

RESEARCH PROCESSES: DESIGN PROCESSES: DESIGN EPISTEMOLOGIES AND ONTOLOGIES IN DESIGN EDUCATION

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ABSTRACT

It is advantageous for designers, researchers and educators to develop forms of knowledge maps to determine a multiplicity of processes. These knowledge maps, or epistemologies, can start to provide understanding of the centrality of the design process as a means of initiating change in man-made things [1] or of design as the driver for the wealth creation process, and therefore contrasting these processes from the essential process of the researcher, which is to seek to understand and describe behaviours: natural, human and so on.

The paper will develop and describe a particular epistemology using a two-dimensional knowledge map approach similar to that used by Hall [2].

This map of design will be used also to describe the design educational process as carried out on most design courses, which is to produce design professionals, and look at the aims of this educational processes as students become designers – moving the theory from simply a map of knowledge to an embedded processes as they become designers: moving from simply knowing about design to becoming designers themselves. From epistemology to ontology.

It will also investigate how this process takes place for researchers, using the design map to describe the research process as well as the design process.

The comparison will indicate how significantly different the two processes are and ask the question of what sort of beings educators are trying to develop – design practitioners or design researchers – in the context of this fundamental difference.

Keywords: Design philosophy, epistemology, design research

1 INTRODUCTION

It is sometimes helpful not to go to dictionaries in order to define topics, but instead to provide overviews of the sometimes imprecise terminology in terms of pictures, associations and other information. In doing so one builds up a general concept of what is meant by a particular topic and how that topic is organised: how it relates to other areas, and how these have been construed and understood.

Such a process may be carried out at a linguistic level, as Lakoff does [3] or on a cultural level through a series of snapshots, including visual memories and cameos that are categorised for no particular reason except perhaps that they touch in space, time or some other dimension. For example, appreciation of fashion or style is ordered in this way [4]. Even mathematics is conceptualised differently depending upon whether it is delivered to students of engineering, science, or mathematics [2]. We can take this approach with design, building up a conceptual map that could be described as an epistemology, laying out the connections and processes involved in Design so that they can be understood in a two-dimensional manner, with connections and links to other topics. Such an approach will never result in a complete overview and understanding, but is an imperfect way of describing a process and concept that is in reality multi-dimensional, with multi-layered connections and links as well as nuances, cultural shifts, changes in meanings according to context, culture and time and so on.

Accordingly, this process of abstracting conceptual maps is not one that is carried out to any extent within design courses: few, if any, have significant attempts at including design philosophy – usually for the very commendable reason that they are trying to produce designers rather than philosophers.

2 BUILDING A DESIGN MAP

2.1 Design as an agent of change

Jones refers to design as being the agent of change in man-made things [1]. Strictly speaking, he perhaps means that design is the catalyst that enables changes to take place from the natural, given world into a man-made world. The process of change is the manufacturing process: design is the catalyst that makes that energises that manufacturing process and makes decisions, however weak, about how that manufacturing process takes place. The diagram may be started as in Figure 1.

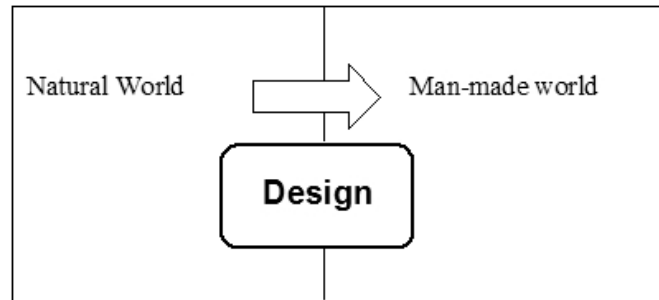


Figure 1. Change through design

2.2 Design is making dreams a reality

Not only does design act as the agent of change, it also works to produce an embodiment of the designer's thinking and ideas. Whilst dreams may not always function in reality, the design process takes our plans to encapsulate them within products and seeks to make what our desires into the reality of our designed, man-made world. We may therefore develop another diagram that describes design as being the embodiment of the imaginary, thought or virtual world, and treat that as a horizontal division. We can build up a complementary diagram, as shown in figure 2.

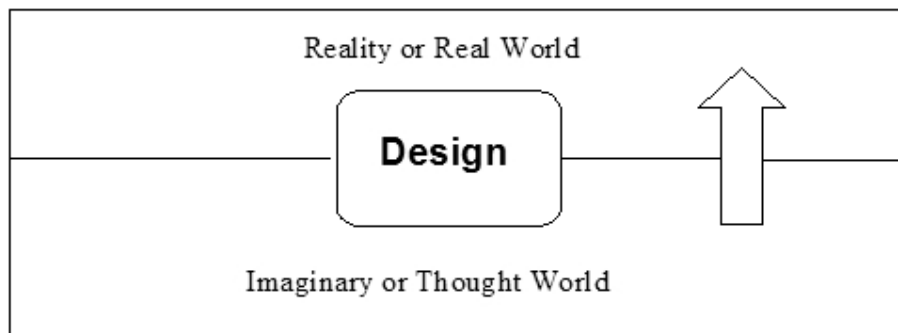


Figure 2. Design transforms the virtual world into the real world

This, again, is an oversimplification. The processes here include thinking, drawing, computer modelling, building physical models and testing them to provide feedback on the ideas. Rather than a simple single arrow indicating that the flow is from ideas to reality we could complicate the picture enormously with multiple feedback arrangements and with a set of timelines at different design stages, as are done in a significant number of design texts such as [5-7].

Thus we now have design crossing the boundary between the natural and man-made worlds and also crossing the boundary between the real and imaginary worlds.

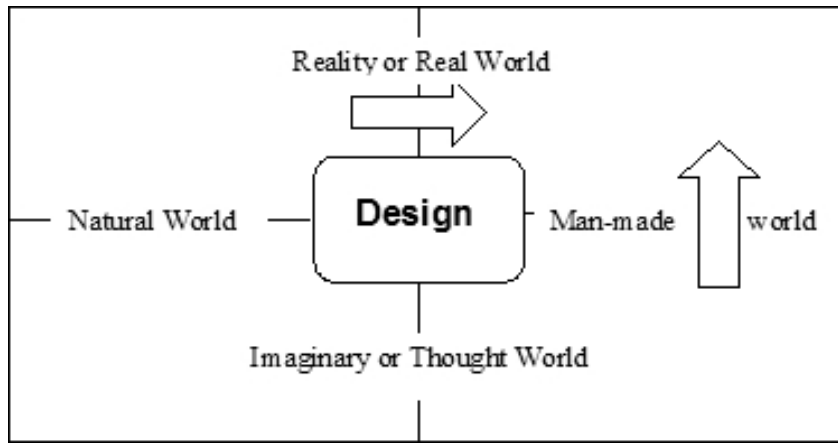


Figure 3. Design crosses the boundaries between the real and imaginary and between the natural and man-made worlds

3 THE POSITION OF OTHER PROCESSES ON THE MAP

Now that this central part of our design process map has been put into place other processes and concepts can be added.

3.1 Scientific processes

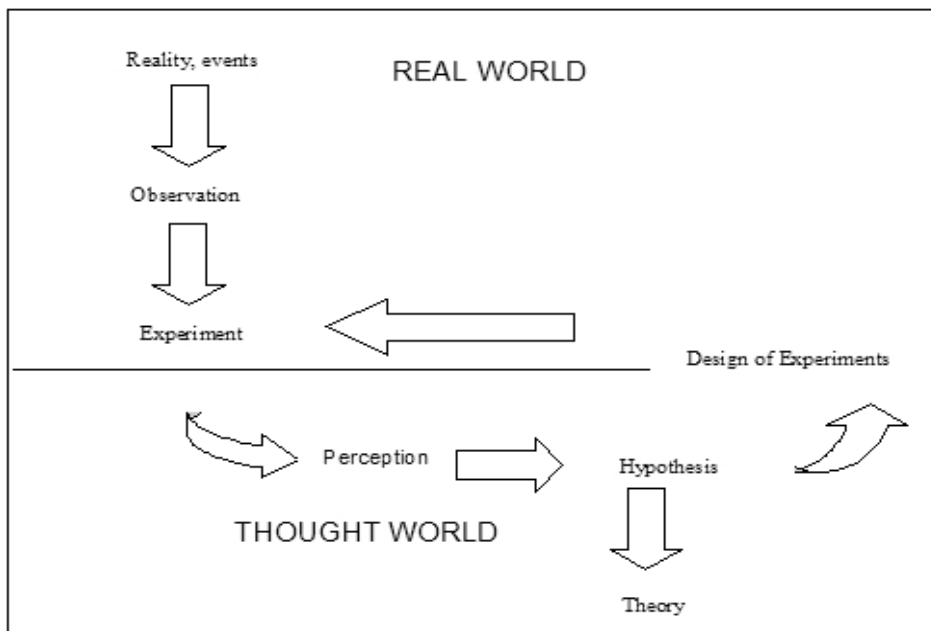


Figure 4. Scientific process of thought

This design process contrasts the scientific. Design and engineering ('science of manipulation') are about changing the world; science is about understanding nature. Schumacher [8] spoke of the science of understanding and the science of manipulation, the latter in a somewhat derogatory manner, highlighting that the essential feature of science is to understand. Science is about comprehending the reality; how the world (both the natural world and the man-made world) works. Science acquires knowledge through observation and experiment, testing, systemising and incorporated into general principles and theories.

Figure 4 seeks to describe this process in general terms.

For designers, these scientific theories form part of the coherent set of things that can result and develop with their design ideas. They validate and guide, significantly, the embodiment of their designs from idea to product. Theories input information about real-world behaviour to designers.

3.2 The relationship of Design to market needs

On the other side of the diagram we can start to add some of the more human dimensions and activities.

Raw material is not normally shaped by the manufacturing processes simply because some designer decides that is what they want to see manufactured, although from time to time that is the case. Rather, the process is more likely to be that a need for the artefact is uncovered through a process of market research – that is, of observing and investigating the market using certain of the analysis tools used for scientific research but without necessarily the coherent process of experimental design, although market research processes clearly need to have some ideas and embodiment of those ideas. The concept here is that the manufactured objects will be utilised by people to meet some sort of felt need that they may have – even if they were unable to identify what need was before the product that they always wanted was put before them.

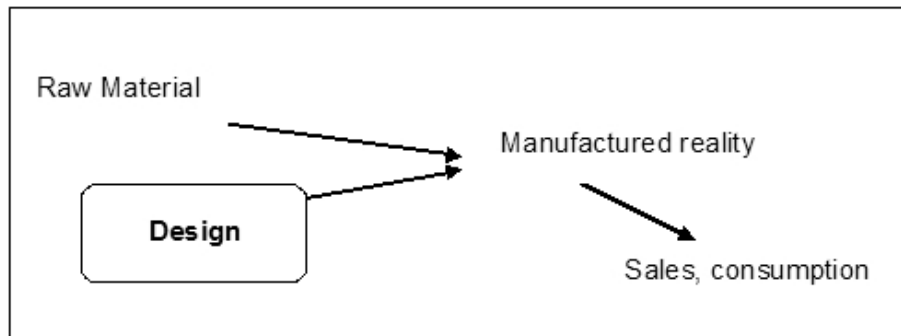


Figure 5. The pull of need on design

3.3 The relationship of Design with aesthetics

Aesthetics is about all of our senses, not just sight. In meeting needs for products designers also have to meet people's sensory desires and not simply their needs. A further item might be added to the diagram in the lower right quadrant showing that aesthetics are considered by the designer in that they form part of the way this feeds design ideas and also by the end user, the consumer, in that their concepts and senses are satisfied – hopefully – by the designed products.

3.4 The position of Design methods and processes

Design is a process. Some process plans need to form part of the designer's toolkit: things like creative processes and methods must become part of the way designers work. The experimental design for validating these processes is, for the most part, not carried out in a scientific fashion. Design processes and methods need to be added into the bottom right quadrant.

4 THE OVERALL VIEW

The overall design knowledge map starts to look something like Figure 6. This forms an epistemology of design. We realise where the information for design ideas comes from – whether it be information from scientific theories, aesthetics, market research, empirical design processes or manufacturing. The diagram is necessarily simplistic and is simply meant to be an aid rather than be argued as being able to be validated effectively.

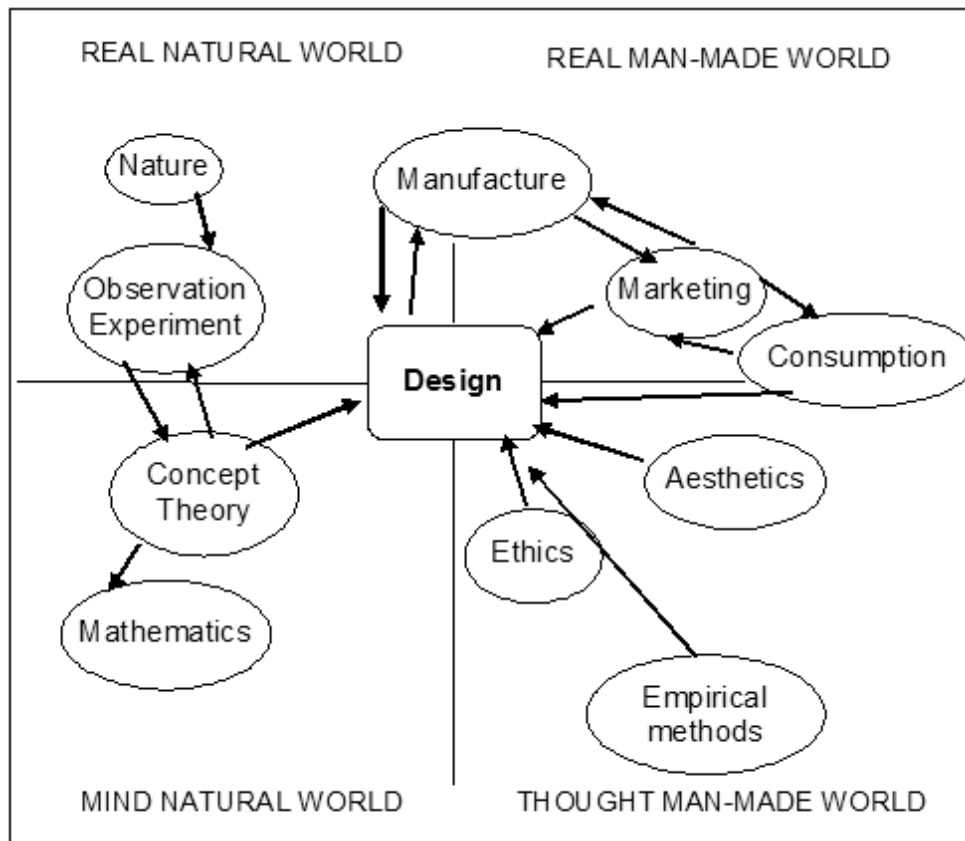


Figure 6. Overview of a Design map

5 THE POSITION OF TRAINEE DESIGNERS

How might our students relate to this design map? They are being trained, we hope, so that they might become and develop into designers. Their place is quite clearly to carry out the processes in the centre and to transform ideas into plans for manufacture. In this, they cease to be mere observers of the design process but become intricately woven into it as an essential component. They pick up the information in scientific theory: they pick up the information from empirical methods: they pick up information from ethics, aesthetics, marketing, manufacture and consumption that develops their idea-development processes and hones them so that they become familiar and automatic [9, 10]. In this, designers stop trying to comprehend the process but take part in it. The process changes from simply being a design map in front of them to being something that they don't need because they are intimately connected. This changes from epistemology – how the knowledge is structured – to ontology – the nature of their being as they become embedded within the process themselves [11]. They are, in effect, situated in the 'Design' box in the middle of the picture, reaching in one direction towards the manufacturing processes involved in making things from materials: reaching in the other direction towards their ideas, thoughts and thinking processes: to one side towards the market and towards the other as they need to take due regard for developed and validated scientific theories and processes

6 STUDENT DESIGNERS AS RESEARCHERS?

So how might students be involved in research processes? And in what way may these be useful for them? As indicated above, their primary aim should not be to become researchers but designers.

There are probably two parts to this answer. The first is that design students are not expected to be those formulating general scientific or other theories built upon research results and their work is not expected to be part of the pile of scientific research papers that keeps the paper mill going [12]. As such they are not expecting to be or even become part of the group of professional, paid-up researchers who are creating and validating theories. So expecting them to take part in initiating this sort of research process is unrealistic. We are not expecting our students to become academics, but practitioners. However, they are expected to understand some of the results of the theories and to be

able to apply them in their general design work. It is in this manner that the paper on the use and teaching of mathematics was written [2].

The second part is more subtle. There may not be any research theories that are perceived to be relevant to the specific design problem or issue that they are trying to resolve. In this case, they will have to develop a knowledge of the processes that are required not to validate scientific theory, but to provide a coherent answer that is sufficiently relevant for that particular issue. Tools such as the IDEO Cards [13] can provide sets of design-based methods that can be applied to find sets of relevant answers that are predominantly (but not totally) research-based. These may not be adequate in the terms that the scientific community can recognise, but they nevertheless seek to provide coherence and validity to the design activity that is the core set of skills and abilities we need to be developing in our students.

The conference, one might suggest, may be asking the wrong question. Instead of trying to make design students part of the research community we need, instead, to understand how significantly different the design process is from the research process and also how the design process is perhaps uniquely placed to be accessible to people in their daily, everyday lives in a way that the research process is not for most people. We need to accept that designers being academic researchers does not work, in general. And student designers work even less well as researchers. We should not be asking them to be these idealised academics. They should have a map of how research (scientific and other) fits in – a map of different types of research knowledge, an epistemology, yes – but they need to be fundamentally involved in the design process and not the research process.

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