EXPLORING THE DISCIPLINARY CORE OF DESIGN: COMMON GROUND BETWEEN ITS THEORY AND PRACTICE

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ABSTRACT

The field of design is becoming increasingly interdisciplinary as fields such as service design, interaction design, and design management emerge. Understanding a disciplinary core – a core set of concepts and topics – enables the identification of its key practices and emerging research agenda, which is particularly valuable when collaborating across disciplines. However, limited research has explored such fundamental elements in design. Twelve designerly workshops were conducted to explore the disciplinary core of design in the relationship between its theory and practice. These workshops involved 37 design academics and 26 design practitioners in the United Kingdom. The analysis of the workshop data revealed the composition of a set of core concepts and topics in design and their underlying meanings for participants. This study identifies core design knowledge and practice and proposes a theoretical basis for the disciplines of design.

Keywords: Core design knowledge, Design practice, Workshop research

1 INTRODUCTION

The field of design has become increasingly interdisciplinary (Cooper, 2009). New areas of study combine design with other fields of research and practice, including design management (Boland and Collopy, 2004), design thinking (Brown, 2009), and service design (Sangiorgi, 2011). Such fields require designers to integrate their design-specific knowledge with a broader understanding of other fields. Understanding a discipline's common body of knowledge enables the identification of its key practices and emerging research agenda (Young, 2010), which is particularly valuable when collaborating across disciplines. However, limited research has explored such fundamental elements in design (Cross, 2007). This paper explores design's common body of knowledge through two research questions:

1. How can a set of core design knowledge and practice be defined and identified?

2. To what extent does the design community recognise and share its core knowledge and practice?

2 DESIGN AS A DISCIPLINE

Design can embrace a wide range of other disciplines (Cooper and Press, 1995). Simon (1969) argues that, 'Design is the core of all professional training; it is the principal mark that distinguishes the professions from the sciences'. In line with this, Borja De Mozota (2003) defines design, from its etymology, as 'an activity involving a wide spectrum of professions in which products, services,

graphics, interiors, and architecture all take place'. These definitions reveal that design has a variety of identities and functions in industry and society and implies that design is an interdisciplinary field of study that deals with many kinds of issues around objects contained within it. In other words, design operates in relation to a wide range of different conditions, other disciplines and professions, not simply in isolation (Best, 2010).

In contrast, some authors have claimed that design should be understood as an independent discipline with its own theoretical issues. One of the most influential scholars in this area is Bruce Archer (1979) who proposes 'design' as the missing segment of education to be placed alongside Science and the Humanities. According to him, design should be regarded as a fundamental aspect of education, which is distinctive from Science and Humanities. Similarly, Love (2002) claims that there are concepts and theories that constitute core areas of a discipline relating to designing and designs, as distinct from other disciplines. In Cross (2007), distinctive characteristics of the design discipline are defined as designerly ways of knowing.

Examining design as a discipline revealed that design is a professionalised activity with special skills and expertise that comprise a discipline. While acknowledging its interdisciplinary nature, design can be seen as an independent discipline through establishing a theoretical underpinning as a field of study and practice. The following sections will discuss two complementary areas of the design discipline: design theory and design practice, and their relationship.

2.1 DESIGN THEORY

In terms of building theories of design, there has been little progress (Love, 2002; Friedman, 2003; Hatchuel, 2001; Hatchuel and Weil, 2009), as the emergence of design as a discipline is relatively recent (Buchanan, 1998). Instead, most design theories are drawn from other disciplines, not from within itself (Andruchow, 2010). Many researchers agree upon the lack of common theoretical foundations across design professions (Buchanan, 1995; Margolin, 1989, 1992; Poggenpohl, Chayutsahakij and Jeamsinkul, 2004; Love, 2002; Friedman, 2000; 2003). There are several problems that hinder the construction of design theories, such as ambiguous terminology (Andruchow, 2010), epistemological contradiction (Love, 2005), and a failure to develop grounded theory out of practice (Friedman, 2003). Even though design theory may sometimes have had doubts regarding its epistemology, meaning and purpose, the legitimation of design theory allows the practice of design to construct a discourse according to the ways general theories work construct theirs. There are some distinguishing characteristics of design theory, which are described below.

Conceptualisation of how things should be: Design theory tries to conceptualise the future – e.g. how things should be, how things could work better, how the current situation became the preferred one – rather than theorising the present situation, e.g. how things are, how things work, what the current situation is (Simon, 1969).

Tacit knowledge: There is a general consensus among researchers that there is a 'designerly way of knowing' (Lawson, 2004; Cross, 2007) and that this kind of design knowledge is widely known as tacit knowledge which has been emphasised by many authors, e.g. Cross, Naughton and Walker (1981), Pye

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(1964), and Lawson (2004). Specifically, Lawson (2004) claims that well-structured theoretical knowledge and actual designing could be different things, mentioning the difficulty that designers may have when connecting theoretical knowledge to designing.

Embodiment of the values of science: There has been a predominant view in design theory that regards design as a scientific activity. This stems from the Modern Movement in design in the early part of the century (Cross, Naughton and Walker, 1981). The premises of this view can be twofold. One is the belief that design activity can be analysed in the same way as scientific activity. The other premise is that what attracts design theorists is not the methods of science but the values of science, which are 'rationality, neutrality and universalism' (Cross, Naughton and Walker, 1981).

2.2 DESIGN PRACTICE

Cross et al. (1996: 1) contend that, "Design activity encompasses some of the highest cognitive abilities of human beings, including creativity, synthesis and problem solving", indicating that there are significant intellectual challenges when analysing design activity. Some researchers attempted to analyse aspects of design practice through categorizing them. For example, Potter (2002) classifies design practice into three simple categories: product design (things), environmental design (places) and communication design (messages). Furthermore, it is possible to identify the basic characteristics of practice in design to be found in the literature:

Creating how things should be: Design, in its basic role, can be seen as creating something new which is yet to exist. Nelson and Stolterman (2003) remark that humans have always been creating the world in a way it should be through designing. Meanwhile design theory conceptualises how things should be and informs the conceptualisation of practice to create the way things should be.

The ability to visualise tacit knowledge: Design practice involves the various methods and tools that are required to create designs (Lawson and Dorst, 2009). Specifically, there are a number of visual representation skills that are used throughout the design process, such as drawing, modelling, prototyping, photographing and so on. Lawson (1980, 2004) acknowledges that visualization skills are central to all designers.

Embodiment of the values of craft (studio) practice: A number of research projects into the role of studio in design education have been conducted across the fields within design, though specifically in architecture (Cuff, 1991; Vesley, 2004; Potts, 2000; Wigley, 2004). The Bauhaus tradition is taken as the model that initially introduced a set curriculum and a clear structure for studio-based learning (Williams, Ostwald and Askland, 2010). This tradition of craft practice is often ascribed to the problems in developing a theory of design.

2.3 RELATIONSHIP BETWEEN DESIGN THEORY AND DESIGN PRACTICE

From the discussion of the characteristics of design theory and practice, it can be concluded that design as a discipline involves a rich relationship between

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theory and practice, between the conceptualisation of how things should be and creating how things should be, and between tacit knowledge and the ability to visualize tacit knowledge as artefacts or services. The intimate relationship between theory and practice in design suggests that the intersection between the two may imply something about the disciplinary core of design.

This theory-practice relationship in design can be graphically represented as shown in Figure 1 where the design discipline territory bounds two overlapping circles, representing design-theory space and design-practice space, respectively. This framework has also been applied to develop designerly approaches to identifying the disciplinary core of design (Jung et al., 2011).
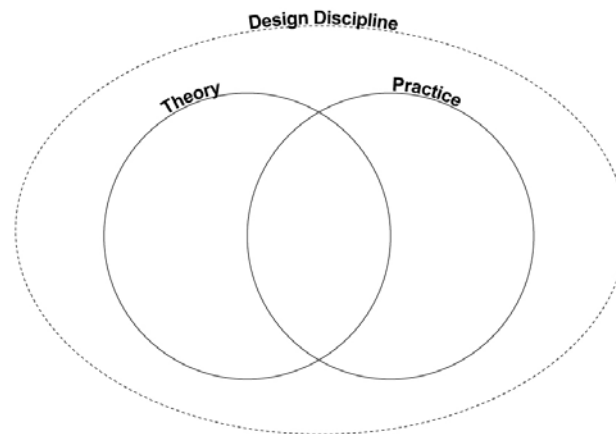

Figure 1 –A framework for relationship between theory and practice in design

3 RESEARCH DESIGN

Within the two complementary areas of design, its theory and practice, the design theory space was represented by design academia as often featuring contemplative and rational type of thinking and creates or reflects on theories as the outcome of such thinking. The design practice space was represented by the design industry as a form of doing, where theories or abstract concepts are practised in real world contexts. To look at the intersection between the two areas, this research is designed to balance the sample size from each area. Amongst a series of 12 workshops conducted in the UK, five were held within design academia (e.g. design schools in universities) and seven held within the design industry (e.g. design companies, agencies and studios). They involve 37 design academics, including design educators and design researchers, and 26 design practitioners, including designers, design consultants, and design managers. An overview of the workshop research and its participants is summarised in Figure 2.

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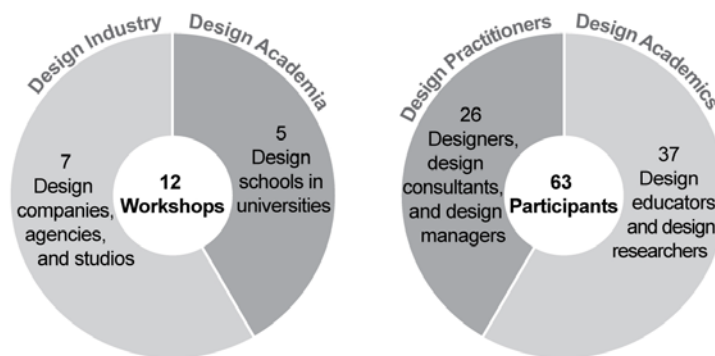PARIS COLLEGE OF ART
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Figure 2 –Overview of workshop research

3.1 WORKSHOP PARTICIPANTS

Sampling of workshop participants considered a range of contexts of design practice in both design academia and industry to better represent the design community. Thus, it was intended that selected participants involve a variety of design expertise and experience. Also, an even distribution of workshop locations around the UK was primary. The criteria used in the process for selecting target participants were as follows: (i) Design schools in universities, which have a well-established tradition in design research and education, (ii) Design companies, agencies, and studios that have a good record of receiving awards nationally and internationally, and (iii) Individual design practitioners and researchers who have a good record of presenting or publishing their work to the public both online and offline. Participants were found through contacts gathered from previous research activities and also a Web search.

Participants were contacted via emails, and follow-up emails were sent to discuss details and arrange the date, time, venue, etc., once there was an interest in participation. The person who was in contact with the researcher agreed on securing a venue for the workshop (normally, a meeting room in the organisation was used) and recruiting at least three of his/her colleagues to attend the workshop. Close to the arranged date, a reminder email was sent out. After the workshop, a summary report was created for each workshop and delivered to the participants.

3.2 WORKSHOP STRUCTURE

The workshops consisted of three stages and five activities (Table 1). They were adapted mainly from the book, Gamestorming (Gray, Brown, and Macanufo, 2010), which is addresses designing games and how to use those games to create, develop, and refine ideas. The first 'Opening' stage helps participants open their mind and their flow of ideas, in which a brainstorming method is used. In the second 'Exploring' stage, participants experiment their ideas by categorising, mapping, and drawing them in order for new ways of seeing things to emerge. The activities employed in this stage include card sort, concept drawing, and image-ination. The last 'Closing' stage provides opportunities for participants to share their ideas through group presentation and discussion. This structure was applied to every workshop without any changes, apart from group discussion, which was omitted if time did not allow towards the end of a workshop. The workshop was intended to last for about an hour, based on a timetable agreed with participants in advance.

STAGE	ACTIVITY	DESCRIPTION
Opening (Divergent)	Brainstorming	Warming-up and ideation activity: Participants are asked to generate ideas in response to the questions
Exploring (Emergent)	Card sort	Categorising and mapping exercise: Participants are asked to work as a team and organise information written on the index cards through group discussion. Additional activities (e.g. naming, describing, and ranking the categories that they created) are followed.
	Concept drawing	Visual thinking exercise 1: Participants are asked to give forms and shapes to the selected abstract concepts by employing their visualisation skills
	Image-ination	Visual thinking exercise 2: A set of images are used as a prompt to facilitate participants' thinking and to elaborate their own understanding on the given concepts and issues in design.
Closing (Convergent)	Presentation and Discussion	Presenting the work created in the workshop, group discussion, feedback and summary of the workshop

Table 1 – Structure of the workshop

The benefits of adopting a workshop format for this research include the followings. Firstly, different forms of qualitative data were collected, including verbal (recorded), written, and visual (drawings and images). For example, participants created notes on the post-its, index cards, and papers in brainstorming and the card sort task, hand drawings with the written descriptions in concept drawing, and their conversation and discussions that were audio recorded throughout the workshop. Secondly, deeper insights and a wide range of opinions were drawn from participants via discussions and a group presentation within the workshop than would have been through one-to-one interviews. Lastly, participants were able to learn from each other by sharing their thoughts and perspectives on the given topics through conversation.

4 RESEARCH FINDINGS

Data was gathered primarily from two different contexts: design academia and design industry (see Figure 2). Each research context forms a different dataset, which divides the entire workshop data into two datasets. These datasets are compared to reveal whether contextual factors influenced participants' perspectives and, if so, to what degree. Thus the views of design academics and those of design practitioners indicated are compared to explore where commonalities and tensions may exist, and to understand to what extent the two groups of participants share their core design knowledge. The following sections delineate the results of the analysis focusing on the comparison of the two datasets based on context. The sections are presented according to different activities of the workshop: brainstorming, card sorting, concept drawing and image-ination.

4.1 BRAINSTORMING

In the brainstorming session, participants generated various concepts and topics that are relevant in design based on three questions: What are the important skills and methods in design?; What are the important attributes and capabilities of designers?; and what is important design knowledge and understanding? Participants wrote down their responses to each question for one minute. The results are summarised in Figure 3, presenting frequently mentioned concepts and topics with their frequencies of being mentioned in different workshops.
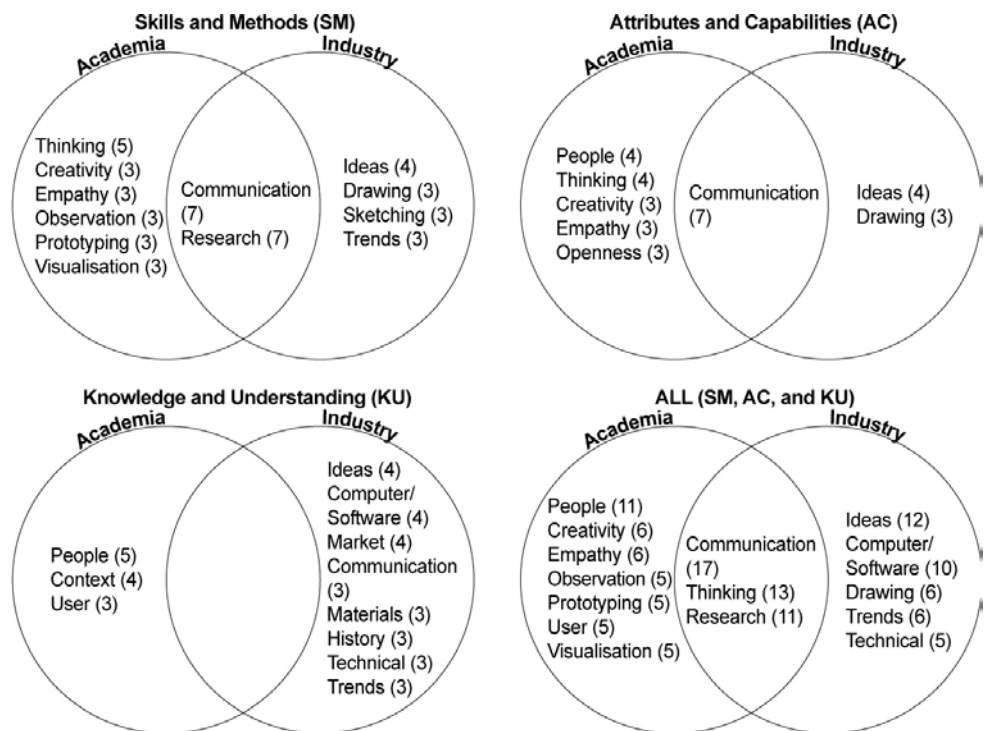

Figure 3 –A summary of the brainstorming results

The first diagram (SM) shows that considerable attention was paid to skills and methods for communication and research by both design academia and industry. Design academics emphasised thinking skills whereas practitioners focused on ideation skills. Within the second diagram (AC), the intersection indicates that both design academics and practitioners regarded communication as important attributes and capabilities required in design. Within the remaining areas of the AC diagram, academics value understanding people, thinking, being creative, and being open-minded while practitioners highly appreciated coming up with great ideas and being able to draw. The third diagram (KU) shows nothing in the intersection between academia and industry, indicating that there was a lack of common body of knowledge in design. Whilst academics focused more on understanding people, context, and users, practitioners focused more on understanding how to generate ideas and knowing how to use computers, and understanding the market.

Lastly, the diagram that summarises all three diagrams (SM, AC, and KU) suggests that communication, thinking, and research are fundamental across the different contexts of design. In design academia, participants were more concerned with people to understand their needs and wants. In the design

industry, a bigger emphasis was on the whole process of generating, developing, and communicating ideas.

4.2 CARD SORT

Sixty core concepts were drawn from the literature in design as a general subject of study and practice. They were provided for participants to explore each concept being written on each index card. Participants were asked to sort the index cards into categories based on the importance of a concept. The results of sorting cards were analysed focusing on the frequency of a concept being categorised as 'Very important'. The card sort results are summarised in Figure 4, presenting the concepts that were regarded as very important in all the workshops within academia and the industry.
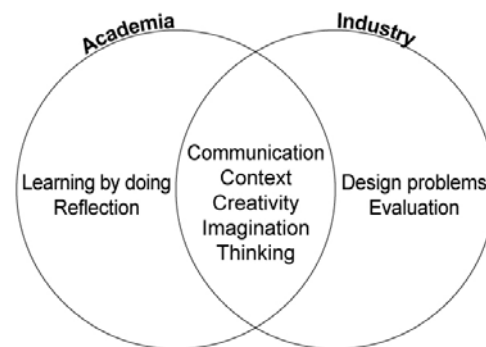

Figure 4 –A summary of the card sort results

Five concepts were considered essential within all the workshops held in either design academia or design industry. These concepts are communication, context, creativity, imagination, and thinking. This is partly conforming to the brainstorming data, which revealed that both design academics and practitioners highly valued communication and thinking. Therefore, the workshops suggested these five concepts as fundamental to the disciplinary core. Design academia focuses more on designers' ability to learn by doing and to reflect on what they are doing whereas the design industry requires designers to be highly capable in identifying/solving design problems and evaluating possible solutions.

4.3 CONCEPT DRAWING AND IMAGE-INATION

Followed by brainstorming and card sorting, another two linked activities, concept drawing and image-ination, allowed participants an opportunity to explore their implicit understanding of three selected concepts: communication, thinking, and creativity. Participants visualised these abstract concepts using their hand drawing skills, often supplemented by a brief written description of their drawings.

4.3.1 *Communication*

Participants from design academia described the concept of communication, focusing on its three aspects: methods, processes, and networks of people. Many participants from design industry described that communication enables a common understanding between people involved in the design process, such as groups of stakeholders or other designers. This is to be achieved by using

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different communication methods to exchange their thoughts. Specifically, communicating through visuals (drawings) was highlighted.

4.3.2 *Thinking*

Many design academics illustrated lots of different thoughts are linked and interconnected in thinking. Mind mapping was often used to describe visually that thinking is about making links, finding patterns, and creating orders. In the design industry, thinking process was generally described as not linear but directional towards outcome, for example, decisions or ideas. This often accompanies changes of status, which turns a chaotic status into an orderly one and vice versa. Across different contexts of the workshops, a metaphor of a lightbulb was also used frequently to describe generating and developing ideas through thinking.

4.3.3 *Creativity*

Similar to thinking, the metaphor of a lightbulb was commonly used to illustrate the concept of creativity. In this way, creativity was interpreted as an explosion of (new) ideas. It was also seen that creativity was understood as creative moments within thinking process. To spark those creative moments, designers stressed being playful and relaxed. Another common metaphor used across academia and industry was thinking outside the box, which means thinking differently. In general, creativity was described as something accidental and serendipitous.

5 DISCUSSION

The data produced by participants from design academia and design industry was analysed and compared to find similarities and differences between them. Through this, three main themes emerged: skills and ability to communicate effectively; thinking for conceptualisation vs thinking for creation; and creative idea generation. This section will begin by discussing the triangulation of evidence to identify these themes. The second section of the discussion will move on to exploring what this may mean for the core of design knowledge. This will argue that the generic transferrable skills form the core of design and that design knowledge was secondary to designers' skills and methods, remaining implicit.

5.1 IDENTIFYING THE CORE OF DESIGN

This discussion presents the workshop research findings, focusing on triangulating the findings from the different types of data gathered. Through this analysis, communication, thinking, and creative idea generation were identified as important themes.

5.1.1 *Skills and ability to communicate effectively*

Analysis of the brainstorming data revealed that both design academics and design practitioners considered communication to be of the utmost importance in design. This indicates that people in the design community, regardless of the context in which they work, share the value of employing good communication

skills as an essential part of their design practice. Specifically, the importance of communication in design was acknowledged in many respects. For example, many participants mentioned that it is important to be able to communicate their ideas in different forms (e.g. visual, verbal, and written) and be proficient in communicating clearly and effectively. Some participants suggested visual communication as most effective way of communication utilised by designers.

5.1.2 *Thinking for conceptualisation vs. thinking for creation*

Also, both academics and practitioners highly valued employing various thinking skills. Academics discussed the importance of understanding people's needs and wants, design practitioners focused more on generating ideas as well as developing and testing them, thus ultimately solving the design problems that they face. Design academia also focused on learning by doing and being reflective whilst design industry focused on identifying and solving design problems as well as evaluating alternatives to make decisions. The visual data generated in the workshops, particularly the drawings created by participants, indicated thinking as a process that expands and grows by connecting many different ideas and thoughts amongst more than one person.

5.1.3 *Creative ideas generation*

Creativity was generally understood as light bulb moments of coming up with new ideas, indicated by the visual data created in the workshops, particularly the drawings created by participants. This creative moment of illumination of ideas, often named as creative leap and eureka moments in the literature (Lawson, 2004). Both creativity and thinking occur in tandem during the creative process, implying a close relationship.

5.2 IMPLICATIONS FOR THE CORE OF DESIGN

5.2.1 *Generic transferable skills*

Three concepts, discussed above, were highly valued in different activities of the workshops: communication, thinking, and creativity. Also, their importance was commonly agreed between academia (theorising design) and the industry (practicing design). Thus, these concepts are at the intersection of theory and practice, wherein the disciplinary core of design can be found, suggested by the literature review on the relationship between theory and practice in design.

In addition, the three concepts greatly overlap with generic transferable skills required for the graduates from higher education. Much has been studied about generic/core/key skills that are transferable from context to context. These skills often include communication, problem-solving, creative team-working, and critical thinking (Billing, 2003). This is consistent with the finding of this study that the importance of communication, thinking, and creativity is widely acknowledged within the design community regardless of domain specificity.

5.2.2 *Tacit design knowledge*

There was a lack of consensus on what constitutes important design knowledge and understanding. Instead, it was identified that developing one's own capabilities and attributes to carry successfully practice design was more important than acquiring a set of skills or a body of knowledge in design in

general. In this sense, design knowledge was considered secondary to the more practical skills and attributes that a designer required to complete the everyday tasks of their job. Theory building is important to establish design as a discipline. However, this study indicates that design as more practice-based discipline, developing subject-relevant attributes and capabilities has more relevance to the core of design.

6 CONCLUSION

As design becomes increasingly interdisciplinary and merges with other fields in the formation of new areas of study, the need to identify the disciplinary core of design becomes pressing. Yet, little research has explored the fundamental elements of design. Through workshop research that involved multiple data gathering methods, this study indicates that the core design skills and knowledge are more generic transferrable abilities that apply to various disciplines and contexts, rather than subject-specific. This general application of the core design knowledge might hinder theory development that is specific to the design discipline. The core concepts and topics as collectives rather than individuals can be an area where theory building in design as a general subject of study and practice can be reinvigorated.

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