DESIGNED INQUIRY: THE SIGNIFICANCE OF RESEARCH EDUCATION FOR INDUSTRIAL DESIGNERS

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ABSTRACT

Research does not sit comfortably within industrial design practice in either an educational or professional context. This is largely due to the conventions of the client-designer relationship and the constraints of design delivery and cost. There is however an increasing interest in design research capability, particularly in ethnographic research as the *experience* of the product or service becomes a focal concern [1]. Methods of social inquiry offer a wealth of possibilities for designers to learn more about the global, social and environmental contexts of their work. This paper explores the significance of research education in training industrial designers capable of responsive, realistic and forethoughtful problem solving in increasingly complex socio-cultural and environmental contexts. It argues that the skills supported and extended by research education are invaluable in training designers able to think and design independently.

Keywords: design research, research for design, unobtrusive observation, design for sustainability

1   INTRODUCTION

Nemeth [2] suggests that the omission of research from the design process is a significant problem; designers need to develop research skills that will help situate their designs off the screen and within the world as it is, not only for the sake of better technical results but for the future viability of the design profession. Without the ability to understand the complexity and nuance of human behaviour, Nemeth argues, design will be unable to grow beyond its client-serving role.

I would add that this 'growth' of design depends upon bringing behavioural understanding to the most pressing concern of our time: the development of sustainability in the intimate contexts within which design comes to life. This is not simply a moral responsibility; it is a practical recognition and an opportunity. If we accept design's role in the structural un-sustainability of our environments [3], we can see that research is critical in not only understanding but also changing these environments. I would like to propose that the significance of design research lies in the possibility of contributing to the evolution of more sustainable ways of living and working and finding new pathways for the profession and scholarly culture of Industrial Design.

There is clearly a window of opportunity in the educational institution to explore and experiment in an environment that is not dominated by business as usual commercial values. In this, research education provides a critical range of tools and experiences to

facilitate a process of knowledge acquisition, learning and experimentation perhaps not afforded elsewhere. This engagement must exist in tandem to and draw upon the technical proficiency being achieved to support the 'industry readiness' of graduates for the status quo real world of industrial design. Equally, it becomes necessary in preparing graduates for a changed industrial culture and the evolution of alternative futures for industrial design.

In the past few years, a new design research program at the University of Western Sydney has been exploring how 'research for design' [4] could support learning in the development of both independent and client-driven design projects that are thoughtfully oriented toward sustainability. Drawing on methods of unobtrusive observation [5] derived from the social sciences and also on the technical, ergonomic and studio-based design knowledge students have developed throughout their courses, the program attempts to involve students in designing from inside a social context rather than imposing design on a context. The designer is encouraged to carefully examine the existing product *milieu* [1] relevant to their interests, to develop empathy for the end-user and recognise their co-operative role in living design.

2   BACKGROUND TO THE PROGRAMME

Designed Inquiry: research methods for designers is situated in the second semester of students' third year of study – this is the final year for those graduating with a Design and Technology degree including those who are planning to go on to teach school-level design and technology curriculum. *Designed Inquiry* is particularly tailored for those developing major projects for their final year of study within either a brief-driven course work or self-directed honours project.

Developing *Designed Inquiry* has been a real intellectual adventure. My colleagues and I set out with an enthusiasm for social science orthodoxy because of a perceived lack of social research in design but have since become somewhat playful and transgressive with its methods. This is partly due to a desire to dismantle the prevailing perception that research is not yet design and partly because of the discomfort of traditional modes of analysis in which judgement must be suspended. There was a need to tailor and simplify research exercises so that undergraduate students could conduct actual research rather than just plan it. Mostly, however it is because of a desire to communicate the liberating realisation that design is not 'technical' but rather operates in an interpretative hermeneutic context. Design extends and facilitates our habits, desires and expectations; and while it imposes its will it is also imposed upon by actual users. Design is about co-operative, particular realities. So too, design investigation should be released from the idea of research as a fact-based activity.

Designed Inquiry is a self-directed project of investigation. The first task is for students to select a topic of research for which they have some passion and have been able to identify some nascent problems. A range of preliminary 'briefs' developed in relation to current research interests of academic staff or based on previous student studies are presented as options. These tend to be inclined toward developing sustainability both because it is a rich framework for design research and because it is a key shared priority of research active staff members. Past projects have included commuting by bicycle, managing waste flows within an office, surgery or restaurant, exploring the role of parental fear in children's use of public playgrounds, the limits and possibilities of universal design in making recreational spaces more accessible or the cultural aversion to waterless sanitation.

Over time, particular focal areas of research expertise are built up, so that rather than starting from scratch, students have an opportunity to access a portfolio of existing

research conducted in a particular area. The idea that a variety of design students can 'own' a project at particular times and from particular perspectives suggests a productive way to organise and benefit from communal research effort. This concept of the evolving research brief recognises the necessary communal, collaborative nature of knowledge and the ecological character of design problems [6] whilst design creativity allows each individual student to make a personal contribution to the field of study.

One of our early realisations in developing a unit that teaches research methods for designers was that designers need to think with and through things. They need 'hands-on', physical and visual forms of research that can deliver immediate empirical and tactile information. They need to employ and test their thinking in models and they need exemplars to recall, emulate and transfer into their own research domains. This had an effect on the modes of research we explored and the shape of students' proposed research projects. It also caused us to reflect on how research should be presented. The centrepiece of the student's design investigation became their visual process diary. The visual diary becomes a repository of the student's reflections, ideas, observations and concepts over the course of the subject; it reveals the evolution of thinking about a topic and is validated as an important aspect of their assessment.

3   PRIMARY RESEARCH EXERCISES: SOME EXAMPLES

A diverse range of research exercises drawn from a variety of sources have been employed within the subject. As an undergraduate program of study conducted within a fourteen week period, we focus on research exercises that can be conducted without participants, with small samples of peers or enacted solely by the designer-researcher. The focus is on descriptive activity that reveals and situates design in life and re-evaluates the end-user as a co-designer whose trust in carefully justified design concepts should be deserved. At the same time, the continual evolution of design ideas through processes of visual modelling is supported. A sample of research exercises follow. The first couple focus on description, the second two on use and the last two on experience.

3.1   Description: Zoom In

The ability to trace the lineage of a design or indeed a problem that has been facilitated by design over time is a very significant aspect of what we attempt to teach in *Designed Inquiry*. The observation and on-the-ground analysis of 'experienced' products and environments provides clues about use via its trace in the visible marks of wear and tear. As I have explored in a previous paper, a sense for the product-in-use is strikingly absent in the CAD oriented design environment of pristine newness and yet it is a rich source of design information about the qualities of material and cultural durability which are of particular relevance to sustainability [7].

Students are taught to regard both literature and existing designs and designed environments as 'existing knowledge'. This exercise, based on a studio drawing exercise a colleague did in her own undergraduate degree, asks students to find:

1.   a product or environment within the topic *milieu* that is at least ten years old and still in use.
2.   a related product/environment that is at most six months old and in use.
3.   an object from nature that appeals (leaf, shell, apple).

They are then asked to divide a page of their visual process diary into a series of twelve boxes and 'zoom in' – drawing four thumbnail views of details from each of these objects. The idea is to focus in on the details, taking time to get the drawings as accurate as possible with lots of shading to indicate texture. The limited durability of many industrial designs is exposed in this observational exercise as students' attention is drawn to marks of wear and tear on controls and buttons, fading, changes in materials

and joins. By encouraging this level of detailed attention, students are prompted to consider how usage and time change the appearance of natural and artificial things and how well they sustain damage. It also offers an experience of visualising design which is far removed from the sleek new form and 'corrective' gaze of industrial graphics software.

3.2 Description: Trace Analysis

This exercise, derived from the social science method of researching material culture as well as ergonomic heuristics, takes the objectives of 'zoom in' into the field. Students are asked to produce a photographic essay on a range of objects, unpopulated environments and views 'in situ' and describe, again via annotation, the relevance of what they are seeing. The idea is to identify indices of use, wear and tear and what these might reveal.

Both this and the previous exercise assist students to grasp a situated, ecological understanding of the existing material elements in their topics well before they become the background to people and their activities. The aim is to help foster a tolerance to the decline of materials and encourage the design of products that support this decline through aesthetic choices and appropriate specification. This can open our eyes to the consequences and quality of design decisions and processes over time, and our minds to different sorts of possibilities for designing with materials.

3.3 Use: Behavioral Mapping

This exercise is used to map networks of actions and interactions in order to identify patterns of activity within a particular environment. It is also used to identify the chain of actions associated with everyday rituals, like preparing a meal. Like the ergonomic method of 'task analysis' and various forms of flow analysis, this exercise helps to identify sequential problems that could lead to design objectives. We have found behavioural mapping is also an exercise that encourages experimentation with graphic forms of data collection which students often find an intuitive, enjoyable and engaging process.

3.4 Use: Observations

In this exercise students observe and carefully document how people work out their relationships with products and environments. Students might observe a range of people negotiating the same public environment, like a playground, or one person using a single design. This exercise tends to reveal tacit information which users themselves do not notice and could possibly fail to articulate in an interview or more formal task analysis in which task performance is likely to be self-consciously conventional. While ergonomics helps us to understand orthodox and conventional uses, people actually use things in various and idiosyncratic ways. Observations of how people use swings in public playgrounds show that swings are regularly used as seating for social chitchat or for quiet contemplation. They are also used as a prop for standing, climbing, twisting and a variety of other gymnastic contortions which completely ignore their careful anthropometric design.

Questions we use to guide observations of how people use things.
• Describe the state of the product/environment as accurately as possible in words and pictures.
• What is the observed person/people using the product for?
• What problems, if any, do they appear to be experiencing while using the product?

- How does their body accommodate the product (do they need to squint, bend over etc.)
- Is their use conventional or idiosyncratic? How?
- How tolerant is the product of their use or misuse?
- What ancillary products do they need to use this product?
- Do they focus on the product while they use it, or
- Use it whilst doing something else?
- What are they not noticing about the product?
- What are they taking a while to notice?
- How do they handle the product?
- What other influences effect the user, for example do they have enough light?
- Is their use intermittent or continuous?
- How do they *stop* using the product? Do they display care in putting it away?
- How does the product look—well treated, clean or
- Is it being run fast and hard until it falls apart?
- What happened while you were conducting your observations? [8]

3.5 Experience: Day in the Life

The final two exercises are designed to engender empathy for the user on the part of the designer. The first is a 'day in the life' exercise [9] which asks students to model the experiences of a particular social actor throughout an entire day. In the past, students have attempted to commute via a wheel chair or negotiate an environment without aural or visual feedback to access some of the challenges a hearing or visually impaired person might face. Students are free to document this as a photographic survey, an illustrated storyboard, animated sequence or film. This exercise layers the experiences of the user and the designer and is generative of unexpected insights into the relationship between perception and action. This is probably the most popular of the research exercises as it is enjoyable to create and perform the research and document the process.

3.6 Experience: Cultural Probe

The second 'experience' exercise is the design of a cultural probe [10], in which students develop a pack of engaging research activities for a particular stakeholder group. The idea is that research involvement should be an enjoyable, worthwhile and possibly enlightening experience and that if it is, the data it produces is likely to be inspiring and more akin to the pleasure of good design. It is a very useful exercise to end on for assessors because in designing the probe packs, students must consolidate and prioritise their interpretations of stakeholders developed in the preceding research exercises. It is also an inspiring exercise for students who have to relinquish the technical perspective on research for design and embrace their own interpretations of the end-user. As Gaver et. al. [11] describe it, the aim is not to extract user requirements, but rather to generate returns that "reverberate with mutual influence".

The cultural probe is meant to inspire empathic design responses and as such introduces designers to the idea of including stakeholders within a design development process. This has become a key aim of the program. Considering the end-user as a co-designer is particularly important in relation to sustainability, where sometimes drastic changes to everyday practices are required to make a new design 'fire'.

In one example, a student interested in designing a culturally acceptable composting toilet found that the success of the design would depend on end-users, suppliers, installers, cleaners, gardeners, local council all being 'in' on the design. Her research found that the key to the historical failure of the technology as a viable replacement to

water-borne sanitation was in large due to the fact that the passage of design from object to social artefact was ignored by the focus on technical problem-solving at the front end of the design process. To address this, the student not only explored the technical and aesthetic issues associated with the design, she also addressed the need to provide appropriate whole of life information to end-users in an engaging website. Her postgraduate research project proposes to design and build a working prototype to collect data from users and other stakeholders who will reflect a range of experiences of the design over time and feed into the design development process.

4   CONCLUSIONS

Industrial Design is a nascent scholarly discipline which is in the early stages of developing a research culture. It has a strong vocational history, and so research represents not only an expansion, but in some ways a redirection of its traditional ground. An important area for the further development of *Designed Inquiry* is in establishing viable pathways for research into professional and educational futures. We need to show that postgraduate research can be well supported financially and academically and that the university can develop entrepreneurial ideas and link with appropriate industrial partners. It is important to create a research culture that recognises the value of collaboration. It is critically important to create opportunities to seed projects that could grow to have a life beyond the institution. This is particularly the case in an industrial environment that is only just beginning to notice its ecological consequences and wake up to the value of long-term, forethoughtful and ecologically responsive design thinking.

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