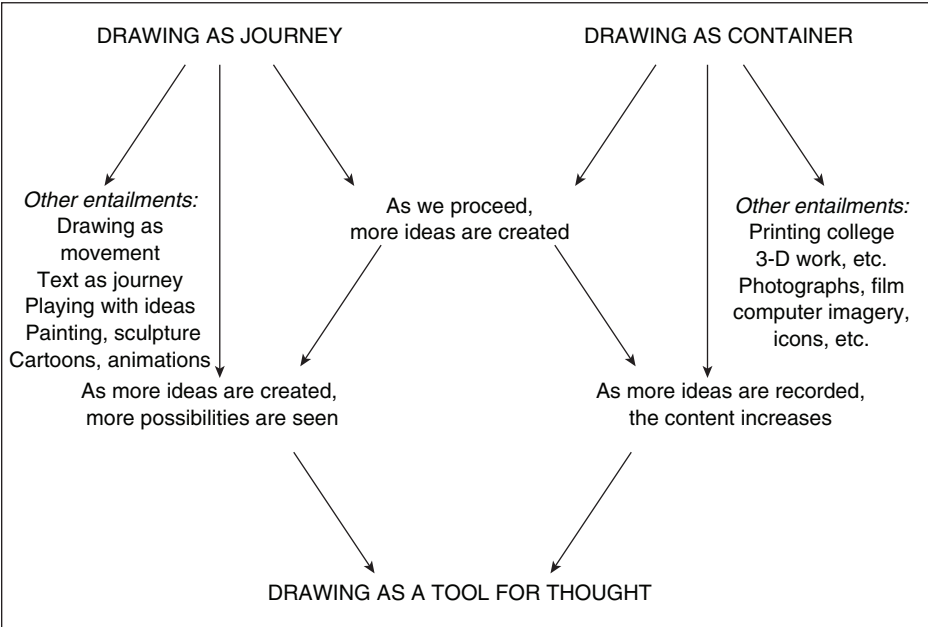


Figure 0.3 Extrapolation C of Lakoff and Johnson (1980: 96)

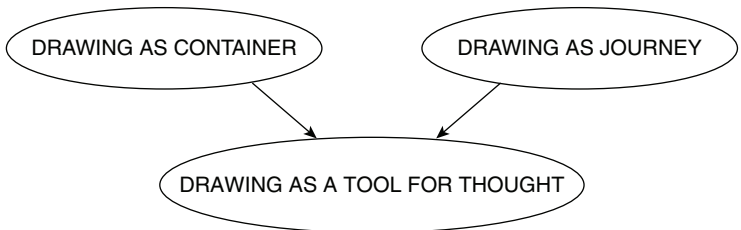


Figure 0.4 Container/Journey metaphor (Hope, 2001)

This model not only transformed my understanding of the role of drawing in supporting thinking, but also gave me a narrative in which to embed an explanation of the process of design drawing to Year 2 children (explained in ‘Dimension 6: Drawing to design’). It is a useful metaphor of the process of drawing of every kind, not just for designing, since it assumes the symbolic, metaphorical nature of drawing itself. Drawing holds meaning contained within the form of the lines that extends beyond their physical mark on the page. The process of resolution of thought into graphic form is a journey involving exploration, ambiguity, clarity and compromise. It involves the use of symbolism as shorthand containers for complex emotional or psychological states or for social situations. It involves the movement of ideas across a surface, that can be reviewed, considered and provide yet more fuel for thought. This is as

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true of the small child's naive drawing of 'Daddy's house' as of the adult's sophisticated rendering of a multimillion pound community housing complex.

The Container/Journey metaphor is not spelt out in these words in every section so that readers become irritated with an overused mantra, but it is always there in the distinction between 'the drawing' (noun) and 'drawing' (verb) and exists as subtext to the use of the words 'product' and 'process' or in phrases such 'generate and develop ideas'. The development of the model is clearly focused in 'Dimension 2: Drawing to mean', in the discussion of *enaction* as the active and deliberate creation of meaning through process towards product through metaphor, analogy, semiotics and symbolism. However, whether spelt out or implied, the central tenet of this book is that all children's drawing in every dimension has this dual role: to carry their ideas on a journey of exploration that enables them to learn to think about a myriad new possibilities in every direction.

The dimensions of drawing

In order to impose some structure on an exploration and discussion of this ubiquitous, multi-purpose and multifaceted activity and to create a coherent storyline within the book, the examination of the multiple roles of drawing exploits the metaphor of the *dimensions* of the area of drawing. This seems a good metaphor that fits with the idea of journeying, as well as a convenient organizational tool. Drawings are created on a surface, which, whether flat or curved, is treated as two-dimensional in the act of drawing. The surface on which the drawing takes place has an area across which the drawing expands and is mapped as the drawing implement moves across it, exploring the space and leaving a trail of its passing. Crossing and joining lines breaks up the surface area into smaller spaces that convey meaning, feeling, knowledge, insight and inventiveness. The word 'dimensions' seems to express this sense of exploration of area, of moving about within a wide plain. Dimensions can spread. They define boundaries but enclose areas that may be full of possibilities. Expanding dimensions multiplies area. Thus, to talk about drawing and its purposes in terms of mapping dimensions seems to have a holistic sense of integrity with the subject matter and the Container/Journey metaphor. Each area of the book explores a different dimension of the use of drawing.

The name of each dimension begins with the words 'Drawing to ...' which not only express purposeful activity but also direction, travelling, going somewhere that is, perhaps, exciting, exploratory and where the imagination and emotion have not been before:

- Drawing to play
- Drawing to mean
- Drawing to feel
- Drawing to see
- Drawing to know
- Drawing to design

This choice of organization conveys the range of purposes for which drawing may be used. These purposes, of course, overlap and the process of drawing (whether producing a single drawing or series of drawings) answers several purposes. A book is an essentially linear device for organizing information, and as soon as a reader is presented with a list, the inference is that the list is sequential and that the early items in the list precede those at the end, and that its categories are discrete, not overlapping or entwined. There may also be the assumption that the author thinks the list is exhaustive. Neither should be assumed from the organizational device of this book or of its labelling.

The introduction that you are currently reading is sub-titled 'Drawing to think', suggesting openness, beginnings, first imaginings within the head. There is, throughout the book, an inevitable ongoing conflict between the drawing process and the drawn product. The final section of the book, 'Drawing to conclusions', brings the book full circle and yet also looks to the future.

Overview of the dimensions

Drawing to play

This dimension begins with the stories: stories about young infants' first explorations of making marks on paper. The connections between playfulness and creativity are established. The importance of having time to experiment with any media before being required to produce something interesting or creative is asserted. An overview of drawing materials is provided.

This dimension is about discovery, about finding out how to use different materials and techniques at any age. Although beginning with the infant's first attempts at mark-making, this dimension stresses the importance of play, not just as a childish characteristic, but as an essential prerequisite to creativity. Finding out how to handle materials, mastering techniques, exploring different media is essential for 'possibility thinking' to use Craft's (1997) term, as is the development a playful, risk-taking disposition. Playing with ideas, taking ideas on a journey of discovery towards an effective outcome, is only possible through developing the knowledge of the materials and techniques that will contain and express them.

Drawing to mean

Drawing is imbued with meaning surprisingly soon after its first appearance in the child's repertoire of activities. This dimension explores the meaning which drawing is and can express and the way in which it stands as a visual metaphor for ideas in the head and perceptions of the observed world. Also considered is the way in which pre-school children combine both drawing and writing as their understanding of symbolic recording systems develops.

A major thread which is explored in this dimension is the role of metaphor and analogy and the way in which drawing is 'seen as if' it were a real object or scene or as a representation of knowledge about relationships between abstract ideas. Drawing acts as a bridge between the inner world of the imagination and

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reason and the outer world of communication and sharing of ideas. This is true both of the products of drawing (the containers of the ideas, perceptions and relationships) and of the process (the journey undertaken in exploiting and developing the analogy or visual metaphor).

Drawing to feel

The discussion begins with a consideration of the sensual appeal of the media, the feel of crayons and the smell of paint. It considers the sense of fulfilment and well-being generated by creative endeavours, the role of pattern, music and poetry. The range of emotional states that are generated by and perceived through drawing are explored, including a discussion of drawing and spirituality.

Immersion in the process of drawing can significantly impact for good the child's sense of well-being through the intensity of involvement in a process that does not pass through the language receptors of the brain but engages directly with the emotional triggers. Directly expressing a full range of emotions through drawing is difficult for young children, whose repertoire with lines and forms is limited through inexperience and practice. However, this should not deter teachers from expecting children to explore feelings and emotions through drawing. The form that the drawing takes may contain, to adult eyes, little of emotional impact, but for the child the process of thinking through a situation or of empathizing with others may be a journey of exploration of emotional and spiritual affect.

Drawing to see

This is not an explanation of how to get children to produce realistically lifelike portraiture or landscapes. This discussion is about seeing as understanding, and about expressing and exploring that understanding through drawing. The reasons for young children's production of canonical drawings are discussed together with the development of children's locational drawings. Sub-genres' observational drawing are considered, to illustrate the range of demands made on children's understanding.

The discussion is placed within the framework of the developments of adult art across the past 100 years, which has witnessed deep changes in how the verb 'to see' is interpreted in relation to drawing and painting. This should be reflected in the expectations that teachers have of children's art. 'Seeing as' in Wittgenstein's (1969) sense of the word is a making sense, a perceiving and understanding, of making connections and linking new observations to prior knowledge. Requiring children to aspire to produce lifelike images that contain no more than poor camera shots of the world around them is to offer a poor model of observational drawing and denies children the richness of experience of travel through the possibilities and potentialities of the multiple genres of locational representation.

Drawing to know

This dimension covers the use of drawing to plot abstract concepts such as mathematics, to understand the form of things through geometry, and to find

a path to other places through map-making. This is drawing at its most cerebral and yet its most basic. Simple line diagrams are used to develop ideas and communicate them to others. Puzzles and problems can be solved by seeing them as sharing common topographical forms.

Line drawings that are used to plot relationships can enable the modelling of concepts and complex abstract ideas. These make the topological form of the puzzle or problem visible and enable the classification of like problems through conceptual mapping. A relatively small set of these mappings can be used to support children's thinking and to develop their abilities in perceiving the underlying structures of problems which at first sight appear to be quite different. Cartography, the plotting of maps of the physical, geographical world enables children to develop a sense of place and a means by which they can image the spatial relationships between different locations, whether on a large or small scale. The journey taken in this case might be literal.

Drawing to design

The final dimension to be discussed is design drawing. Not because it represents the zenith of children's capability but because a depth of understanding is required about the way things work and the way drawing can be used to represent, generate and develop innovative ideas. The use of the Container/Journey metaphor with a class of Year 2 children is explained and the way in which this enabled them to use drawing as a tool for design thinking is discussed.

In the concluding section of the book 'Drawing to conclusions', the main points from each dimension are drawn together and some ways forward for teachers are suggested.

Drawing across the curriculum

This book asserts a holistic view of its subject matter. There are no sections called 'art', 'D and T', 'science' and so on because these are in many cases false divisions. The problem with seeing disciplines or curricular subjects as discrete entities is that this creates the urge to define the boundaries of the subject into *is/is not*. For instance, where mathematics begins to overlap with art or geography, the temptation is to pull up the drawbridge and declare that this area of the subject is no longer mathematics. By this thinking, mathematics is 'pure.' It is 'hard' and abstract, with little relationship with other areas of life. The UK Numeracy Strategy, for instance, by defining the mathematical content of the curriculum, has frequently led to the delivery of a subject from which has been expunged any overlap with other curriculum areas, so that the content is concentrated on arithmetic and algebra, with little emphasis on geometry, visual patterning and conceptual spaces. This defining of mathematics as numbers has excluded much of the material that forms the cornerstone of twentieth-century mathematical research into pattern, symmetry and chaos that children find exciting and stimulating.

This is equally true of other areas of human knowledge. The more strictly the boundaries between one discipline and another are established and defended,

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the more the application of one way of thinking to another area of endeavour is precluded. This is worrying because many great leaps forward in human knowledge have been achieved by those whose training or background was in one discipline and who then moved into another, taking with them the insights and metaphors of the former. Keeping the boundaries tightly guarded means that useful metaphors cannot creep across. If Lakoff and Johnson (1980) are right, that all human knowledge is created through application of metaphor from the already known to the new encounter, then it is fluidity across the boundaries that we should be encouraging in our children and young people, and ignoring the hang-wrings of the gatekeepers of the subject disciplines.

A new world in a new century needs new ways of thinking. The gigabytes of computer power now at our disposal should help us to realize that the old linear way of recording ideas is past. Gardner (2007) identifies 'Five Minds for the Future' for the twenty-first century. Pink (2005) looks for 'A Whole New Mind' for the 'Conceptual Age'. Meanwhile, schools chug along much as they have before, snowed under with government directives and repeated calls for returns to old ways of doing things ('Back to Basics' and other similar cries). Why, bewailed Toffler, in 1970, do our schools still 'crank out Industrial Man' (361) when 'Johnny lives in the hurricane's eye of change?' (371).

This book is unlikely to radically change the curriculum but its aim is to expand teachers' thinking about how children's ideas are generated and recorded. In many areas of the curriculum, children's thinking and learning could be enhanced by using drawing to support thinking rather than as well as in conjunction with other ways of recording and developing ideas. Drawing is a powerful and accessible yet frequently under-utilized means of enabling children to learn and understand the ideas of others and to effectively generate, develop, draft, express, expand and communicate their own wonderful ideas.

Some of the functions of drawing for learning and thinking

Multiple uses and applications of drawing for learning and thinking are explored throughout the course of the book, frequently in juxtaposition. The following list indicates the key uses of drawing as a process for learning and thinking:

- generating ideas
- developing ideas
- developing personal response
- investigating form
- understanding function
- modelling ideas, concepts and relationships
- clarifying ideas, observations and relationships
- representing abstract concepts
- mapping relationships
- analysing concepts
- establishing patterns
- developing understanding
- questioning observations
- manipulating key concepts and relationships

developing narrative
communicating to others.

This will involve the development of:

observational skills
discernment of similarities, differences and patterns
recognition of scale, proportion, relationships
hand-eye coordination
motor skills
knowledge and understanding of materials, tools and techniques
development of visual literacy
language
evaluative and critical skills
formation of personal viewpoint
willingness to change and adapt
higher-order analytical skills
meta-cognitive reflective and analytical capabilities
multimedia communication skills.

The form of the drawn product may be:

sketches and first drafts of half-considered ideas
well-finished products that closely mirror an observation
random marks, lines, patches of colour
text items as well as drawing, including numerals and other symbols
analogues of concepts and relationships
expressive of deep emotion
purposefully dispassionate
possibilities for production in another medium
developing and communicating personal or shared meaning
exploratory of materials and techniques
part of a series that develops ways of communicating ideas
symbolic, semiotic, metaphoric, metonymic, analogical, allegorical, paracosmic
for private pleasure, a social act, or public view
any or all of the above.

None of these are exhaustive lists. Their purpose is simply to indicate the range of processes that drawing as a tool for learning and thinking can encompass.