The Perception of Design:
a study of the understanding of design contribution within the business management sector through comparative analysis

by

Jennifer Heaney

A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs in partial fulfillment of the requirements for the degree of

Master of Design

in

Industrial Design

Carleton University
Ottawa, Ontario

ABSTRACT

The professions of business and design are based in distinct modes of knowledge and process but are interdependent in practice. The capacity of the designer to innovate can be negatively impacted if his/her understanding for design contribution is misaligned with that of the business manager. In order to address the way in which design is perceived by those who procure design services, there is a need to first illustrate the ways in which their perception deviates from that of the designer. This paper presents research into design understanding as a comparison between design professionals and business managers. Data for the study is obtained using both ethnographic and design research methods. Results demonstrate issues associated with understanding the complex nature of design activity through a quantitative, linear approach versus an iterative, exploratory process.

Keywords:

Design Research, Design Process, Perception, Procurement, Business Management, Understanding

ACKNOWLEDGEMENTS

To Alistair.

Always remember: *"Sometimes you have to take the leap*

and build your wings on the way down" – Kobi Yamada. Follow your heart.

To my husband,

For his patience, support and understanding.

Also, to GRC Architects,

who allowed me to step away from my professional role

to explore other interests

Thank you to all who took the time to complete the survey

and to the twelve workshop participants, for making this research possible

And finally, special thanks to my co-supervisors:

Leighann Neilson, for her enthusiasm

and willingness to help me with this study;

and Stephen Field, who guided me through this process

with unwavering dedication and encouragement.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

PREFACE

When I was young and would tell people that I wanted to be an architect, more than one person assumed I wanted to dig for bones. The professions of 'architect' and 'archeologist' were foreign and interchangeable to many people in the small town where I grew up. I was the first in my family to pursue a post-secondary education, yet the idea that I possess a specialized knowledge of value (beyond prioritized aesthetics) is essentially unrecognized because architecture is for the elite. As a result, I have always felt that they don't really understand what I do. On the other hand, I have never been able to clearly explain it to them either.

Throughout my university education and the 15 years that I have worked as a practicing architect I have come to learn that, at least for architecture (I can't speak to archeology), understanding of the profession is foreign to minds well beyond those in insular communities. Over and over at conferences, in media, and in casual conversation I listen to architects express the perception that nobody understands what it is that they do.

When I decided to broaden my experience and pursue a Master's degree in the School of Industrial Design at Carleton, the interdisciplinary program exposed me to the fact that many of the concerns felt by architects are common across design sectors and that there is a body of research focused around these issues. This introduction to design

research has equipped me with new ways of communicating design contribution that will no doubt influence my future work and identity as an architect.

This research study has not only allowed me to explore some of the reasons why the design process might be inadequately understood outside of the profession but more importantly, how we can begin to address the issue.

1. INTRODUCTION

"The central challenge of the design profession is to make ourselves relevant to business leaders." – Darrel Rhea, Vice Chairman of The Design Management Institute

(Lockwood, 2007)

This research is designed to test the hypothesis that the contributions that are made by designers when providing professional services are inadequately appreciated within the business sector, to the detriment of the design profession. The capacity of business managers to evaluate professional design services is restricted if they do not understand what they are paying for. As a result, decisions must be based on price and the demonstrated experience of the designer[1] – neither of which reflect the innovative capacities of the design professional to address the project requirements. A study of design understanding among business professionals explores the magnitude of this issue through a comparison of design understanding among business managers with that of design professionals.

1.1 Rationale

The aim of conducting such an investigation is to validate a frequently expressed perception by design professionals that their work is misunderstood by their clients

[1] In architectural procurement practices, proponents are often required to demonstrate that they have previously completed three projects of a similar scope and scale as the project that they are being considered for. This contradicts a process that seeks to create something new and unique to the client's requirements and not to merely replicate what has been done previously.

(Monteiro, 2012; Norman, 2013; Scher, 2005; Tombs, 2001). This condition is alleged to limit the capacity of the designer to innovate as clients undervalue the design process (Dilnot, 1982) and as a result, allot inadequate resources (i.e. schedule, budget) in support of design project realization. The ubiquity of this perception within the design industry is reinforced by a large body of research devoted to increasing awareness of the contribution of design to society. However, this research focuses on (1) design as an end-product (Hertenstein, Platt, & Veryzer, 2013; Norman, 2013); (2) the integration of design literacy programs into the school system (Fry, 2015; Nae, 2017; Nielsen et al., 2012); or (3) "design thinking" as a resource for implementation in business (Cross, 2007; Design Council, 2013; Design Research Society, 2013; Mintrom & Luetjens, 2016). To this author's knowledge, there is no body of work that explores the prevailing awareness of the action of design (as required to generate an end-product) and the contributions of the designer's skillset, from the viewpoint of those outside of the profession. The intention of this research undertaking is to demonstrate how business people perceive the design process and examine how this might validate or contradict the perception of the designer that he/she is misunderstood.

For the purpose of this study, the business management sector has been singled out as that which holds the ability to directly influence key issues impacting design outcome (Topalian, 1989). Beyond supporting business through the development of innovative products, systems, services, and experiences, design services are procured and managed within frameworks which have been developed by business managers. The term

‘Designer’ is used in reference to individuals who have completed higher education in design and have achieved membership or designation in a professional design association.

1.2 Research Questions

Through qualitative and quantitative methods, this research seeks to develop empirical evidence to support the claim that professional design work is undervalued by non-designers and asks the question:

> *Is there a disparity between how professional designers understand their work and how design contributions are understood by those within the business management sector?*

In support of this question, the research seeks to answer the following:

- *Why do professional designers perceive an undervaluation of their work by individuals outside of the design field?*
- *Do non-designers understand professional design activity?*
- *Do non-designers attribute value to professional design activity?*

The data obtained through this study is fundamental to the validation of existing and future attempts to champion design education for the business sector. Efforts to increase awareness and consideration for design contributions will continue to go

unrecognized outside of the design community if concerns are not substantiated by empirical data.

1.3 Approach

The research begins with a literature review to assess the designer's perception of the non-designer's valuation of design contribution. The review examines advocacy efforts directed at increasing the understanding of design outside of the sector; why it might be important that non-designers value professional design activity; and what impediments might exist against the promotion of design understanding.

Following the literature review, the study's inferential mixed-methods approach is described. The quantitative and qualitative methods of data collection employed include an online survey and an in-person workshop. After a description of each method, the results are summarized and discussed together with the opportunities and barriers they present within the design and business sectors. The study concludes by defining its contributions to the field and providing recommendations for future research.

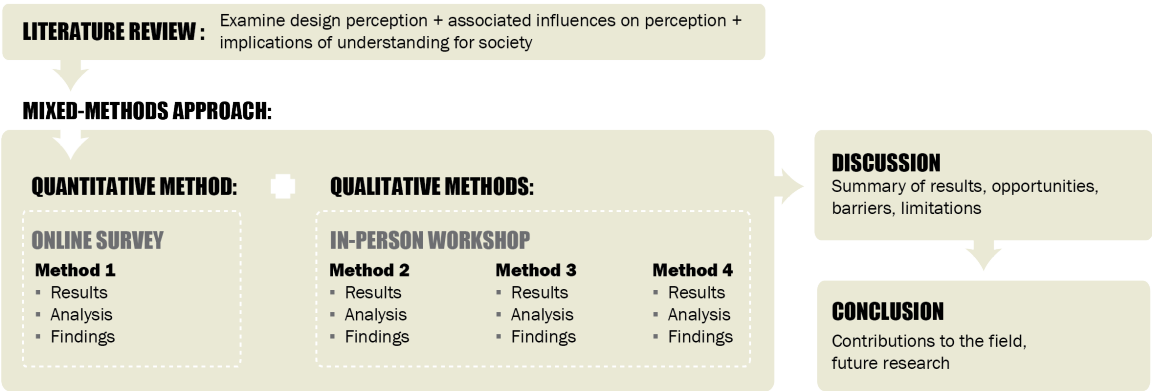


Figure 1-1: Approach to research

1.4 Contribution

This research is developed in support of previous and ongoing self-promotion efforts by professional designers aimed at the enhanced understanding and valuation of the design sector by non-designers. Empirical evidence is collected through research processes targeted towards individuals outside of the design sector. This bottom-up approach deviates from a predominantly inward-focused discourse and looks outward to explore what is currently understood about the design profession by non-designers, how that information is being obtained (or formulated), and what the implications of that understanding are for design professionals, business professionals, and society at large.

The World Design Organization (WDO) provides the following definition for Industrial Design. This definition can easily extend from Industrial Design to apply to many of the design professions:

> …Design is a strategic problem-solving process that drives innovation, builds business success, and leads to a better quality of life through innovative products, systems, services, and experiences. …Design bridges the gap between what is and what's possible. It is a trans-disciplinary profession that harnesses creativity to resolve problems and co-create solutions with the intent of making a product, system, service, experience or a business, better. At its heart, …Design provides a more optimistic way of looking at the future by reframing problems as opportunities. It links innovation, technology, research, business, and customers

> to provide new value and competitive advantage across economic, social, and environmental spheres. (wdo.org)

"Products, services, communications, and environments all benefit from well considered design" (Waterhouse, 1996, p. 5) delivered by multidisciplinary teams, however ultimately "responsibility for the quality of design rests with business leaders" (Topalian, 2012) as they procure and manage the process. This quality can only be achieved when the design professional adequately recognizes the management parameters within which the design outcome will be implemented. Illuminating the different ways in which business professionals and design professionals consider the design process will enhance working relationships to enhance the contributions of all members of the interdisciplinary team.

2. LITERATURE REVIEW

Literature related to design process, design education, and design literacy was reviewed together with literature on the value of design, the relationship of design and business, and the topic of procurement. The objective of this research was to understand 1) why design professionals perceive their contributions to be misunderstood by non-designers, 2) what is being done in response to that perception, and 3) what the implications of improved understanding outside of the profession might be.

2.1 Design Perception

The word 'design' can be used as both a noun and a verb. As a noun, it refers to a plan, an intent, or an outcome; as a verb, it refers to the processes that are encompassed in design ability (Gedenryd, 1998). Design research summarizes design ability as, "comprising resolving ill-defined problems, adopting solution-focused cognitive strategies, employing abductive or appositional thinking and using non-verbal modelling media." (Cross, 1990). While this definition of the verb form of design is reflective of the work that design professionals do, it may not represent the commonly held view of design activity. The following sections investigate some of the issues associated with design understanding as it relates to the design professional and those outside of the design sector.

2.1.1 **Perceived Understanding of Design**

In publications, conferences, panel discussions, and casual conversations within the design sector, professional designers frequently assert that the work that they contribute is poorly understood and undervalued by their clients. In her book, *Make it Bigger*, Paula Scher suggests that a lack of design understanding amongst those with the power to make decisions has negative implications for the illustration industry (Scher, 2005, p. 17). Design director Mike Montiero addresses why clients think they can lowball fees with the statement that "design doesn't hold any value for them" in his book *Design is a Job* (Monteiro, 2012, p. 52). Stephen Bradley makes a comment on his company blog for Vanseo Design that, "Non-designers generally see design as making things look pretty" (Bradley, 2015). The claim is made by design professionals time and again in podcasts ("Clever Podcast," 2018), online discussion boards (Wolf, 2005), film (Fabrica, 2016), and symposia (www.popcancrit.ca/2018) centered on the topic of design.

John Heskett (2002) affirms that "the common perception of designers is that their approach to their subject matter differs from the rational analysis and scientific rigor of the business disciplines" (as cited in Beverland, 2005, p. 195). Kotler and Rath support this "stereotyped thinking" that designers hold for business managers and cite a comment by Rita Siegal: "they are trained in business schools to be numbers-oriented, to minimize risks and to use analytical, detached plans – not insights gained from hands-on experience" (as cited in Kotler & Rath, 1984). The perception held by design

professionals that those trained in business do not share the values, behaviors, and attitudes to support design activity is mentioned often, but in most instances does not appear to be based on empirical evidence (Micheli, Jaina, Goffin, Lemke, & Verganti, 2012, p. 690). Association of the claim to stereotypes justifiably results in dismissive response from the business profession.

Micheli et al. (2012) contribute to the development of critical evidence for the disparity of understanding through exploratory research that looks "at the language used by managers and design professionals in describing 'good' industrial design" (p. 688). Their study included 8 managers and 11 industrial designers and concluded that although there are some "surprising similarities in the way managers and designers perceive good design, there are also significant differences" (Micheli et al., 2012, p. 688). Although the language used by both groups was similar, the designers emphasized "the use of materials and technology, and the importance for a design to result in an iconic product, whereas managers stressed aspects related to brand and price, and the exclusivity of products that are well designed" (Micheli et al., 2012, p. 702). The study found managers to be commercially oriented with a focus on the end result of brand recognition. On the other hand, industrial designers were more focused on the *means* by which a product might become easily recognizable, iconic, and thereby commercially successful. A small sample size and low reliability figure associated with the coding of this study suggest that additional research on the different perspectives of designers and managers is required. In reference to the study by Micheli et al. on differences in

the language used, the present study seeks to contribute insight into the differences between design professionals and business managers as they present in relation to design understanding.

Government-sponsored initiatives by both the European Commission and Human Resources Development Canada (HRDC) provide further indication of the perceived misunderstanding of design. The *European Design Systems and Innovation Policy* determines that there is a gap in design understanding by policy-makers, businesses, practitioners, the general public and academics. The policy suggests that they attribute the value of design to the integration of knowledge into technology, products, service and strategy, rather than acknowledging it as creative problem-solving (SEE Platform, 2012, p. 7). Although the report indicates that the determination of this gap in understanding is based on discussions with policy makers, it makes no reference to formal research in support of this claim. Similarly, a Canadian report prepared for The Design Sector Steering Committee in 1997 and sponsored by HRDC provides strong research in support of design promotion in Canada and identifies a need to "communicate the power of design to those outside the community" (Waterhouse, 1996, p. 13). Data was collected for the report through interviews and discussion. Of 475 participants, only 15 were indicated as those outside of the design sector. Workshops focused on people from design firms and in-house design departments only (Waterhouse, 1996, p. 174). Both reports present extensive material for extending design understanding beyond the design sector. Research that validates the claim that

design is not currently understood outside of the design community would make this material more effective in its pursuit.

The sentiments expressed by the design sector with regards to how others perceive their work extend throughout the design professions. As indicated by the examples in the introduction, the professions of graphic design, interactive/web design, fashion design, animation, architecture, interior design, industrial design, service design – to name just a few – all share the grievance that those outside of their profession do not comprehend the complexity of work and level of value that design involves.

2.1.2 **Influences on Designer's Perception**

Three factors influence the designer's perception that the work of professional designers is mis-understood by non-designers. First is the inability of the designer to communicate his/her process to others (Dilnot, 1982, p. 143; Schon, 1988), followed by the disappearance of that process in the resultant product or outcome (Hara & Arai, 2012). The third factor manifests through the information provided by business managers and is reflected in design procurement practices.

Academic research validates the design professional's perception that their values, behaviors and attitudes towards design are not understood, as it indicates that the process of design is complex and challenging to define. Design researcher, Nigel Cross explores the mysteries of "design ability" in his book *Design Thinking: Understanding How Designers Think and Work* (2011); cognitive scientist Don Norman includes a

chapter on design thinking in *The Design of Everyday Things* (2013); and a PhD thesis titled “How Designers Work: Making Sense of Authentic Cognitive Activity” (1998) was written by Henrik Gedenryd in study of the complex topic. Each of these works strive to give definition to a body of work that professional designers themselves struggle to describe. Cross notes that experienced designers appear to possess a tacit knowledge and that they respond intuitively to problems (Cross, 2011, pp. 6–10). Through design education, students learn to suggest ‘what may be’ through abductive reasoning and become problem-focused thinkers. He describes the progression of novice designer to expert, or professional, as “a matter immersion and internalizing different levels of understanding and achievement”, through practice and the guidance of skillful teachers (p. 147). With time, design thinking becomes an intuitive and natural process. Although the author breaks down the actions of designers into cognitive, teachable skillsets, the capacity of the professional designer to implement these skills in a non-linear and instinctive manner limits his/her ability to communicate what takes place.

Credence qualities are aspects of services that cannot be evaluated by a consumer even after 'consumption' but have perceived value (www.businessdictionary.com). High-credence service professionals are often required to defend their expertise to clients who lack the specialized knowledge required to evaluate the service (Jochen Wirtz & Lovelock, 2018, p. 42; Zeithaml, Bitner, & Gremler, 2017, p. 23). Design professionals are likewise tasked with educating their clients (Tombs, 2001), however they are “notoriously weak” at explaining what design is able to contribute (Dilnot, 1982, p. 143;

Schon, 1988). Client education that originates solely from the designer might justifiably result in the designer feeling misunderstood as a result of poorly communicated information.

Gedenryd's 1998 dissertation indicates that only recently have researchers begun to more accurately define the design process through increased study (Gedenryd, 1998). The internet introduced unprecedented access to information and the need for professionals to defend their specialized knowledge (and expertise in applying that knowledge) was amplified exponentially (Zeithaml et al., 2017, p. 16). Design research struggles to provide support for professional designers but the transmission of this information from academia to practice is slow (SEE Platform, 2012, p. 13). Historically, design education has supported the "production of goods and manufacture of consumer desire" (Hall, 2016, p. 3). Design research concepts in support of design thinking are making their way into design education[2] ("The Design Discussion," 2013) and will help to equip future designers with a better understanding of their specialized knowledge. The designer's inability to communicate their process to their clients presently remains an impediment in the industry.

The understanding of design is further affected by a phenomenon known as the "Paradox of the Active User" (Hara & Arai, 2012). Users typically seek to interact with

[2] Master's programs in design, such as the MDes program at Carleton University, provide exposure to the increasing body of academic research on design

products of design in a way that makes the processes invisible. Although users might benefit from a deeper understanding of the products that they interact with and begin to recognize the implications of that product beyond their interactions, their interest does not extend to design process. As a result, the value that society attributes to design is minimized.

Finally, the concerns of the design sector are supported by evidence found in the procurement processes employed by policy-makers and businesses. In Ottawa, advocates for the reform of architectural procurement processes champion the elimination of fee-based scoring of proposals in favor of a quality-based selection of architects.[3] Awarding design work on the basis of fees encourages professional designers to undervalue the costs associated with projects in favor of winning the bid (Dreessen, 2017). The resultant struggle to complete the work on time and on budget compromises the project and indicates to the designer the misaligned priorities of the client in the achievement of successful outcomes.

Additionally, an inadequate understanding of design commonly results in design professionals being brought into the project too late to effectively contribute (Kotler & Rath, 1984). The breadth of knowledge that designers possess extends beyond

---

[3] Quality-Based Selection (QBS) is a process that deviates from the lowest-price approach to procuring services to favor a points-base approach. Bidders are awarded points based on their measurable capacities in specific categories and ratings. Fees are discussed only at the final, negotiating stage. (ontarioconstructionreport.com/the-case-for-quality-based-selection-does-the-lowest-price-provide-the-best-value-for-architectural-and-design-services)

aesthetics. When called upon to “make things look good”, the professional designer must consider what Schon describes as “combinations of possible problem descriptions and corresponding solutions” (Pauwels, Meyer, & Campenhout, 2013, p. 45). These combinations will often extend to the realm of “what could have been”, the outcome now impacted by decisions made before the designer could effectively contribute to the solution. Where the methods by which designers are hired to contribute to a project prioritize good business, the result is often compromised outcomes for the project.

2.1.3 **Influences on Design Understanding**

In a 1982 paper written to set out background issues for a subsequent paper presentation at the Design Policy Conference, researcher Clive Dilnot outlines some of the inherent problems with understanding design. He first addresses the social tendency to equate design activity with design outcome and the resultant disappearance of the processes directed towards that achievement. The design activity is reduced to a simple means to an end, the value of which lies wholly in the manifested solution (Dilnot, 1982). Nigel Cross supports this line of thinking and observes that, “When designers – especially skilled, successful designers – talk spontaneously about what they do, they talk almost exclusively about the outcomes, not the activities” (Cross, 2011, p. 6). By obscuring the idea of process, the designer contributes to the lack of knowledge held by the general public.

Dilnot goes on to discuss issues of understanding which are inherent to the design process itself. To do this, he cites the work of Bruce Archer (1979) which defines two notions of problem: the statement of requirements and the obscurities about those requirements. The author argues that Archer's observation emphasizes design as, "a complex, interactive process [that] breaks with the socially given definition of design in terms of static parallels" (Dilnot, 1982). The design professional does not set out to simply answer the problem, but instead explores the qualities of the problem itself to better understand the full breadth of the issue to which he/she must respond (Pauwels et al., 2013). Elements of the problem are clarified as solutions are explored, prompting the designer to continuously re-examine and re-define the problem in an interactive, iterative process of development. Society undervalues the design process when it is considered only as a means-to-an-end.

The complexities inherent to design set the subject apart from the traditional and established systems of knowledge (i.e. humanities, technology/engineering, art/creativity, and economics/management). Design education carries the potential to bridge the gap between theory and practice (Celi & Formia, 2017). However, the subject of design, identified by Winter-Simat, Wright, and Choi (2017) as "an approach to understanding complex systems, framing ill-defined problems, and taking empathetic iterative action, presents as an ideal project-based framework for the transformative learning required in the development of global citizenship" (p. 1651), is absent from elementary and secondary (i.e. pre-tertiary) education where inductive and deductive

forms of reasoning are taught in pursuit of solving well-defined problems. Education in design thinking and methodology is limited to the professional design community and therefore difficult to grasp by those outside of the industry (Nae, 2017, p. 846). A lack of introductory knowledge about design emphasizes the knowledge asymmetry[4] between the client and the designer. This gap in information restricts the ability of the client to evaluate design services in design terms and prompts the requirement to evaluate the services by the analytical and quantifiable means (i.e. price) in which they do possess adequate knowledge (Zeithaml et al., 2017, p. 453).

2.2 Design Advocacy

From 1946 and continuing into the 1980s, design promotion policies of the Canadian government supported growth in the design sector in recognition of the role of design in the country's cultural and economic growth. This support began with a successful exhibition by the National Research Council titled "Design in Industry", which spurred the creation of the Industrial Design Section office and subsequent National Industrial Design Council. Initially established under the supervision of the National Gallery, it was re-established within the Department of Trade and Commerce and became the National Design Council. Following the "watershed events" of Expo 67 and the ICSID 67

[4] Knowledge asymmetry occurs when outside professionals provide non-resident knowledge-intensive services to client firms. The client does not possess the technical knowledge to evaluate the effort invested or the outcome accomplished by the professional agents. This attribute is not unique to design, but rather is common to all professions – distinguishable by their application of abstract knowledge (Sharma, 1997).

(International Council of Societies of Industrial Design), Design Canada formed in 1976 as an executive arm of the National Design Council. The mandate of the Design Canada program was to promote and encourage design in Canadian industry amongst business and the general public. When the federal government shifted priorities and cancelled the program 1985, it was recommended that professional design associations and industry bodies assume responsibility for design promotion (Waterhouse, 1996, pp. 45–46).

The Design Exchange (DX) was established in 1991 to serve as a national institution for design research and education. The DX promotes design through an awards program, workshops and seminar series, exhibitions, and other educational programs, yet "remains disconnected from the broader community of practicing designers" (Vinodrai, 2009) and non-designers. The Royal Architectural Institute of Canada advocates for "responsible architecture that enhances quality of life, while addressing important issues of society" (RAIC.org), yet most event attendees are architects. These are two examples of design organizations that have included design advocacy in their mandate, however the private-sector led design approach struggles to extend the impact of their efforts beyond the community of the designers that it champions.

New approaches that present opportunities to reach outside of the design sector have been subsequently highlighted by design research and are discussed in the following sections.

2.2.1 **Approaches**

Ongoing efforts by design professionals and design researchers offer approaches to increase understanding for design amongst other sectors. These efforts focus predominantly on the integration of design education into the pre-tertiary school curriculum (Nae, 2017; Winter-Simat, Wright, & Choi, 2017), design education for business professionals (Topalian, 2002), and the promotion of design thinking in government and corporate work environments (Mintrom & Luetjens, 2016). Advocacy efforts are further directed towards ideas of strategic positioning, promotional exposure, policy, and legislation (Waterhouse, 1996).

2.2.1.1 Design Education: General

The 2nd International Conference for Design Education Researchers in Oslo May 14– 17, 2013 on the theme of 'Design learning for tomorrow – Design education from Kindergarten to PhD' received 225 full papers on the subject. An introduction to the conference proceedings indicates that the theme was organized around the support of sustainable futures. The intro states,

> *"With this conference we have the ambition to see education at many different levels in securing a sustainable future for the design of everyday life solutions. For that we need qualified and reflective decision makers with a consciousness for quality of design and solutions" (Design Research Society, 2013, p. i).*

This statement highlights the role of the non-designer in support of design and points to the need for those individuals to be educated in the subject on which their decisions will

be premised. This education needs to extend beyond an appreciation for design solutions to include "qualified and reflective decision" (Design Research Society, 2013; Fry, 2015). In a society where everyone is equipped to recognize the value of a given design, to critically assess the implications based on more than personal reaction, the conversation of design can shift from "why do we need it?" to "how can we make it better?" (Nae, 2017; Nielsen et al., 2012; Vassallo, 2017).

The practical and multidisciplinary benefits of design-oriented learning has recently been recognized by school boards across the country (Waterhouse, 1996, p. 17). Referred to as "21st Century Learning", common themes include communication and collaboration within a diverse team, creative problem solving and innovation, critical thinking, design and innovation, digital literacy, and flexibility and adaptability (Winter-Simat et al., 2017, p. 1653). In elementary school and secondary school, students are learning from all streams of knowledge simultaneously. Pre-tertiary education is at its essence multidisciplinary and provides a supportive environment for the ideals of design thinking to be woven throughout all disciplines.

This move is a clear step forward for design advocacy; however, it stands to reason that the impact to the design sector of this reform to early-learning cannot be analyzed until students of design-based learning have made their way into the workforce.

2.2.1.2 Design Education: Business Professionals

Design and business are intrinsically linked (Muratovski, 2015; Topalian, 1989, 2012), however the importance of design to business is seldom acknowledged (Topalian, 1989). In a statement prepared for the first issue of the journal *Design Studies*, design research professor Bruce Archer states his dismay for the lack of dissemination of design methodology to business and government:

> *"It is really rather an alarming thought that most of those who make the most far-reaching decisions on matters affecting the material culture, such as business men, senior civil servants, local government officers, members of councils and public committees, not to mention members of parliament, had an education in which contact which the most relevant disciplines ceased at the age of thirteen"* (Archer, 1979, p. 18)

While the statement is forty-years old, the problem continued to be perpetuated by Canadian graduate business schools where design and design management principles had historically not been part of the curricula (Waterhouse, 1996, p. 157). The ensuing integration of design-oriented learning into pre-tertiary education has the potential enhance baseline understanding of design for business professionals, however post-secondary education often continues to compartmentalize the two subjects. The European Design Systems and Innovation Policy recommends that business students take modules in design management as a means to support the integration of design into innovation policies and programs (SEE Platform, 2012). A 1995 survey of Canadian

MBA schools indicated that although opportunities existed for MBA students to take design courses on about half of the campuses surveyed, 71% of respondents indicated that students do not do so (Waterhouse, 1996). An update to this study is necessary to the impact that increased interest in design has impacted these findings.

More recent literature indicates that subsequent emphasis on the relevance of design has manifested crossover of the subject with a wide variety of curriculum in the last decade (Nae, 2017). Many undergraduate business programs now include modules on design in terms of information systems and design management[5]. As faculty and students in the sciences, humanities, business and technology fields are provided increasing resources to explore new possibilities to explore design and innovation, the impact of this educational shift may have begun to manifest in the workforce in support of *design thinking*.

It should be noted that the profession of Design Management effectively bridges the gap between business and design in instances where the value of design has been recognized within the company and the management of the process has been prioritized. However, organizations that are dependent on "a culture and strategy that fosters efficiency, cost-cutting, incremental changes, and a focus on day-to-day

[5] Thank you to the external reviewer for indicating that this crossover has occurred in business school programs.

business…do not value innovation" (Stamm, 2010). Design management roles are therefore limited to only the most enlightened companies (Topalian, 1989).

2.2.1.3 Design Thinking

Design thinking reaches across economic, technical, social, philosophical, and historical realms. As noted by Nigel Cross (2007), it is "accessible to all those involved in the creative activity of making the artificial world" (p. 46) which, in effect, includes everyone. Businesses are beginning to learn to look for solutions in an innovative way that relies on reaching out to other disciplines to expand potential and design is increasingly being recognized as a strategic business resource. Major businesses, such as GE and IBM, have begun to invest in their own design capabilities (Muratovski, 2015, p. 121). Mintrom & Luetjens (2016) indicate that Design Thinking is looked to as a means of increasing the likelihood that public policies will have intended effects through "tapping the knowledge of targeted individuals, creating opportunities for significant public engagement of diverse perspectives, and prototyping interventions" (p. 395). Participant observation, open-to-learning conversations, conceptual mapping, and sensemaking are a sampling of concepts founded in design that are finding new application in business and government sectors (Design Council, 2013; Mintrom & Luetjens, 2016). In other words, "*design thinking* encourages business managers to shift from an analytic mindset to a generative, creative, and risk-taking one" (Burdick, 2010, p. 8). Design thinking is about empowering passive citizens and understanding their experiences and cannot be viewed simply as a means to an end. Mintrom & Luetjens

(2016) emphasize that the effectiveness of the approach is dependent of the user's understanding and intent (p. 299).

2.2.2 **Implications**

Enhanced understanding and valuation of design services by those outside of the professional design sector has potential economic, environmental, and social implications. A society that is uneducated in the consequences of design work that is poorly considered is an impediment to innovation (Monteiro, 2012; Norman, 2013; Scher, 2005) and will continue to unwittingly contribute to global issues of concern.

2.2.2.1 Economic Implications

A Danish report on the economic effects of design states that, "businesses and decision-makers have lacked relevant information on the effects of design on national and business economics" (NAEH, 2003). It provides statistical data that reflects increased gross revenues for Danish companies that purchase design and that increase design activity; a positive correlation between design and employment; and better gross revenue performances and higher marked exports for innovative companies. The report serves as a knowledge base that brings some of this information to light.

"Shaping Canada by Design" identifies the importance of design support for the Canadian economy in the following areas:

- corporate purchasing and strategic decision-making
- building domestic market share and new export markets

- international demand for Canadian design innovation
- research and development breakthroughs (Waterhouse, 1996)

The contributions of professional designers generate revenue and create employment; add value and enhance sustainability; create new knowledge and innovation; enhance community engagement and identity; and construct quality of place to fuel economic growth (Vinodrai, 2009, p. 4). As a strategic management tool in business, design further contributes to economic competitiveness (Muratovski, 2015; Vinodrai, 2009, p. 4).

Historically, design has not been recognized as an economic activity (Hobday, Boddington, & Grantham, 2011, p. 5). In response to this, both the Canadian report and the European policy plan put forth recommendations for quantifying the contribution of design to corporations, the general public, and to governments (SEE Platform, 2012; Waterhouse, 1996).

2.2.2.2 Environmental Implications

There is a need for radical change in the way we produce and live if we are to avoid an ecological disaster resulting from excessive standards of consumption. Across the globe, societies need to learn a better way of living that reduces our ecological footprint (Manzini, 2007). Design professionals are positioned to lead this charge in two ways: first, as the quintessential providers of the products which threaten to overtake us; and second, as those trained in solution-based thinking. To start, the designer needs to take

responsibility “for what they bring into, or take out of, being” (Fry, 2015, p. 418). In a time when the means of production is becoming increasingly available to the individual (i.e. at home 3D printers), this is no small task. The idea of consequence needs to come to the forefront for designers and non-designers alike. It is to this end that the second designer attribute can be employed. Design thinking “focuses on a changed or improved future” (Winter-Simat et al., 2017, p. 1656) and fuels the development of sustainability as it seeks to solve complex and ‘wicked’ problems’ through critical creativity. To be successful in and gain traction for change in our world, the establishment of a strong public perception of design thinking which supports the redirection of practice away from uncritical production is required.

2.2.2.3 Social Implications

Clive Dilnot (1982) points to design as “a social activity carried out for social ends” (p. 139). The solution-led approach of designers is well-suited to addressing issues through interdisciplinary conversation that brings everyone to the table (Cross, 2007). Working along “parallel lines of thought” (Cross, 2007), designers rely on the contributions of other knowledge sources to form the basis of their actions. Attempts to define design in terms of its relationship to art or science, or as a technical activity, lose sight of this social characteristic (Cross, 2007; Dilnot, 1982).

The unique way with which design professionals address wicked problems and solutions positions them to aid in addressing the wide range of wicked social problems including

poverty, affordable housing, health care, gun violence and racial intolerance, to name just a few. Design thinking involves the intertwining of abductive, deductive, and inductive reasoning in an interdisciplinary approach to problem solving (Pauwels et al., 2013, p. 58). Designers cannot solve the problems of the world on their own, however using design thinking they are equipped to make valuable contributions.

Unfortunately, the significance of the role of design in society is poorly understood by many – including the designers themselves. Design education does not teach that empathy and understanding drive the processes by which products are created because the market dictates that skills and know-how be emphasized (Winter-Simat et al., 2017, p. 1651). Design researchers can continue to propose solutions for reform in design education but until society learns to recognize the relevance of this change and redirect their own views of product outcome, the education system will continue to fuel the job-market. The social quality of design activity requires that if all those associated with the project comprehend the significance of the work, the outcome will be better.

The designer is well-positioned to lead the charge in pursuit of ill-defined economic, environmental and social concerns using the interdisciplinary approach of design thinking, however this approach is dependent on the user's understanding and intent (Mintrom & Luetjens, 2016, p. 299). Effective contribution to these issues through the design thinking approach requires that analytic process be set aside and that a level of risk-taking be embraced by all members of the team.

2.3 Literature Insights

Design research in the last two decades has made great progress in giving definition to professional design activity and providing a clarity by which designers can defend their process. It has identified far-reaching implications of design for society and proposed several means for expanding the knowledge and appreciation for design into education, government and business. While the process of integration into these areas has begun to manifest through the uptake of Design Thinking and 21st Century learning, the resulting impact to high-level management will not be apparent for years to come. To affect change at this level, current managers need to gain design knowledge retroactively, and they need to develop a desire to do so.

This literature review proposes economic, environmental, and social implications to address the question, 'why should they care?' while also acknowledging that inadequate understanding of design by society forms a break in the association of design with these concerns. Research and studies that promote design understanding for non-designers provide academic justification as to why non-designers might not perceive design as a valuable activity however little empirical data has been collected to support this claim. If asked, business managers may (correctly or not) respond that their understanding of design is more than adequate. Indications of misunderstanding that are construed from procurement practice and mis-aligned language could be founded on inward-looking premises by the design profession that miss other avenues to be explored in bridging the gap between business and design.

2.4 Literature Summary

This literature review highlights several issues associated with design understanding. Decades of research towards unravelling the complexities of design activity are aiding progress towards greater design understanding by society in support of addressing issues of global concern. Continued promotion of design understanding among key decision makers in corporations and businesses will help these individuals understand what it is that design professionals do and therefore strengthen the designers' capacity to contribute as members of the interdisciplinary design team.

3. METHODS

The methodology for this research is discussed below, followed by an introduction to the four different research methods that were used. Research design is then discussed in detail, outlining the design and data collection methods for each stage.

3.1 Mixed Method Approach

This study uses mixed-methods design to test design understanding through a quantitative survey and the qualitative design research method of card sorting. The methodology integrates the findings of multiple approaches using a two-stage equal status sequential-concurrent design, represented in Figure 3-1, to corroborate results through triangulation (Schoonenboom & Johnson, 2017). The first stage collects quantitative data through an online survey in order to provide an overview of the understanding among design by individuals within and outside of the design field. This method presents a variety of concepts related to design and samples a large group of people from a variety of backgrounds. The survey is also used to recruit participants in development of the subsequent phase. In the second stage, a select group of participants contribute to three qualitative methods, intended to substantiate the data collected from the quantitative results. Participants for this stage were chosen based on their association with either design or business management on a professional level, and willingness to participate. The research prioritized equal representation during the workshop of both groups to support comparative analysis of the data. The data from the quantitative study and the qualitative studies are analyzed independently and the

results of both are compared to see whether they yield the same results. The participant-selection variant of the mixed-methods approach (i.e. participant recruitment through the survey) prioritizes the qualitative phase in sequence, however each method was developed independently from the others. The methodology for this research was informed by Creswell's convergent-parallel approach and designed to develop a more complete understanding of the research problem by obtaining different but complementary data through a variety of methods (Ray, 2009).

QUAN → (QUAL + QUAL + QUAL)

Figure 3-1: Two-stage equal-status sequential-concurrent design

Two key rationales for performing mixed method research for this study have been identified from a list created by Alan Brynman (as cited in Schoonenboom & Johnson, 2017, p. 111). These include 1) Credibility, which refers to the suggestion that employing both approaches enhances the integrity of finding) and; 2) Diversity of Views. The mixed method approach addresses the second rationale in several different ways (Schoonenboom & Johnson, 2017, p. 111):

- learning from the different perspectives of designers and non-designers
- determining what works for whom and the relevance/importance of context
- Including/comparing multiple perspectives and data regarding design
- Explaining complexity

Where a survey provides the opportunity to sample many people, an in-person workshop that includes equal representation of participants who are knowledgeable about design and those unfamiliar with the profession, facilitates communication and dissemination of viewpoints between the two. By virtue of the linear and direct means by which survey questions present a concept, design must be distilled into distinct processes and contributions for the examination of understanding using this method. Conversely, the qualitative methods employed during the workshop present a holistic opportunity to consider design understanding in response to the complex and iterative nature of the subject.

3.2 Research Method

Figure 3-2 illustrates the mixed-method approach design for this study. The two stages are conceptualized as a Qualtrics online survey (stage 1/Method 1) and an in-person workshop (stage 2/Methods 2, 3, and 4). The first point of integration between methods occurs during the data collection stage of Method 1, where participants are recruited for stage 2. The point of extension of the mixed method process takes the form of a second stage consisting of three qualitative methods: 1) Closed card sort, with group participation; 2) Individual open card sort; and 3) Questionnaire. Data from each method is analyzed independently. A second point of integration occurs when results are combined and triangulated to provide insights in response to the research question.

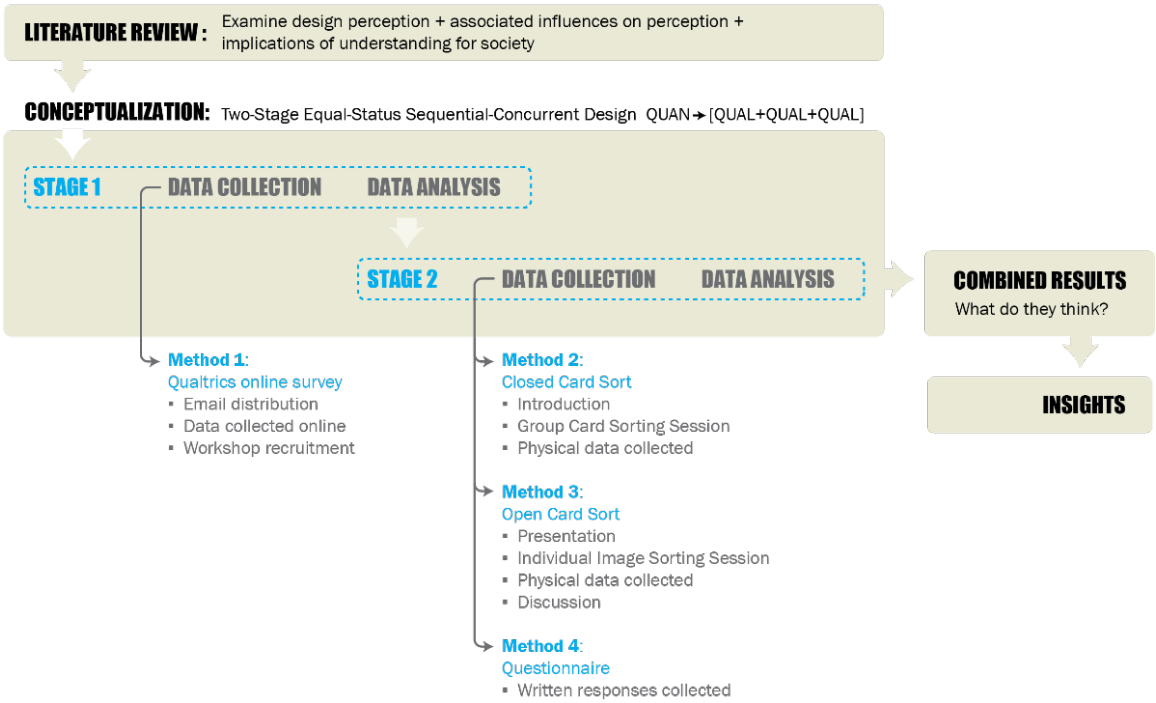


Figure 3-2: Methods Map

3.3 Research Design

The participation of individuals outside of the design sector was central to the development of this research. Design advocacy efforts focused on increasing the awareness of design by non-designers has lacked the validation that a gap in understanding does exist. Although design researchers have supported the concern through a dissection of design activity that determines it to be too closely associated to design outcome, complex in nature, and unique to all other disciplines, the resultant understanding by society has not been tested. To test the claim that there is a disparity between what professional designers understand their job to be and how non-designers

view the contributions of designers to the business sector, individuals from both within and outside of the design profession were included in the study.

3.3.1 **Participant Selection**

Business professionals, design professionals, and graduate or 4th-year students from the Sprott School of Business at Carleton University were recruited from contacts and associates of the research team. This purposeful sampling included those perceived to have had opportunity to gain some practical exposure within their field. Master of Design (MDes) students from the School of Industrial Design were also invited to participate to expand representation of the design professionals beyond the architects who largely represented this sector in the original invitation distribution. The email invitation to participate (Appendix B) contained a clickable link to the online survey and participants were encouraged to forward the information to any friends or colleagues whom they felt might also be willing to participate in support of this study.

At the end of the survey, participants were asked: *Would you like to receive information as to how you might contribute further in this study through participation in a 1-hour workshop?* Those who indicated 'yes' received an email with details regarding the workshop format, when and where it would take place, and a request to confirm participation (Appendix B). The workshop was designed to include an equal number of business and design participants, from varying backgrounds and levels of experience. Survey respondents who expressed interest in the workshop were recruited to satisfy

these criteria. A summary of workshop participants can be found in Section 4.2.1, Table 4-5.

3.3.2 **Stage 1: Survey**

In order to gain an appreciation of the understanding of the role of design professionals, a series of seventeen (17) questions about design and six (6) questions pertaining to respondent attributes was developed.

A Qualtrics Survey Software license was obtained through Carleton University for use in survey development and distribution. Data was collected using the web-based survey platform and analyzed using the software's tools for weighting and filtering responses.

3.3.2.1 Design

A cross-sectional survey titled 'Understanding Design' was designed to elucidate how design is perceived by society. Formulated on the basis of the research literature, the questions were aimed at gauging individual opinions about design in order to test the theory that the subject is inadequately understood by non-designers. An initial series of questions about attitudes, beliefs, and values associated with design was followed by a shorter series of questions pertaining to the attributes of the respondent (Stockemer, 2018, p. 37). The latter questions included previous exposure to design/designers,

working status, level of education, language, and gender, and were included to facilitate inferences about potential disparities in the responses.

The survey was comprised of twenty-three (23) closed-ended questions in total (Appendix C). The questions used the following fixed choice response formats: Likert Scale, Semantic Differential Scale, Multiple Choice, Rank Order, Matrix Table (Stockemer, 2018, p. 44). Where it was reasonable to do so, a neutral/don't know option was included to address the consideration that some respondents may know very little about the subject. Question content was informed by academic research literature on the topic of design. The survey was pretested by two professional designers and two business professionals for accuracy, comprehension, and flow. Both designers were practicing architects with 20+ years of experience in their field. One business professional was a chartered professional accountant (CPA) who has worked for 15+ years as Chief Financial Officer at a property management company. The fourth individual to pretest the survey was a Political Science professor familiar with social survey research methods. The survey was modified based on their feedback prior to distribution.

Opinion-based questions were organized to address general level of knowledge about the design profession, design, and designers at the beginning, followed by questions requiring more detailed/specific knowledge of design (Table 3-1).

Q1.2 to Q1.4	design as a profession	(4 questions)
Q1.5 to Q1.10	design and designers	(6 questions)
Q1.12 to Q1.13	design education	(2 questions)
Q1.11, Q1.14, Q1.15	design process	(3 questions)
Q1.16 to Q1.17	design considerations	(2 questions)

Table 3-1: Survey topic distribution

An introduction to the survey requested that respondents consider the subject as it might apply universally to all categories of design (i.e. industrial design, interior design, architecture, software design, fashion design, graphic design, to name a few).

3.3.2.2 Data collection methods

The survey questions were operationalized as both nominal and ordinal variables. In the ordinal variable questions, there is a linear progression and clear order to the categories by which to analyze the data (Stockemer, 2018, p. 50). Responses to nominal variable question types were analyzed through comparison of typical/dominant responses within each of three groups: business respondents (G1_BUSI), design respondents (G2_DESIGN), and (G3_OTHER). The 'Other' group was included in this method as a means to distinguish professional bias from more generally held opinion.

Ordinal Variable Questions (Likert Scale, Semantic Differential Scale, Matrix Table):
Q1.1, Q1.2, Q1.3, Q1.4, Q1.7, Q1.8, Q1.10, Q1.13, Q1.16, Q2.1, Q2.2, Q2.3
Nominal Variable Questions (Multiple Choice, Rank Order):
Q1.5, Q1.6, Q1.9, Q1.11, Q1.12, Q1.14, Q1.15, Q1.17, Q2.4, Q2.5

Table 3-2: Survey question variables

3.3.3 **Stage 2: Workshop**

The workshop was designed to bring designers and non-designers together for discussion and to collect qualitative data using two variations of the design research method of card sorting and an exit questionnaire. A graphic included on the following page provides a visual summary of the workshop activities (Figure 3-3).

Sorting tasks have been important in perception research (Blanchard & Banerji, 2016) and were selected to be used as an in-person method for collecting data on participant's perception of design. The method involves "presenting participants with images of common objects, people, or places and having them sort according to particular themes or criteria" (Kumar, 2013, p. 117). Previous research has demonstrated that a relatively small sample of participants for in-person card sorts can offer significant results (Last & Simmons, n.d.).

Sorts provide a flexible and intuitive means of research (Coxon, 1999) that is well suited to this study where participants with varying levels of exposure to the subject are involved. Coxon notes that, "organizing a set of things into a smaller number of groups is perhaps one of the most basic of cognitive and language processes" (Coxon, 1999). The task allows participants to instinctively respond to the images on the cards through a meta-level method of discovery (Coxon, 1999) and to formulate their own parameters without risk of "getting it wrong". The resultant data demonstrates, "the inferential relations that members of a given society commonly share about the things they select to observe" (Coxon, 1999). In addition to the applicability of the method to small-scale

perception studies, the card sort methods were chosen as a means to engage both designers and businesspeople in the topic of design in a way that allowed everyone to contribute intuitively and with ease.

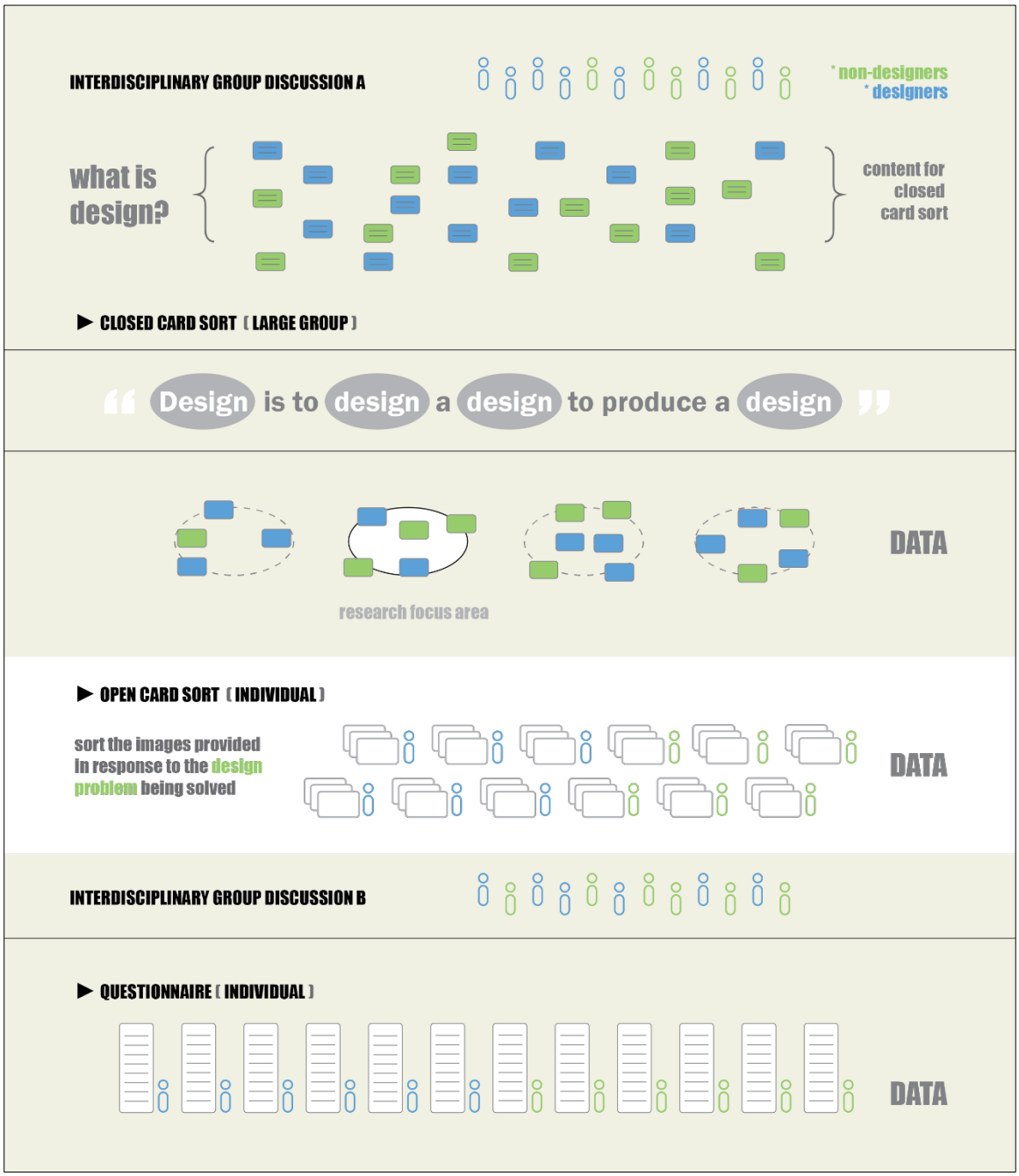


Figure 3-3: Workshop Summary Graphic

3.3.3.1 Design

Card sorting can be performed as open (where participants give you the names for the groups they create), closed (where they sort into groups you provide), and Q-sorts (where they sort related items into an order or ranking). An initial closed-sort group activity was designed to serve several functions: 1) to introduce the different ways of considering the word 'design'; 2) to familiarize the group with the sorting approach; and 3) to gain insight into the understanding of design by business participants in relation to design participants. Content for the closed-sort was generated by the participants, who were asked to write a list of words that came to mind in response to 'Design'. Each participant selected two words from their list to write on two 4x6 cards. The cards were printed with either a green or a blue border and distributed to participants based on their association with business (green) or design (blue) (Figure 3-4). These cards were collected from the group and shuffled by the researcher.

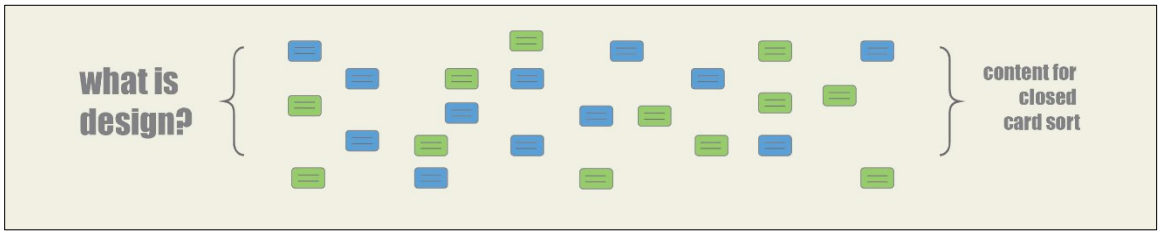


Figure 3-4: Closed Card Sort Content Generation

The researcher then presented four (4) sorting categories to the group, and the cards were pinned to the wall under pre-determined headings through group consensus (Figure 3-5). Through the use of colour-coded cards, the activity generated a visual representation of the differences in how 'Design' is considered by the business

participants versus the design participants. Additional details regarding this sorting activity can be found in section 4.2.2.

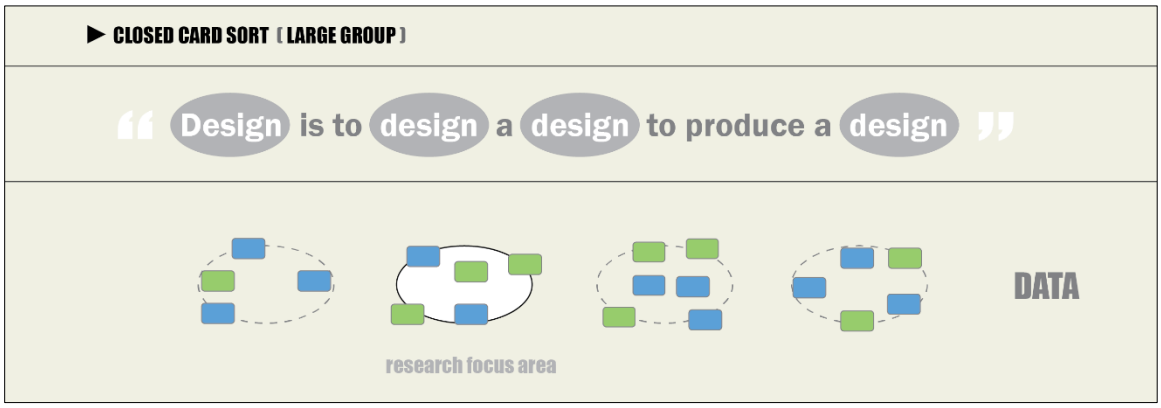


Figure 3-5: Closed Card Sort

An open-sort activity, chosen to elicit a 'natural' level of categorization (Coxon, 1999) from the participants, followed the closed card sort. This activity was performed individually by participants and involved the sorting of 35 images into categories using the criterion of similarity. The images were selected by the researcher and individually printed to produce identical decks of cards for distribution to each participant. To create the deck, full-colour 4"x6" images were printed on heavy-weight card-stock. The images were precisely cut out and the corners rounded so that the cards were consistently sized, durable, and pleasing to work with. A round sticker with a numeric code was adhered to the corner of each card. The code identified which deck the card belonged to and the image number that would be used to record the sort information.

Figure 3-6: Open-sort image cards

Where this research aims to compare the responses of two distinct groups of participants, the criteria for sorting the cards is not central to the task. The psychological connection of categorization with judgements of similarity (Blanchard & Banerji, 2016) suggests that sorting by the criteria of similarity can be done with relative ease by anyone. For this workshop, participants were asked to sort the deck of images into piles using the criteria of similarity (Figure 3-7). Participants were asked to label their piles only after the sort had been completed to minimize the tendency highlighted by researchers to sort only into categories that can be easily justified when simultaneous labeling is performed (Blanchard & Banerji, 2016). As in the closed-card sort, the research team distributed 4”x6” cards coded green (business) and blue (design) to participants corresponding to these groups. Participants created a label for each group using the cards provided, and recorded the images assigned to that label on the same card using the numeric code associated with each image.

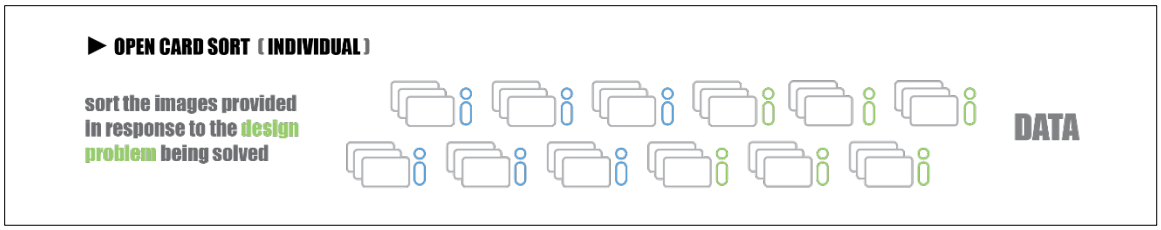


Figure 3-7: Open Card Sort

The topic of what images or content to include in a sorting exercise is not addressed in depth in literature on the method. At its most specific, "the items can come from many sources including user research, brainstorming, competitive evaluations, and task analysis" (http://usabilitybok.org/card-sorting). When selecting content, a laddering technique may be used to determine a hierarchy, through which entities within the same horizontal level in the hierarchy might be chosen. Entities from the upper tiers of the hierarchy are preferred for their likelihood of generating more abstract and general categories than those in lower categories which would share a variety of attributes (Rugg & McGeorge, 2005). Blanchard and Banerji (2016) indicate that concrete objects are more likely to be categorized on their basic-level perceptual features first, before semantic memory is searched for higher-level categorizations" (p.1321). These types of objects simplify the task for participants resulting in a more enjoyable session, whereas abstract concepts may be taxing (Blanchard & Banerji, 2016).

The images used in this research workshop were obtained through the royalty-free/ public domain section of the online image database Dreamstime (www.dreamstime.com) using the search category 'objects'. Images that had a singular man-made element of focus; varied levels of visual complexity; and a similar granularity (Spencer, 2004) were

chosen. These three criteria were developed to minimize confusion about what the intended subject matter of the image was; to promote thinking about the types of problem solving that might result in both a very minimal object and a complicated-looking object; and to present a consistent type of image for consideration.

The group of selected images were categorized by the dominant design sectors represented: signage, automotive, service, architecture, product design, interior design, and fashion design. Images were added or removed to ensure that each category was represented by at least two images. Two male subjects, aged 40 and 6, were asked to perform a sort of the cards as a pretest before a final decision was made by the researcher for which images to include. The pretest was performed to check for obvious omissions and how well each object can be recognized.

Research suggests that 20 to 60 images are recommended to keep the task manageable when performed in person, with 40 being the most common number used (Blanchard & Banerji, 2016; Coxon, 1999; Rugg & McGeorge, 2005). To fall within the suggested quantity of images, the researcher deleted redundant content within each category and incongruent imagery to reach a final image count of 35 (refer to Appendix D for images).

Participants were asked to sort the image cards in response to the design problem being solved as a way to distinguish design as an activity from design as a concept, intention, or result. Additional details regarding this sorting activity can be found in section 4.2.3.

At the end of the workshop, all participants received an exit questionnaire (Appendix D) (Figure 3-8). Four (4) opinion-based questions asked participants to reflect upon the information that was presented during the workshop. The initial two (2) questions were formatted in two parts: part 'a' was a closed-ended question related directly to the material presented; and part 'b' asked them to explain their response to part 'a'. The third question related to the impact of the workshop on the way in which the participant considers design. Part 'a' asked if it had an impact (yes/no), while part 'b' referenced the first closed-sort activity and asked the participant to write a new list of five (5) things that come to mind when he/she considers 'design'. Part 'c' asked them to explain any differences to their original list. The final question asked participants to identify if they are a professional designer (yes/no) so that the responses could be analyzed as a comparison between design and business participants.

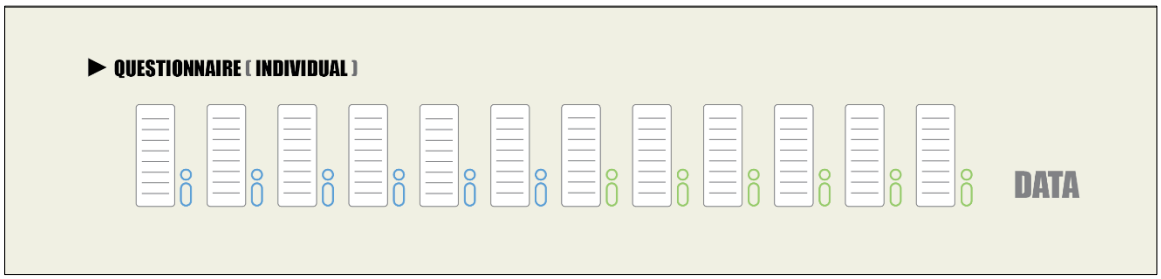


Figure 3-8: Questionnaire

3.3.3.2 Data collection methods

The workshop discussion and activities were photographed and observed by the research team. Results of the individual image sorting exercise were labelled and recorded by participants and collected, taking care to keep the sort piles intact for

verification. Hand-written notes were taken throughout the process to capture significant comments and actions.

Data collected through each of the three methods (closed sort, open sort, and questionnaire) was tabulated using Microsoft Excel and sorted into two groups based on the participant's identification with business (G1_BUSI) or with design (G2_DESIGN). This information can be found in Appendix E. The data within each group was analyzed for each method through an exploratory analysis of responses. G3_OTHERS were not represented in the workshop.

4. DATA COLLECTION AND ANALYSIS

4.1 Survey Summary

The survey was accessed via a clickable link contained in an email invitation distributed by the research team (Appendix B). Respondents who accessed the survey read through a written introduction that briefly explained the intent of the survey and thanked them in advance for their participation. The following page contained a link to download the survey consent form (Appendix A) that explained implied consent through submission of completed survey. Twenty-three (23) questions were displayed one at a time. Respondents were required to provide an answer for each question before they could proceed to the next. Following the last questions, survey respondents were informed that their response had been submitted and thanked for taking the time to participate. Generally, the survey took an average of 15 minutes to complete.

4.1.1 **Survey Participants**

Associates from within and outside of the design sector, professional (design) colleagues of the research team, and Master of Design (MDES) students in the School of Industrial Design were invited to participate in the survey. Master of Business Administration (MBA) and PhD students in the Sprott School of Business at Carleton University and fourth-year marketing students enrolled in BUSI4209A Consumer Culture Theory also received the invite. As previously indicated, professionals and graduate students were targeted based on their potential to have gained practical exposure within their respective fields of business and design. Figure 4-1 indicates that all but 7% of

participants (n=83) have completed a post-secondary education, with 24% of participants holding a professional designation.

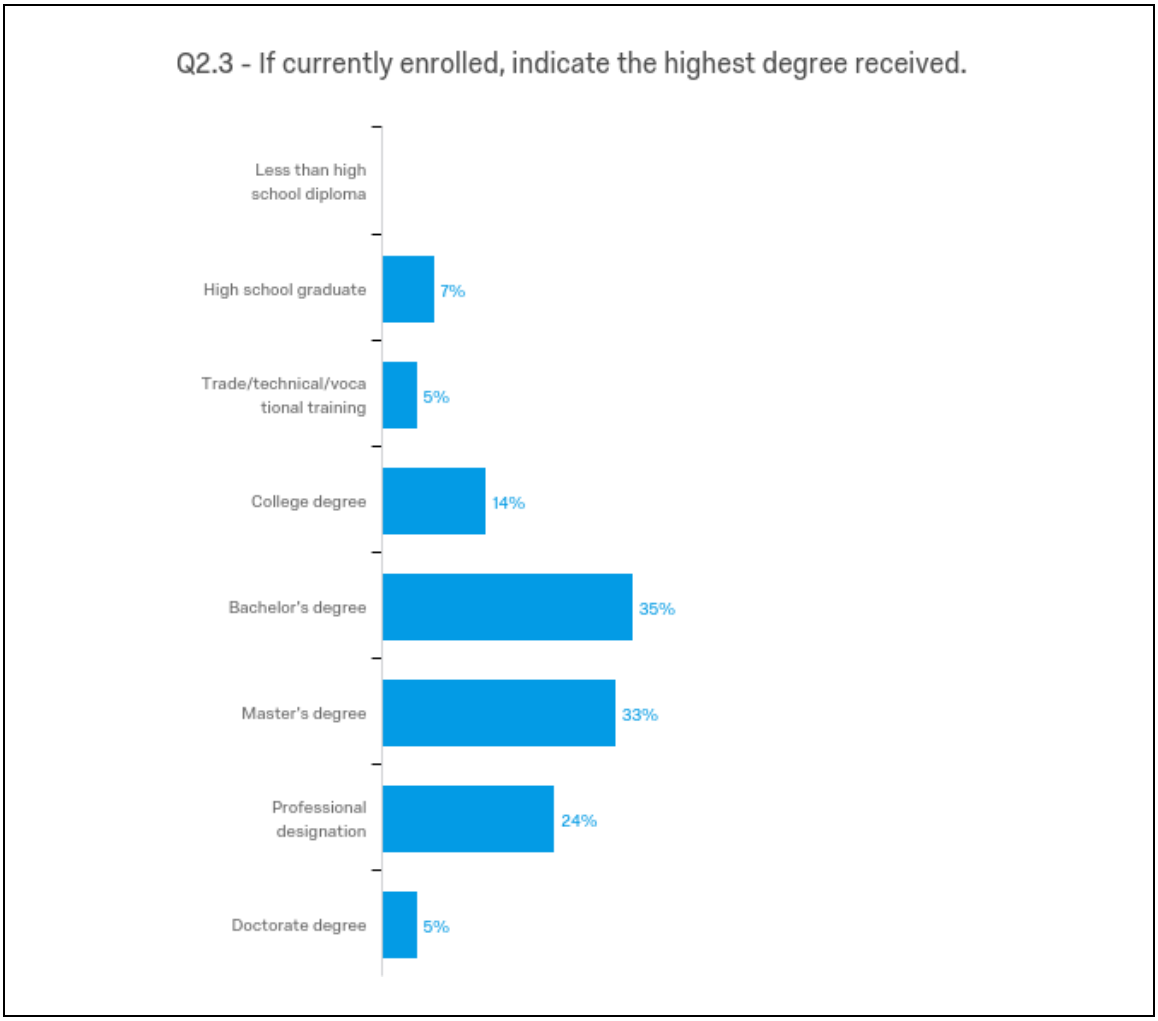


Figure 4-1: Education level completed by survey participants (Q2.3)

The survey questions did not ask respondents to self-identify as being from business, design, or 'other'. To form a basis for comparison between design and business, survey responses were categorized into the following three groups based on responses to Q1.1: *How well informed, if at all, would you say you are about each of the following professions?*

G1_BUSI	Business
G2_DESIGN	Architecture, Industrial Design/Product Design, UX Design
G3_OTHER	Medical, Engineering, Science, Law, Teaching

Table 4-1: Approach to respondent grouping

The distribution of responses to Q1.1 comprised of respondents indicating professions in which they are 'Very well' or 'Extremely well' informed is demonstrated in Figure 4-2.

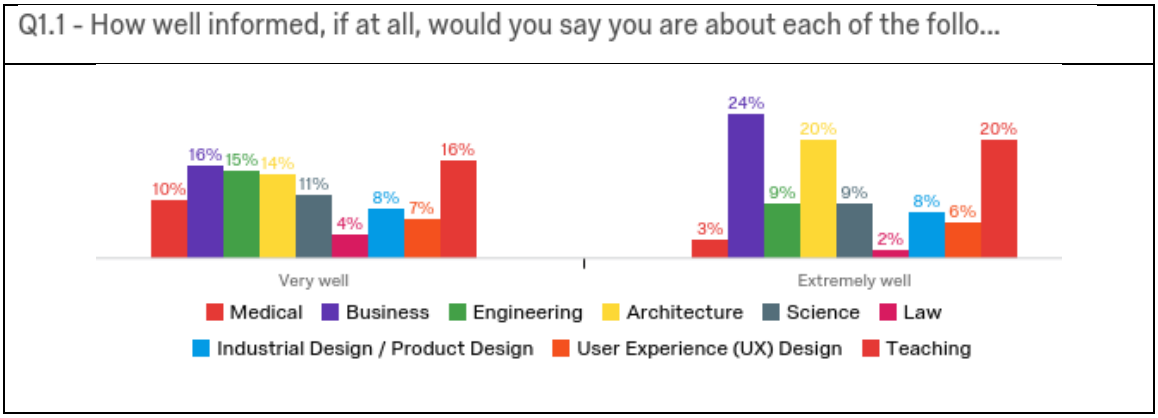


Figure 4-2: Distribution of respondents indicating 'Very well' and 'Extremely well' informed in the listed professions (Q1.1)

Categorization between the groups was further refined as follows:

- Respondents who indicated 'Very Well' for any of the design professions but indicated 'Extremely well' for the business profession were included in G1_BUSI.
- Respondents who indicated 'I am a professional designer' in response to *Q2.1: Which of the following applies to you?* were included in G2_DESIGN.

The results of this categorization formed the basis for comparison between design and business, with the following response breakdown:

G1_BUSI	31 respondents (9)	37.3%
G2_DESIGN	33 respondents (9)	39.8%
G3_OTHER	19 respondents (3)	22.9%

Table 4-2: Percentage of respondents in each group

The level of education completed by participants within each group can be seen in Table 3-1. The survey allowed respondents to select multiple answers, resulting in slight discrepancy between the number of survey respondents and the number of responses recorded in the table.

	G1_BUSI	G2_DESIGN	G3_OTHER
Less than high school diploma	0	0	0
High school graduate	3	1	2
Trade/technical/vocational training	1	2	1
College degree	2	7	3
Bachelor's degree	5	15	8
Master's degree	14	11	2
Professional designation	9	9	3
Doctorate degree	2	0	2

Table 4-3: Highest degree received (Q2.3)

4.1.2 **Method 1: Survey**

A total 111 participants received an email invitation to participate in the online survey (Appendix B). Of the 65 participants who initiated the survey, 54 submitted completed responses. Incomplete survey responses were not included in the results. Participants

who received the email invitation were encouraged to forward an anonymous link to the survey to any of their contacts who might be interested in the subject. 29 responses were collected by anonymous link. In total, 83 completed survey responses were collected.

The initial email distribution took place on March 9th, 2019. Invitees were requested to complete their survey responses by March 15th, at which time survey response collection was deactivated. The anonymous link was distributed by the Sprott School of Business to an indeterminate number of 4th year, PhD and MBA students within the school on March 9th and March 12th.

S	M	T	W	T	F	S
March 2019						
						9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						
April 2019						
	1	2	3	4	5	6

Active response collection Inactive response collection

Table 4-4: Survey response collection period

Ongoing interest in the survey prompted reactivation of survey response collection beyond the initial one-week time frame. A second mass distribution took place on March 29th and included 17 contacts. Total response collection took place over a 25-day period, with response collection paused for 8 days (Table 4-4).

4.1.2.1 Survey Results

The following is an analysis of survey responses to the seventeen (17) questions asked in relation to design understanding for the design profession, designers, and design. The analysis has been grouped according to the topic distribution discussed in section 3.3.2.1.

Q1.1 to Q1.4: Design as a Profession (4 questions)

The initial four survey questions explore level of understanding for design as a profession in general, in terms of the different design sectors, and in relation to understanding for business.

Q1.1 How well informed, if at all, would you say you are about each of the following professions?

- 39% (n=13) of G2_DESIGN participants indicated 'Extremely Well' and 45% (n=15) indicated 'Very Well' informed about Architecture; 39%(n=13) indicated 'Very Well' informed about Engineering
- G3_OTHER participants indicated greatest familiarity with Teaching (29% (n=2) 'Extremely Well', 26% (n=5) 'Very Well'). 79% (n=15) indicated that they were 'Somewhat Well' informed about Business.

Q1.2 In your opinion, how well informed would you say designers are about the business profession, on a scale of 1 to 5? (1: not well informed, 5: extremely well informed)

- 0% of the respondents in G1_BUSI and G3_OTHER and only 3.03% (n=1) in G2_DESIGN indicated that designers are 'extremely well informed' (5/5) about the business professions
- 35.48% (n=11) of G1_BUSI and 31.58% (n=6) of G3_OTHER indicated that designers are well informed (4/5) about the business profession while only 21.21% (n=7) of G2_DESIGN indicated this.
- 51.52% (n=17) of G2_DESIGN and 48.39% (n=15) of G1_BUSI indicated that designers are informed to a mid-range (3/5) about the business profession.

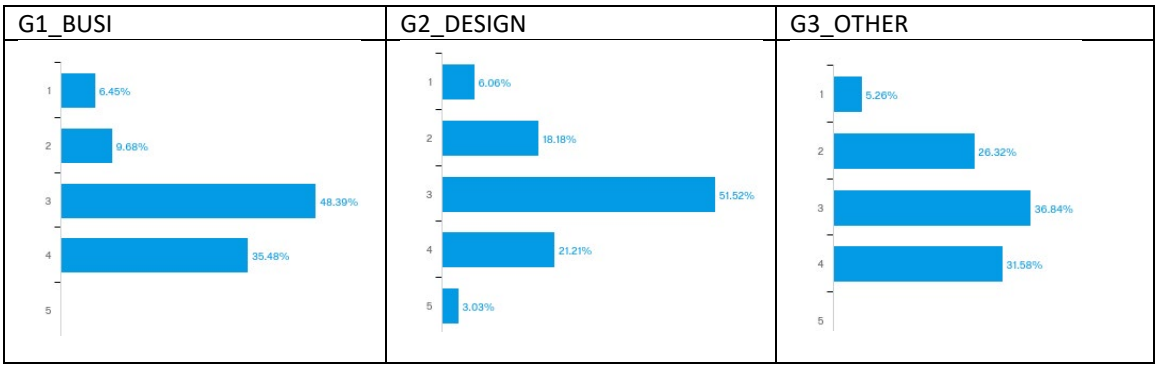


Figure 4-3: In your opinion, how well informed would you say designers are about the business profession, on a scale of 1 to 5? (Q1.2)

Q1.3 How much would you say you know about design as a profession, on a scale of 1 to 5? (1: Nothing at all, 5: Very detailed knowledge of)

- 0% of G1_BUSI and G3_OTHER rated their knowledge of design as a profession = 5 (Very detailed knowledge of)
- 0% of the respondents in G3_OTHER rated their knowledge of design as a profession > 3 (detailed knowledge)

- 81.82% (n=27) of G2_DESIGN rated their knowledge of design as a profession > 3 (detailed knowledge)
- 38.71% (n=12) of G1_BUSI rated their knowledge of design as a profession < 3 (low level knowledge)
- 68.42% (n=13) of G3_OTHER rated their knowledge of design as a profession < 3 (low level knowledge)

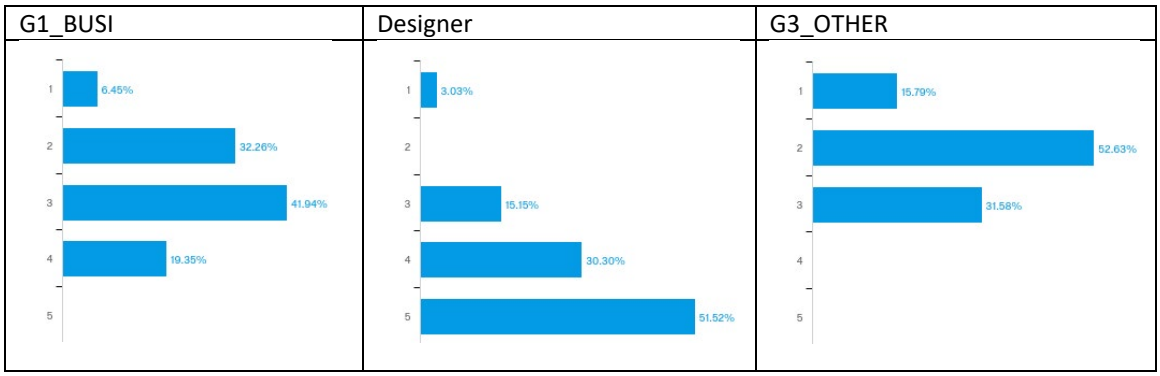


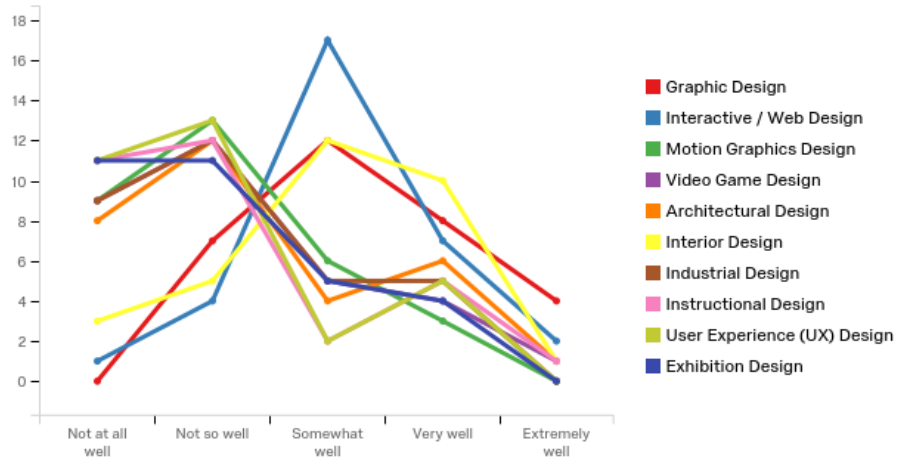
Figure 4-4: How much would you say you know about design as a profession, on a scale of 1 to 5?(Q1.3)

Q1.4 How well do you understand the following design professions in terms of the services they provide and the work that they do to provide those services?

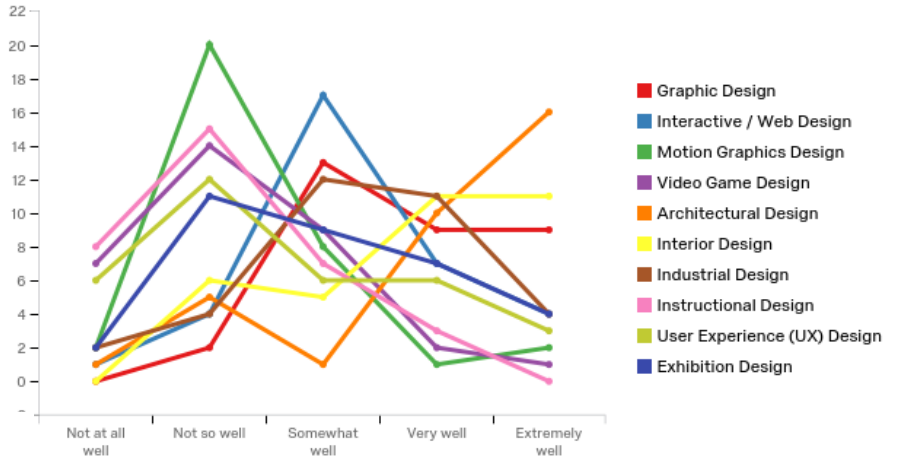
- The greatest percentage of respondents (>33%) in G1_BUSI and G3_OTHER indicated understanding 7/10 design professions 'Not So Well'
- Graphic Design and Interactive/Web Design reflected the highest level of understanding, 'Somewhat Well', by G1_BUSI and G3_OTHER, followed by Interior Design
- Instructional Design and Motion Graphics Design reflected the lowest level of understanding by all groups

- 0% of G3_OTHER indicated understanding any design profession ‘extremely well’
- 79% (n=26) of G2_DESIGN indicated understanding Architectural Design ‘Very Well’ or ‘Extremely Well’ and 67% (n=22) indicated understanding Interior Design either ‘Very Well’ or ‘Extremely Well’

G1_BUSI



G2_DESIGN



G3_OTHER

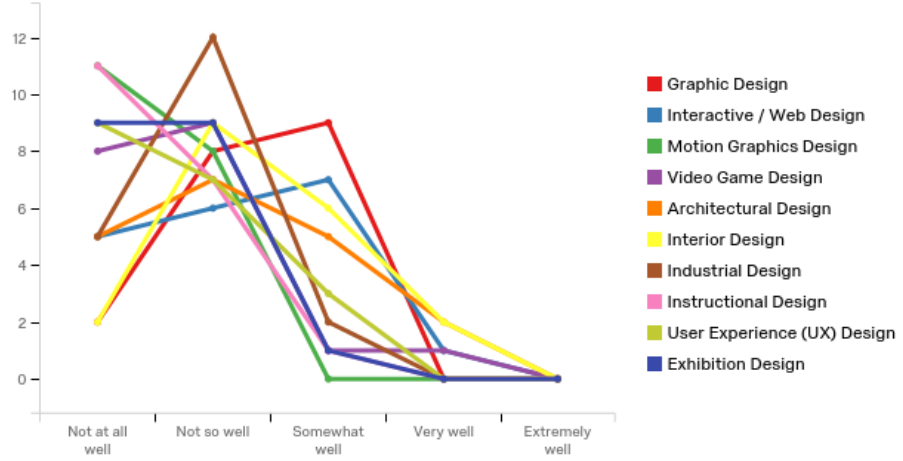


Figure 4-5: How well do you understand the following design professions in terms of the services they provide and the work that they do to provide those services? (Q1.4)

Findings:

Q1.1 approaches the understanding of design in comparison to other professions, with the highest level of understanding amongst respondents indicated for Business, followed by Architecture and Teaching (Figure 4-2). The lowest level of understanding was for Law, Medical, and UX Design. Non-designers (G1_BUSI and G3_OTHER) indicate that designers are better informed in business than designers themselves indicate (Figure 4-3). Designers (G2_DESIGN) show a mid-range understanding of the business profession. Q1.3 asks how much respondents know about design as a profession. Predictably, Designers indicate that they possess a very detailed knowledge of the profession while the majority of those outside of this group indicate a low-level of knowledge. The final question in this section asks how much respondents know about the services that designers provide within the different design sectors. Non-designers (G1_BUSI and G2_OTHER) indicated the greatest level of understanding (Somewhat Well) for Graphic Design and Interactive/Web Design while G2_DESIGN indicated the highest level of understanding for Architectural (79% (n=26) either 'Very Well' or 'Extremely Well'). The finding from this question is discussed further in Section 5.1.7 Insight 5. Instructional Design reflected the lowest level of understanding by all groups.

Q1.5 to Q1.10: Design and Designers (6 questions)

The next six (6) survey questions explore the level of understanding that respondents have for design and what designers do. Two questions related to where information regarding Design and Designers is obtained inform what influences design

understanding. A series of statements regarding Design and Designers are presented in the subsequent four questions to gain insight into what participants value in the design process.

Q1.5 If you wanted to learn more about Design, where might you search for information? *select all that apply*

- All groups indicated 'Ask designers I have met / I know' and 'Internet' as the top two places to search
- G1_BUSI and G3_OTHER both indicated 'Ask designers I have met / I know', 'Internet', and 'Friends and Family' as the top three places to search; G3_OTHER also indicated 'University/Colleges/Lecturers'
- G2_DESIGN indicated the highest variety of places to search and included 'Work Colleagues' and 'Library / books' (neither of which were selected by a significant percentage of either of the other groups), in addition to 'Ask designers I have met / I know', 'Internet', and 'University/Colleges/Lecturers'
- 'Friends and Family' was not selected as one of the top places to search by a more than 10% of G2_DESIGN respondents
- 'Magazines', 'TV or Radio programmes', 'School/Teachers', and 'Other' were not selected by more than 10% of any group

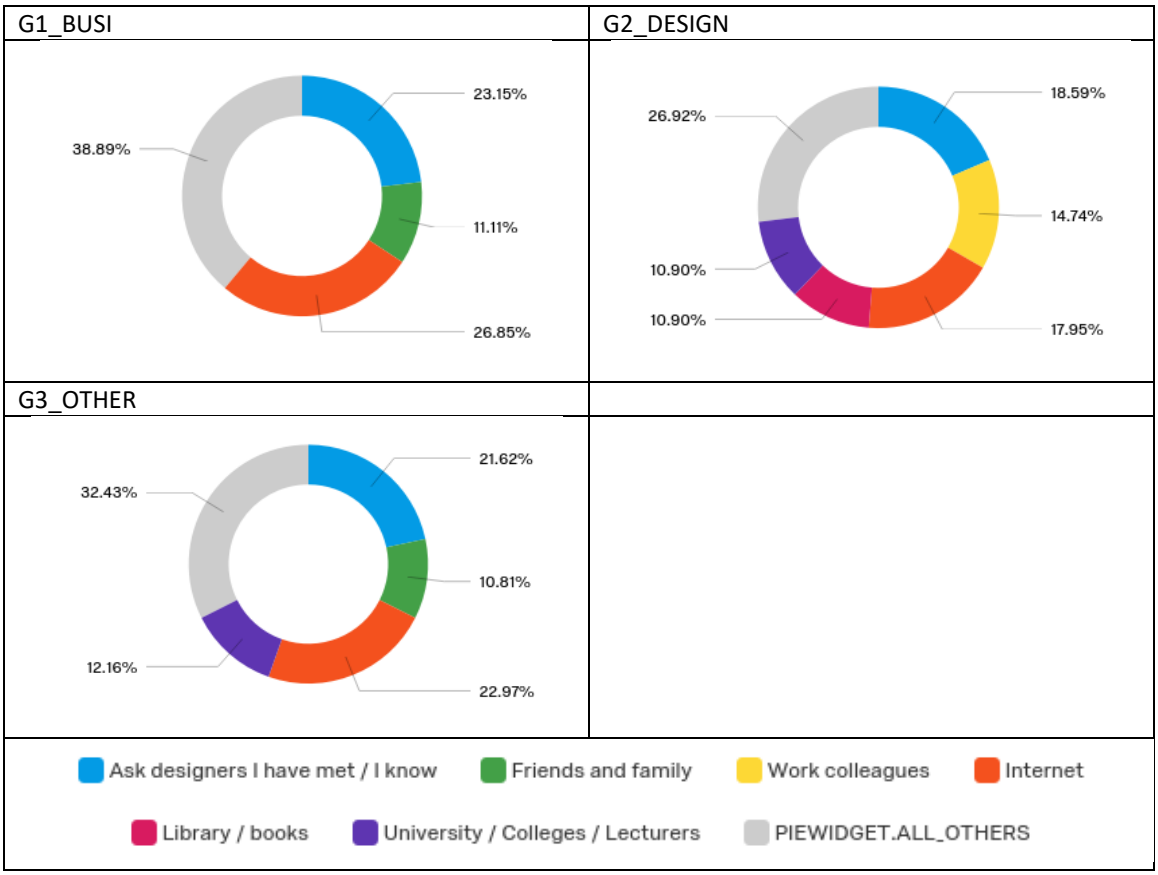


Figure 4-6: If you wanted to learn more about Design, where might you search for information? select all that apply (Q1.5)

Q1.6 If you wanted to learn more about what Designers do, where might you search for information? *select all that apply*

- All groups indicated 'Ask designers I have met / I know' and 'Internet' as the top two places to search
- G2_DESIGN and G3_OTHER also indicated 'University / Colleges / Lecturers'
- G2_DESIGN indicated the highest variety of places to search and included a fourth option of 'Work Colleagues' which was not selected by a significant percentage of either of the other groups

- ‘Friends and family’, ‘Magazines’, ‘Library/Books’, ‘TV or Radio programmes’, ‘School/Teachers’, and ‘Other’ were not selected by more than 10% of any group

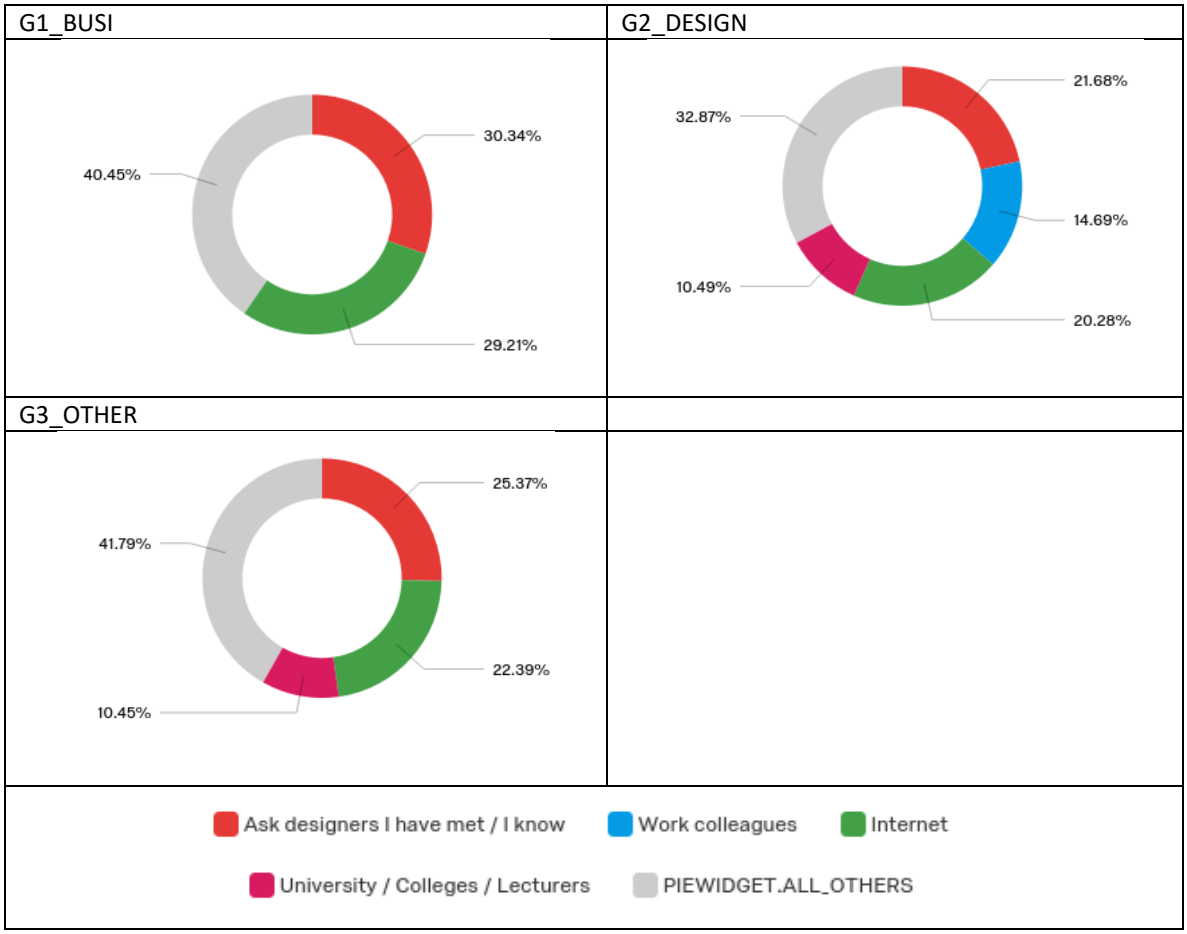


Figure 4-7: If you wanted to learn more about what Designers do, where might you search for information? select all that apply (Q1.6)

Q1.7 To what extent do you agree or disagree with the following statements about designers?

- G2_DESIGN indicated the strongest level of disagreement for ‘Designers are paid too much’ (52%, n=17); G1_BUSI and G3_OTHER ‘Neither agree nor disagree’ with this statement

- G1_BUSI indicated the strongest level of disagreement for ‘Design talent comes naturally’ (52%, n=16); 42% (n=8) of G3_OTHER ‘Somewhat agree’ with this statement and G2_Design ‘Somewhat agree’ (39%, n=13) or ‘Neither agree nor disagree’ (39%, n=13)
- G3_OTHER indicated the strongest level of disagreement for ‘Designers don’t understand real people’ (42%, n=8). Responses by both G1_BUSI and G2_DESIGN are distributed to a similar degree between ‘Strongly disagree’, ‘Somewhat disagree’, and ‘Neither agree nor disagree’.
- 68% (n=13) of responses by G3_OTHER indicate that ‘Designers are good at drawing’, while G1_BUSI ‘Neither agree nor disagree’ (55%, n=17) and G2_DESIGN ‘Neither agree nor disagree’ (30%, n=10) or ‘Somewhat agree’ (36%, n=12)
- All groups ‘Strongly agree’ with ‘Designers make things look good’ (G1_BUSI (58%,n=18), G2_DESIGN (61%, n=20), G3_OTHER (47%, n=9).

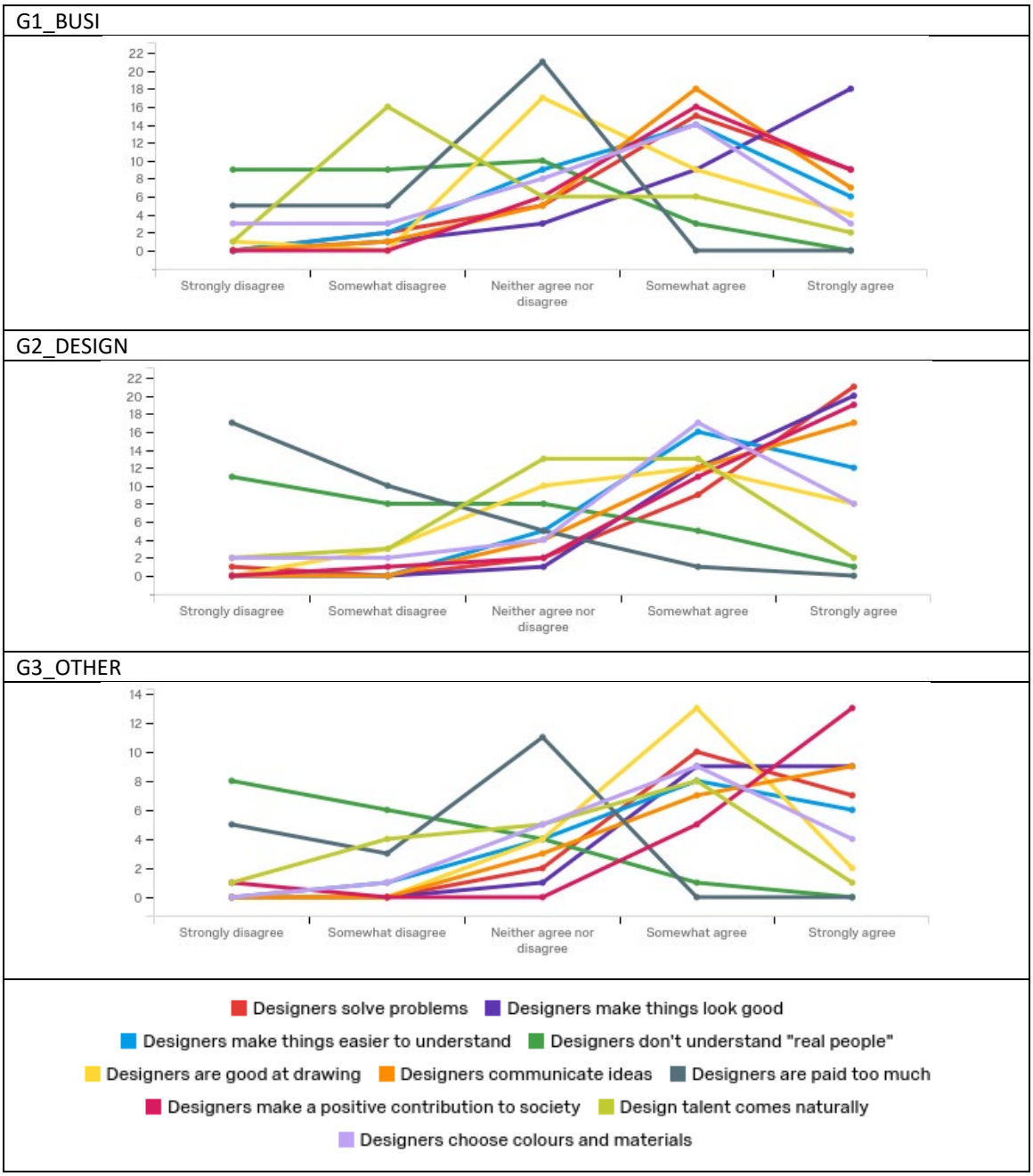


Figure 4-8: To what extent do you agree or disagree with the following statements about designers? (Q1.7)

Q1.8 To what extent do you agree or disagree with the following statements about design?

- All groups 'Strongly disagree' with 'Design is a waste of money'. G2_DESIGN (36%, n=12) and G3_OTHER (58%, n=11) also 'Strongly disagree' with 'Anyone can design'. G1_BUSI 'Somewhat disagree' with this statement (45%, n=14).
- All groups 'Somewhat disagree' with 'The design process starts once the client knows what he/she wants'
- All groups 'Strongly agree' with 'Design is important'. G2_DESIGN (73%, n=24) and G3_OTHER (84%, n=16) also 'Strongly agree' with 'Design is valuable'. G1_BUSI 'Somewhat agree' with this statement (54%, n=17).

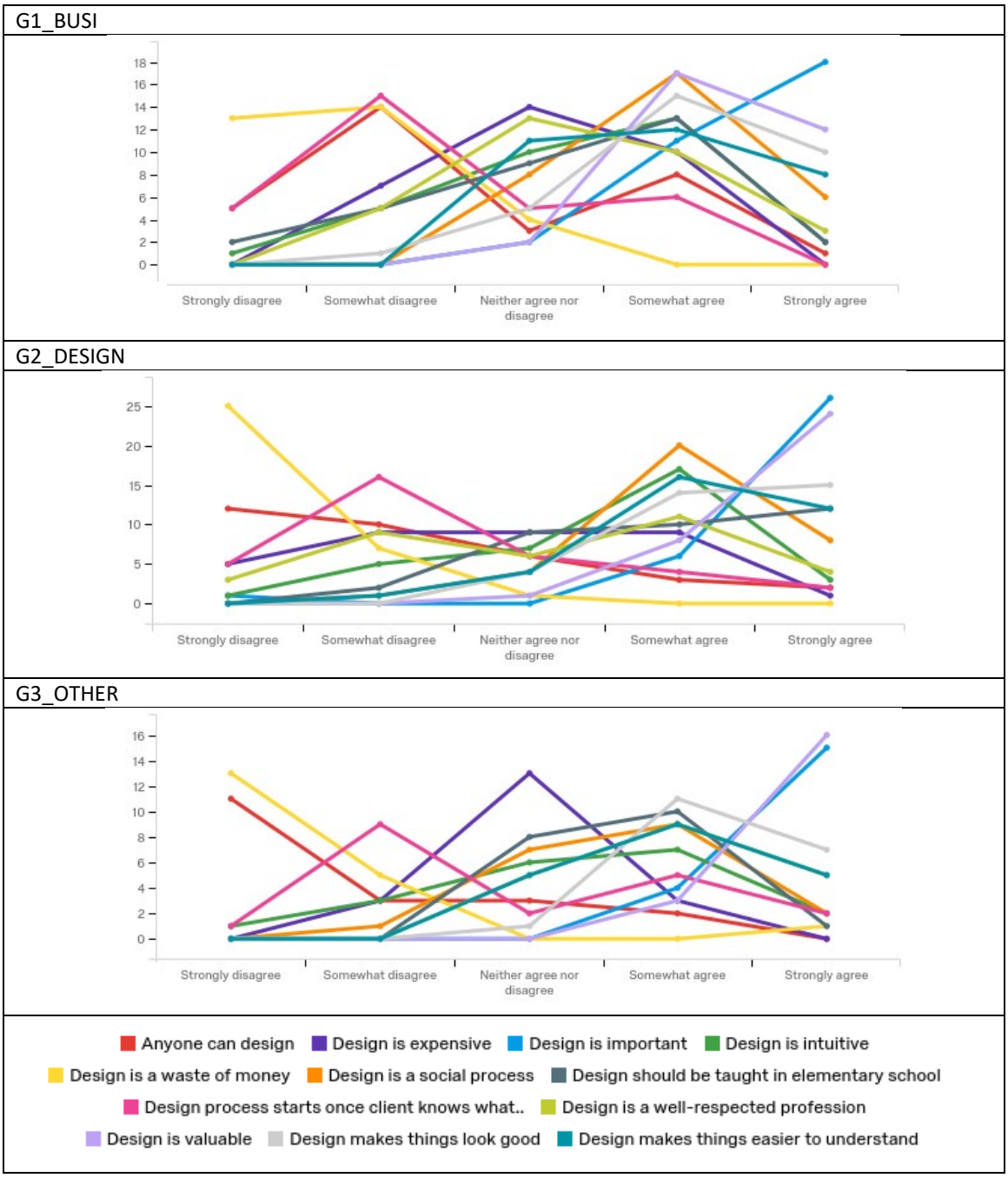


Figure 4-9: To what extent do you agree or disagree with the following statements about design? (Q1.8)

Q1.9 On the series of 1 to 5 rating scales listed below, where would you rank the following statement? *"The work of a designer is..."*

- G2_DESIGN and G3_OTHER tended show the highest response percentage at mid-range (3/5) for 4 of 6 statements
- Where responses indicated consensus in one direction or the other this direction was the same amongst all 3 groups
- G1_BUSI indicated high percentage one way or the other for three of six statements: Collaborative (4), Fluid (4), and to make clear (2)

G1_BUSI

AWA.FIELD	1		2		3		4		5	
Independant (1) Collaborative (5)	3.23%	1	9.68%	3	12.90%	4	41.94%	13	32.26%	10
Intuitive (1) Intellectual (5)	3.23%	1	16.13%	5	58.06%	18	22.58%	7	0.00%	0
Linear (1) Reiterative (5)	0.00%	0	3.23%	1	41.94%	13	38.71%	12	16.13%	5
Structured (1) Fluid (5)	0.00%	0	9.68%	3	32.26%	10	41.94%	13	16.13%	5
to make clear (1) to conceal (5)	9.68%	3	41.94%	13	38.71%	12	9.68%	3	0.00%	0
easily defined (1) vague (5)	6.45%	2	29.03%	9	38.71%	12	22.58%	7	3.23%	1

G2_DESIGN

AWA.FIELD	1		2		3		4		5	
Independant (1) Collaborative (5)	0.00%	0	6.06%	2	30.30%	10	33.33%	11	30.30%	10
Intuitive (1) Intellectual (5)	0.00%	0	9.09%	3	57.58%	19	27.27%	9	6.06%	2
Linear (1) Reiterative (5)	0.00%	0	0.00%	0	45.45%	15	33.33%	11	21.21%	7
Structured (1) Fluid (5)	6.06%	2	12.12%	4	42.42%	14	30.30%	10	9.09%	3
to make clear (1) to conceal (5)	33.33%	11	30.30%	10	27.27%	9	6.06%	2	3.03%	1
easily defined (1) vague (5)	15.15%	5	27.27%	9	42.42%	14	12.12%	4	3.03%	1

G3_OTHER

AWA.FIELD	1		2		3		4		5	
Independant (1) Collaborative (5)	0.00%	0	0.00%	0	47.37%	9	21.05%	4	31.58%	6
Intuitive (1) Intellectual (5)	0.00%	0	5.26%	1	57.89%	11	36.84%	7	0.00%	0
Linear (1) Reiterative (5)	5.26%	1	5.26%	1	26.32%	5	31.58%	6	31.58%	6
Structured (1) Fluid (5)	5.26%	1	5.26%	1	42.11%	8	31.58%	6	15.79%	3
to make clear (1) to conceal (5)	26.32%	5	36.84%	7	26.32%	5	5.26%	1	5.26%	1
easily defined (1) vague (5)	0.00%	0	21.05%	4	73.68%	14	0.00%	0	5.26%	1

Figure 4-10: On the series of 1 to 5 rating scales listed below, where would you rank the following statement? "The work of a designer is..." (Q1.9)[6]

Q1.10 How involved do you think designers are in the following areas of work?

- All groups indicate 'Very involved' for Construction, Manufacturing, and Entertainment; All groups indicate 'Not very involved' for Law

Findings:

Questions Q1.5 and Q1.6 ask respondents where they might search for information regarding the topics of design and designers. Results were filtered to a performance threshold of 10%, with options below this threshold categorized as 'other'. For design, 'Ask designers I have met / I know' and 'Internet' were indicated as the top two places to search within all groups. To learn more about designers, all groups again indicated 'Ask designers I have met / I know' and 'Internet' as the top two places. These findings are discussed further in section 5.1.8 Insight 6. For both questions, G2_DESIGN provided the greatest variety of places to search. Q1.7 and Q1.8 elaborate on the prior two questions through a series of specific statements about Designers and Design. All groups responded similarly to statements about Design in Q1.8, however statements about Designers reflected less consensus beyond strong agreement from all groups for 'Designers make things look good'. Q1.9 explores some of the qualities of design work. Responses from G2_DESIGN and G3_OTHER tended show the highest percentage at mid-range (3/5), with consensus in one direction or the other being the same amongst

[6] During the thesis examination it was pointed out that the term "intellectual" might be considered differently by different people. The intent was to consider the term in opposition to "intuitive" and therefore "rational" might have been a better choice for this question. Thank you to the examiners for pointing this out to me.

all groups. G1_BUSI indicated high percentage one way or the other for three of six statements. Responses to Q1.10 “How involved do you think designers are in the following areas of work?” were consistent amongst all three groups and indicated a high level of involvement with Construction, Manufacturing, and Entertainment and a low level of involvement with Law. The similarity among responses provided by the participant groups is discussed in section 5.1.1 Insight 1.

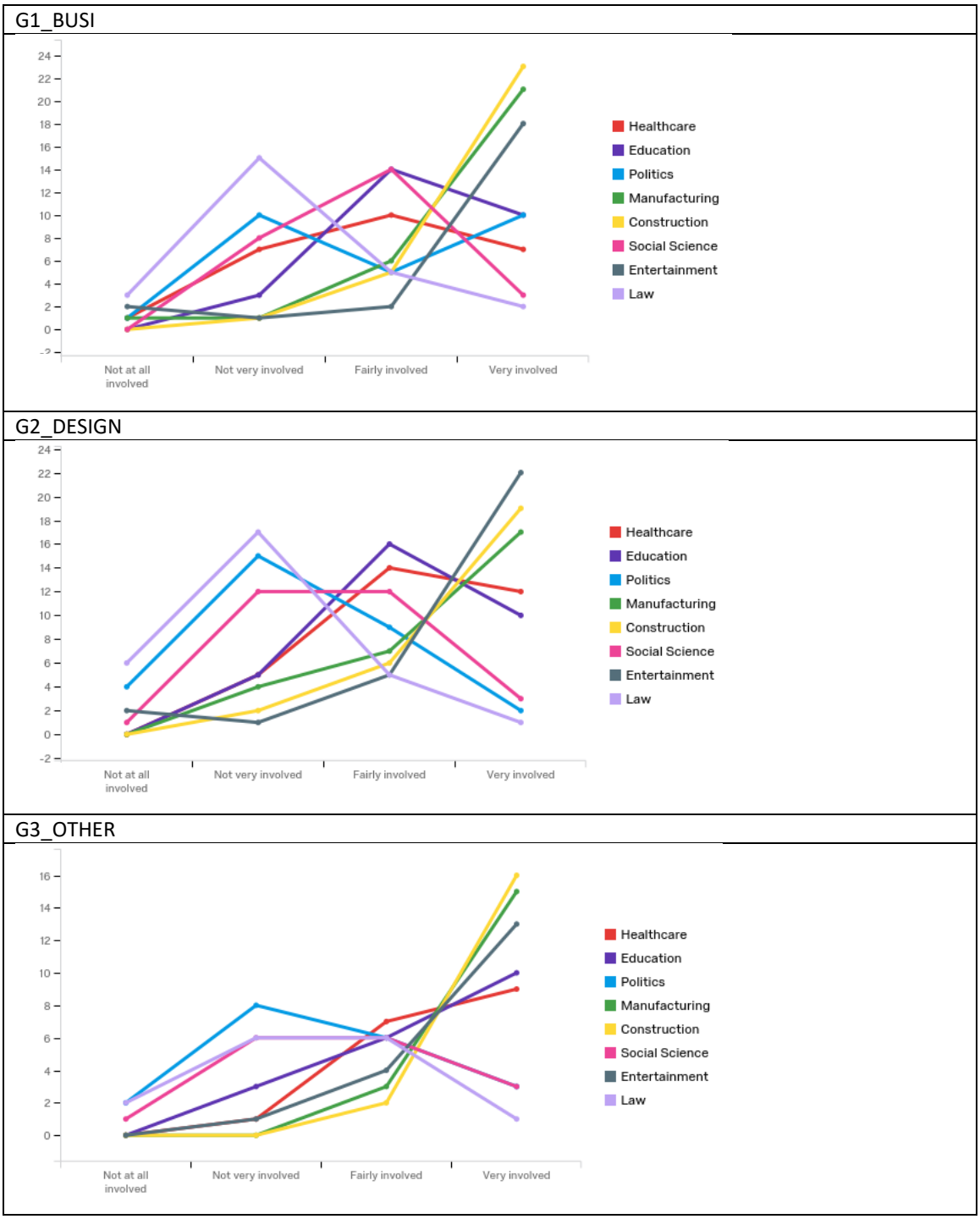


Figure 4-11: How involved do you think designers are in the following areas of work? (Q1.10)

Q1.12 to Q1.13: Design Education (2 questions)

Questions related to design education were asked to gain insight into how non-designers perceive the process in comparison to design professionals.

Q1.12 Select the top three activities that you perceive to be relevant to design education, in terms of teaching students:

- All groups indicated 'design skills', 'visual communication' and 'problem solving' as the top three activities relevant to design education
- All groups indicated 'technical skills' as a top three relevant activity by a significant percentage (>10%)
- G1_BUSI also indicated 'collaboration' as a top three relevant activity by a significant percentage (>10%) and 9% of G1_DESIGN indicated same.

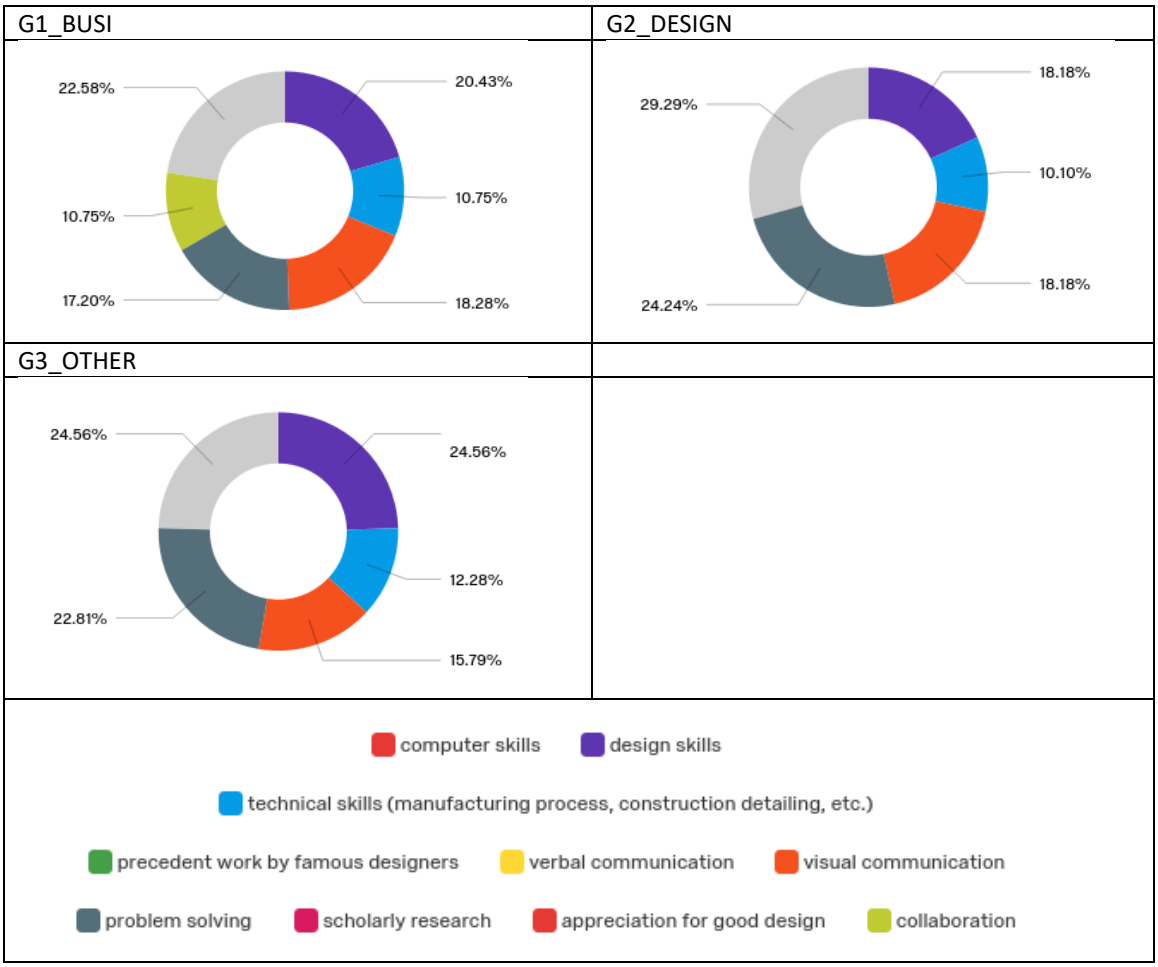


Figure 4-12: Select the top three activities that you perceive to be relevant to design education, in terms of teaching students (Q1.12)

Q1.13 Relative to other professional post-secondary programs (i.e. Engineering, Medicine, Law, Business, etc.), how demanding are Design Education programs?

- G3_OTHER indicated that Design Education programs are more demanding than G1_BUSI indicated
- G2_DESIGN indicated that Design Education programs are more demanding than either of the other two groups indicated

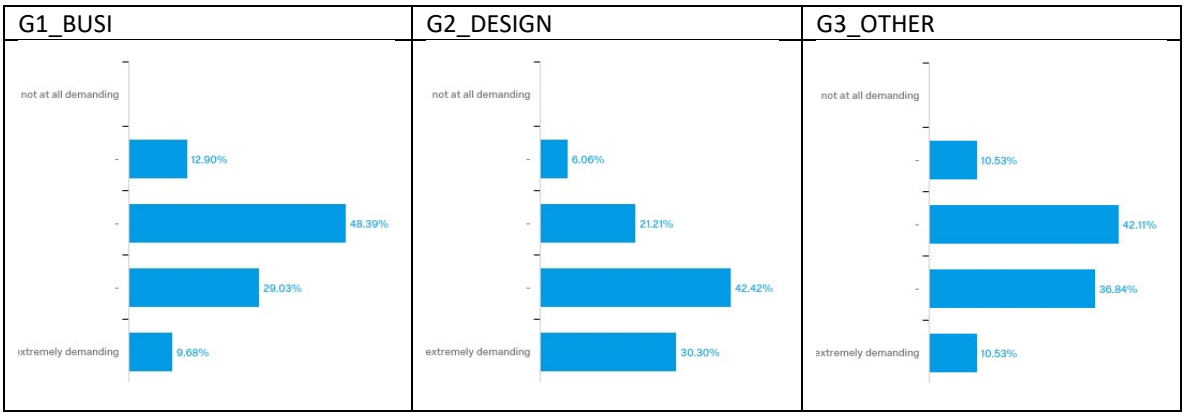


Figure 4-13: Relative to other professional post-secondary programs (i.e. Engineering, Medicine, Law, Business, etc.), how demanding are Design Education programs? (Q1.13)

Findings:

When asked about activities perceived to be relevant to design education, all groups indicated 'design skills', 'visual communication' and 'problem solving' as the top three selections, followed by 'technical skills'. Responses to how demanding Design Education programs are varied between the three groups with G2_DESIGN indicating the highest level of demand and G1_BUSI indicating the lowest level. This finding is discussed in section 5.1.1 Insight 1.

Q1.11, Q1.14, Q1.15: Design Process (3 questions)

Design understanding was further explored through three (3) questions which asked respondents to indicate the relevance of different activities to the design process.

Q1.11 Rank Activities in order of what you perceive to be most relevant to the design process: Research, Communication, Drawing, Coordination, Innovation

- All groups ranked Communication #1 and Drawing #5,
- G1_BUSI ranked Research #3, Coordination equally at #3 and #4, and Innovation #4

- G2_DESIGN and G3_OTHER ranked Research #2, Innovation #3, and Coordination #4

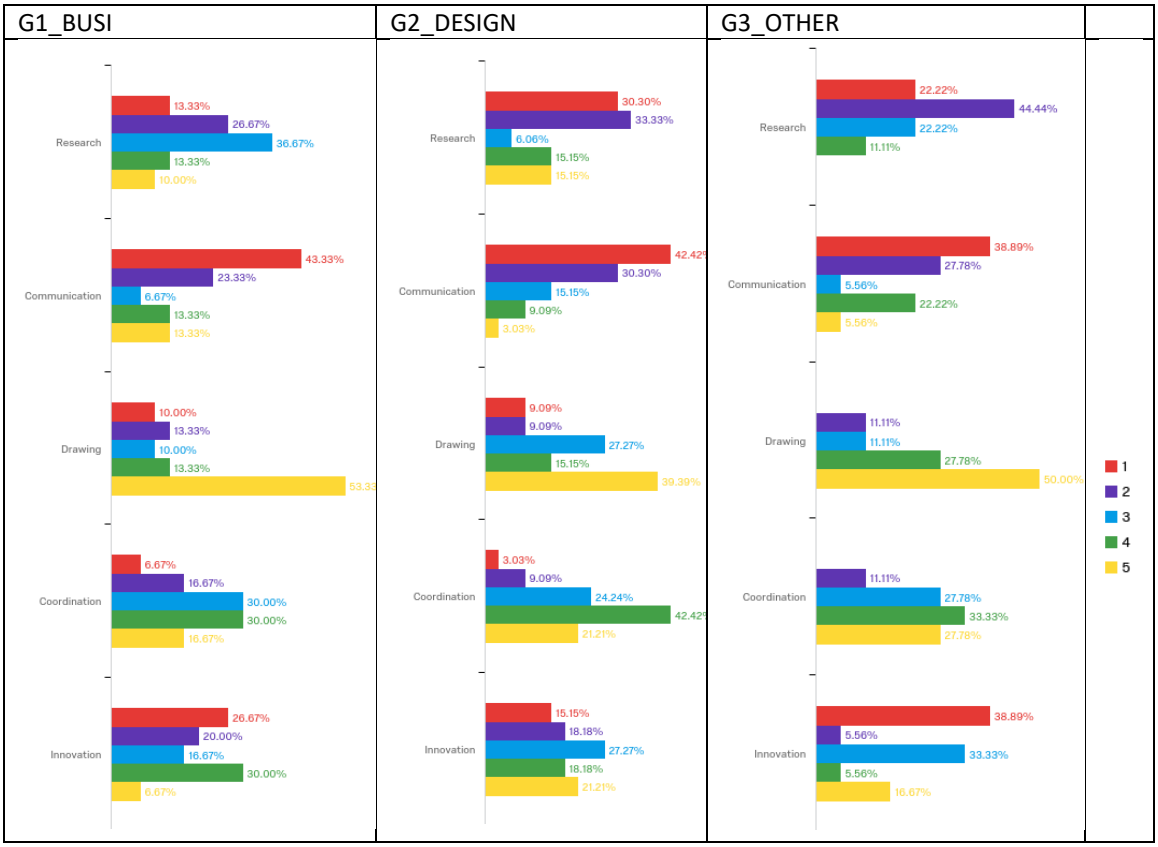


Figure 4-14: Rank Activities in order of what you perceive to be most relevant to the design process (Q1.11)

Q1.14 In your opinion, designers use models / drawings to: Communicate ideas; Represent final design; Test alternatives; Show off skills; Explore ideas; Market ideas (*select all that apply*)

- All groups provided similar response distribution

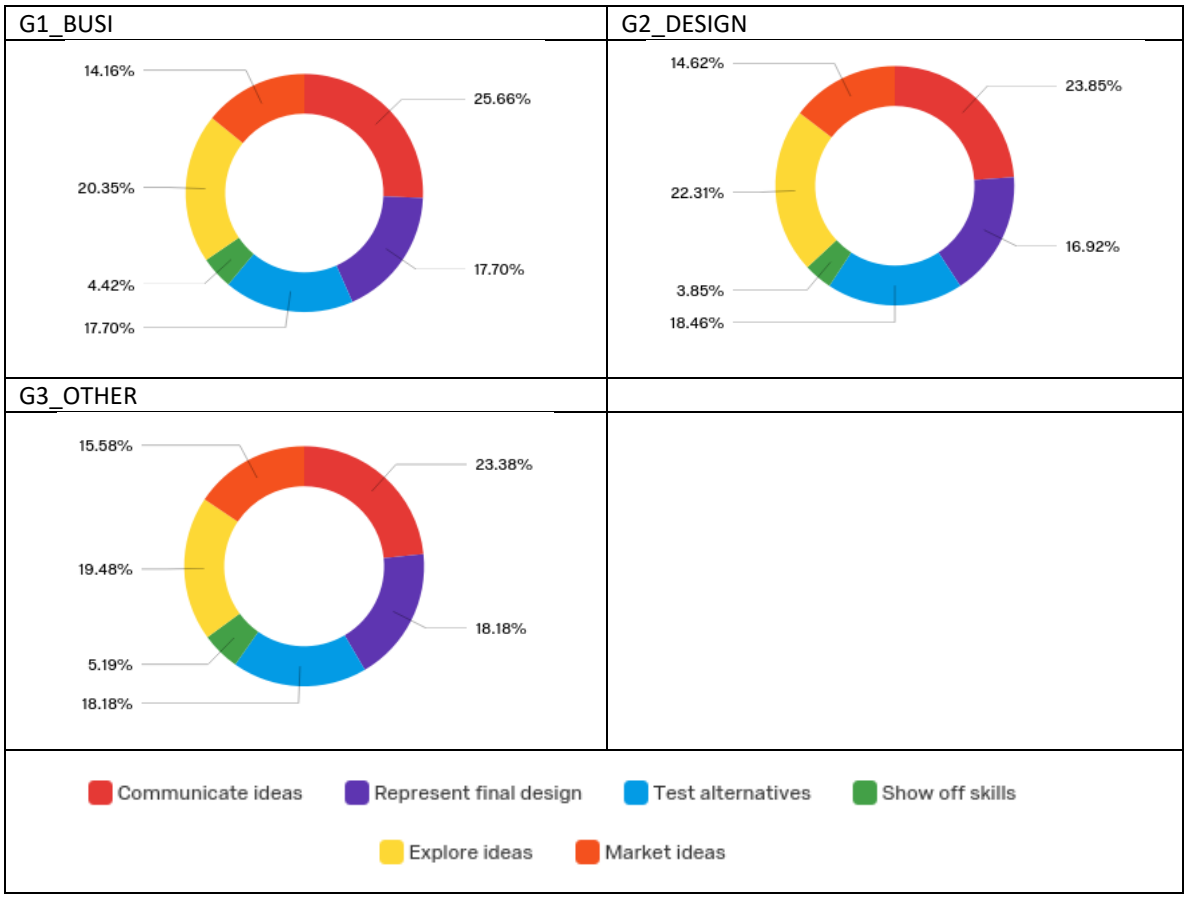


Figure 4-15: In your opinion, designers use models / drawings to: select all that apply (Q1.14)

Q1.15 In your opinion, designers review each other's work to: Make each other more resilient to criticism; Raise concerns about the design; Develop alternative options; Demonstrate own knowledge; Gain insights (*select all that apply*)

- A small percentage of G1_BUSI and G2_DESIGN indicated that designer's review each other's work to 'demonstrate own knowledge' while 0% of G3_OTHER indicated this
- 13% of G2_DESIGN indicated 'Make each other more resilient to criticism' resulting in a lower percentage indicating 'Raise concerns about the design'

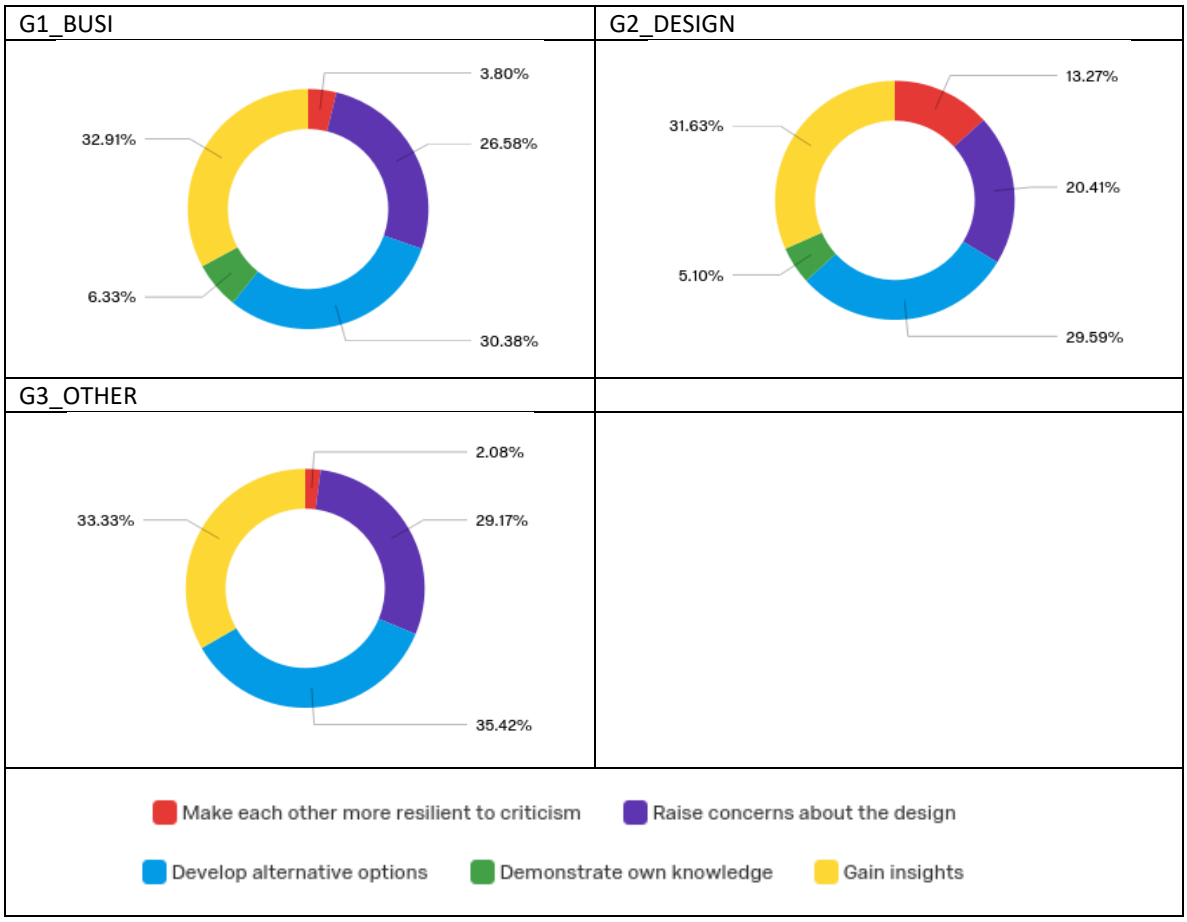


Figure 4-16: In your opinion, designers review each other's work to: select all that apply (Q1.15)

Findings:

For Q1.11 all groups ranked Communication as the activity most relevant to the design process and Drawing as the activity least relevant. Where G1_BUSI did not conclusively rank the remaining three activities, Groups 2 and 3 each indicated Research #2, Innovation #3, and Coordination #4. Responses regarding the use of models and drawings by designers were consistent within all three groups. In response to Q1.15 regarding design reviews, G2_DESIGN were the outliers with 13% (n=4) indicating that they are used to 'Make each other more resilient to criticism'. For the most part, similar

response distribution was returned by all three groups regarding design process.

Q1.16 to Q1.17: Design Considerations (2 questions)

The final two questions relate to the variety of considerations associated with design to provide insights into understanding amongst each participant group for the scope of design contribution to society.

Q1.16 The services a Designer provides are [Valuable]; [Ethical]; [Dispensable]; [Overrated]:

- All groups indicate services to be both 'Fairly' and 'Very' Ethical
- All groups indicate services to be 'Not at all' overrated and 'Not very' Dispensable
- 100% (n=33) of G2_DESIGN and 95% (n=18) of G3_OTHER indicate services to be 'Very' valuable, while G1_BUSI indicates them to be 'Fairly' (20% (n=6)) and 'Very' (80% (n=24)) valuable

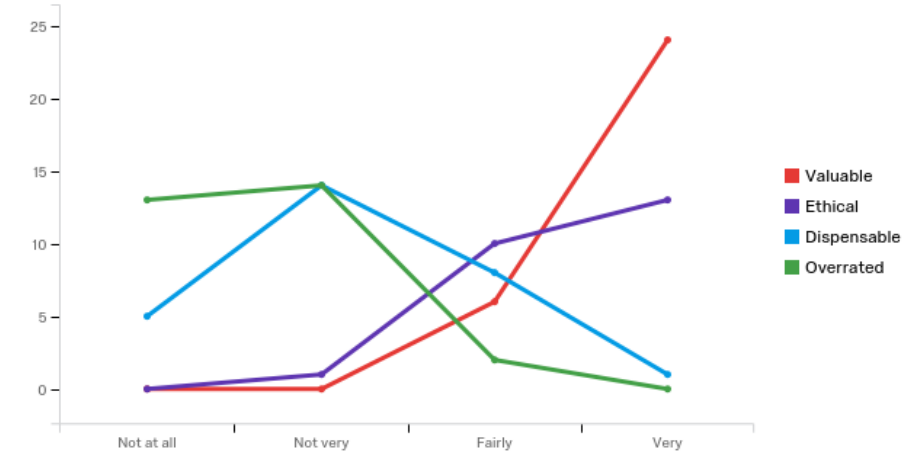
Q1.17 The considerations that are addressed through design are: [Financial]; [Psychological]; [Environmental]; [Operational]; [Physical]; [Emotional]; [Aesthetic]; [Sustainable]; [Marketable]; [Empathetic] (select all that apply)

- All groups provided similar response distribution

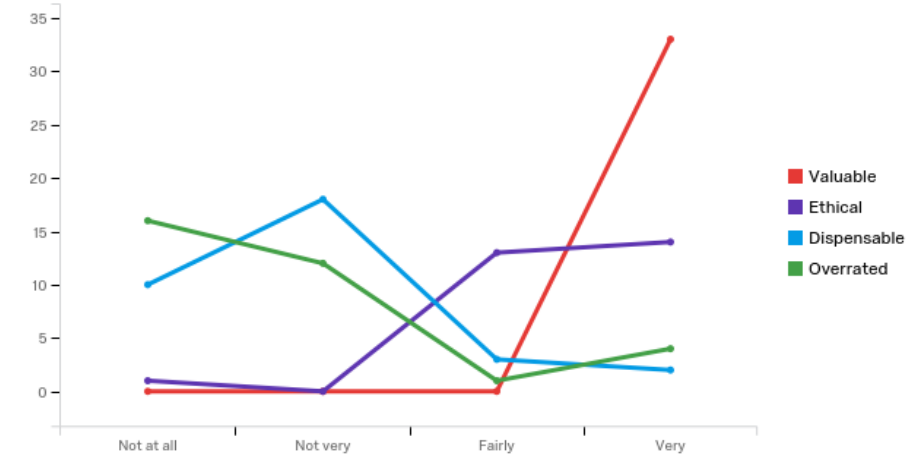
Findings:

Both questions had a high level of consensus among all groups. The level of similarity among responses provided by the three participant groups for these questions is discussed in section 5.1.1 Insight 1.

G1_BUSI



G2_DESIGN



G3_OTHER

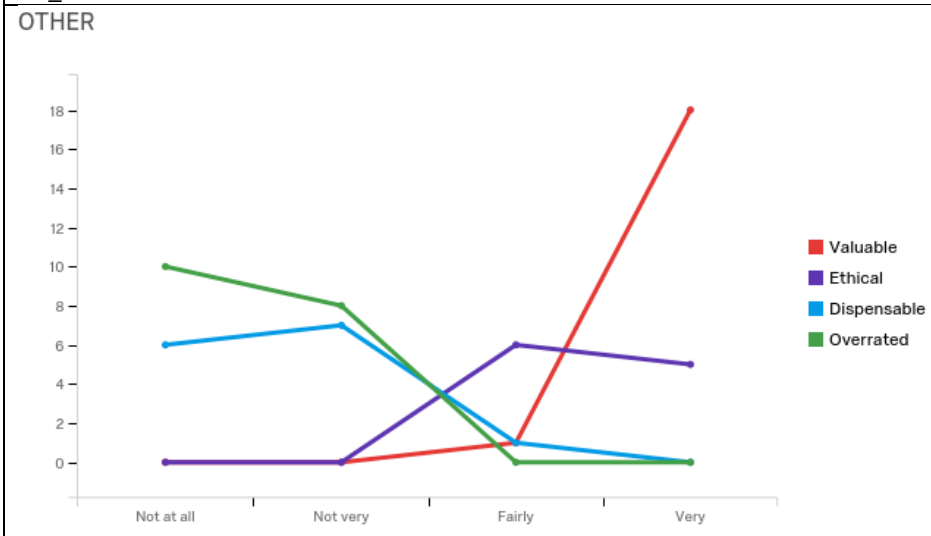


Figure 4-17: The services a Designer provides are…(Q1.16)

Figure 4-18: The considerations that are addressed through design are: select all that apply (Q1.17)

4.2 Workshop Summary

An initial presentation by the researcher presented the intention of the research to compare design understanding among design professionals and business participants (Figure 4-19). Throughout the workshop the concept of design as problem solving was emphasized.

A summary of the workshop is represented graphically in the preceding section (Figure 3-3). The workshop procedure consisted of the following:

- Introductory presentation to the participant group (as a whole) by the researcher related to the meaning of the word ‘design’.
- Two (2) card-sorting sessions
    1) Closed card-sort with all participants sorting as a group to compare the understanding of the word ‘design’ by design and business participants
    2) Open card-sort with participants individually performing the activity to compare the understanding of the concept of ‘design as problem solving’ by design and business participants
- Concluding group discussion between the participant group (as a whole) and the researcher focused on challenges faced during the image-sorting activities and discussed the designer’s role in problem solving.

Figure 4-19: Workshop – Initial presentation

The concluding group discussion encouraged open dialog between designers and business participants, allowing for the designers to share their knowledge and learn from those who may have a different understanding of the topic. Following this discussion, participants completed a questionnaire regarding the information addressed through the presentation and activities. Refer to Appendix D for the workshop agenda.

4.2.1 **Workshop Participants**

Q3.1 of the survey asked respondents: *Would you like to receive information as to how you might contribute further in this study through participation in a 1-hour workshop?* 41 of the survey respondents indicated 'yes' and received an email with details regarding the workshop format, when and where it would take place, and a request to confirm participation (Appendix B). Of the 41 respondents, 12 confirmed attendance by email response. Five (5) posters were pinned up in Dunton Tower where the Sprott School of Business is located, however these did not draw any response.

The workshop took place at Carleton University on April 5th, 2019 at 5:30pm with 12 participants. The group included equal representation of design participants and business participants (the category 'other' was not represented), from a variety of backgrounds and levels of experience. Participant attributes are summarized in Table 4-5.

Workshop Participants			
Non-Designers G1_BUSI	Business Professional	Male	Bachelor's Degree
	Graduate Business Student	Male	Master's degree
	Graduate Business Student	Male	Professional Designation, Master's degree
	Graduate Business Student	Male	Bachelor's Degree
	Business Student	Female	High School Diploma
	Business Student	Male	High School Diploma
Designers G2_DESIGN	Architect	Male	Professional Designation
	Architect	Male	Professional Designation
	Architectural Technologist	Female	Bachelor's Degree
	Industrial Designer	Female	Bachelor's Degree
	Graphic Designer	Other	Bachelor's Degree
	Industrial Designer	Male	College Degree

Table 4-5: Summary of Workshop Participants

4.2.2 **Method 2: Closed Card Sort**

Content for the closed card sort was generated by the workshop participants. Following a brief introduction to the workshop, participants were given 2-minutes to each write a list of five (5) words or phrases that come to mind when they consider the word 'Design'. Once participants had completed their lists, they were asked to select the two words or phrases that best represented the list and to write these on each of two index cards which had been distributed to them and colour coded with a green border for G1_BUSI and a blue border for G2_DESIGN. Participants were not alerted to the distinction between cards. Completed cards were collected by the researcher, who then pinned up a banner with the following design quote,

"DESIGN is to DESIGN a DESIGN to produce a DESIGN" – John Heskett (2002)

Four distinct ways of considering the word 'design' were presented by PowerPoint slide to the group in relation this quote: 1) as a Concept: (n) what do you mean by design?; 2) as an Action:(v) what does a designer do?; 3) as an Intention:(n) how will the design be

implemented?; and 4) as a Result:(n) what is the outcome? (Figure 4-20). The researcher presented the cards one at a time to the group by holding it up and reading the text aloud. The participants indicated whether the content referred to a concept, an action, an intention, or a result by group consensus, and the researcher pinned each card to the wall under the relevant design headings captured by the Heskett quote. As participants considered how to sort the cards, they repeatedly referenced the slide on the monitor for clarification as to which part of the quote applied.

Concept:	(n) what do you mean by design?
Action:	(v) what does a designer do?
Intention:	(n) how will the design be implemented?
Result:	(n) what is the outcome?

Figure 4-20: Slide describing ways of considering the word 'design'

4.2.2.1 Closed Card Sort Results

Twenty-five (25) cards were generated by 11 participants performing this activity (the twelfth workshop participant arrived late). One participant from G1_BUSI had difficulty selecting just two from his list of five and requested additional cards because "all of the words are pretty good". These have been identified in the results by asterisk (*). Two cards were duplicated during sorting when the group agreed that the card was relevant to two categories and are identified with a mark (†). Table 4-6 shows the sort results of the sort.

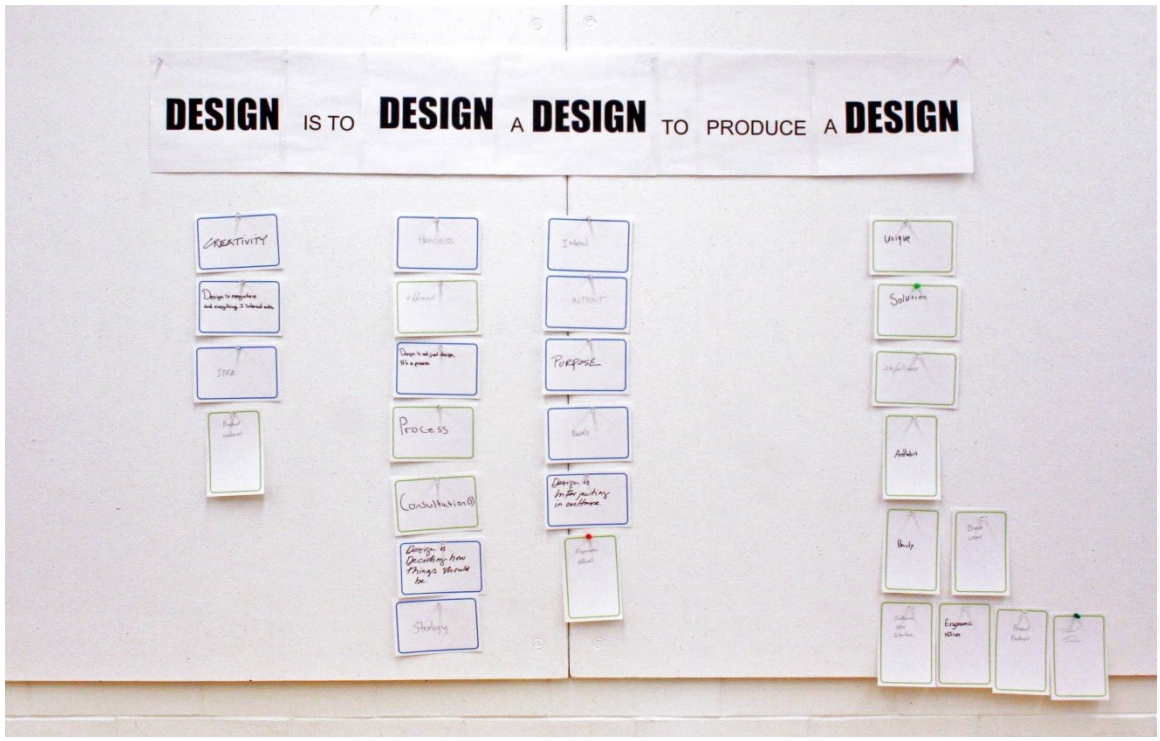


Figure 4-21: Closed Card Sort

Concept – 4 cards	
Product Features†	G1_BUSI
Idea	G2_DESIGN
Design is everywhere and everything I interact with	G2_DESIGN
Creativity	G2_DESIGN

Action – 7 cards	
Strategy	G2_DESIGN
Design is deciding how things should be	G2_DESIGN
Consultation(s)	G1_BUSI
Process	G1_BUSI
Design is not just design, it's a process	G2_DESIGN
Efficient	G1_BUSI
Process	G2_DESIGN

G1_BUSI G2_DESIGN

Intention – 6 cards	
Ergonomic Offices *†	G1_BUSI
Design is interjecting in culture	G2_DESIGN
Needs	G2_DESIGN
Purpose	G2_DESIGN
Intent	G2_DESIGN
Intent	G2_DESIGN

Result – 10 cards	
Unique	G1_BUSI
Solution	G1_BUSI
Usefulness	G1_BUSI
Aesthetics	G1_BUSI
Beauty	G1_BUSI
Brand Logos*	G1_BUSI
Software User Interface*	G1_BUSI
Ergonomic Offices†	G1_BUSI
Product Packages*	G1_BUSI
Product Features*†	G1_BUSI

* >2 cards submitted by same participant, † card duplicated to sort to 2 categories

Table 4-6: Closed Card Sort Results

- When asked to consider ‘design’, only participants from G1_BUSI contributed cards which the group sorted under ‘Result’.
- All but one contribution to each of ‘Concept’ and ‘Intention’ came from G2_DESIGN.
- Cards sorted under ‘Action’ were contributed by both G1_BUSI (3/7) and G2_DESIGN (4/7).
- The greatest number of cards (10) were sorted under ‘Result’, however 4 of these were contributed by a single participant who submitted >2 cards.

Findings:

In the closed card sort activity G1_BUSI primarily considered ‘result’ and ‘action’, while G2_DESIGN considered ‘concept’, ‘intention’, and ‘action’ in response to the images of designed elements. This aligns with the study by Micheli et al. (2012) regarding the perception of industrial design by managers where it is indicated that designers focus on the means by which a design comes to satisfy the end goal and managers focus on the result. This finding is further discussed in section 5.1.5 Insight 3.

Following the sort, the group was informed that the green and blue cards indicated whether a card was contributed by G1_BUSI or G2_DESIGN. Participants demonstrated surprise at the singularity of contributions grouped under ‘Result’.

4.2.3 **Method 3: Open Card Sort**

For the open card sort activity, the twelve participants were seated around a long table in an unspecified arrangement of business participants and design participants. The

researcher highlighted that the focus of the study was on the action/verb form of 'design' in relation to the activity they had just completed and presented the idea of the designer as a problem solver to the group. The next slide contained a graph that had been generated from survey responses to *Q1.7: To what extent do you agree or disagree with the following statement about designers: Designers solve problems?* The graph indicated that 44% of respondents 'Strongly agree' and 40% 'Somewhat agree' with the statement. When the researcher commented that she found these results surprising, a design participant expressed similar surprise while one of the business participants questioned the comment. Workshop participants were asked to consider design as problem solving for the next activity.

Individuals were each given a deck of thirty-five (35) 4"x6" image cards. Each deck was identical in format and content. A detailed description of the card decks was provided earlier in section (3.3.3.1) and the images that were used for the cards can be found in Appendix D. Participants were informed that they would have 10 minutes to sort the cards into groupings using the criteria of similarity. They were instructed to take some time to look through all the cards before sorting and to follow the guidelines in Figure 4-22: Card sort instruction slideFigure 4-22.

A subsequent series of slides provided an example to demonstrate that cards can be sorted into any number of groups depending how you consider them. Images of fruit were used for the example to avoid influencing the sort of images composed of man-made elements (Appendix D).

Image Sort Instructions

1. look at all of the cards before sorting
2. sort the items into separate groups, using a single criterion
3. record the items in each group

DO:

- use the categories of 'other', or 'not sure' only if necessary
- create as many or as few piles as you wish
- create categories containing a single card
- change categories or re-sort at any time

DO NOT:

- lump two sorting criteria together in one sort
- Use the numbering as criterion

Figure 4-22: Card sort instruction slide

The researcher instructed the group to "sort the images in response to the design problem being solved". A slide with this instruction remained on the monitor throughout the activity for reference. Participants proceeded to sort their cards with no additional questions and did not appear to need the instructions again. The research team recorded the following observations of the sort:

- G1_BUSI
    - More chaotic sorting
    - Did not follow the instructions as well
    - Sorting was not in piles; cards were moved around into areas.
    - Less of a systematic approach
- G2_DESIGN
    - There was much more selective organization by the designers
    - Viewing of all the cards, then sorting
    - Sorting into well-organized piles
    - Neat well executed
    - Followed instructions
    - Seemed effortless

Figure 4-23: Open card sort activity

Everyone successfully completed the task in the allotted time. Once they had finished sorting their cards, blank index cards were distributed, and participants were asked to label each pile and record the cards sorted under that label using the numeric code in the corner of each image. The researcher requested that no changes be made to the piles at this time.

Following this activity participants were asked what issues, if any, they had with sorting the image cards. Several participants indicated that the greatest difficulty was sorting images under a single category.

4.2.3.1 Open Card Sort Results

Data from the open card sort was recorded for each participant using Spencer's analysis spreadsheet (2004). The card number was entered in the first column and the label of the group that the sorter made in the second. This data entry automatically populated a big matrix of all the data where each row represents a card and each column a participant. The row and column intersections contain the label for each group. This spreadsheet allowed the researcher to see all the participant data in one place (Table 4-7 and Appendix E).

Card no	Card name	Sort7	Sort8	Sort9	Sort10	Sort11	Sort12	SortsCompleted
01	San Diego Signage	Branding	No true "problem"/aesthetic	Surface Treatment	Graphic/texts	Graphic Design	External signage	6
02	Moped	Unity	Design for human Interaction	Beyond Function	Things about movement	Means of transportation	Engaged sitting (lean-in activities)	6
03	White Bridge	Rhythm	Structure/Structural		Things about movement	Landscape/building /architecture	Suspension/Object Support	5
04	Car Interior	Branding	Design for human Interaction	Surface Treatment	Things about movement	Means of transportation	Roof/Shelter	6
05	Outhouse	Mood/Environment	Environment/Area	Timeless	Nature	Landscape/building /architecture	Roof/Shelter	6
					Things sized to		Suspension/Object	

Table 4-7: Raw Data Worksheet

Analysis of the open sort activity was simplified by converging the participant categories with those used in the closed sort activity[7]. To do this, a list of the 77 categories that the participants used was created. The researcher considered each category in relation to where it best fit in the sentence, "Design[concept] is to Design[problem] a Design[intention] to produce a Design[result]". The consideration for Design that best

[7] Spencer (2009) provides guidelines for the convergence of participant categories with standardized labels to make it easier to see patterns (p. 114). She suggests only combining labels that are very similar in language or idea into a standardized label that represents the idea. Since the intent was to analyse how 'Design' was considered by participants in relation to card placement, the participant categories were standardized on the basis of those considerations for this study. This approach prioritized the analysis of consideration for 'Design'.

represented the participant category was recorded as the standardized label next to the participant category in the spreadsheet (Table 4-8 and Appendix E). Similar names or concepts were standardized using the same label and a consistent approach to converge the categories was used throughout the process to minimize potential for the comparative analysis to be influenced by interpretation. Where categorization was not easily apparent or could be standardized in more than one category, the researcher referenced the content of the images sorted under the participant label to clarify the intent of the sorter. The two labels of 'Application' and 'Unsure' were generated by participant sort categories that did not correspond to any of the labels 'Concept', 'Intention', 'Result', or 'Problem'.

Sorter	Original category	Standardised category
Sort7	Experiences/Systems	Intention
Sort7	Branding	Problem
Sort7	Rhythm	Problem
Sort7	Mood/Environment	Problem
Sort7	Function	Problem
Sort7	Unity	Problem
Sort8	Structure/Structural	Problem
Sort8	Environment/Area	Result
Sort8	No true "problem"/aesthetic	Problem
Sort8	Design for human interaction	Problem
Sort9	Beyond Function	Problem

Table 4-8: Standardized Categories

This process was continued until every participant category had been assigned a standardized label. These labels were used for the analysis of the data.

The following two tables show the original categories used in each sort, and the 6 categories used to standardize the results. A black dot indicates the category which the researcher determined to best reflect the content of the sort. A white dot indicates other categories under which the original category label might be considered. Several

limitations are associated with the approach that was taken in this convergence process and are described in section 5.4.

	Sorter	Original category	Concept	Intention	Result	Problem	Application	Unsure
G1_BUSI	Sort1	Fashion	●		○			
		Artistic		●				
		Products			●			
		Infrastructure			●			
		Products			●			
	Sort2	Inspiring Aesthetics	○			●		
		Best Physics		○		●		
		Best Experience				●		
		Aesthetics after the fact			●			
		Unsure						●
	Sort3	Work/Occupation					●	
		Athletics					●	
		Architecture	●					
		Fashion	●		○			
		Branding/Logo			○	●		
		Public Transit			●	○		
		Materialsitic Goods			●			
		Engines			●			
		Home Décor			●			
		Tools			●			
	Sort4	Fashion	●		○			
		Unique				●		
		Need				●		
		Function				●		
		Aesthetics	○			●		
		Purpose				●		
		Logos			●			
		Homes			●			
	Sort5	Product or brand communication		●		○		
		Material		●	○			
		Broad questions on how to live				●		
		Unsure						●
	Sort6	Information		●	○	○		
		Communicating		●		○		
		Interaction				●		
		Estétique	○			●		

Table 4-9: Summary of Standardized Open Card Sort Categories for G1_BUSI

	Sorter	Original category	Concept	Intention	Result	Problem	Application	Unsure
G2_DESIGN	Sort7	Experiences/Systems		●	○			
		Branding	○			●		
		Rhythm			○	●		
		Mood/Environment			○	●		
		Function				●		
		Unity				●		
	Sort8	Structure/Structural			○	●		
		No true "problem"/aesthetic	○			●		
		Design for human interaction				●		
		Environment/Area			●			
	Sort9	Vanity					●	
		Beyond Function				●		
		"Touch" Ergonomics				●		
		Reaching the sky			○	●		
		Trends				●	○	
		Surface Treatment			○	●		
		Timeless				●		
	Sort10	Nature				●		
		Things sized to hands				●		
		Things about movement				●		
		Graphic/texts			●			
		Buildings			●			
		Things to wear			●			
		Places to sit			●			
		Round Sports Stuff			●			
		Light			●			
	Sort11	Industrial Design	●					
		Landscape/building/architecture	●					
		Interior Design	●					
		Design for sport	●					
		Graphic Design	●					
		Means of transportation		●	○	○		
		Personal object design	○		●			
	Sort12	Gaming					●	
		Stuff to focus or help keep focus or loose focus				●		
		Roof/Shelter			○	●		
		Up-wards		○		●		
		Suspension/Object Support		○		●		
		Engaged sitting (lean-in activities)				●		
		Clothes			●			
		External signage			●			

Table 4-10: Summary of Standardized Open Card Sort Categories for G2_DESIGN

Table 4-11 and Table 4-12 below illustrate the distribution of cards by each group of participants under the standardized categories and reflect the following results:

- Almost two times as many cards were sorted under the category 'Problem' by Designers (G2_DESIGN) than by Non-Designers (G1_BUSI)
- Over two times as many cards were sorted under the category 'Intention' by G1_BUSI than by G2_DESIGN

Standardised category	Sorters who used this *	Total cards in this category	Unique cards	Agreement
Concept	4	20	13	0.38
Intention	5	32	26	0.25
Result	11	52	32	0.15
Problem	12	91	34	0.22
Unsure	2	10	9	0.56
Application	2	5	5	0.50

Table 4-11: Category Summary Table (G1_BUSI)

Standardised category	Sorters who used this *	Total cards in this category	Unique cards	Agreement
Concept	5	20	20	0.20
Intention	2	14	13	0.54
Result	9	39	30	0.14
Problem	23	125	35	0.16
Unsure	0	0	0	n/a
Application	2	8	8	0.50

Table 4-12: Category Summary Table (G2_DESIGN)

* The "Sorters who used this" column indicates the distribution of the 77 participant-generated categories within the 6 standardized categories

Several guides to card sorting activities recommend the analysis tools developed by Donna Spencer in association with her book *Card Sorting: Designing Usable Categories* (2009). These tools are available online for download (Spencer, 2004) and were used to analyze the data from the open card sort in this study . Spencer recommends

exploratory analysis of card sorts unless large amounts of data are collected, in which case statistical analysis may be required. Data from G1_BUSI (6 sorts) and G2_DESIGN (6 sorts) were analyzed separately using exploratory analysis to identify key patterns and draw comparisons between the two groups. Correlations between the grouped individual sorts were summarized as cards sorted with high agreement (>75%), medium agreement, or low agreement (<25%), where the percentage indicates the number of sorts to include a card under the same standardized category.

Analysis of G1_BUSI (6 sorts):

- 0/35 cards had a high level of agreement among G1_BUSI
- The only card which was not sorted under the category 'Problem' by G1_BUSI was [25] White Interior.
- 28/34 cards sorted under the category 'Problem' had a medium level of agreement.
- 17/32 cards sorted under the category 'Result' had a medium level of agreement.
- 4/13 cards sorted under the category 'Concept' had a medium level of agreement. These included [29] Black + White Fashion, [30] Colourful Loafers, [32] Green Blouse, and [12] Watch
- 4/26 cards sorted under the category 'Intention' had a medium level of agreement. These included [1] San Diego Signage, [26] Art Signage, [25] White Interior, and [14] Concrete Interior
- 5/5 cards sorted under the category 'Intention' had a low level of agreement

- None of the cards sorted by G1_BUSI participants were sorted into a single category by all participants. 9/35 cards were sorted under the category 'Unsure'.
- 12/35 cards were sorted under 4/6 categories by G1_BUSI. 2/35 cards were sorted under 5/6 categories.

Analysis of G2_DESIGN (6 sorts):

- 7/35 cards sorted by G2_DESIGN had a high level of agreement, all of which were categorized under 'Problem'
- 35/35 cards sorted under the category 'Problem' had a high or medium level of agreement among G2_DESIGN.
- 6/30 cards sorted under the category 'Result' had a medium level of agreement. These included [29] Black + White Fashion, [30] Colourful Loafers, and [32] Green Blouse (50%-60% agreement) and [1] San Diego Signage and [26] ART Signage and [8] Airport Service Window (33%-40% agreement).
- The categories 'Concept' and 'Application' had low level agreement for all cards sorted under these categories and the category 'Intention' had low level agreement for all but one card sorted under this category.
- None of the G2_DESIGN participants sorted any cards under 1 category only nor under the category 'Unsure'.
- 5/35 cards were sorted under 4/6 categories by G2_DESIGN. 1/35 cards were sorted under 5/6 categories.

Findings:

In the open card sort activity, a greater level of consensus for card categorization was seen among G2_DESIGN than G1_BUSI. Asked to sort 'in response to the problem being solved', G2_DESIGN identified 23 categories associated with 'Problem'. All cards were sorted into these categories with a medium or high level of agreement among participants. G1_BUSI identified only 12 categories associated with 'Problem' with a medium level of agreement for 28/34 cards. Two participants in G1_BUSI sorted into and 'Unsure' category while no participants in G2_DESIGN sorted into this category. In both groups, images related to Fashion and to Signage stood out as having a strong level of agreement under the sorting category used by the group. In contrast to the survey findings, the findings of the card sort activity reflected differences between the two groups of participants. This finding is further discussed in section 5.1.1 Insight 1.

4.2.4 **Method 4: Questionnaire**

Following the open card sort, the researcher presented a second graph that had been generated from survey responses, this time in response to *Q1.8 To what extent do you agree or disagree with the following statement about design: Design process starts once the client knows what he/she wants?* This slide was erroneously presented as the response to "designers solve problems", with the researcher indicating that the previous graph reflected something else. Misrepresentation of the two slides caused confusion for both the researcher and the participants. The slides were intended to demonstrate a disparity between responses to "designers solve problems" and "design process starts

once the client knows what he/she wants" in defense of the study when in fact on further review, they do not. While subsequent discussion was influenced by the confused results and inaccuracy of these graphs, it was determined by the research team that the data collected through the two card sorts and the questionnaire was not impacted.

A group discussion about issues related to understanding of the design process and the work/role of designers was dominated by one business participant who was passionate about design. Design participants did not participate in the discussion but later indicated that they were interested to hear what the others had to say. Because of time constraints, open discussion was limited to only a few comments among the group.

Following the discussion, participants were asked to complete a short questionnaire in response to the workshop activities and discussion (Appendix D). These results are presented in the next section.

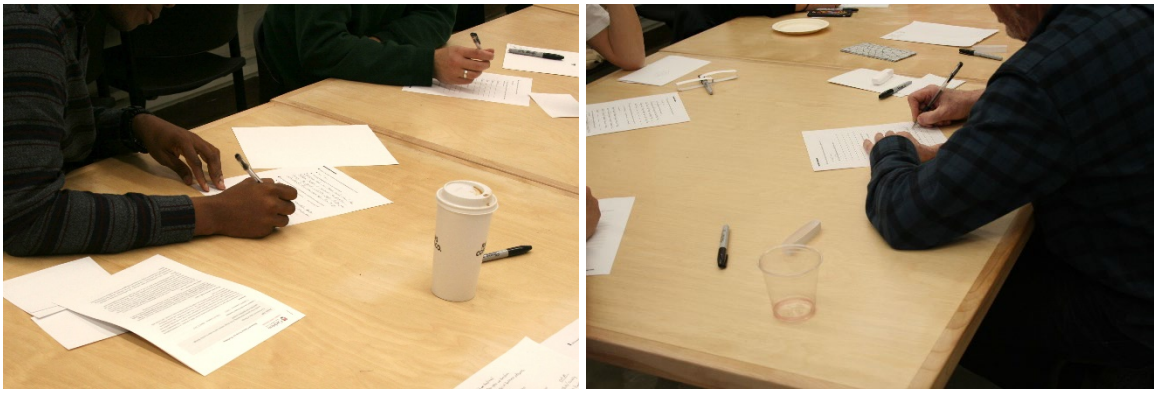


Figure 4-24: Images of questionnaire activity

4.2.4.1 Questionnaire Results

Q1a Had you previously considered the concept of designer as problem solver

- 100% of both groups responded 'yes'

Q1b Do you agree/disagree with this concept

- Responses addressed problem solving by Everybody (36%), Designer (27%), Privileged participants (17%), and Design (27%). Also, Designer defining the problem (45%) and solving other people's problems (9%)
- 60% of G1_BUSI and 33% of G2_DESIGN indicate that the designer defines the problem
- 50% of G2_DESIGN and 20% of G1_BUSI indicate that everybody solves problems

Q2a How important is researching and understanding the problem to formulating a solution?

- 100% of G1_BUSI and 83% of G2_DESIGN indicated that it is 'Very important'

Q2b Please Explain

- Eight distinct concepts were referenced in explanation of Q2a.
- 40% of G1_BUSI responses indicated that the solution is dependant on the problem and 40% indicated that it is necessary to identify underlying issues
- 33% of G2_DESIGN and 20% G1_BUSI explained Q2a in terms of finding the right solution

Q2c Who is responsible for developing this understanding in a design project?

- The majority of participants from both groups identified 'Stakeholders' (50%), 'Client' (58%), 'Designer' (58%), and 'End User' (42%) in response to this

question, with 50% of G1_BUSI also identifying 'Consultants'.

- Of these four, 'Stakeholders' was the only response referenced by G1_BUSI (67%) more often than G1_DESIGN (33%).

Q3a Did this workshop impact the way in which you consider design?

- 67% of G1_BUSI and 67% of G2_DESIGN indicated 'yes'

Q3b Write a list of 5 things that come to mind when you consider 'what is design', now that we have done this exercise.

- Fourty-seven (47) responses were collected in response to Q3b. These responses were standardized by the researcher under the categories 'Concept', 'Action', 'Intention' and 'Result', as was done by the group for the closed card sort (refer to section 4.2.2). 66% of these responses reflect the 'action' form of design (Table 3-1)

Findings:

The survey responses reflect that more G2_DESIGN participants consider the concept of design as problem solving than G1_BUSI participants. Participation in the workshop equalized the responses by G1_BUSI and G2_DESIGN to the way they consider 'design', although a tendency to consider design in terms of 'result' is still reflected in the responses provided by G1_BUSI and 'action', 'concept', and 'intention' are predominantly considered by G2_DESIGN.

Concept – 4 responses	
Complexity of Design as a practice	G2_DESIGN
Design in culture	G2_DESIGN
Idea	G2_DESIGN
Design is everywhere	G1_BUSI
Its everywhere	G1_BUSI
Product/end result is the focus of design from non-designers - interesting	G2_DESIGN

Intention – 6 responses	
Makes Money	G2_DESIGN
Promotes Exchange	G2_DESIGN
Manufacturing	G2_DESIGN
Intent	G2_DESIGN
Needs	G2_DESIGN
Detail	G1_BUSI
Purpose	G2_DESIGN

Result – 6 responses	
Experiences	G2_DESIGN
Things	G2_DESIGN
Products	G1_BUSI
Brands	G1_BUSI
Logos	G1_BUSI
A Result	G1_BUSI
End Products	G1_BUSI

G1_BUSI G2_DESIGN

Action – 11 responses	
Finds Insight	G2_DESIGN
Discourse Analysis	G2_DESIGN
Craft of Communications	G2_DESIGN
Process	G2_DESIGN
Critical Thinking	G2_DESIGN
Multi-disciplinary	G2_DESIGN
Process	G2_DESIGN
Problem Solving	G2_DESIGN
People	G2_DESIGN
What are designers actually doing?	G2_DESIGN
Engagement	G2_DESIGN
Action – Agency of designer	G2_DESIGN
Communication	G2_DESIGN
Process	G2_DESIGN
Creativities	G2_DESIGN
Uniqueness	G1_BUSI
Creativity	G1_BUSI
Innovations	G1_BUSI
Problem-solving	G1_BUSI
Efficiency	G1_BUSI
Solution to a problem	G1_BUSI
A desired state	G1_BUSI
More than just aesthetics	G1_BUSI
Consulting	G1_BUSI
Unique	G1_BUSI
Solutions	G1_BUSI
Creativity	G1_BUSI
Takes time	G1_BUSI
Pay attention to design roles/perception	G2_DESIGN
Communication to audience groups	G2_DESIGN
Process	G2_DESIGN

* >2 cards submitted by same participant, † card duplicated to sort to 2 categories

Table 4-13: Write a list of 5 things that come to mind when you consider 'what is design' (Q3b)

5. DISCUSSION

Exploratory analysis of the results from the quantitative survey results and qualitative design research methods forms the second point of integration[8] in the two-stage equal-status sequential-concurrent mixed-method design. This section discusses the perception of non-designers in relation to those of design professionals based on the research findings

5.1 Insights

Several insights into design understanding were gained through comparison of the two groups. Insight 1 indicates that data collection methods can influence how design is understood by participants and suggests how these methods may have influenced the data differently. Although the mixed-methods approach was selected to legitimize the results of the data, divergent results prompted consideration for the way the research question is presented by the different methods. Insights 2, 2a and 2b elaborate on the first insight to illustrate what inconsistencies resulted from the use of different methods in this study. The subsequent four insights discuss design understanding as it relates to the different considerations of design, and the final insight provides information on where design understanding comes from.

[8] The first point of integration occurred when participants for stage 2 were recruited during stage 1.

5.1.1 **Insight 1**

Different research methods used in the study produced different results regarding design understanding

Findings from the survey analysis reflect little difference in the attitudes, beliefs, and values that are held by designers and by non-designers with regards to design. Responses to statements about design and designers and questions regarding design process and considerations were consistent among all three study groups. Clear differences were apparent only with regards to two questions. In response to *Q1.13: how demanding are design education programs* 30% of G2_DESIGN indicated 'extremely demanding', while only 9% of G1_BUSI and 10% of G3_OTHER indicated the same. Over 40% of respondents in the latter two groups selected the option mid-way between 'not at all demanding' and 'extremely demanding', indicating that they may have a neutral opinion on the subject as a result of not having attended post-secondary design school. Responses to *Q1.9: "The work of a designer is"* were consistent among G2_DESIGN and G3_OTHER with the highest percentage (>33%) of respondents ranking at '3' (neutral), or distributed to the same side of '3'. 42% of G1_BUSI respondents leaned one way or the other with regards to several statements where designers were neutral: independent < collaborative, structured < fluid, and to make clear > to conceal. These responses reflect a greater consensus for the work of designers among G1_BUSI than those provided by the other two groups.

Data collected through the two card sorting methods demonstrated distinct differences in understanding between the designers and the business participants. In the closed card sort, cards that were sorted under the category 'result' were contributed exclusively by business participants. Design participants sorted cards solely by the three other considerations of design (concept, action, and intention) presented to the group. In the open card sort, the 'unsure' category was used by business participants only and revealed less certainty for the sort activity among these participants. A lower level of consensus in how the cards were sorted by G1_BUSI suggests a varied or less defined understanding of design among this group.

To resolve divergence in the results of mixed method research, Schoonenboom and Johnson (2017) suggest that the researcher "determine which component has resulted in a finding that is somehow expected, logical, and/or in line with existing research" (p116). As stated in the literature review, researchers have determined several issues that impede design understanding among non-designers. The literature reviewed in this study further suggested that current methods used by business managers are defined by priorities that do not properly acknowledge the designer's contributions. Since the literature supports the findings of the card sort exercise, an explanation for the deviation that fits the results of both methods must be developed.

"Differences between results from different data sources could … be the result of properties of the methods involved, rather than reflect differences in reality" (as cited in Schoonenboom & Johnson, 2017). Two card-sort activities produced similar results,

whereas the findings from the survey differed from the card sort results. Understanding design process and how it might be communicated differently through survey questions than through design research methods helps to explain the deviating results shown by the data.

In their study of the perception of industrial designers among business managers, Micheli et al. note that, “perceptions of design are subjective, difficult for interviewees to articulate, and challenging for researchers to interpret accurately” (Micheli et al., 2012, p. 693) and therefore a suitable technique is necessary. The mixed methods of quantitative and qualitative data collection used in this study explore the understanding of design amongst two groups of participants using the familiar survey method of data collection and the less pervasive method of card sorting. The latter is a design research method which prompts participants to abandon linear reasoning in favor of intuitive, iterative response (Kumar, 2013). The design research method could not be rationalized by explicit knowledge in terms of ‘right’ or ‘wrong’ the way that survey responses might be approached. The task could be completed by all participants but relied on a tacit understanding of design in order to sort “in response to the problem being solved”. When asked to look backwards from a designed object and consider the processes that resulted in that outcome, the answers are less apparent.

Design thinking is supported by tacit knowledge of the process[9] (Cross, 2011; Schon, 1988). The concept of tacit knowledge was introduced by the Hungarian philosopher-chemist Michael Polanyi (1891-1976) in his 1966 book 'The Tacit Dimension'. Also referred to as informal knowledge, it informs a way of responding that does not seek rational explanation or justification for the action. Tacit knowledge is acquired largely through association with other people and requires joint or shared activities to be imparted from on to another (www.businessdictionary.com). In professional design education, students are immersed in problem-solving processes and closely mentored to develop a storehouse of knowledge by which to work. As stated in the literature, design is not traditionally included as part of pre-tertiary or non-design post-secondary education. Although the intuitive way of thinking is employed in many fields and is not unique to designers, the content of that knowledge and how it informs design process is.

The different types of knowledge accessed in the two types of methods suggests that while business participants understand the independent design concepts that are accessible by explicit knowledge, tacit knowledge of design is required to understand the complex interrelation of processes that make-up design as problem solving. This is supported by Insight 2.

---

[9] Cross (2011) discusses the way in which designers think about and respond to problems as an intuitive response that one either inherently possesses or develops through education. He indicates that the designer's reasoning processes are not based upon the conventional inductive and deductive forms of logical inferences, but that their processes are abductive and fluid (p10).

5.1.2 **Insight 2**

There is a disparity between how business participants perceive their understanding of design and the capacity that business participants have to demonstrate their understanding of design through design methods

In response to a divergence in the overall results of the survey with the overall results of the card sort activities, Insight 1 discusses how different research methods access different types of knowledge. The next 2 insights discuss specific instances where the data collected through different methods reflects different results. In each case, the business participants indicated a level of understanding in response to a direct question but *demonstrated* a different understanding through participation in the study.

5.1.3 **Insight 2a**

Business participants who indicated understanding for the concept of 'designer as problem solver' demonstrated less understanding for 'design as problem solving' when it was presented in the card images as an applied concept.

All business participants indicated 'yes' when asked if they had previously considered the concept of designer as problem solver in the questionnaire. The image sorting activity challenged participants to *demonstrate* their understanding of designer as problem solver. Images were representative of problem solving, however the sort analysis for G1_BUSI reflected only low to medium agreement for cards sorted in the

category ‘problem’. The business group struggled with problem solving as an applied concept.

Where most business participants sorted into 5 or less categories, all design participants sorted their cards into 6 or more categories - all of which were predominantly related to the standardized category ‘problem’. The design participants demonstrated a clearer understanding of design as problem solving through greater agreement in how the cards were sorted.

5.1.4 **Insight 2b**

Survey responses by business professionals indicated that they have a better level of understanding about design as a profession than they think they have

Business participants indicated an average (3/5) to low (2/5) level of understanding for the design profession however the overall survey responses by business participants did not reflect a demonstrable difference in understanding to respondents familiar with design. Either a) the survey results did not accurately reflect the level of understanding or b) the respondents have a greater level of understanding about design than they perceive. Results from the literature review and the card sort methods discussed in Insight 1 suggest that the former is true.

5.1.5 **Insight 3**

Business professionals tend to consider 'Result' and 'Action' while design professionals tend to consider 'Concept', 'Intention', and 'Action' with respect to design

The results of the workshop validate the suggestion that the social tendency is to equate design activity with design outcome (Dilnot, 1982). When asked to list words that come to mind in response to 'design', business participants formed associations under the heading 'result' more than any other heading. Similarly, the open card sort demonstrated a significant level of agreement under the standardized category 'result' despite being asked to consider the image in response to the problem being solved. Although Dilnot (1982) also notes a tendency for designers to discuss design in terms of 'result', the card sort activity supported the demonstration of understanding using tacit knowledge rather than verbal communication and responses were strongly represented with a medium to high level of agreement for all 35 cards under the category 'problem'.

When similar results were found by Micheli et al. (2012) in their study of the language that managers use with regards to design, they suggest that managers need to recognize that they have different perceptions of the "means" and "ends" when communicating with designers, and that their different vocabularies may create misunderstandings and tension. With respect to the designer's role they suggest that,

> New product development is cross-functional and involves many views, opinions, and the need for decisions that may involve compromises for some functional areas. It appears that designers must be more aware of this and the commercial

> aspects of projects. Therefore, they need to think in advance how functional and market needs can be incorporated and an original and provocative design can still be achieved. (p. 703)

In addition to this, the literature reviewed in this study suggests that designers tend to promote their work in terms of end result and fuel the potential for design to be considered differently by others than to how designers consider their work. Adequate recognition by both design professionals and business managers for the differences in how design may be considered by the other party will facilitate the design process by minimizing potential misunderstanding.

5.1.6 **Insight 4**

Fashion and Signage are correlated to a greater extent than other design outcomes

Images related to Fashion and Signage elicited strong consensus among both groups, although in different categories. The designers sorted all images related to each of the two design sectors into categories standardized as 'result', while the business participants sorted images related to Fashion into the standardized category 'concept' and images related to Signage into 'intention'. Participants in both groups agreed with the association of fashion images to other fashion images and signage images to other signage images, however opinions on how they should be categorized differed. Neither group sorted these images with a significant level of agreement under the standardized category 'problem'. Images related to Fashion and Signage stood out from images that

reflect the other design sectors, suggesting that these sectors are considered uniquely from the other sectors (automotive, service, architecture, product design, and interior design) represented by the images.

5.1.7 **Insight 5**

Business professionals indicate highest understanding ('Somewhat Well') for Graphic Design and Web Design, while Design professionals indicate that they understand Architectural design 'Extremely Well'.

Graphic Design and Web Design are ubiquitous in daily activities. Exposure to and interaction with the products of these design sectors makes it easy to assess. Other design sectors such as UX Design, Motion Graphics, or Instructional Design are much less familiar. Although the products of Industrial Design and Architecture are also very accessible, the design fields are closely associated with external fields such as manufacturing and engineering to immediately complicate understanding. Design professionals indicate a strong understanding for architectural design because by virtue of their connection to the researcher, many respondents are likely directly involved in the field.

5.1.8 **Insight 6**

Designers and non-designers seek out design information primarily by asking designers they have met or know and, on the Internet

Research indicates that designers have difficulty communicating their contributions (Cross, 2011; Dilnot, 1982; Schon, 1988) however they are a primary source of information for designers and non-designers alike. The internet is the foremost research tool for all topics but is widely understood to be unreliable in the legitimacy of the information that it provides. Although neither source has a strong capacity to deliver accurate information, they are what fuel current design understanding.

5.2 Opportunities

This research does not endeavor to set the design field apart as being any more complex or difficult to understand than other fields, but rather to define which attributes of the design process might complicate its understanding by non-designers. The study determines that design is too closely associated to design outcome, complex in nature, and unique to all other disciplines. These attributes impact critical communication with business managers and methods developed in reference to these attributes might be considered in order to strengthen the managers ability to evaluate the designer's contribution.

The results of this study suggest that future efforts to enhance understanding for the profession be based in design methodology. The literature determines that design is a

complex, non-linear process (Cross, 2011). Research methods which break down the actions of the designer to describe it as an assemblage independent processes rather than “an iterative form of interplay between partial problems and their solutions” are in essence no longer about design (Pauwels et al., 2013, p. 45). If researchers elect instead to break out static elements of the process to facilitate communication with business managers, then the realities of what design entails cannot be adequately understood (Dilnot, 1982). Design methods provide opportunities to deviate from business-driven means of evaluating design services that focus on quantifiability and employ methods founded in the same innovative thought processes that business managers aim to understand.

By outlining the perception of undervaluation that is held by designers, why it might be important that business managers value design activity, and what impediments exist against the promotion of design understanding, this research brings clarity an issue of primary concern to designers. It defines the problem in order to bring awareness to business managers who may not otherwise understand the concern. The findings suggest that there are differences in how designers and business managers consider design, and support efforts directed at procurement reform to better reflect design activity in the process.

While the results of the survey analysis may not adequately gauge the understanding of design, it does provide insight into how information pertaining to design and designers is being obtained. Design understanding that starts with the education of designers,

aimed at strengthening their ability to communicate their working process and contributions, will support client understanding and the propagation of comprehensive online content. Efforts to publish findings from scholarly design research in mainstream media and online resources will facilitate understanding for both design professionals and non-designers who seek out information on design. It stands to reason that increased design comprehension within the design industry and a strengthened ability to defend design expertise must be achieved before those outside of design can fully comprehend the contributions that designers make within the business industry. A better understanding of the design process will result in better working relationships between business managers and designers to increase quality and innovation in design outcome.

5.3 Barriers

Bridging the gap between Business and Design depends on the integration of design-based method into existing business approaches. Data collected in this study indicates that design understanding among businesspeople does not currently align with that of designers and that managers are best equipped to consider design through conventional methods (survey) than through design methods (card sort). Where previous efforts to conform design to business continue to pose challenges for both professions (Dreessen, 2017), a revamped tactic that suggests business utilize a design approach might be considered. For this to occur, business professionals would have to become familiar

with design research methods and the capacity that they have to contribute to the evaluation and understanding of design.

Inadequate understanding for the business sector by designers weakens the discussion when design professionals utilize stereotyped thinking in defense of their claim that they are misunderstood. This study was authored by a designer who struggled to accurately reflect the business profession through a limited understanding of it. This work should be considered as an introduction to the issue through which business professionals can gain insight into the concerns held by design professionals. Business and design must both contribute to increased understanding within the field.

The gaps within the design field itself form the greatest barrier to design understanding. Scholarly research on design is not disseminated in design education programs and design education does not link adequately with design practice (Tatlisu & Kaya, 2017). These gaps impact design understanding by professional designers as the tacit knowledge developed through education skills allows them to abandon reasoning in practice and work intuitively (Schon, 1988). Closing these gaps will facilitate an understanding of design that can be disseminated to clients by the design professional.

5.4 Limitations

The survey and workshop data is limited by a non-response bias which occurs when only those interested in the subject respond (Stockemer, 2018, p. 59). Research participants may have a greater consideration for design than those who elected to not participate

because they care less about the subject. Inferences from this potentially biased sample may not accurately reflect the design understanding of the greater business or design professions.

The survey questions did not ask respondents to self-identify as being from business, design, or 'other' and as a result this information had to be determined based on information provided in response to other questions. The omission of this question was an oversight by the researcher, and it is recommended that future researchers add a question to the survey that allows respondents to self-identify.

In the open-card sort activity, over-standardization of participant categories carries the risk of researcher interpretation influencing the data. The approach taken to converge the participant categories under standardized labels limits analysis of the card sort data to the different ways that 'Design' was considered. This analysis provides an idea of what participants think a card means but is limited by the fact that the card could only be sorted under one category. Additionally, less manipulation of the participant categories, where only labels that are very similar in language or idea are combined, would allow for more extensive analysis of the data and richer insights into the labels that were used, organizational schemes, and accuracy of grouped content.

The study included nine (9) survey participants in each of G1_BUSI and G2_DESIGN that indicated that they held a professional designation (i.e. CPA, OAA). Some survey respondents holding a post-secondary degree and no designation may also be trained as

professionals in their field however this cannot be determined based on the survey data. Interpretation of the survey responses may be limited by low representation of professional designers and professional business managers. While efforts were made to concentrate participation to upper-year and graduate students who have had adequate opportunity to gain practical experience in their field, the level of experience was not identified.

Architects and industrial designers represented the majority of respondents in the design group. As the data is intended to reflect understanding amongst all designers, the study would benefit from contributions from a greater variety of design professions.

The pre-professional and professional architecture education of the author and subsequent graduate studies included one graduate course in Design Research Methods and did not include any courses in statistical analysis. The data collected through this research was analyzed through exploratory analysis and comparison. The data should be further analyzed using statistical analysis to strengthen the author's findings.

6. CONCLUSION

This research looks beyond the designer's assertion that the work that they contribute is poorly understood and undervalued by their clients to explore understanding of design process amongst non-designers in the business sector. Using two different methods produced incongruous results. Business participants demonstrated a comparable understanding of design to that of designers through survey question responses, however understanding diverged when tacit knowledge was tested through the card-sorting exercises. Different results from the two methods suggest that design understanding cannot be comprehensively studied through quantitative means.

The literature indicates that the subject of design is too closely associated to design outcome, complex in nature, and unique to all other disciplines. These three attributes lead designers to perceive an undervaluation of their work by individuals outside of the design field. Their own understanding of the subject occurs on a level best reflected through practice, as designers rely on tacit knowledge and react intuitively to design problems. An inadequate ability to clearly explicate their contributions to a project limits understanding among non-designers.

Survey results from this study suggest that business professionals understand the distinct elements of design process. Design however has been defined through design research literature as a complex system of interrelationships founded in Design Thinking. This is where the deviation in understanding occurs. When understanding for

this system was tested through the card-sort exercises, the business participants were less knowledgeable about design.

6.1 Contribution to the Field

This research studies the understanding and valuation of the design sector by business professionals in comparison to that of designers. In practice and in literature, designers frequently declare that a misunderstanding of their contributions by the business sector compromises their ability to innovate and impacts the quality of their work. Efforts to effect change with regards to this understanding tend to fall short as the designers' concerns do not extend outside of their profession. A study that invites business professionals to examine their own understanding opens up the conversation to bring greater awareness to the issue.

Key barriers to design understanding were identified through the literature review. These provide a framework on which to build increased understanding both within and beyond the field of design.

Most importantly, the two methods used in this study provided different results regarding the understanding of design by non-designers and highlights the importance of employing proper technique to communicate, understand, and explore design. As design process struggles to fit comfortably within the rigid confines of business procedure, design understanding challenges qualitative research to address the topic using methods that have the capacity to accurately present design. Future attempts to

research design understanding can benefit from this research and focus on the use of design research methods of data collection.

7. FUTURE RESEARCH

Several areas of future research emerge in response to the findings of this study. Some provide opportunities to further validate and expand upon this data while others would seek new data in support of enhanced design understanding.

This research into the disparity between how professional designers understand their work and how design contributions are understood by those within the business management sector should be explored through larger participant groups from diverse geographical areas using comparable and alternate research methods to expand on the findings of this study.

A inverse study to this that explores the understanding that designers have for business would extend insights into perception between the two fields. Definition of the methods by which business managers approach problems and the attributes of business management that make managers unique from designers would support the relevance of this study to business professionals.

The use of quantitative methods to measure design understanding should be further tested to determine their applicability to this subject.

The card-sorting workshop focused on the barrier to understanding that was identified by Nigel Cross (2011) as design process being too closely associated with outcome. Design complexity and the uniqueness of the profession were additionally identified through the literature review as impediments to design understanding. Studies into these barriers would inform how to best begin to address the issue.

The primary goal of this research project was to broaden the conversation of design understanding beyond the design sector to include those implicated in the concern. Further studies to determine the key points where the design process might be undermined by poor understanding, and how that might alter the outcome could provide quantifiable, empirical data for consideration by the business sector. This type of study would bring attention to the topic of design understanding to those best positioned to initiate change.

REFERENCES

Archer, B. (1979). Whatever became of Design Methodology. *Design Studies*, *1*(1), 17–18. https://doi.org/10.1016/0142-694X(79)90023-1

Beverland, M. B. (2005). Managing the Design Innovation-Brand Marketing Interface: Resolving the Tension between Artistic Creation and Commercial Imperatives. *The Journal of Product Innovation Management*, (22), 193–207.

Blanchard, S. J., & Banerji, I. (2016). Evidence-based recommendations for designing free-sorting experiments. *Behavior Research Methods*, *48*(4), 1318–1336. https://doi.org/10.3758/s13428-015-0644-6

Bradley, S. (2015). Why the Value and Perception of Design Don't Match. Retrieved from vanseodesign.com

Burdick, A. (2010). Design without designers. *Core 77*, 1–9. https://doi.org/10.1039/c5cp03370e

Celi, M., & Formia, E. (2017). Aesthetics of futures. Shaping shared visions of tomorrow. *The Design Journal*, *20*(sup1), S63–S76. https://doi.org/10.1080/14606925.2017.1353039

Clever Podcast. (2018). *Episode 72: Cory Grosser. [Podcast]*. Retrieved from http://www.cleverpodcast.com/blog/ep-72-cory-grosser

Coxon, A. P. M. (1999). *Sorting Data: Collection and Analysis*. *SAGE Research Methods*. Thousand Oaks, CA: Sage Publications, Inc.

https://doi.org/https://dx.doi.org/10.4135/9781412985871

Cross, N. (1990). The nature and nurture of design ability. *Design Studies*. https://doi.org/10.1016/0142-694X(90)90002-T

Cross, N. (2007). From a Design Science to a Design Discipline: Understanding Designerly Ways of Knowing and Thinking. In R. Michel (Ed.), *Design research now, essays and selected projects* (pp. 41–54). Basel: Birkhauser Verlag AG. https://doi.org/10.1007/978-3-7643-8472-2_3

Cross, N. (2011). *Design Thinking*. Bloomsbury Academic.

Design Council. (2013). *Design for Public Good*. *Annual Review of Policy Design* (Vol. 1). Retrieved from http://ojs.unbc.ca/index.php/design/article/viewFile/540/479

Design Research Society. (2013). Design Learning for Tomorrow. In J. B. Reitan, P. Lloyd, E. Bohemia, L. M. Nielsen, I. Diagranes, & E. Lutnaes (Eds.), *Proceedings of the 2nd International Conference for Design Education Researchers* (Vol. 4, p. 657). Oslo, Norway. https://doi.org/10.1016/j.mejo.2007.03.010

Dilnot, C. (1982). Design as a socially significant activity: an introduction. *Design Studies*, *3*(3), 139–146.

Dreessen, T. (2017). Letter to The Honourable Catherine McKenna, MP for Ottawa Centre and the Minister of the Environment and Climate Change, February 9, 2017. Retrieved from http://oaa.on.ca/government-initiative-

detail/oaa_provides_insight_into_architectural_issues/199

Fabrica. (2016). *Design is Future*. Spain. Retrieved from designisfuture.com

Fry, T. (2015). Design: On the question of “The imperative.” *Design and Culture*, *7*(3), 417–422. https://doi.org/10.1080/17547075.2015.1105713

Gedenryd, H. (1998). *How Designers work: Making Sense of Authentic cognitive Activity*.

Hara, T., & Arai, T. (2012). Encourage non-designer’s design: Continuous value creation in manufacturing products and services. *CIRP Annals - Manufacturing Technology*, *61*(1), 171–174. https://doi.org/10.1016/j.cirp.2012.03.068

Hertenstein, J. H., Platt, M. B., & Veryzer, R. W. (2013). What Is “Good Design”?: An Investigation of the Complexity and Structure of Design. *Design Management Journal*, *8*(1), 8–21. https://doi.org/10.1111/dmj.12000

Heskett, J. (2002). *Toothpicks & Logos: Design in Everyday Life*. Oxford: Oxford University Press.

Hobday, M., Boddington, A., & Grantham, A. (2011). An Innovation Perspective on Design : Part 1 Published by : The MIT Press Linked references are available on JSTOR for this article : An Innovation Perspective on Design : Part 1. *Design Issues*, *27*(4), 5–15.

Jochen Wirtz, & Lovelock, C. H. (2018). *Essentials of Services Marketing, 3rd Edition* (3rd ed.). Essex, England: Pearson Education Limited. https://doi.org/10.1002/joe

Kotler, P., & Rath, A. G. (1984). Design: A Powerful but Neglected Strategic Tool. *Journal*

of Business Strategy, *5*(2), 16–21.

Kumar, V. (2013). *101 Design Methods*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Last, J., & Simmons, S. (n.d.). Card Sorting. Retrieved April 27, 2019, from http://designresearchtechniques.com/casestudies/card-sorting/

Lockwood, T. (2007). Design Value: A Framework for Measurement. *Design Management Review*, *18*(4), 90.

Micheli, P., Jaina, J., Goffin, K., Lemke, F., & Verganti, R. (2012). Perceptions of industrial design: The "means" and the "ends." *Journal of Product Innovation Management*, *29*(5), 687–704. https://doi.org/10.1111/j.1540-5885.2012.00937.x

Mintrom, M., & Luetjens, J. (2016). Design Thinking in Policymaking Processes: Opportunities and Challenges. *Australian Journal of Public Administration*, *75*(3), 391–402. https://doi.org/10.1111/1467-8500.12211

Monteiro, M. (2012). *Design is a Job*. Retrieved from http://books.google.com/books?id=OoMwMwEACAAJ&pgis=1

Muratovski, G. (2015). Paradigm Shift: Report on the New Role of Design in Business and Society. *She Ji: The Journal of Design, Economics, and Innovation*, *1*(2), 118–139. https://doi.org/10.1016/j.sheji.2015.11.002

Nae, H.-J. (2017). An Interdisciplinary Design Education Framework. *The Design Journal*, *20*(sup1), S835–S847. https://doi.org/10.1080/14606925.2017.1353030

NAEH. (2003). The Economic Effects of Design, (September), 1–34.

https://doi.org/10.3386/w0964

Nielsen, L. M., Naess, P., Reitan, J. B., Digranes, I., Berg, A., Maus, I. G., & Koteles, L. (2012). Design Literacy – From primary education to university level. *DRS2012 Bangkok*, 1–3.

Norman, D. A. (2013). *The Design of Everyday Things - Revised and Expanded Edition*. *Human Factors and Ergonomics in Manufacturing*. https://doi.org/10.1002/hfm.20127

Pauwels, P., Meyer, R. De, & Campenhout, J. Van. (2013). Design Thinking Support: Information Systems Versus Reasoning. *Design Issues*, *29*(Spring 2013), 42–59. https://doi.org/10.1162/DESI_a_00209

Ray, R. (2009). *Designing and Conducting Mixed Methods Research [Book Review]*. *Qualitative Research Journal* (Vol. 7). https://doi.org/10.3316/qrj0702090

Rugg, G., & McGeorge, P. (2005). A rticle picture sorts and item sorts. *Expert Systems*, *22*(3), 94–107.

Scher, P. (2005). *MakeItBigger*. New York, NY: Princeton Architectural Press.

Schon, D. A. (1988). Designing : Rules , types and worlds, 181–190.

Schoonenboom, J., & Johnson, R. B. (2017). How to Construct a Mixed Methods Research Design. *KZfSS Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *69*(S2), 107–131. https://doi.org/10.1007/s11577-017-0454-1

SEE Platform. (2012). European Design Systems and Innovation Policy. *See Policy Booklet 5*, (September). Retrieved from http://www.seeplatform.eu/docs/SEE Platform

policy booklet 5.pdf

Sharma, A. (University of M. (1997). Professional as Agent : Knowledge Asymmetry in Agency Exchange. *The Academy of Management Review*, *22*(3), 758–798. Retrieved from https://www.jstor.org/stable/259412

Spencer, D. (2004). Card Sorting: A Definitive Guide. Retrieved March 24, 2019, from http://boxesandarrows.com/card-sorting-a-definitive-guide/

Spencer, D. (2009). Card Sorting: Designing Usable Categories. In *Card Sorting: Designing Usable Categories*.

Stamm, B. (2010). Innovation-What's Design Got to Do with It? *Design Management Review*, *15*(1), 10–19. https://doi.org/10.1111/j.1948-7169.2004.tb00145.x

Stockemer, D. (2018). *Quantitative Methods for the Social Sciences*. *Quantitative Methods for the Social Sciences*. https://doi.org/10.1007/978-3-319-99118-4

Tatlisu, E., & Kaya, Ç. (2017). The Reflection of Experiential Knowledge Into Professional Practice: Case of Industrial Design Education. *The Design Journal*, *20*(sup1), S1415–S1429. https://doi.org/10.1080/14606925.2017.1352667

The Design Discussion. (2013). *DMI*, (Summer), 12–13.

Tombs, R. (2001). Why design is important: five designers speak to non-designers. In *Journal of Scholarly Publishing* (Vol. 33, pp. 37–46). https://doi.org/10.3138/jsp.33.1.37

Topalian, A. (1989). ORGANIZATIONAL FEATURES THAT NURTURE DESIGN SUCCESS. In

Second International Conference on Engineering Management (pp. 50–57).

Topalian, A. (2002). Promoting Design Leadership through Skills Development Programs. *Design Management Journal*, *13*(3), 10–18. https://doi.org/10.1111/j.1948-7169.2002.tb00313.x

Topalian, A. (2012). Frontline Roles for Design Leaders in the Multiverses of Business. *Design Management Journal*, *7*(1), 29–39. https://doi.org/10.1111/j.1948-7177.2012.00031.x

Vassallo, S. (2017). *The Way to Design*. Foundation Capital. Retrieved from https://www.jiscmail.ac.uk/cgi-bin/webadmin?A2=phd-design;b7a5e9d.05

Vinodrai, T. (2009). The Place of Design : Exploring Ontario's Design Economy, (March), 45. Retrieved from http://www.ico-d.org/database/files/library/Canada_The_Place_of_Design_TVinodrai.pdf

Waterhouse, P. (1996). *Shaping Canada's Future BY DESIGN*. *Design*.

Winter-Simat, N., Wright, N., & Choi, J. H. (2017). Creating 21st Century Global Citizens. A design-led systems approach to transformative secondary education for sustainability. *The Design Journal*, *20*(sup1), S1651–S1661. https://doi.org/10.1080/14606925.2017.1352688

Wolf, T. (2005). Re: Design...design process + design sensibility. Retrieved from https://www.jiscmail.ac.uk/cgi-bin/webadmin?A2=phd-design;b7a5e9d.05

Zeithaml, V. A., Bitner, M. J., & Gremler, D. (2017). *Services Marketing: Integrating*

Customer Focus Across the Firm (Seventh). New York, NY: McGraw-Hill Education.

APPENDICES

Appendix A Ethics

A.1 Ethics Clearance

Office of Research Ethics
503 Robertson Hall | 1125 Colonel By Drive
Ottawa, Ontario K1S 5B6
613-520-2600 Ext: 4085
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The Carleton University Research Ethics Board-B (CUREB-B) has granted ethics clearance for the research project described below and research may now proceed. CUREB-B is constituted and operates in compliance with the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* (TCPS2).

Ethics Protocol Clearance ID: Project # 110357

Research Team: Jennifer Heaney (Primary Investigator)
Leighann Neilson (Research Supervisor)
Stephen Field (Research Supervisor)

Project Title: The Perceived Value of Design: a study of the general understanding of the design industry and its value to society through quantitative and qualitative research

Funding Source (If applicable):

Effective: **March 08, 2019** Expires: **March 31, 2020**.

Please ensure the study clearance number is prominently placed in all recruitment and consent materials: CUREB-B Clearance # 110357.

Restrictions:

This certification is subject to the following conditions:

1. Clearance is granted only for the research and purposes described in the application.
2. Any modification to the approved research must be submitted to CUREB-B via a Change to Protocol Form. All changes must be cleared prior to the continuance of the research.

3. An Annual Status Report for the renewal of ethics clearance must be submitted and cleared by the renewal date listed above. Failure to submit the Annual Status Report will result in the closure of the file.If funding is associated, funds will be frozen.
4. A closure request must be sent to CUREB-B when the research is complete or terminated.
5. During the course of the study, if you encounter an adverse event, material incidental finding, protocol deviation or other unanticipated problem, you must complete and submit a Report of Adverse Events and Unanticipated Problems Form, found here: https://carleton.ca/researchethics/forms-and-templates/

Failure to conduct the research in accordance with the principles of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans 2ndedition* and the *Carleton University Policies and Procedures for the Ethical Conduct of Research* may result in the suspension or termination of the research project.

Upon reasonable request, it is the policy of CUREB, for cleared protocols, to release the name of the PI, the title of the project, and the date of clearance and any renewal(s).

Please contact the Research Compliance Coordinators, at ethics@carleton.ca, if you have any questions.

CLEARED BY: **Date: March 08, 2019**

Bernadette Campbell, PhD, Chair, CUREB-B

Natasha Artemeva, PhD, Vice-Chair, CUREB-B

A.2 Survey Consent Form

Carleton UNIVERSITY
Canada's Capital University

Research Consent for Online Survey

Project Title

The Perceived Value of Design:

a study of the general understanding of the design industry and its value to society through quantitative and qualitative research

Carleton University Project Clearance

CUREB-B Clearance #: 110357 Date of Clearance: March 9, 2019

Invitation

We are asking you to complete this survey because you are a student/employee involved with offering business and professional services. This survey is being conducted by Jennifer Heaney of the Carleton University School of Industrial Design (id@carleton.ca, 613-520-5672) working under the supervision of Prof. Stephen Field.

Objectives and Summary:

The aim of this study is to better understand any barriers that might exist between designers and those commonly tasked with procuring design services through a series of questions related to design perception.

We estimate that the survey will take about 10 minutes to complete. Your participation in this survey is voluntary, and you may choose not to take part, or not to submit the completed survey. Once survey responses are submitted, they cannot be withdrawn. We expect to survey a total of 30 people.

Risks and Benefits:

We do not anticipate any risks from taking the survey, nor do we anticipate that you will derive any direct benefit.

Confidentiality and Data Storage:

We will treat your personal information as confidential, although absolute privacy cannot be guaranteed. No information that discloses your identity will be released or published. Research records may be accessed by the Carleton University Research Ethics Board in order to ensure continuing ethics compliance.

The results of this study may be published, but the data will be presented so that it will not be possible to identify you, unless you give consent. All research data will be password-protected, and any hard copies of data will be kept in a locked cabinet at Carleton University.

Your data will be stored and protected by Qualtrics Survey Management, on servers located in Toronto, ON, but may be disclosed via a court order or data breach.

After the study is completed, we will retain your anonymized data for future research use.

A.2 Survey Consent Form

Version 2018-09-12

Withdrawal

Incomplete survey responses will not be submitted.

Following submission of completed survey responses, you may request that your data be removed from the study and deleted by notice given to the Principal Investigator (named above) within five days after your participation.

REB Review and Contact Information:

This project was reviewed and cleared by the Carleton University Research Ethics Board. If you have any ethical concerns with the study, please contact Dr. Bernadette Campbell, Chair by phone at 613-520-2600 ext. 4085 or by email at ethics@carleton.ca.

Implied consent:

By completing the online survey and pressing 'SUBMIT', you are agreeing to participate in the study.

Researchers Contact Information:

Name:	Jennifer Heaney
Department:	Carleton University, School of Industrial Design
Tel.:	[redacted]
Email:	jennifer.heaney@carleton.ca

Supervisor Contact Information:

Name:	Stephen Field,
Department:	Carleton University, School of Industrial Design
Tel.:	613-520-2600 x8371
Email:	Stephen.field@carleton.ca

A.3 Workshop Consent Form

Carleton UNIVERSITY
Canada's Capital University

Research Consent Form for Workshop

Project Title

The Perceived Value of Design:

a study of the general understanding of the design industry and its value to society through quantitative and qualitative research

Carleton University Project Clearance

CUREB-B Clearance #: 110357 Date of Clearance: March 8, 2019

Invitation

You are invited to take part in a research project because you are either a designer, or a student/employee of the business sector involved with offering business and professional services. The information in this form is intended to help you understand what we are asking of you so that you can decide whether you agree to participate in this study. Your participation in this study is voluntary, and a decision not to participate will not be used against you in any way. As you read this form, and decide whether to participate, please ask all the questions you might have, take whatever time you need, and consult with others as you wish.

What is the purpose of the study?

This study aims to better understand any barriers that might exist between designers and those commonly tasked with procuring design services, and to develop ideas for improvement. **The researcher in this study is an MDes graduate student from Carleton University's School of Industrial Design, Faculty of Engineering and Design**. The student is working under the supervision of Professor Stephen Field in Carleton University's School of Industrial Design, Faculty of Engineering and Design.

What will I be asked to do?

If you agree to take part in the study, we will ask you to participate in a 45 minute to 1 hour long in-person workshop, to be held at Carleton University on **Thursday, April 4th at 5:30pm**. This workshop involves observing an image-sorting task within the natural context of our MDes seminar room. The study also involves asking you questions in an informal interview style within the same setting to clarify things the researchers observed and/or questions on the approaches you use to complete your tasks. It is anticipated that the group will consist of six to twelve participants. Activities will take place in small groups, with participants sharing their responses with the larger group. With your consent, photos and video will be taken during the observation as well as notes and audio recording (to supplement note-taking).

Your identity will be protected in the study: your name will not be used in this study or linked to information and once your identity in the photos and video are obscured, the raw data showing your identity will be destroyed. You may be contacted in the future to provide feedback on the researchers' insights.

A.3 Workshop Consent Form

Possible Benefits

Following the workshop, you may come away with a better understanding of the design process. Your participation may also allow researchers to better understand the perception of design by non-designers.

Compensation/Incentives

Refreshments will be provided, and parking will be reimbursed by the researcher upon request.

No waiver of your rights

By signing this form, you are not waiving any rights or releasing the researchers from any liability.

Withdrawing from the study

If you withdraw your consent during the course of the study, all information collected from you before your withdrawal will still be used, unless you request that it be removed from the study data. Audio and video recorded in a group setting cannot be deleted, however data specific to the withdrawn individual will be excluded from the analysis.

After the study, you may request that your data be removed from the study and deleted by notice given to the Principal Investigator (named above) within ten days after your participation.

Confidentiality

All research data, including video recordings and any notes will be stored on the researcher's password protected computer for future research and/or to draw upon for generalized, non-identifiable publications. Any hard copies of data (including any handwritten notes or USB keys) will be kept in a locked office at Carleton University. Research data will only be accessible by the researcher and the research supervisor.

You will be assigned a code so that your identity will not be directly associated with the data you have provided. All data, including coded information, will be kept in a password-protected file on a secure computer.

We will treat your personal information as confidential, although absolute privacy cannot be guaranteed. No information that discloses your identity will be released or published. Research records may be accessed by the Carleton University Research Ethics Board in order to ensure continuing ethics compliance.

Future Use of Data

The results of this study may be published or presented at an academic conference or meeting, but the data will be presented so that it will not be possible to identify any participants.

Data Retention

Raw data will be deleted at the conclusion of the study, however anonymous, de-identified data may be retained. Once the project is completed, all research data will be kept for ten years and potentially used for other research projects on this same topic. At the end of ten years, all research data will be securely destroyed. (Electronic data will be erased, and hard copies will be shredded.)

A.3 Workshop Consent Form

Ethics review

This project was reviewed and cleared by the Carleton University Research Ethics Board B. If you have any ethical concerns with the study, please contact Dr. Bernadette Campbell, Chair, Carleton University Research Ethics Board (by phone at 613-520-2600 ext. 4085 for CUREB B or by email at ethics@carleton.ca).

Statement of consent – print and sign name

I _____voluntarily agree to participate in this study.
(print name)

I agree to be audio recorded	___Yes	___No
I agree to be video recorded	___Yes	___No
I agree to be photographed	___Yes	___No

(Note: Audio recording is mandatory for participation. You may still participate if you decline options to be photographed and/or video recorded)

_____ _____

Signature of participant Date

Research team member who interacted with the subject

I have explained the study to the participant and answered any and all of their questions. The participant appeared to understand and agree. I provided a copy of the consent form to the participant for their reference.

_____ _____

Signature of researcher Date

Researchers Contact Information:

Name: Jennifer Heaney
Department: Carleton University,
School of Industrial Design
Tel.: [redacted]
Email: jennifer.heaney@carleton.ca

Supervisor Contact Information:

Name: Stephen Field,
Department: Carleton University,
School of Industrial Design
Tel.: 613-520-2600 x8371
Email: Stephen.field@carleton.ca

B.1 Survey Recruitment Email

Appendix B Recruitment

B.1 Survey Recruitment Email

Subject: Invitation to participate in a research thesis on the Perceived Value of Design

CUREB-B Clearance#: 110357 **Date of Clearance:** March 8, 2019

I am hoping that you might be able to help me with a research project that I am undertaking as part of the Master of Design (MDes) program in the School of Industrial Design at Carleton University. For my thesis I am exploring the following question:

What do non-designers understand the role of the design professional to include and how does this affect their capacity to quantify the abilities of the designer to add value to a project?

To address this question, I am surveying individuals from both within and outside of the design profession.
Please consider participating in an online survey regarding this topic by March 15th, and forwarding information to any of your colleagues that you feel might also be willing to participate in support of this study.

Follow this link to the Survey:
Take the Survey

Or copy and paste the URL below into your internet browser:
https://carletonu.az1.qualtrics.com/jfe/form/SV_6ETOQEr9zFzmAaF?Q_DL=b95FlMQ355NE3s1_6ETOQEr9zFzmAaF_CGC_2iqFA4ummx57yjH&Q_CHL=email

I have provided some text below that you can modify as you see fit and forward by way of introduction to potential participants. I really appreciate your help!

"My [friend/colleague/student] Jennifer Heaney is collecting research through an online survey for her Master of Design (MDes) thesis at Carleton University. Her topic is on the Perceived Value of Design by business professionals and she has asked that I reach out to some people in the business profession on her behalf. This is an opportunity for you to help define some of the barriers that exist between designers and those that hire them.
If you would be willing to participate, please link to the survey here: Survey Link*. If you have any issues with the link, please contact* jennifer.heaney@carleton.ca*. The task should take about 10 minutes to complete."*

Sincerely,

Jen.

B.3 Recruitment Poster

Carleton UNIVERSITY

The Perceived Value of Design

Research Workshop for Business Students and Staff

To participate in this study, you must be:

- ✓ A student, employee, or educator from within the field of business
- ✓ At least 18 years old
- ✓ Comfortable in the English language

The workshop will explore the understanding of the design process by those within the business sector using image cards to facilitate discussion.

*Note that consent for audio recording during the sessions is mandatory. Individuals who do not consent to video recording may still participate.

This interactive 1-hour session will take place on campus.
Food and refreshments will be served & parking will be reimbursed.

CUREB-B Clearance #110357 Date of Clearance: March 8, 2019
The ethics protocol for this project has been reviewed and cleared by the Carleton University Research Ethics Board. If you have any ethical concerns with the study, please contact Dr. Bernadette Campbell, Chair, Carleton University Research Ethics Board-B (by phone at 613-520-2600 ext. 4085 or via email at ethics@carleton.ca).

Please contact the researcher, Jennifer Heaney, for more details on this study at **jennifer.heaney@carleton.ca**

Jennifer Heaney
jennifer.heaney@carleton.ca

Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca
Jennifer Heaney
jennifer.heaney@carleton.ca

B.3 Workshop Recruitment Email

Re: Invitation to participate in a Research Workshop on the perceived value of design

Hi,

You are receiving this email because you answered 'yes' when asked if you would like to receive additional information regarding the opportunity to participate in an **Image Sorting Session** during the online survey titled *Understanding Design*.

The session has been scheduled on **April 4th, 2019** at **5:30pm**, and will take place at Carleton University in room 3464 of the Mackenzie Building. This session will be conducted as a 1-hour workshop where images and small-group interactions will be used to facilitate discussion about how designers and non-designers perceive design. Snacks and refreshments will be provided and parking costs will be reimbursed upon request.

Please take a moment to read through the attached consent form which contains additional information on what your participation will involve, and indicate by response to this email whether or not you will be able to attend. Kindly respond before Wednesday, March 27th.

Sincerely,

Jennifer Heaney

Appendix C Survey Questions

C.1 Survey Questions

Research Consent for Online Survey

Understanding Design

Thank you for participating in this survey. Through the following questions, I aim to gain an appreciation of your understanding of the role of design professionals.
There are dozens of categories of design (i.e. industrial design, interior design, architecture, software design, fashion design, graphic design, to name a few). When responding to these questions, please attempt to consider design as it might apply universally to these categories.

You may save and return to the survey at any time. By completing the online survey and pressing 'SUBMIT', you are agreeing to participate in the study. Incomplete surveys will not be submitted.

Please take a moment to download and read the consent form using the link on the next page before you continue.

Carleton Survey Consent

Survey Questions

How well informed, if at all, would you say you are about each of the following professions:

	Not at all well	Not so well	Somewhat well	Very well	Extremely well
Medical	○	○	○	○	○
Business	○	○	○	○	○
Engineering	○	○	○	○	○
Architecture	○	○	○	○	○
Science	○	○	○	○	○
Law	○	○	○	○	○
Industrial Design / Product Design	○	○	○	○	○
User Experience (UX) Design	○	○	○	○	○
Teaching	○	○	○	○	○

C.1 Survey Questions

In your opinion, how well informed would you say designers are about the business profession, on a scale of 1 to 5?

	1	2	3	4	5	
Not well informed	○	○	○	○	○	Extremely well informed

How much would you say you know about design as a profession, on a scale of 1 to 5?

	1	2	3	4	5	
Nothing at all	○	○	○	○	○	Very detailed knowledge of

How well do you understand the following design professions in terms of the services they provide and the work that they do to provide those services?

	Not at all well	Not so well	Somewhat well	Very well	Extremely well
Graphic Design	○	○	○	○	○
Interactive / Web Design	○	○	○	○	○
Motion Graphics Design	○	○	○	○	○
Video Game Design	○	○	○	○	○
Architectural Design	○	○	○	○	○
Interior Design	○	○	○	○	○
Industrial Design	○	○	○	○	○
Instructional Design	○	○	○	○	○
User Experience (UX) Design	○	○	○	○	○
Exhibition Design	○	○	○	○	○

C.1 Survey Questions

If you wanted to learn more about **Design**, where might you search for information?
select all that apply

Ask designers I have met / I know

Friends and family

Work colleagues

Internet

Magazines

Library / books

TV or Radio programmes

University / Colleges / Lecturers

Schools / Teachers

Don't Know

[ ] Other

If you wanted to learn more about **what Designers do**, where might you search for information?
select all that apply

Ask designers I have met / I know

Friends and family

Work colleagues

Internet

Magazines

Library / Books

TV or Radio programmes

University / Colleges / Lecturers

Schools / Teachers

Don't Know

[ ] Other

C.1 Survey Questions

To what extent do you agree or disagree with the following statements about designers?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Designers solve problems	○	○	○	○	○
Designers make things look good	○	○	○	○	○
Designers make things easier to understand	○	○	○	○	○
Designers don't understand "real people"	○	○	○	○	○
Designers are good at drawing	○	○	○	○	○
Designers communicate ideas	○	○	○	○	○
Designers are paid too much	○	○	○	○	○
Designers make a positive contribution to society	○	○	○	○	○
Design talent comes naturally	○	○	○	○	○
Designers choose colours and materials	○	○	○	○	○

C.1 Survey Questions

To what extent do you agree or disagree with the following statements about design?

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Anyone can design	○	○	○	○	○
Design is expensive	○	○	○	○	○
Design is important	○	○	○	○	○
Design is intuitive	○	○	○	○	○
Design is a waste of money	○	○	○	○	○
Design is a social process	○	○	○	○	○
Design should be taught in elementary school	○	○	○	○	○
The design process starts once the client knows what he/she wants	○	○	○	○	○
Design is a well-respected profession	○	○	○	○	○
Design is valuable	○	○	○	○	○
Design makes things look good	○	○	○	○	○
Design makes things easier to understand	○	○	○	○	○

On the series of 1 to 5 rating scales listed below, where would you rank the following statement?

"The work of a designer is..."

	1	2	3	4	5	
Independant	○	○	○	○	○	Collaborative
	○	○	○	○	○	

C.1 Survey Questions

Intuitive						Intellectual
Linear	○	○	○	○	○	Reiterative
Structured	○	○	○	○	○	Fluid
to make clear	○	○	○	○	○	to conceal
easily defined	○	○	○	○	○	vague

How involved do you think designers are in the following areas of work?

	Not at all involved	Not very involved	Fairly involved	Very involved	Don't know
Healthcare	○	○	○	○	○
Education	○	○	○	○	○
Politics	○	○	○	○	○
Manufacturing	○	○	○	○	○
Construction	○	○	○	○	○
Social Science	○	○	○	○	○
Entertainment	○	○	○	○	○
Law	○	○	○	○	○

Rank Activities in order of what you perceive to be most relevant to the design process:
drag and drop

Research

Communication

Drawing

Coordination

Innovation

C.1 Survey Questions

Select the top three activities that you perceive to be relevant to design education, in terms of teaching students:

computer skills

design skills

technical skills (manufacturing process, construction detailing, etc.)

precedent work by famous designers

verbal communication

visual communication

problem solving

scholarly research

appreciation for good design

collaboration

Relative to other professional post-secondary programs (i.e. Engineering, Medicine, Law, Business, etc.), how demanding are Design Education programs?

	1	2	3	4	5	
not at all demanding	○	○	○	○	○	extremely demanding

In your opinion, designers use models / drawings to:

select all that apply

Communicate ideas

Represent final design

Test alternatives

Show off skills

Explore ideas

Market ideas

Don't know

C.1 Survey Questions

In your opinion, designers review each other's work to:
select all that apply

Make each other more resilient to criticism

Raise concerns about the design

Develop alternative options

Demonstrate own knowledge

Gain insights

Don't know

The services a Designer provides are:

	Not at all	Not very	Fairly	Very	Don't know
Valuable	○	○	○	○	○
Ethical	○	○	○	○	○
Dispensable	○	○	○	○	○
Overrated	○	○	○	○	○

The considerations that are addressed through design are:
select all that apply

Financial

Psychological

Environmental

Operational

Physical

Emotional

Aesthetic

Sustainable

Marketable

Empathetic

Don't know

C.1 Survey Questions

Socio-demographics

Which of the following applies to you?
select all that apply

I am a professional designer

I have used the services of a professional designer

I work with designers

I have designers among my family and friends

I have an interest in design

I have no experience with design professionals

I have no interest in design

Don't know

[ ] Other

Which of the following best describes your current working status?

Working full time (30+ hours)

Working part time (9-29 hours)

Retired

Student

[ ] Other

What is the highest degree or level of school you have completed?
If currently enrolled, indicate highest degree received

Less than high school diploma

High school graduate

Trade/technical/vocational training

College degree

Bachelor's degree

Master's degree

Professional designation

Doctorate degree

C.1 Survey Questions

What is your primary language?

English

French

Other

What gender do you identify with?

Male

Female

Other

Prefer not to say

Block 3

Would you like to receive information as to how you might contribute further in this study through participation in a 1 hour workshop?

Selecting 'yes' grants the researcher permission to forward additional information regarding the workshop only and does not indicate agreement to participate.

Yes

No

Please enter your email address to receive additional information regarding the workshop

Appendix D Workshop

D.1 Workshop Agenda

Thursday, April 4th, 2019

5:30pm (5 min)

1> Introduction

5:35pm (10 min)

2> Ask individuals to write a list of [**at least**] **5 things in response to the following:** "When I say 'design', what word or phrase comes to mind?"

- **a. Distribute coloured index cards to participants, giving one colour to non-designers and a different colour to designers. Ask them to write their top two responses on separate cards.**
- **b. Researcher collects cards and shuffles them up.**

3> As the individuals are writing their lists, the researcher pins up banner with the quote: "Design is to design a design to produce a design" (Heskett)

5:45pm (15 min)

4> All participants discuss the different meanings ('concept', 'action', 'intention' or 'result') of the word 'design' demonstrated by the quote

5> Researcher presents each response to all participants and pins it to the wall, sorting them into groupings of 'concept', 'action', 'intention' or 'result'.

- **a. If necessary (because of a low number of participants), request participants to write their remaining responses on cards and repeat exercise to expand list**

6> All participants discuss the four groupings. Further discussion items might include: designer vs non-designer responses, groupings with the most vs least responses, duplicate responses, etc.

6:00pm (20 min)

7> Researcher emphasises the focus of the study on the action/verb form of 'design'. The concept of design as a means to solve problems **is presented to the group.**

8> Each individual is given a deck of 20-30 image cards and several blank cards.

- **a. Using the image cards, the participants are instructed to individually sort the images** *in response to the design problem being solved*. **Using blank cards provided, a representative from each group writes a heading or keyword to describe each image grouping.**

b. Researcher records the completed exercise for each group.

6:20pm (5 min)

9> All participants discuss the following:

a. Was the exercise easy, or difficult? What issues did you face while sorting the cards?

b. In your opinion, who is typically responsible for defining the problem – the client or the designer? Why? If it is the client's responsibility, is it adequate for the client to describe the problem to the designer and ask for a solution? Should the designer question the problem?

"Design is the ability to imagine that-which-does-not-yet-exist, to make it appear in concrete form as a new purposeful addition to the real world" (Nelson+Stolterman, 2002)

"The fundamental problem is that designers are obliged to use current information to predict a future state that will not come about unless their predictions are correct…The designer must be able to predict the ultimate effects of their proposed design as well as specifying the actions that are needed to bring these effects about." (Jones, 1970 in Design Methods)

Therefore, the problem cannot be fully formulated in isolation from the proposed solution.

6:25pm (5 min)

10> All participants asked to respond in writing to the following:

a. Had you previously considered the concept of designer as problem solver? Do you agree/disagree with this concept? Please explain.

b. How important is understanding the problem to formulating a solution?

c. If you were to write a list of 5 things that come to mind when I say 'design', now that we have done this exercise, how would that list differ from your initial list?

D.2 Presentation Slides

DESIGN

1

Concept: (n) what do you mean by design?

Action: (v) what does a designer do?

Intention: (n) how will the design be implemented?

Result: (n) what is the outcome?

2

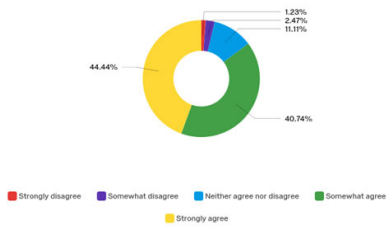
Concept: (n) what do you mean by design?

Action: (v) what does a designer do?

Intention: (n) how will the design be implemented?

Result: (n) what is the outcome?

3



4

Image Sort Instructions

1. look at all of the cards before sorting
2. sort the items into separate groups, using a single criterion
3. record the items in each group

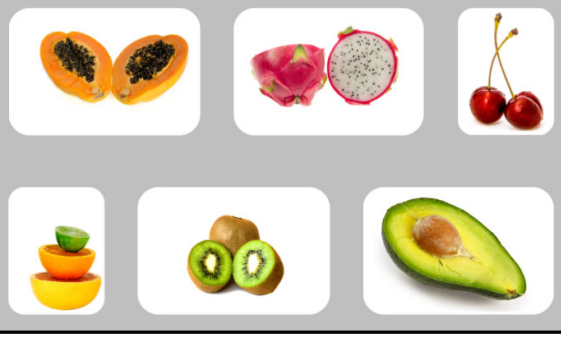
DO:

- Use the categories of 'other', or 'not sure' only if necessary
- create as many or as few piles as you wish
- create categories containing a single card
- change categories or re-sort at any time

DO NOT:

- lump two sorting criteria together in one sort
- Use the numbering as criterion

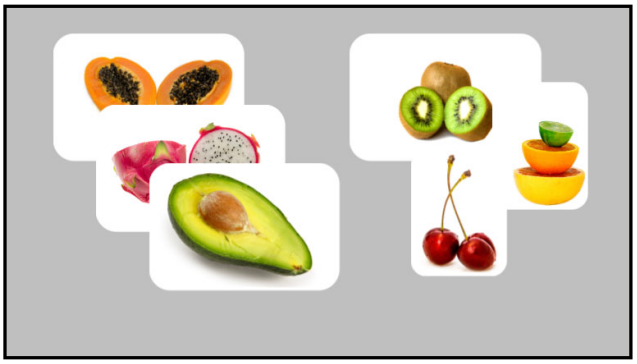
5



6

D.2 Presentation Slides

7



8

sort the images

in response to the design problem being solved

9

sort the images

in response to the complexity

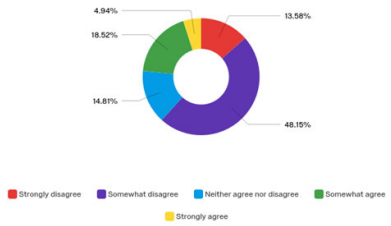
of the design problem being solved

10

"Design is the ability to imagine **that-which-does-not-yet-exist**, to make it appear in concrete form as a new purposeful addition to the real world"

(Nelson+Stolterman, 2002)

11



12

D.2 Presentation Slides

"The fundamental problem is that designers are obliged to use **current information** to **predict a future state** that will not come about unless their predictions are correct…The designer must be able to **predict the ultimate effects of their proposed design** as well as specifying the actions that are needed to bring these effects about."

- Jones, 1970 in Design Methods

13

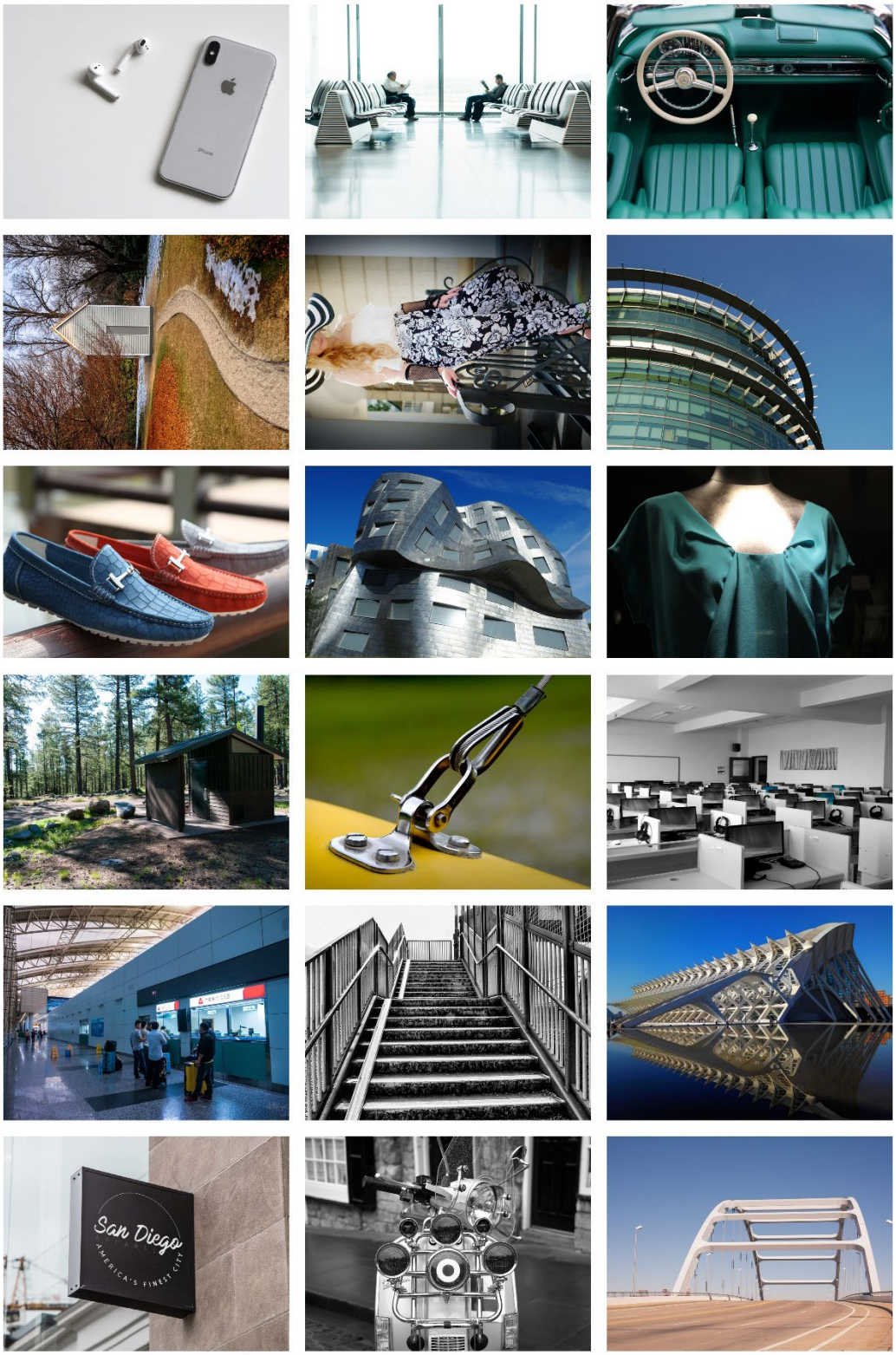
questionnaire

14

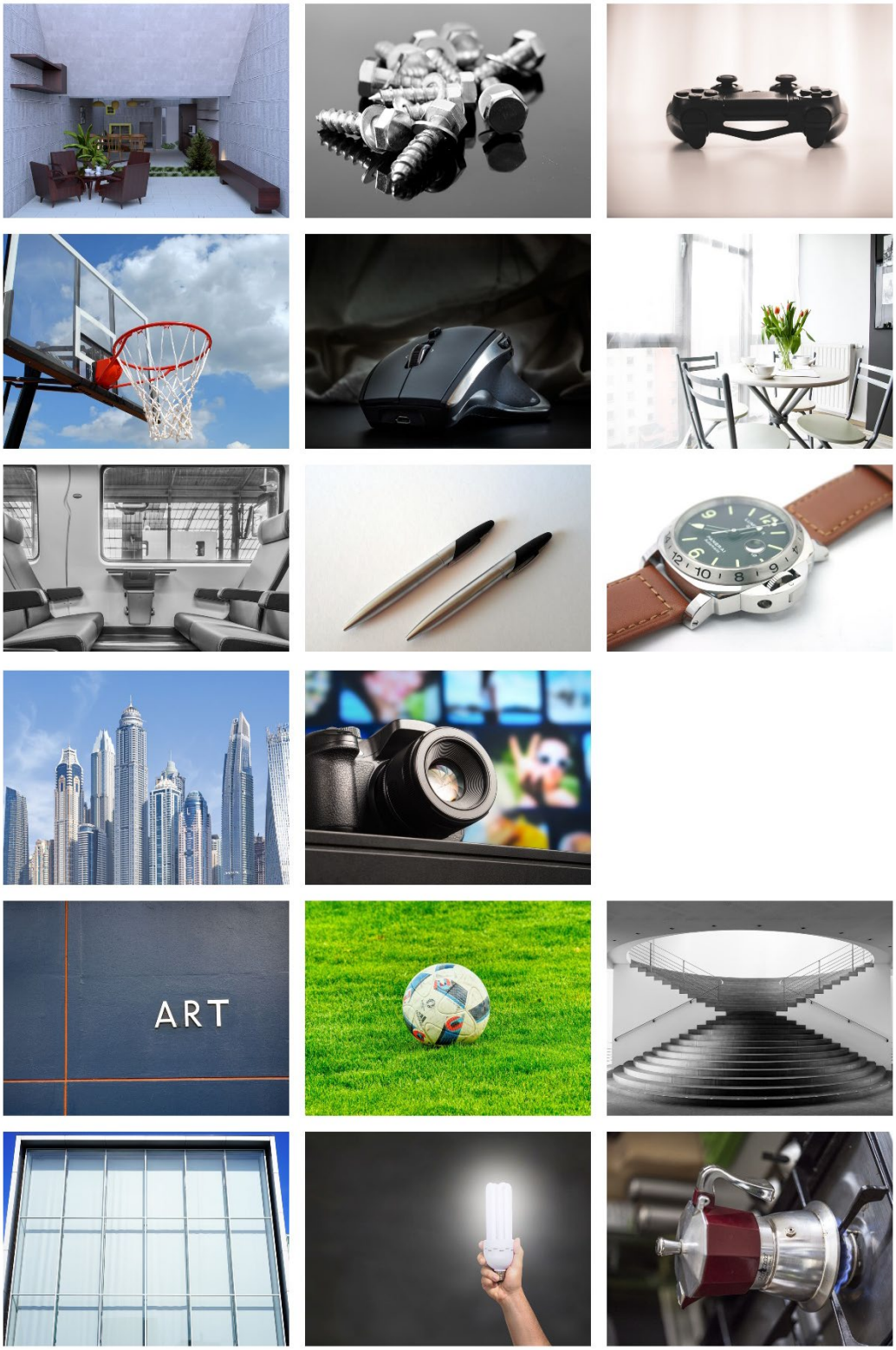
Thank-you!

15

D.3 Images for Open Card Sort



D.3 Images for Open Card Sort



D.4 Questionnaire

WORKSHOP QUESTIONNAIRE

1. Had you previously considered the concept of designer as problem solver?

a. Yes [ ] No [ ]

b. Do you agree/disagree with this concept? Please explain.

_____

_____

_____

_____

2. How important is researching and understanding the problem to formulating a solution?

a. Not very important [ ] Somewhat important [ ] Very important [ ]

b. Please explain.

_____

_____

_____

_____

c. Who is responsible for developing this understanding in a design project?
(list all that apply)

_____

_____

_____

_____

[turn over...]

3. Did this workshop impact the way in which you consider design?

a. Yes [ ] No [ ]

b. Write a list of 5 things that come to mind when you consider 'what is design', now that we have done this exercise.

1. _____

2. _____

3. _____

4. _____

5. _____

c. How does this list differ from your initial list (if at all)?

_____

_____

_____

_____

4. Are you a professional designer (or student of a design-related program)?

Yes [ ] No [ ]

Thank You!

Appendix E Data

E.1 Open Card Sort Summary

Summary

Card no	Card name	Sort7	Sort8	Sort9	Sort10	Sort11	Sort12	SortsCompleted
01	San Diego Signage	Branding	No true "problem"/aesthetic	Surface Treatment	Graphic/texts	Graphic Design	External signage	6
02	Moped	Unity	Design for human Interaction	Beyond Function	Things about movement	Means of transportation	Engaged sitting (lean-in activities)	6
03	White Bridge	Rhythm	Structure/Structural		Things about movement	Landscape/building /architecture	Suspension/Object Support	5
04	Car Interior	Branding	Design for human Interaction	Surface Treatment	Things about movement	Means of transportation	Roof/Shelter	6
05	Outhouse	Mood/Environment	Environment/Area	Timeless	Nature	Landscape/building /architecture	Roof/Shelter	6
06	Cable Connection	Function	Structure/Structural	Timeless	Things sized to hands	Industrial Design	Suspension/Object Support	6
07	Curved Curtainwall	Rhythm	Structure/Structural	Reaching the sky	Buildings	Landscape/building /architecture		5
08	Airport Service Window	Experiences/Systems	Environment/Area	Reaching the sky	Buildings	Interior Design	Roof/Shelter	6
09	Staircase (straight run)	Rhythm	Environment/Area	"Touch" Ergonomics	Things about movement	Means of transportation	Up-wards	6
10	Train Interior	Experiences/Systems	Environment/Area	"Touch" Ergonomics	Things about movement	Means of transportation	Engaged sitting (lean-in activities)	6
11	Two Pens	Experiences/Systems	Design for human Interaction	Surface Treatment	Things sized to hands	Personal object design	Stuff to focus or help keep focus or loose focus	6
12	Watch	Unity	Design for human Interaction	"Touch" Ergonomics	Things sized to hands	Personal object design	Stuff to focus or help keep focus or loose focus	6
13	Office Workspace	Rhythm	Environment/Area	Trends	Places to sit	Interior Design	Engaged sitting (lean-in activities)	6
14	Concrete Interior	Mood/Environment	Environment/Area	Trends	Nature	Interior Design	Engaged sitting (lean-in activities)	6
15	Screws	Function	Structure/Structural	Timeless	Things sized to hands	Industrial Design	Suspension/Object Support	6
16	Stadium	Rhythm	Structure/Structural	Beyond Function	Buildings	Landscape/building /architecture	Roof/Shelter	6
17	Basketball Hoop	Experiences/Systems	Design for human Interaction	Timeless	Round Sports Stuff	Design for sport	Gaming	6
18	Computer Mouse	Unity	Design for human Interaction	"Touch" Ergonomics	Things sized to hands	Personal object design	Gaming	6
19	Window Wall	Rhythm	Structure/Structural	Reaching the sky	Buildings	Landscape/building /architecture	Up-wards	6
20	Lightbulb	Function	Design for human Interaction	Timeless	Light	Industrial Design	Stuff to focus or help keep focus or loose focus	6
21	Coffee Maker	Unity	Design for human Interaction		Things sized to hands	Personal object design	Stuff to focus or help keep focus or loose focus	5
22	Video Game Controller	Experiences/Systems	Design for human Interaction	"Touch" Ergonomics	Things sized to hands	Personal object design	Gaming	6
23	Highrise Skyline	Rhythm	Structure/Structural	Reaching the sky	Buildings	Landscape/building /architecture	Roof/Shelter	6

cardsort analysis hearey-DESIGNERS ONLY

Summary

Card no	Card name	Sort7	Sort8	Sort9	Sort10	Sort11	Sort12	SortsCompleted
24	SLR Camera	Experiences/Systems	Design for human Interaction	Vanity	Things sized to hands	Personal object design	Stuff to focus or help keep focus or loose focus	6
25	White Interior	Mood/Environment	Environment/Area	Trends	Places to sit	Interior Design	Engaged sitting (lean in activities)	6
26	ART Signage	Branding	No true "problem"/aesthetic	Beyond Function	Graphic/texts	Graphic Design	External signage	6
27	Soccer Ball	Branding	Design for human Interaction	Surface Treatment	Round Sports Stuff	Design for sport	Gaming	6
28	Simple Outbuilding	Mood/Environment	Environment/Area	Reaching the sky	Nature	Landscape/building /architecture	Roof/Shelter	6
29	Black-White Fashion	Unity	No true "problem"/aesthetic	Vanity	Things to wear	Personal object design	Clothes	6
30	Colourful Loafers	Branding	No true "problem"/aesthetic	Vanity	Things to wear	Personal object design	Clothes	6
31	Ghery Building	Experiences/Systems	Structure/Structural	Beyond Function	Buildings	Landscape/building /architecture	Roof/Shelter	6
32	Green Blouse	Rhythm	No true "problem"/aesthetic	Vanity	Things to wear	Personal object design	Clothes	6
33	Rounded Staircase	Rhythm	Environment/Area	Reaching the sky	Things about movement	Means of transportation	Up-wards	6
34	Iphone	Experiences/Systems	Design for human Interaction	"Touch" Ergonomics	Things sized to hands	Personal object design	Stuff to focus or help keep focus or loose focus	6
35	Airport Seating	Experiences/Systems	Environment/Area		Places to sit	Interior Design	Engaged sitting (lean in activities)	5

E.1 Open Card Sort Summary

Summary

Card no	Card name	Sort1	Sort2	Sort3	Sort4	Sort5	Sort6	SortsCompleted
01	San Diego Signage	Artistic	Aesthetics after the fact	Branding/Logo	Logos	Product or brand communication	Information	6
02	Moped	Products	Best Physics	Engines	Unique	Product or brand communication	Interaction	6
03	White Bridge	Infrastructure	Best Physics	Architecture	Aesthetics	Broad questions on how to live	Estétique	6
04	Car Interior	Products	Aesthetics after the fact	Engines	Unique	Product or brand communication	Interaction	6
05	Outhouse	Infrastructure	Best Experience	Home Décor	Homes	Broad questions on how to live	Estétique	6
06	Cable Connection	Products	Best Physics	Architecture	Purpose	Material	Interaction	6
07	Curved Curtainwall	Infrastructure	Inspiring Aesthetics	Public Transit	Aesthetics	Broad questions on how to live	Estétique	6
08	Airport Service Window	Infrastructure	Unsure	Tools	Function	Broad questions on how to live	Information	6
09	Staircase (straight run)	Infrastructure	Best Physics	Architecture	Function	Broad questions on how to live	Estétique	6
10	Train Interior	Infrastructure	Best Experience	Public Transit	Function	Broad questions on how to live	Communicating	6
11	Two Pens	Fashion	Aesthetics after the fact	Work/Occupation	Need	Product or brand communication	Interaction	6
12	Watch	Fashion	Aesthetics after the fact	Materialsitic Goods	Fashion	Product or brand communication	Interaction	6
13	Office Workspace	Infrastructure	Best Experience	Work/Occupation	Function	Broad questions on how to live	Interaction	6
14	Concrete Interior	Artistic	Unsure	Home Décor	Homes	Broad questions on how to live	Communicating	6
15	Screws	Products	Best Physics	Tools	Purpose	Material	Interaction	6
16	Stadium	Artistic	Inspiring Aesthetics	Architecture	Aesthetics	Broad questions on how to live	Estétique	6
17	Basketball Hoop	Infrastructure	Best Physics	Athletics	Need	Product or brand communication	Interaction	6
18	Computer Mouse	Products	Best Experience	Work/Occupation	Need	Product or brand communication	Interaction	6
19	Window Wall	Infrastructure	Unsure	Architecture	Function	Broad questions on how to live	Estétique	6
20	Lightbulb	Products	Unsure	Branding/Logo	Purpose	Product or brand communication	Interaction	6
21	Coffee Maker	Products	Best Physics	Materialsitic Goods	Purpose	Product or brand communication	Interaction	6
22	Video Game Controller	Products	Best Experience	Materialsitic Goods	Need	Product or brand communication	Interaction	6
23	Highrise Skyline	Infrastructure	Inspiring Aesthetics	Architecture	Aesthetics	Broad questions on how to live	Estétique	6
24	SLR Camera	Products	Unsure	Materialsitic Goods	Need	Product or brand communication	Interaction	6
25	White Interior	Artistic	Unsure	Home Décor	Homes	Product or brand communication	Communicating	6
26	ART Signage	Artistic	Unsure	Branding/Logo	Logos	Unsure	Information	6
27	Soccer Ball	Products	Unsure	Athletics	Need	Product or brand communication	Interaction	6

cardsort_analysis_jncancy-NO ONLY

E.1 Open Card Sort Summary

Summary

Card no	Card name	Sort1	Sort2	Sort3	Sort4	Sort5	Sort6	SortsCompleted
28	Simple Outbuilding	Infrastructure	Unsure	Home Décor	Homes	Broad questions on how to live	Estétique	6
29	Black–White Fashion	Fashion	Inspiring Aesthetics	Fashion	Fashion	Product or brand communication	Estétique	6
30	Colourful Loafers	Fashion	Aesthetics after the fact	Fashion	Fashion	Product or brand communication	Estétique	6
31	Ghery Building	Artistic	Inspiring Aesthetics	Architecture	Aesthetics	Broad questions on how to live	Estétique	6
32	Green Blouse	Fashion	Aesthetics after the fact	Fashion	Fashion	Product or brand communication	Estétique	6
33	Rounded Staircase	Infrastructure	Inspiring Aesthetics	Architecture	Function	Broad questions on how to live	Estétique	6
34	Iphone	Products	Best Experience	Materialsitic Goods	Need	Product or brand communication	Interaction	6
35	Airport Seating	Infrastructure	Best Experience	Public Transit	Function	Broad questions on how to live	Communicating	6

cardsort_analysis_jncancy-NO ONLY

E.2 Open Card Sort Standardized Categories

CatsRaw

Sorter	Original category	Standardised category
Sort7	Experiences/Systems	Intention
Sort7	Branding	Problem
Sort7	Rhythm	Problem
Sort7	Mood/Environment	Problem
Sort7	Function	Problem
Sort7	Unity	Problem
Sort8	Structure/Structural	Problem
Sort8	Environment/Area	Result
Sort8	No true "problem"/aesthetic	Problem
Sort8	Design for human interaction	Problem
Sort9	Beyond Function	Problem
Sort9	"Touch" Ergonomics	Problem
Sort9	Reaching the sky	Problem
Sort9	Trends	Problem
Sort9	Vanity	Application
Sort9	Surface Treatment	Problem
Sort9	Timeless	Problem
Sort10	Nature	Problem
Sort10	Graphic/texts	Result
Sort10	Things sized to hands	Problem
Sort10	Things about movement	Problem
Sort10	Buildings	Result
Sort10	Things to wear	Result
Sort10	Places to sit	Problem
Sort10	Round Sports Stuff	Result
Sort10	Light	Result
Sort11	Industrial Design	Concept
Sort11	Personal object design	Result
Sort11	Means of transportation	Intention
Sort11	Landscape/building/architecture	Concept
Sort11	Interior Design	Concept
Sort11	Design for sport	Concept
Sort11	Graphic Design	Concept
Sort12	Stuff to focus or help keep focus or lo	Problem
Sort12	Clothes	Result
Sort12	Roof/Shelter	Problem
Sort12	Up-wards	Problem
Sort12	Suspension/Object Support	Problem
Sort12	Engaged sitting (lean-in activities)	Problem
Sort12	External signage	Result
Sort12	Gaming	Application

E.2 Open Card Sort Standardized Categories

CatsRaw

Sorter	Original category	Standardised category
Sort1	Fashion	Concept
Sort1	Artistic	Intention
Sort1	Products	Result
Sort1	Infrastructure	Result
Sort1	Products	Result
Sort2	Inspiring Aesthetics	Problem
Sort2	Best Physics	Problem
Sort2	Best Experience	Problem
Sort2	Aesthetics after the fact	Result
Sort2	Unsure	Unsure
Sort3	Public Transit	Result
Sort3	Work/Occupation	Application
Sort3	Materialsitic Goods	Result
Sort3	Engines	Result
Sort3	Athletics	Application
Sort3	Home Décor	Result
Sort3	Architecture	Concept
Sort3	Tools	Result
Sort3	Fashion	Concept
Sort3	Branding/Logo	Problem
Sort4	Unique	Problem
Sort4	Need	Problem
Sort4	Function	Problem
Sort4	Aesthetics	Problem
Sort4	Fashion	Concept
Sort4	Purpose	Problem
Sort4	Logos	Result
Sort4	Homes	Result
Sort5	Broad questions on how to live	Problem
Sort5	Product or brand communication	Intention
Sort5	Material	Intention
Sort5	Unsure	Unsure
Sort6	Interaction	Problem
Sort6	Estétique	Problem
Sort6	Information	Intention
Sort6	Communicating	Intention

StandardSummary

Card no	Card name	Sort7	Sort8	Sort9	Sort10	Sort11	Sort12
01	San Diego Signage	Problem	Problem	Problem	Result	Concept	Result
02	Moped	Problem	Problem	Problem	Problem	Intention	Problem
03	White Bridge	Problem	Problem		Problem	Concept	Problem
04	Car Interior	Problem	Problem	Problem	Problem	Intention	Problem
05	Outhouse	Problem	Result	Problem	Problem	Concept	Problem
06	Cable Connection	Problem	Problem	Problem	Problem	Concept	Problem
07	Curved Curtainwall	Problem	Problem	Problem	Result	Concept	
08	Airport Service Window	Intention	Result	Problem	Result	Concept	Problem
09	Staircase (straight run)	Problem	Result	Problem	Problem	Intention	Problem
10	Train Interior	Intention	Result	Problem	Problem	Intention	Problem
11	Two Pens	Intention	Problem	Problem	Problem	Result	Problem
12	Watch	Problem	Problem	Problem	Problem	Result	Problem
13	Office Workspace	Problem	Result	Problem	Problem	Concept	Problem
14	Concrete Interior	Problem	Result	Problem	Problem	Concept	Problem
15	Screws	Problem	Problem	Problem	Problem	Concept	Problem
16	Stadium	Problem	Problem	Problem	Result	Concept	Problem
17	Basketball Hoop	Intention	Problem	Problem	Result	Concept	Application
18	Computer Mouse	Problem	Problem	Problem	Problem	Result	Application
19	Window Wall	Problem	Problem	Problem	Result	Concept	Problem
20	Lightbulb	Problem	Problem	Problem	Result	Concept	Problem
21	Coffee Maker	Problem	Problem		Problem	Result	Problem
22	Video Game Controller	Intention	Problem	Problem	Problem	Result	Application
23	Highrise Skyline	Problem	Problem	Problem	Result	Concept	Problem
24	SLR Camera	Intention	Problem	Application	Problem	Result	Problem
25	White Interior	Problem	Result	Problem	Problem	Concept	Problem
26	ART Signage	Problem	Problem	Problem	Result	Concept	Result
27	Soccer Ball	Problem	Problem	Problem	Result	Concept	Application
28	Simple Outbuilding	Problem	Result	Problem	Problem	Concept	Problem
29	Black+White Fashion	Problem	Problem	Application	Result	Result	Result
30	Colourful Loafers	Problem	Problem	Application	Result	Result	Result
31	Ghery Building	Intention	Problem	Problem	Result	Concept	Problem
32	Green Blouse	Problem	Problem	Application	Result	Result	Result
33	Rounded Staircase	Problem	Result	Problem	Problem	Intention	Problem
34	Iphone	Intention	Problem	Problem	Problem	Result	Problem
35	Airport Seating	Intention	Result		Problem	Concept	Problem

StandardSummary

Card no	Card name	Sort1	Sort2	Sort3	Sort4	Sort5	Sort6
01	San Diego Signage	Intention	Result	Problem	Result	Intention	Intention
02	Moped	Result	Problem	Result	Problem	Intention	Problem
03	White Bridge	Result	Problem	Concept	Problem	Problem	Problem
04	Car Interior	Result	Result	Result	Problem	Intention	Problem
05	Outhouse	Result	Problem	Result	Result	Problem	Problem
06	Cable Connection	Result	Problem	Concept	Problem	Intention	Problem
07	Curved Curtainwall	Result	Problem	Result	Problem	Problem	Problem
08	Airport Service Window	Result	Unsure	Result	Problem	Problem	Intention
09	Staircase (straight run)	Result	Problem	Concept	Problem	Problem	Problem
10	Train Interior	Result	Problem	Result	Problem	Problem	Intention
11	Two Pens	Concept	Result	Application	Problem	Intention	Problem
12	Watch	Concept	Result	Result	Concept	Intention	Problem
13	Office Workspace	Result	Problem	Application	Problem	Problem	Problem
14	Concrete Interior	Intention	Unsure	Result	Result	Problem	Intention
15	Screws	Result	Problem	Result	Problem	Intention	Problem
16	Stadium	Intention	Problem	Concept	Problem	Problem	Problem
17	Basketball Hoop	Result	Problem	Application	Problem	Intention	Problem
18	Computer Mouse	Result	Problem	Application	Problem	Intention	Problem
19	Window Wall	Result	Unsure	Concept	Problem	Problem	Problem
20	Lightbulb	Result	Unsure	Problem	Problem	Intention	Problem
21	Coffee Maker	Result	Problem	Result	Problem	Intention	Problem
22	Video Game Controller	Result	Problem	Result	Problem	Intention	Problem
23	Highrise Skyline	Result	Problem	Concept	Problem	Problem	Problem
24	SLR Camera	Result	Unsure	Result	Problem	Intention	Problem
25	White Interior	Intention	Unsure	Result	Result	Intention	Intention
26	ART Signage	Intention	Unsure	Problem	Result	Unsure	Intention
27	Soccer Ball	Result	Unsure	Application	Problem	Intention	Problem
28	Simple Outbuilding	Result	Unsure	Result	Result	Problem	Problem
29	Black+White Fashion	Concept	Problem	Concept	Concept	Intention	Problem
30	Colourful Loafers	Concept	Result	Concept	Concept	Intention	Problem
31	Ghery Building	Intention	Problem	Concept	Problem	Problem	Problem
32	Green Blouse	Concept	Result	Concept	Concept	Intention	Problem
33	Rounded Staircase	Result	Problem	Concept	Problem	Problem	Problem
34	Iphone	Result	Problem	Result	Problem	Intention	Problem
35	Airport Seating	Result	Problem	Result	Problem	Problem	Intention

E.3 Open Card Sort Correlation Analysis

Correlation

Card no	Card name	Concept	Intention	Result	Problem	Unsure	Application	Categories for this card	Categories with high agreement	Categories with medium agreement	Categories with low agreement
1	San Diego Signage	17%		33%	50%			3	0	2	1
2	Moped		17%		83%			2	1	0	1
3	White Bridge	20%			80%			2	1	0	1
4	Car Interior		17%		83%			2	1	0	1
5	Outhouse	17%		17%	67%			3	0	1	2
6	Cable Connection	17%			83%			2	1	0	1
7	Curved Curtainwall	20%		20%	60%			3	0	1	2
8	Airport Service Window	17%	17%	33%	33%			4	0	2	2
9	Staircase (straight run)		17%	17%	67%			3	0	1	2
10	Train Interior		33%	17%	50%			3	0	2	1
11	Two Pens		17%	17%	67%			3	0	1	2
12	Watch			17%	83%			2	1	0	1
13	Office Workspace	17%		17%	67%			3	0	1	2
14	Concrete Interior	17%		17%	67%			3	0	1	2
15	Screws	17%			83%			2	1	0	1
16	Stadium	17%		17%	67%			3	0	1	2
17	Basketball Hoop	17%	17%	17%	33%		17%	5	0	1	4
18	Computer Mouse			17%	67%		17%	3	0	1	2
19	Window Wall	17%		17%	67%			3	0	1	2
20	Lightbulb	17%		17%	67%			3	0	1	2
21	Coffee Maker			20%	80%			2	1	0	1
22	Video Game Controller		17%	17%	50%		17%	4	0	1	3
23	Highrise Skyline	17%		17%	67%			3	0	1	2
24	SLR Camera		17%	17%	50%		17%	4	0	1	3
25	White Interior	17%		17%	67%			3	0	1	2
26	ART Signage	17%		33%	50%			3	0	2	1
27	Soccer Ball	17%		17%	50%		17%	4	0	1	3
28	Simple Outbuilding	17%		17%	67%			3	0	1	2
29	Black+White Fashion			50%	33%		17%	3	0	2	1
30	Colourful Loafers			50%	33%		17%	3	0	2	1
31	Ghery Building	17%	17%	17%	50%			4	0	1	3
32	Green Blouse			50%	33%		17%	3	0	2	1
33	Rounded Staircase		17%	17%	67%			3	0	1	2
34	Iphone		17%	17%	67%			3	0	1	2
35	Airport Seating	20%	20%	20%	40%			4	0	1	3
	Cards in this category	**20**	**13**	**30**	**35**	**0**	**8**				
	Cards with high agreement (>75%)	**0**	**0**	**0**	**7**	**0**	**0**				
	Cards with medium agreement	**0**	**1**	**6**	**28**	**0**	**0**				
	Cards with low agreement (<25%)	**20**	**12**	**24**	**0**	**0**	**8**				

cardsort_analysis_jheaney-DESIGNERS ONLY

E.3 Open Card Sort Correlation Analysis

Correlation

Card no	Card name	Concept	Intention	Result	Problem	Unsure	Application	Categories for this card	Categories with high agreement	Categories with medium agreement	Categories with low agreement
1	San Diego Signage		50%	33%	17%			3	0	2	1
2	Moped		17%	33%	50%			3	0	2	1
3	White Bridge	17%		17%	67%			3	0	1	2
4	Car Interior		17%	50%	33%			3	0	2	1
5	Outhouse			50%	50%			2	0	2	0
6	Cable Connection	17%	17%	17%	50%			4	0	1	3
7	Curved Curtainwall			33%	67%			2	0	2	0
8	Airport Service Window		17%	33%	33%	17%		4	0	2	2
9	Staircase (straight run)	17%		17%	67%			3	0	1	2
10	Train Interior		17%	33%	50%			3	0	2	1
11	Two Pens	17%	17%	17%	33%		17%	5	0	1	4
12	Watch	33%	17%	33%	17%			4	0	2	2
13	Office Workspace			17%	67%		17%	3	0	1	2
14	Concrete Interior		33%	33%	17%	17%		4	0	2	2
15	Screws		17%	33%	50%			3	0	2	1
16	Stadium	17%	17%		67%			3	0	1	2
17	Basketball Hoop		17%	17%	50%		17%	4	0	1	3
18	Computer Mouse		17%	17%	50%		17%	4	0	1	3
19	Window Wall	17%		17%	50%	17%		4	0	1	3
20	Lightbulb		17%	17%	50%	17%		4	0	1	3
21	Coffee Maker		17%	33%	50%			3	0	2	1
22	Video Game Controller		17%	33%	50%			3	0	2	1
23	Highrise Skyline	17%		17%	67%			3	0	1	2
24	SLR Camera		17%	33%	33%	17%		4	0	2	2
25	White Interior		50%	33%		17%		3	0	2	1
26	ART Signage		33%	17%	17%	33%		4	0	2	2
27	Soccer Ball		17%	17%	33%	17%	17%	5	0	1	4
28	Simple Outbuilding			50%	33%	17%		3	0	2	1
29	Black+White Fashion	50%	17%		33%			3	0	2	1
30	Colourful Loafers	50%	17%	17%	17%			4	0	1	3
31	Ghery Building	17%	17%		67%			3	0	1	2
32	Green Blouse	50%	17%	17%	17%			4	0	1	3
33	Rounded Staircase	17%		17%	67%			3	0	1	2
34	Iphone		17%	33%	50%			3	0	2	1
35	Airport Seating		17%	33%	50%			3	0	2	1
	Cards in this category	**13**	**26**	**32**	**34**	**9**	**5**				
	Cards with high agreement (>75%)	**0**	**0**	**0**	**0**	**0**	**0**				
	Cards with medium agreement	**4**	**4**	**17**	**28**	**1**	**0**				
	Cards with low agreement (<25%)	**9**	**22**	**15**	**6**	**8**	**5**				

cardsort_analysis_jheaney-ND ONLY

E.4 Questionnaire Response Summary

Questionnaire with Analysis

Question No.	1a	1b		2a	2b	
Question	Had you previously considered the concept of designer as problem solver?	Do you agree/disagree with this concept?		How important is researching and understanding the problem to formulating a solution?		
ID	Yes/No	Please explain.	STANDARDIZED	Not very important; Somewhat important; Very important	Please Explain.	STANDARDIZED
P.01	Yes	Yes, however whether the problem being solved is the "correct" problem worth solving becomes the bigger question - Any one can solve a problem, but who is privileged to participate matters more.	1: anyone can solve a problem; 3: "correct problem"; 7: privileged participants	Very important	Assumes influence as a linear process; Design-Research adopts a non-linear process	5: non-linear
P.02	Yes	I strongly agree with a designer being a problem solver. But I also think that everyone is a problem solver. Design occurs through a problem/need which brings them to solve it.	1: everyone is a problem solver; 4: design is problem solving	Very important	Researching & understanding the problem is really important. It helps you focus on the import need & problem, defining the problem that you are looking to solve.	3: informs solution
P.03	Yes	I agree. But I consider everyone is a problem solver, just designers are subjected to solve other people's problems	1: everyone is a problem solver; 5: designers solve other people's problems	Very important	That is fundamental. Breaking down the problem to its purest form helps provide a solution	3: informs solution
P.04	Yes	Both agree/disagree. Sometimes it is about "solving" a problem. Sometimes there is no "problem" and design is about other things	6: design is about things other than problem	Somewhat important	Sometimes the "problem" is not actually "the problem" - e.g. A church is not a "problem" to solve - so "research" is necessarily going to help.	6: design is not dependant on there being a problem
P.05	Yes	I strongly agree that designers are problem solvers, but also in some situation the people defining the problem	2: designers are problem solvers; 3: sometimes designers define the problem	Very important	to find the solution to a problem not only in the design area, but every area of profession. First the problem needs to be well understood by researching similar problem and their solutions	4: precedence
P.06	Yes	I think that designers work to help people articulate problems that they will then attempt to solve. In that sense, the designer will always attempt to clarify questions to try to solve	2: designers attempt to solve problems; 3: designers help articulate problems	Very important	Research is very important in that previous work on a similar problem helps refine potential solutions to current questions	4: precedence
P.07	Yes	Agree. Designers help us better understand the problem. That's a start to problem solving. A good website page helps you understand the business of the org.	3: help understand the problem	Very important	Helps understand the variable factors involved. There will always be unforeseen circumstances.	2: variable factors, unforeseen circumstances
P.08	Yes	Agree. Design is everywhere!!		Very important		

E.4 Questionnaire Response Summary

Questionnaire with Analysis

Question No.	1a	1b		2a	2b	
Question	Had you previously considered the concept of designer as problem solver?	Do you agree/disagree with this concept?		How important is researching and understanding the problem to formulating a solution?		
ID	Yes/No	Please explain.	STANDARDIZED	Not very important; Somewhat important; Very important	Please Explain.	STANDARDIZED
P.01	Yes	Yes, however whether the problem being solved is the "correct" problem worth solving becomes the bigger question - Any one can solve a problem, but who is privileged to participate matters more.	1: anyone can solve a problem; 3: "correct problem"; 7: privileged participants	Very important	Assumes influence as a linear process; Design-Research adopts a non-linear process	5: non-linear
P.02	Yes	I strongly agree with a designer being a problem solver. But I also think that everyone is a problem solver. Design occurs through a problem/need which brings them to solve it.	1: everyone is a problem solver; 4: design is problem solving	Very important	Researching & understanding the problem is really important. It helps you focus on the import need & problem, defining the problem that you are looking to solve.	3: informs solution
P.03	Yes	I agree. But I consider everyone is a problem solver, just designers are subjected to solve other people's problems	1: everyone is a problem solver; 5: designers solve other people's problems	Very important	That is fundamental. Breaking down the problem to its purest form helps provide a solution	3: informs solution
P.04	Yes	Both agree/disagree. Sometimes it is about "solving" a problem. Sometimes there is no "problem" and design is about other things	6: design is about things other than problem	Somewhat important	Sometimes the "problem" is not actually "the problem" - e.g. A church is not a "problem" to solve - so "research" is necessarily going to help.	6: design is not dependant on there being a problem
P.05	Yes	I strongly agree that designers are problem solvers, but also in some situation the people defining the problem	2: designers are problem solvers; 3: sometimes designers define the problem	Very important	to find the solution to a problem not only in the design area, but every area of profession. First the problem needs to be well understood by researching similar problem and their solutions	4: precedence
P.06	Yes	I think that designers work to help people articulate problems that they will then attempt to solve. In that sense, the designer will always attempt to clarify questions to try to solve	2: designers attempt to solve problems; 3: designers help articulate problems	Very important	Research is very important in that previous work on a similar problem helps refine potential solutions to current questions	4: precedence
P.07	Yes	Agree. Designers help us better understand the problem. That's a start to problem solving. A good website page helps you understand the business of the org.	3: help understand the problem	Very important	Helps understand the variable factors involved. There will always be unforeseen circumstances.	2: variable factors, unforeseen circumstances
P.08	Yes	Agree. Design is everywhere!!		Very important		

Questionnaire with Analysis

Question No.	2c		3a	3b		3c	4
Question	Who is responsible for developing this understanding in a design project?		Did this workshop impact the way in which you consider design?	Write a list of 5 things that come to mind when you consider 'what is design', now that we have done this exercise.			Are you a professional designer (or student of a design-related program)?
ID	(list all that apply)	STANDARDIZED	Yes/No	(list 5)	**STANDARDIZED**	How does this list differ from your initial list (if at all)	Yes/No
P.01	(.Hippo.) Highest Paid-Person's Opinion. ↳And who ever has and holds the money	5: funder	No	1. Makes Money 2. Promotes Exchange 3. Finds Insight 4. Discourse Analysis 5. Craft of Communications	1: economic 1: economic 2: innovation 3: social 3: social	Does not differ	Yes
P.02	- Everybody on the team, that is a multi-stakeholder task. This is a co-operative exercise with everyone on the team to help define the problem properly & have different insights & perspectives	1: stakeholders	Yes	1. Process 2. Experiences 3. Manufacturing 4. Critical Thinking 5. Multi-disciplinary	4: process 3: social 3: process 2: innovation 5: multidisciplinary	It differs a little bit, but not too much. I still think design is a process and the final product is never fully final even when you produce it.	Yes
P.03	Client, Designer, User	2: client; 3: designer; 4: user	Yes	1. Process 2. Problem Solving 3. Intent 4. People 5. Things	4: process 2: innovation 4: process 3: social 6: outcome	People	Yes
P.04	Designers help but sometimes clients have to understanding of the problem.	2: client; 3: designer	Yes	1. Complexity of Design as a practice 2. Design in culture 3. What are designers actually doing? 4. Engagement 5. Action - Agency of Designer	4: process 7: cultural 4: process 3: social 8: responsibility	More factors - maybe more complexity	Yes
P.05	the designer; the client; the user; the authorities responsible for the boundaries & regulations	2: client; 3: designer; 4: user; 6: authorities	No	1. idea 2. communication 3. process 4. creativities 5. needs	2: innovation 3: social 4: process 9: creativity 4: process		Yes
P.06	Community members; individuals; designers themselves; academics; funders	4: community; 1: individuals; 3: designers; 7: academics; 5: funder	Yes	1. Products 2. Brands 3. logos 4. uniqueness	6: outcome 6: outcome 6: outcome 2: innovation	I don't tend to consider products in my thinking about design. I guess I have a very abstract understanding of design	No
P.07	1. The Client 2. The Designer	2: client; 3: designer	Yes	1. Creativity 2. Innovations 3. Problem-solving 4. Efficiency	9: creativity 2: innovation 4: process 4: process, 6:outcome		No
P.08	All that are involve in a project should have a say to help a designer	1: stakeholders; 3: designer	No (verbal explanation provided: this response reflects that workshop confirmed pre-existing consideration for design)	Because I think design is everywhere. The workshop just confirms what I thought.			No

Questionnaire with Analysis

Question No.	2c		3a	3b		3c	4
Question	Who is responsible for developing this understanding in a design project?		Did this workshop impact the way in which you consider design?	Write a list of 5 things that come to mind when you consider 'what is design', now that we have done this exercise.			Are you a professional designer (or student of a design-related program)?
ID	(list all that apply)	STANDARDIZED	Yes/No	(list 5)	**STANDARDIZED**	How does this list differ from your initial list (if at all)	Yes/No
P.09	All people share the load. Communication between all members working on the design project, customers, clients, etc.	5: consultants; 4: customers; 2: clients	Yes	1. Solution to a problem 2. A Desired state 3. A Result 4. More than just Aesthetics 5. Detail	2: innovation 6: outcome 6: outcome 6: outcome 6: outcome		No. Business/ Entrepreneur
P.10	everyone. - one recognizes a solution is needed but brings in a consultant to help further discover the problem → then solution. - those interviewed, manager, consultant → all involved in developing the problem statement.	9: everyone; 1: stakeholders, managers; 5: consultants	No	1. Consulting 2. End Products	4: process 6: outcome	I can think more about the process than the end result. I don not have a better understanding of what designers do. Why call a designer?	No
P.11	The people who's struggling with that problem. Having feedback from the people dealing with it.	2: client; 1: stakeholders	Yes	1. Unique 2. Solutions 3. creativity 4. takes time 5. it's everywhere	2: innovation 6: outcome 9: creativity 4: process 10: everywhere		No
P.12	"Everyone" who is involved in the project: from CEO, stakeholders, designers, operation & maintenance, authorities, product sales/promotion/marketing, END users	9: everyone; 1: stakeholders, 2: CEO; 3: designer; O+M; 6: authorities; 8: marketers; 4: end users	Yes, No	1. Pay attention to design roles/perception 2. Communication to audience groups 3. Product/end result is the focus of design from non-designers - interesting 4. Process	4: process 3: social 6: outcome 4: process 11: purpose	Not so much, just more awareness of how people with different background perceive design	Yes
No. of Respon							
D		**6**	**6**		**6**	**5**	**6**
ND		**6**	**6**		**5**	**2**	**6**
total		**12**	**12**		**11**	**7**	**12**

Questionnaire Summary (DvND)

1a Had you previously considered the concept of designer as problem solver?

	Yes		No		
D	6	100%	0	0%	6
ND	6	100%	0	0%	6
total	12	100%	0	0%	12

1b Do you agree/disagree with this concept?

	1: Everybody solves problems		2: Designer solves problems		3: Designer defines problem		4: Design solves problem		5: Designers solve other people's problems		6: Design is more than problem solving		7: Privileged participants solve problems		
D	3	50%	1	17%	2	33%	2	33%	1	17%	1	17%	1	17%	6
ND	1	20%	2	40%	3	60%	1	20%	0	0%	0	0%	0	0%	5
total	4	36%	3	27%	5	45%	3	27%	1	9%	1	9%	1	9%	11

2a How important is researching and understanding the problem to formulating a solution?

	Not very important		Somewhat important		Very important		
D	0	0%	1	17%	5	83%	6
ND	0	0%	0	0%	6	100%	6
total	0	0%	1	8%	11	92%	12

2b Please Explain.

	1: Solution is dependant on problem		2: Underlying Issues		3: Right Solution		4: Precedence		5: Non-linear		6: Design is not dependant on problem		7: Difficult to define problem		8: Multidisciplinary		
D	0	0%	1	17%	2	33%	1	17%	1	17%	1	17%	0	0%	1	17%	6
ND	2	40%	2	40%	1	20%	1	20%	0	0%	0	0%	1	20%	0	0%	5
total	2	18%	3	27%	3	27%	2	18%	1	9%	1	9%	1	9%	1		11

2c Who is responsible for developing this understanding in a design project?

	1: Stakeholders		2: Client		3: Designer		4: End Users		5: Consultants		6: Authorities		7: Academics		8: Marketers		9: Everybody		
D	2	33%	4	67%	4	67%	3	50%	1	17%	2	33%	0	0%	1	17%	1	17%	6
ND	4	67%	3	50%	3	50%	2	33%	3	50%	0	0%	1	17%	0	0%	1	17%	6
total	6	50%	7	58%	7	58%	5	42%	4	33%	2	17%	1	8%	1	8%	2	17%	12

3a Did this workshop impact the way in which you consider design?

	Yes		No		
D	4	67%	3	50%	6
ND	4	67%	2	33%	6
total	8	67%	5	42%	12

3b Write a list of 5 things that come to mind when you consider 'what is design', now that we have done this exercise.

	1: economic		2: innovation		3: social		4: process		5: multidisciplinary		6: outcome		7: cultural		8: responsibility		9: creativity		10: everywhere		11: purpose		
D	2	33%	4	67%	6	100%	5	83%	1	17%	2	33%	1	17%	1	17%	1	17%	0	0%	1	17%	6
ND	1	20%	4	80%	0	0%	3	60%	0	0%	5	100%	0	0%	0	0%	2	40%	1	20%	0	0%	5
total	3	27%	8	73%	6	55%	8	73%	1	9%	7	64%	1	9%	1	9%	3	27%	1	9%	1	9%	11