DESIGN EDUCATION AND CURRICULUM PLANNING

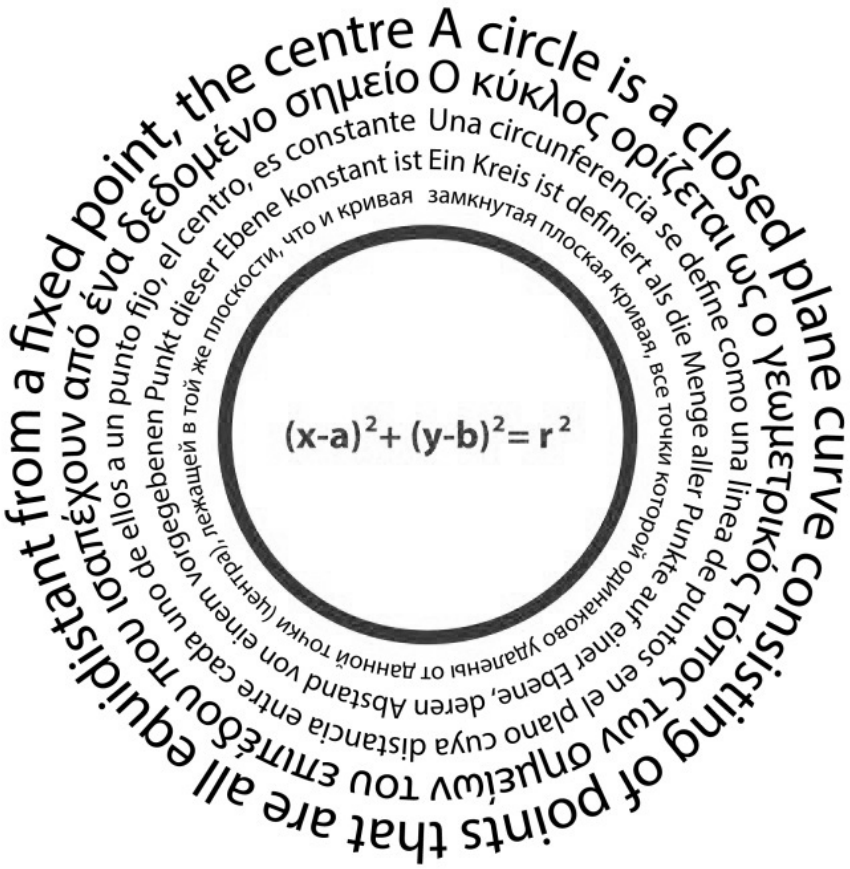

Figure 1 Defining a circle using literacy, numeracy and graphicacy (... in English, Greek, Spanish, German and Russian in the decreasing diameter concentric circles).

[Originally Figure 1.7 in Danos, 2014: 58]

DESIGN EDUCATION AND CURRICULUM PLANNING

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Book and cover design: Eddie Norman

CONTENTS

1. INTRODUCTION

This short volume has been published to explore an apparently on-going gap in the discourse surrounding design education: the nature of design epistemology, or 'What designers know and how they know it', adapting Vincenti's title (1990). This is in no sense a vocational matter. It is an exploration of alternative ways of knowing, and consequently has profound implications for general education. However, within the currently turbulent times it is the 'vocational' that has the attention of politicians and policymakers, so a vocational perspective has been chosen as the starting point of what is essentially a philosophical discussion. A 'designerly way of knowing' is not an imaginary academic construct, but an everyday reality that requires appropriate consideration and weight in curriculum planning. The failure to acknowledge its importance is a measure of the limited understanding of the curriculum planners.

So, where to begin? Anna Rylander's paper written in 2009 is an exploration from the perspective of management researchers, but begins to get to the heart of the matter. Consider the abstract:

> 'This paper argues that knowledge work and design thinking represent different approaches to problem-solving based on fundamentally different epistemologies: a rational, analytic – or "intellectual" – approach, versus an interpretive, emergent, and explicitly embodied approach. While problems to be addressed may be of similar, overlapping, or completely different character, knowledge-intensive firms and design firms have different perspectives for framing problems and different processes and resources at their disposal for solving problems. By comparing the two perspectives on problem-solving and highlighting their different epistemological roots and research traditions gaps where the two perspectives could cross-fertilize each other, for researchers as well as practitioners, are revealed.' (2009: 1)

Within the knowledge-based economy two different approaches are being acknowledged: the 'intellectual' and what has become known as 'design thinking', which is 'interpretative, emergent and explicitly embodied'. Perhaps inevitably given the current level of understanding of design epistemology, the nature and meaning of 'design thinking' is much contested, but the key point here is that 'knowledge-intensive firms and design firms have different perspectives for framing problems'. All these organizations make vital contributions to the economy and, simply taking a vocational perspective, education should enable people to develop capabilities to contribute to both the rational, analytic or 'intellectual' approach and to approaches that are 'interpretative, emergent and explicitly embodied'. And, of course, this is much more than a vocational matter. This is about everyone in their everyday lives, as well as the knowledge-based economy.

So, how can such an important area be so neglected? This is one of the key questions that this book must explore, but perhaps part of the answer lies with the term 'design thinking'. If the exponents of such approaches instead referred to 'designerly ways of thinking and knowing', then perhaps the idea that design did not have a distinct epistemology would not have taken ground. There might at least be acknowledgement that there are designerly ways of knowing, even if they were not well understood. However, perhaps the major obstacle to progress is that design epistemology must embody the visual. Consider this passage from Anna Rylander's paper:

> Three "types of knowledge" characterize design according to Utterback et al. (2006): knowledge about technological opportunities, about user needs, and about product languages (i.e. the signs that can be used to deliver a message to the user and the cultural context in which the user will give meaning to those signs). Most importantly, however, is the balance between those types of knowledge, and the ability to *integrate* them.
>
> As opposed to "knowledge workers," who typically have a business or engineering degree, designers are predominantly trained in art schools, where processes of knowledge creation are marked by interaction with visual and physical elements as well as with words and numbers. Design schools characteristically use design studios as their central educational device. In a process of learning by doing, students are set a series of design problems to solve. They learn how to design largely by "doing" rather than by studying and analyzing (Lawson, 2006). Drawing and sketching constitute an essential part of the knowledge creation process. Designers learn to "think with their hands" (Collopy, 2004), using sketches, prototypes, and intuition to arrive at their final solutions. Schön (1983) described this process as "having a conversation" with the drawing. Design as problem-solving is thus embodied in character and requires the ability to embrace many different kinds of thought and knowledge - art, science, and technology. Design solutions therefore tend to be holistic, and designers have been referred to as "knowledge brokers" (Hargadon & Sutton, 2000). (2009: 5)

So, what is it that designers learn to do? How do designers think with their hands? What is that designers know when they graduate that enables them to embrace many different kinds of thought and knowledge? How do designers engage 'with visual and physical elements as well as with words and numbers'? What kind of learning experiences enable design students to develop such capability? Well, seeking answers to these and the many related questions is the pathway to understanding the meaning of a 'designerly way of knowing', and hence, design epistemology.

The Editorial that appears in Chapter 2 was written as a reaction to the debate that was happening in 2013 concerning the future of design and technology in the National Curriculum in England and Wales. It has since become clear that design epistemology remains central to discussions concerning design education. It seems equally clear that there appears to have been little progress in articulating the issues and beginning their resolution. So it is time for a closer look.

To begin the exploration, this introduction and the Editorial were sent to some immediate colleagues in order to bring together some 'First Thoughts' from a number of informed people. This was an initial step along a difficult journey and it was hoped it would provide guidance about some of the immediate stumbling blocks and pitfalls.

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2. FIRST THOUGHTS ON DESIGN EPISTEMOLOGY

The following Editorial was written in June 2013 by Eddie Norman when design epistemology emerged as a key concern in relation to the discussions that were to determine the future place and shape of design and technology in the National Curriculum for England and Wales. It is used here as a starting point for further, and deeper, consideration of what remains a problematic, but ever more important matter for future curriculum planning relating to design education.

Design and Technology Education: An International Journal 18.2

Design Epistemology and Curriculum Planning

Eddie Norman, Emeritus Professor of Design Education, Loughborough University

Dividing a curriculum into subjects is never going to make it easy to develop effective strategies for design education. In the English National Curriculum design appeared in the documentation in two places; in association with technology (as D&T) and art (as A&D), but some have argued that it has not actually appeared in practice in either. Curriculum politics is interesting, but D&T seems to attract more than its fair share of 'special pleading'. A curriculum derived from the lobbying conducted by special interest groups and selective curriculum development projects tends to be something of a patchwork and lacks a core disciplinary strand. When it comes under challenge there is a serious risk of fragmentation and the whole looking rather less than the sum of the parts, and, at least to some extent, that is the position that D&T in the English National Curriculum now finds itself in.

Essentially, at the root of the current dilemmas lies the question: What is the knowledge base of design? It was the perceived weakness of the epistemological basis of D&T by the 'Expert Panel' that was the focus of its critics. There are two commonly held views concerning design epistemology. The first is that the knowledge base of design is unbounded because the nature and scope of design problems is not definable in advance of designing, and the second holds that there is a fixed core of knowledge that enables designing to take place. The first position leads to the recognition of heuristic-thinking and values that reduce the search space for the resolution of the design. The corresponding pedagogical positions relate to the application of knowledge drawn from across the curriculum and accessing knowledge at the 'point of need'. The second position, which is more commonly associated with technical matters, is much more comfortable if you need to write easily interpreted statements in a 'Programme of Study'. It leads to pedagogical positions associated with the need for sequenced learning prior to designing and hierarchies of concepts for which it is more straightforward to show progression. So it is not really surprising if challenges to the D&T curriculum lead to the emergence (re-emergence) of engineering systems terminology (structural,

mechanical, electronic etc). These are of course concepts from the epistemology of engineering, where the essential language is mathematics, so there are inevitable tensions for those who hold to the first position concerning design epistemology. Aesthetic, economic, moral and technical values for designing (as they were once classified by the Assessment of Performance Unit for Design and Technology (APU) (Hicks et al, 1982:26), and hedonic values, which featured in the Annex to Tender invitation for the APU study (Roberts,1981) are not generally expressed mathematically And so whilst these two positions remain disconnected, one group or the other will inevitably feel outside of their comfort zone. It is a problem exacerbated by the longstanding difficulties that individual English people seem to have in embracing both Science and the Humanities.

The reality of course is that neither of these epistemological positions is accurate in relation to the nature of the problems that designers address. The epistemology of design is actually of a more fluid nature. Roman Architects knew the principles embedded in Vitruvius' *De Architectura* which covered both aesthetic and technical matters. They were used to construct many successful buildings, although they might not be quite the same and have been so rigorously tested as those available to modern architects. Vincenti (1990) has provided a fascinating account of design knowledge derived from a study of aeronautical history: *What Engineers Know and How They Know it*. Vincenti's categories of design knowledge are: fundamental design concepts; criteria and specifications; theoretical tools; quantitative data; practical considerations and design instrumentalities. The whole of this book is central to informing the current debates, but in relation to 'D&T' the final two in this list are the most significant. Consider these quotations:

> 5. Practical considerations. Theoretical tools and quantitative data are, by definition, precise and codifiable; they come mostly from deliberate research. They are not, however, by themselves sufficient. Designers also need for their work an array of less sharply defined considerations derived from experience in practice, considerations that frequently do not lend themselves to theorizing, tabulation, or programming into a computer. Such considerations are mostly learned on the job rather than in school or from books; they tend to be carried around, sometimes more or less unconsciously, in designers' minds. Frequently they are hard to find written down. The practice from which they derive necessarily includes not only design but production and operation as well, though such practice may not – typically is not – by the designers themselves.
>
> (Vincenti,1990: 217)

In relation to the APU's descriptions, Vincenti is referring to technical values.

> TECHNICAL values involve an appreciation and application of the following concepts: efficiency, and the ways in which input is compared with the resultant output; robustness; flexibility, and the ways in which the performance of a man-made object or system might be sensitive to change; precision, and the

qualities of fit and of fitness to purpose, valued either for their own sakes or as a means to an end; confidence, and the ways in which the possible reliability or unreliability of information is taken into account. (Hicks et al, 1982: 26)

Regrettably, there seems to have been surprisingly little progress in defining this practical dimension of design epistemology since this APU study. Vincenti also moved deeper into this area through his consideration of design instrumentalites.

6. Design instrumentalities. Besides the analytical tools, quantitative data, and practical considerations required for their tasks, designers need to know how to carry out those tasks … the instrumentalities of the process – the procedures, ways of thinking, and judgmental skills by which it is done – nevertheless must be part of any anatomy of engineering knowledge. They give engineers the power, not only to effect designs where the form of the solution is clear at the outset, but also to seek solutions where some element of novelty is required. (op cit: 219)

[…and later in discussing these matters…]

Finally, designers need the pragmatic judgmental skills required to seek out design solutions and make design decisions. Such skills like visual thinking, call for insight, imagination and intuition, as well as a feeling for elegance and aesthetics in technical design. (ibid: 222)

From this brief overview, it is already evident that the two positions concerning design epistemology might turn out to be rather less distinct than their proponents would have you believe. Design problems are not really 'defined' or 'ill-defined' in some binary sense, but made up of a myriad of design problems, some more defined than others. Product design specifications (PDS) repeatedly demonstrate this. Design epistemology must embrace all aspects of the PDS, including the hedonistic concerns. That sounds quite dramatic when you write it, but consider the APU's description of hedonic values:

HEDONIC values, which might involve an awareness of:

1. the role of vision. hearing, smell, taste and touch in attaching value phenomena through their direct appeal to the senses;
2. the role of appetite, desire, pleasure, pain, etc. in the evolution of products and systems;
3. the demands made on the configuration of man-made things and systems by the physiology and psychology of people;
4. the importance of hedonic factors in all forms of design activity and an ability to take them into account when designing or evaluating things in the man-made environment. (Roberts, 1981)

To modernise this description 'man' would need to be deleted from 'man-made' which was an expression of its time, but surely these should be routine aspects of design epistemology by now. 'Design for function' and 'design for use' are now assumed to have been completed successfully in product design and manufacture (or customers would be entitled to refunds on products that were not fit for purpose). It is 'design for emotion' that distinguishes successful from unsuccessful products on the shelves of the 21st century. And in these terms, is it so hard to build bridges – to continue the engineering theme – between 'food' and some of the more technical design areas?

Design epistemology is clearly tricky, and it is no doubt a moving target, but there are some significant foundations already in place. Perhaps there are published reflections on Vitruvius' *De Architectura* from modern architects and Vincenti's *What Engineers Know and How They Know it: Analytical Studies from Aeronautical History* from modern aeronautical engineers. If not, developing an understanding of those elements that have stood the test of time and those that have evolved alongside the designing would be an excellent contribution to the literature. In the context of curriculum planning it is time that we had at least a temporary grip on design epistemology, because otherwise the debates become a hotbed of curriculum politics and design education is more important than that.

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