Knowledge Practices In Professional Web Design

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KNOWLEDGE PRACTICES IN PROFESSIONAL WEB DESIGN

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Dedication

To John Warner Frazier and Theresa Marie Turner. Without you I wouldn’t be here.
Acknowledgements

While a dissertation is the product of an individual’s efforts, it doesn’t happen in a vacuum. Too often the labor of significant others is relegated as a small part of the story. My partner, Jessica Dame, played a significant role in helping me finish. One sentence is too little to acknowledge the support she provided. This is as much the product of her labor, emotional output, and financial resources as it is mine.

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Abstract

This study examines the use and construction of knowledge by individuals involved in the professional design of websites. Its focus is on the knowledge practices of those who identify as web designers; professionals engaged primarily in the aesthetic design of websites. This study employs a qualitative semi-structured interview to explore this population’s practices, and adopts a constructivist approach built on critical realist ontology in analyzing the data.

The study addresses the general lack of scholarship focusing on web designers, and helps build an understanding of the processes and forces that govern the development and creation of websites. The findings of this study show how knowledge is created and used, through understanding the practices around the discovery, sharing, and use of information and knowledge by participants. Employing the knowledge lens, the study provides details about not just knowledge and information, but about the way knowledge is used actively in the creative enterprise of study participants.
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Chapter One - Understanding Professional Web Design

Problem Statement

The design of websites by professionals is a phenomenon almost as old as the World Wide Web (Web) itself. The first web page, a proof of concept site put up by Burners-Lee, perhaps doesn’t stand up as an artifact of visual design, but the first banner ad, posted on a Wired Magazine website in 1994 does. This ad was posted about a year after the release of Mosaic, software considered to be the first modern browser (‘Mosaic (web browser),” 2017). This event provides an accessible starting date to mark the commercialization of the web as a medium. The birth of the commercial web is a starting date from which web design developed into a set of skilled labor practices. These practices are crucial to understanding web based artifacts and communication. There are 25 years between that starting point and the time of this writing. Despite the maturity of the web and its importance as a medium, very little is known about several crucial aspects of it as a phenomenon.

The most gaping hole is a lack of attention paid to those who create Websites. While many texts are written for those who work on the web, and by those who work on the web, there has been relatively little has been written about those who work on the web. This neglect is even deeper when the focus is on academic literature, where only a few studies have attempted to document their experiences (Kennedy, 2011). The lack of attention is problematic on two levels: First, without understanding how those who create
sites for the World Wide Web go about their work, we cannot fully understand the values, power, and practices embedded and represented in the objects produced. A focus on the makers of media, is a core proposition for most conceptualizations of media literacy (Christ & Porter, 1998) and is embedded in the American Library Association’s (ALA) Framework for Information Literacy in Higher Education (ALA, 2016).

Secondly, without understanding web designers’ experience, those interested in building to aid web designers in their work, particularly those who build information systems, will not able to build tools which are adequate facilitators of their work (Fidel & Pejtersen, 2005). Bad systems are an impact of this gap, an important one. Creativity is largely a process of analogous thinking (Dorst, 2011; Dorst & Cross, 2001; Visser, 1996), where bad inputs can serve as noise reproducing itself in new designs of those creators exposed.

The Research Problem

Both the creation of websites and the professional practices of those involved in web design require knowledge. Knowledge, defined as the enabling factor for action (discussed at length in chapter 2), is intimately intertwined with the act of creation and the activity of design. Two facets of activities related to knowledge are of interest: Knowledge use, as well as the process of creating knowledge and information is critical for understanding the professional activity that creates and designs information systems. These facets are the keystones for understanding professional activities of those engaged in design. Understanding knowledge use and knowledge creation will help improve web designers’ process and guide practices for knowledge and creative professionals across the boards, which are increasingly structuring their work on the image of the digital creative (Gill, 2007; Gill & Pratt, 2008; Miller, 2010).
This study is an exploration of the characteristics of knowledge use and creation in the context of professional web design. The term professional is used to both indicate the characteristics of the phenomena under study and differentiate between the general activity of web design as an activity and specific demands of web design within a commercial context. Hobbyists exist in spades on the web; it began as an open scholarly platform, and today much of the web is made and maintained at the level of serious leisure. The primary concern of the study is with those who work in a commercial space and engage in the labor market through their specialized knowledge.

**Evidence Justifying the Research Problem**

Web design is a $26.4B in revenue a year industry, with strong growth expected (Carter, 2015). Those who work in new media, a label for the set of professional identities most associated with the professional web design, are frequently held up as a model for the future of labor across industries (Gill, 2007; Kennedy, 2010). Better understanding contexts of those who do this work will help increase awareness of the realities of web work, and improve the experience of those participating in web design. Improvements in working conditions in web design are likely to spread across economic sectors because these professionals serves as a model for how work is changing and will change.

**Deficiencies in the Literature**

Despite the importance of understanding professional web design, there is little academic research examining those involved in it (Abdi, 2014; Gill, 2002, 2007; Gill & Pratt, 2008 Kennedy, 2010; 2011). A well-recognized gap in academic literature, and particular lack of attention by information science, means that individuals interested in
improving practices, especially in regards to their use and discovery of information, have had only a handful texts to consult. These are largely texts for professional practitioners of web design or hobbyists, and have a variable quality, although a few stand out. Of particular note is Hall’s (2013), *Just Enough Research*, which serves to guide those involved in web design through and research process, and Brown’s (2017), *Practical Design Discovery*, about discovery in the design space. The lack of attention from scholarly research has resulted in spotty data on the field in general. A career survey conducted by A List Apart shows the perils of this. The data survey occurred for several years, and provided useful data on the labor situation surrounding web design. However, it ceased being published in 2013. Because there is no US Bureau of Labor and Statistics classifications for those individuals practicing web design as the main part of their professional lives, there is no public data available on the current state of this population, including educational background, salary, or job satisfaction.

**Audience**

This is for a dissertation to be completed in partial fulfillment of the requirements for a Ph. D in library and information science. It is aimed to present an exploratory understanding of an under-researched context and the experiences of those who occupy or exist in that context. Because of the nature of the study, its audience is primarily scholars, and information professionals. Additional work is needed to further flesh out understandings of the context to reify the discoveries of this work, and to repackage findings so that they can be of use to practitioners.

**Research Question**

This study is constructed to explore the question:
How do Web Designers use and construct knowledge in the professional design of websites?

In order to understand how Web Designers use and construct knowledge in the professional design of websites, I ask the following focusing subquestions:

SQ1: What types of information and knowledge are used by Web Designers?

SQ2: How do Web Designers discover information and knowledge?

SQ2: How do Web Designers use information and knowledge?

SQ 4: How do Web Designers share information and knowledge?

SQ 5: What role does work experience play in the information and knowledge practices involved in the design of websites?
Chapter Two - Definitions and Review of Previous Literature

Introductions

This section outlines the understandings and previous works that undergird the study. It begins by defining terms directly related to the study in order to anchor the theory of the study in a static set of terminology. The framework in which the study was conducted, was drawn from these understandings, and is explicated in the following section. They form a scaffolding of theoretical concepts, and assumptions are documented and explicated throughout. Finally, a review of relevant work is presented, further illustrating the gaps that exist in the existing research.

Definitions

Information

Information science is the disciplinary grounding for this study. Because of a limited vocabulary in regards to knowledge, epistemology, and information, the term has a variety of definitions, some of which are in conflict with others. Buckland (1991) provides an in-depth discussion of the range of definitions. Utilizing the Oxford English Dictionary’s definition as a starting point, Buckland devises a schema that classifies each definitions of information based on that conceptualization’s tangibility, and its status as an entity or process. The schema serves as a useful tool when discussing what we talk about when we talk about information. However, in information behavior
research, information is normally unseated within Buckland’s schema, as information may be understood to be both a process and entity, and as both tangible and intangible. The instability in information science research is often the result of the lack of clear declaration about what information means within the texts of the research.

In the case of the study, information is data that has been processed and organized into meaningful patterns, or that result from the output of knowing. This definition is based off that found in Freeburg’s (2017) knowledge lens. It is useful in that it sets a floor for what information can be at the semiotic level, discussed by Raber and Budd (2003), rather than at a purely cognitive level where any sensory data would be considered and treated as information (Goldstein, 2014). For the purposes of information science sensory data is interesting, but the development of that data into meaning is still not understood by disciplines who make it their primary focus, and so unavailable to interlopers or collaborators intersecting at the edges of that site of investigation.

**Knowledge**

Knowledge is defined as the beliefs, attitudes, experiences, and structures that exist in the mind and influence behavior, both subconscious and conscious, as a result of the internalization of information (Freeburg, 2017). This definition is a synthesis of many approaches to the question, what is knowledge? Knowledge has many contexts and definitions within information science, as exemplified by entries in *The Encyclopedia of Library and Information Science*. It has more than four articles that have knowledge as the focus main subject, nearly all taking a different approach to how they view knowledge (see Dang & Ong, 2010; Huotari, 2010; Kimiz, 2010; Moser & Nat, 2010).
**Knowing**

Knowing, or the application of knowledge, is a vital concept as well. It can also be described as knowledge-in-action, which comes from Schön’s (1983) epistemological work. Interestingly, Cook and Brown (1999) reach a similar conclusion, and while they cite Schön’s work in their paper, they primarily draw from Vickers’s work. Schön argues that knowledge-in-action is a key framework for understanding professional activities. Schön’s knowledge-in-action epistemology moves beyond attempting to look at knowledge deployed in a positivist construct of professional ideals, also known as technical rationalism, and changes the focus of understanding to how knowledge is actually deployed within professional enterprises. Schön argues that knowledge, action, and feedback are continuously happening as cyclical process of talk back between actor and world. Recent work published in the journal of applied epistemology argues that such contextual examination of knowledge is both important and overlooked (Coady & Fricker, 2017). Freeburg (2017) brings knowing into an information science frame developing the concept of a *knowledge lens* for understanding the complex processes of knowledge creation and productive inquiries.

**Profession**

The contexts examined by this study are the context of the professional design of websites. The definition of profession, the root for professional, is not as settled term within the literature either. Defining this term serves to ground the study itself, and orient it to bodies of existing work. In common usage the term profession relates to “An occupation in which a professed knowledge of some subject, field, or science is applied; a vocation or career, especially one that involves prolonged training and a formal
qualification. (Oxford English Dictionary)” For this study the occupation undertook is understood to be web design. Due to the technical nature of the activity, it requires some level of specialized knowledge qualifying it for this status (in this case an understanding of the code and technologies that power the web).

This classification has some grounding in the literature. Specialized and/or technical knowledge forms the basis for one of the three primary approaches to the concept of professions within sociological interrogation of the phenomena (Scott & Marshall, 2015). While much of the literature surrounding professions couches it as an ideal separated from an occupation and reifies this distinction through an embrace of professional credentialing bodies, new work involved in interrogating changes in the labor market has drawn on critical critiques of those bodies’ role in the discursive structures of work and society and challenged their status.

Within both the critical and technical rationalist construction of the professional, knowledge plays a key role in the justifying and describing of the practices and power relations of professional activities (MacDonald, 1995). Heavily formalized definitions of who is a professional have served both as a legitimating mechanism and as way to constrict access to markets (Abbot, 1988; Collins, 1990; MacDonald, 1995; Schön, 1983; Tortsdahl, 1990). However, due to newness of the professional activity of web design, and the ways in which those who identify their activities in the market as web design construct their professional labels, professional web design is an understudied phenomenon (Gill, 2007).

The work of web designers needs to be differentiated from web design as a leisure pursuit in order to avoid confusion. While non-professional web design may involve
specialization, and perhaps even a financial transaction, it is not framed nor valued in connection with economic activity. A professional is one who engages in the aesthetic design of websites through knowing-in-action, has specialized knowledge, and utilizes the activity as web design as their primary mode of interaction with market contexts. This definition allows easy qualification as to whether one is, or is not a web designer. Allowing for understanding what web design is allows researchers to differentiate situations that have some but not all aspects of professional web design. This conceptualization is not overly constrictive, in the sense of reifying an ideal at the expense of lived experience, but is decisive.

Two examples using the above description show how we can tell the difference between a hobbyist and a professional, as well as between those engaged in an occupation. In the second example, the difference in the identities of a cook and a chef is examined. While both engage in preparing food as their primary way of economic engagement, only one has specialized knowledge, and as a result is afforded different cultural and economic status. The other situation disambiguated by these distinctions is the difference between a school teacher who makes money playing music at special events and a musician whose primary income and economic identity come from the production of their music. The former is engaged in serious leisure, spending their free time engaging in a hobby at a high level of skill (Hartel, Cox, & Griffin, 2016), but still describes their work identity as a teacher. The later is a professional, their work identity deriving from the playing of music. While both possess specialize knowledge, and both make money, one’s experiences will be vastly different form the other. As a result, this definition framing specialized knowledge in the context of economic activity reflects the
reality of individual situations rather than utilizing social constructs to reify power within exclusionary groups.

As an added benefit of this definition, its ability to frame the study of knowledge falls in line with Schön’s epistemology in action, which examines knowledge deployed in professional contexts. Schön (1983) argues that a large part of the definition of profession is built of an understanding of the epistemology of professional, a conceptualization that is mirrored in a large swath of the literature on professions not reliant on Schön’s work. Schön defines professional as one who has access to a specific specialized body of knowledge, which is used to solve problems.

One qualification not explicit in the definition but still present is the relationship between client and professional. Schön and others (Beckman, 1990; Brante, 1990; Leckie, Pettigrew, & Sylvian, 1996;) argues that the autonomy afforded by the specialization of knowledge and dynamics of the client-professional relationship define a profession, and represent to some degree a level of social recognition. Its presence is implicated because it is the specialized knowledge used as a vehicle for presence in the economic world that is the primary degree of autonomy. Functionally, the professional identity of an activity is embodied in or as an epistemology of knowing-in-action. It is applied to an area of specialized knowledge, and the degrees of autonomy available to the professional provided by this knowledge affords some measure of understanding about what it means to be a professional in their particular context. The result is that in addition to the requirement of specialized knowledge, the ability to deploy it in a market context is what makes a professional. The professional identity of lawyers’ reliance on credentials
bestowed by bar associations has less to do with credentials and more to do with the ability to practice law which those credentials facilitate.

**Theoretical Concepts**

With these basic understandings underneath, it is possible to move upward to discussion of the concepts underlying the study. This section outlines the theoretical structures that serve as the ecology of inquiry for the study. This section addresses the interaction between information practices and professional practices. These becomes important for discussing the interplay between knowledge and practice as a way of understanding the two concepts at the heart of the questions asked by this study: Knowledge creation, and knowledge use. It concludes with an understanding synthesizing existing literature on design, information practices, inquiry into the information behavior of professionals, and connects that to the central research questions of the study.

**Human Information Behavior Research**

Human information behavior are typically grounded in either a cognitive, or social perspective on three types of phenomena: Information seeking, information use, and information need (Wilson, 2002). Such studies generally embrace either a cognitivist or social constructivist perspective, although work that is multifaceted exists (Pettigrew, Fidel, & Bruce (2001). Additionally, Human Information Behavior research generally focuses either on work contexts, or everyday life contexts (Fisher and Julian, 2006).

Findings from everyday life contexts tend to examine information behavior in a particular context. Chatmans’s studies undergirding her *life in the round*(1997), and *information poverty* (1996) theories are examples. Recent cognitive examples include work by Li and Lin (2016), which looked at Weibo posting using social cognitive theory,
and Kinley, Tjondronegoro, Partridge, and Edwards (2014) linked cognitive style to web search behavior.

Information science has also studied behavior in the context of professions. Mishra, Allen and Pearman (2015) studied FEMA commanders and proposed a model for expert problem solving that involved information seeking in intermediate steps between problem solving stages. Freund (2015) contextualized software engineers’ information seeking behavior while operating in a consultancy capacities, finding that constraints and requirements played a major role in their behavior. Cleverly, Burnett, and Muir (2017), used task performance to investigate a relationship between expertise and exploratory search success.

To the some extent, creative professionals have been studied in information behavior contexts. Hemmig (2008) found that artists tended to use information for inspiration, career guidance and development, and knowledge of current trends; they later validated this framework with a quantitative study (2009). Makri and Warwick (2010) identified the prevalence of visual information in architectural practices, though rather than studying active practitioners, their work focused on architectural students. Mason and Robinson (2011) found that emerging artists and designers had similar practices to those noted in established designers, with the exception that cost played a more limiting factor. Beaudoin (2014) identified a relationship between artists’ and architects; use of images and their final work. Laing and Masoodian (2015) found that graphic designers often attempted to control their spaces, had six purposes they used and sought information for, and lacked access to comprehensively useful tools. That is to say, the
tools had the entirety of features and affordances graphic designers needed. Their study’s typology has significant elements in common with Hemmig’s (2008; 2009).

**Information Practices**

In the 1990’s the user centric study of information and a paradigm of information practices were adopted in response to the critical turn in social science. While a variety of approaches branches out of this turn, Savolainen’s approach to information practices as everyday life information seeking (1995), remains one of the most prominent. A basic interpretation of this position is that information practices can be described as, “... a way of doing things, an action, application or performance that occurs as a consequence of intention, habit or routine. (Baker, 2004, p. 164)”, and can be used as a unit of analysis for studying human-information interaction, with the assumption that such interactions are guided by complex socially constructed systems that mediate the ways in which things are known by individuals. Savolainen's work in the late 2000’s marks the primary

![Figure 2.1 - Savolainen's Information Practices Model from Savolainen (2008)](image-url)
point of framing for this approach (Savolainen 2007) and sets it apart from traditional
information behavior research that uses cognitivist approaches to understanding
knowledge (Savolainen, et al., 2009). Tuominen and Savolainen (1997) argue that a
previous cognitivist approach has significant limits to what it can actually show. This turn
is also supported by work that seeks to further understand the social aspects of
information (Raber & Budd, 2003; Talja, 1997, 1999) Savolainen (2009b) later argues
that information practices represent a constructivist alternative to the cognitivist
perspective of information behavior research. In Savolainen’s work, however, he still
positions his framing of everyday life practices in the contexts of information sources and
channels, information use, and information sharing (Savolainen, 2008). Information
practices are framed in terms of patterns of behavior that repeat themselves, with
occasional variations based on contextual factors. Savolainen sees them as, “driven
primarily by socially and culturally shaped values and interests (Savolainen, 2008, p.
48).”

Information practices are constructed to present a divergence with traditional
methodologies. The ontology embedded in its creation, suggests that any scholar using it
takes a constructivist approach to their research. Information practice’s model of
information interaction is laid out in Savolainen's book, Everyday Information Practices
(2008). Savolainen frames information practice as containing three types of information
behavior: Information seeking, information use, and information sharing. Based around
practice, these activities form a fairly inclusive set of action types involved in information
interaction (See figure 2.1 for Savolainen's model).
Scholars interested in a variety of situations have used information practice. A primary divider for understanding in information practices research has been between professional and everyday situations, and further categorized in how the studies are shaped by or located within various contexts (Courtright, 2007). However, information practice as explicit framing device tends to be more dominant in the everyday life contexts, where scholars use it to examine constructed social frames. While work is not less socially constructed than our everyday lives, scholars of information practice have tended to use information practices as a framing device before tacking it onto ontological approaches grounded in either a management or cognitivist approaches.

**Professional Information Behavior**

Information scientists have studied the information behavior of professionals extensively. In the 1960’s and 1970’s, scholars expanded beyond a previous focus on scientists to the information behavior of a broad band of Professions (Leckie, Pettigrew, & Sylvain, 1997). Leckie, Pettigrew, and Sylvain’s model represents one of the first formalizations of information behavior (particularly information seeking) within this context (see figure 2.2). Examining a particular facet of human information interaction, information seeking, stabilizes the set of actions examined by the model, while other economic activity and behaviors are framed within the traditional needs, seeking, use paradigm. However, because concepts within this paradigm are often difficult to isolated, new approaches have been developed that attempt to understand human information interaction as it is situated in the complexities of the real world. These new approaches to research in the study of information behavior can be broadly divided between those taking a cognitivist approach or social constructivist approach. One such cognitive
model, provided by Fidel and Pejtersen (see figure 2.3), proposed a cognitive model for understanding the informational aspects of work (Fidel & Pejtersen, 2004; 2005). The constructivist perspective is represented by practice. Practice represents a newer turn of investigation in the field due in part to; the ontology’s incongruence with traditional user studies paradigms, that restrict the ability to use certain instrument types as primary texts of analysis and has only begun to establish itself as a way of understanding professions as epistemic communities (Heizmann, 2012).

The pools of epistemic cultures in the professions are not uniform, but instead fractious and contentious areas where incongruous boundaries are constructed by social logic. Part of professional epistemic cultures, is then the discourse of knowledge (Heizmann, 2012), how it is used (Laing & Masoodian, 2015; Makri & Warwick, 2010), legitimated (Carvahlo, Dong, & Maton, 2009), shared, sought (Leckie, Pettigrew, and Sylvain, 1996), and experienced (Schön, 1983). Information as an object of analysis

**Figure 2.3 - Information Seeking of Professionals Model from Leckie, Pettigrew, and Sylvain (1996)**

**Figure 2.2 - Cognitive work analysis model (Fidel & Pejtersen, 2004)**
serves as a way to both understand explicit knowledge, and find evidence for tacit knowledge within professionals.

**Knowledge Construction**

Knowledge construction is understood as the creation of new knowledge. In the context of the earlier, definition of knowledge, this means that the change in knowing is the result of exposure to information, as well as to the generating of documents (or artifacts of information containing knowledge from an individual in some socially recognized form). In this sense, knowledge creation is linked to Brookes’s fundamental equation of information science (see Figure 2.4.) (1980), a perspective that is bound both in the cognitivist approach to information, and under the social constructivist approach. This perspective is also embraced by information practice research, and classified as the intangible process square (or information as learning) within Buckland’s (1991) schema of information. Knowledge construction is one facet in knowledge management research, which combines institutional and economic settings with learning theory. Examples can

\[ K_s + \Delta i = K_{[s+\Delta s]} \]

**Figure 2.4 – Brookes’s Fundamental Equation of Information Science.**

be seen laying somewhere near the center of Wenger’s communities of practice, Nonaka and Takeuchi’s SECI’s model, productive inquiry, and Henri’s work on collaborative learning supported by computers (Li, Cox, & Ford, 2017). Schön argues that such the creation of knowledge as active practice is key to professional activity, and grows deeper with expertise (1983), a conclusion backed up by recent research by Pontis and Blandford (2015). Knowledge is an essential part of what makes a profession (Schön, 1983; Torstehndahl, 1990), and communities of professions have a history of coalescing around
methods of knowledge construction historically with the goal of market closure (Collins, 1990; Torstehndahl, 1990). Knowledge construction in this way is an expression of power dynamics within a profession based on the structuration of expertise. Understanding the way in which it is constructed illuminates the legitimation process structured by social and economic forces. This edifice of legitimate construction is important for understanding professions, as well as the goods and services they produce (Carvahlo, Dong, & Maton, 2009).

**Knowledge and Information Use**

Knowledge use is understood in the context of the definition of knowledge. This imparts a direct connection to knowledge in action perspectives outlined in previous sections, it also relates to the body of literature that looks at information use, sometimes labeled as an information-in-action (Harviainen & Savolainen 2014; Savolainen, 2008). Savolainen however, uses information use as a way to anticipate how information as an object and knowing within the individual in action interact with information use (Savolainen 2008, 2009a, 2009b).

Information use is loosely defined under the best circumstances. Kari (2010) conducted a literature review and developed a classification of the six major ways in which information use is conceptualized as part of the field. Several are relevant to this study, including as information practice, information processing, knowledge construction, information production, and as applying information. In particular, Kari’s identification of information use situated as an effect of information fits as best understood with the information practices paradigm used in this study. This sees the actor, not as active in regards to the information, but asks, “what the information does to the person and his/her
problem or situation. (Kari, 2010).” When coupled with Savolainen’s (2008) conceptualization of information use as valuing information sources and using information to direct action, knowledge use can be understood to be the result of the interplay between interaction with external information and knowing to facilitate either action or knowledge creation.

**Professional Literature**

There is a wide variety of literature on web design for professionals. Many focus on the aesthetic and coded based aspects of web design, as cookbooks and tutorials existing for the languages that serve as the backbone of the web. However, as Laing and Massoodian (2015), point out, designers have economic incentives to promote a specific set of practices, which can sometimes result in ideas spreading beyond their general usefulness, such as design thinking (Badke-Schaub, Roozenburg, & Cardoso, 2010). Because the study is bound within the context of web design, books on information architecture, and user experience with titles such as, *Don’t make me think!* (Krug, 2014), *Managing Chaos* (Welchman, 2015), and *Understanding Context* (Hinton, 2014) are removed from discussion. However, it is worth talking about two books targeted at practicing designers from the A Book Apart Series. Both, *Just Enough Research* (Hall, 2013) and *Practical Design Discovery* (Brown, 2017), are how-to manuals for designers that focus on discussing the role that research plays in the design process. Hall’s book is more about research within the contexts of user-centered design, while Brown’s book focuses more on integrating discovery into a design process. Both Brown and Hall see research primarily as a process of discovery, search, and identification of information. Ultimately, both books lack academic back chaining in the form of citations. This,
combined with the lack of clear methodology, makes them useful as potential texts to be analyzed but less useful from a social science perspective, where the lack of clear philosophical orientation can have real consequences.

**Understanding Contexts**

Having explored a variety of facets undergirding the construction of the study’s relationship to its theoretical questions, a synthetic understanding of the subject and the paradigms of information science can be offered. That is by adopting an information practices perspective, the experiences of web designers can be examined so that their experience of the process of designing web sites as market actors can be understood. Because professional contexts are knowledge driven, and the social construction of professions is reliant on knowledge, both in a direct, and abstract sense, understanding the role that knowledge in action plays is essential. The best way to do this is to attempt to ferret out what knowledge is created and why (understood through its use). Because of the setting of the definition of knowledge and information, the idea of knowledge use, is best understood as a perspective of information use, where both the practices of the actor, and the effect that information has on the actors (through systems constructed around the activity of their profession) are examined.

**Knowledge in Design**

Dong, Carvahlo, and Maton (2015) propose the use of Legitimate Code Theory to understand design and professional learning. This theory posits that knowledge is both a social construct, and a real thing with a shape and effect on actors. Most important is that preliminary work shows that different design disciplines use different legitimation structures for their knowledge, meaning that each discipline has a set of practices
legitimating certain types of knowledge. A small study conducted by Carvahlo, Dong, and Maton (2009), showed that fashion designers and engineers use very different sorts of knowledge in their work, but found conflicting structures competing amongst new media designers, “new media designers” being a label that maps onto web work and web designers (Gill, 2007). This demonstrates the need to further develop understandings of knowledge in this space.

This view of web design and the web designer gap is further bolstered by work by Ankersen (2010), who documented how professional discourse around knowledge legitimated certain patterns of knowledge use and technical choices during the aftermath of the 2000 Dot Com Bubble, moving from a web to a web 2.0 perspective. The impact of this history to this study is the understanding that the epistemic structures in design matter., both as a way of understanding the practice and the way that cognition is applied to the design challenges.

Summary

The framework constructed above serves to ground the research questions. Because knowledge is fundamentally the root of professional practice, both in terms of the ability of professionals to act, and the social construction of the activity, knowledge must serve as the point of entry to understand the information practices of the study. Ground this social approach in information practices makes sense given the amount that has been written about it. As a result of that sharing, discovery, and use become important aspects of activity to study, when examining knowledge. Because these activities are expressed through a socially constructed activity actor perceptions of the link between practices, and activity matters. This nexus serves as a transitory point, from
which knowledge in action can be understood. Because these constructs are social, active communication and action are important to understand in light of the overall structure.

Finally, because studies have shown that practice may be changed by expertise, it is important to understand the role that experience plays.
Chapter Three - Methodology

Introduction

This chapter discusses the methodology and research practices undertaken in the construction of the study. It begins by outlining the theoretical basis for the design decisions. This serves to outline the first principles under which the research was conducted. Then it describes the population being studied, the selection of the population, and their recruitment to the study. A section describing the ways in which data was collected and ends with a section describing the analysis of the data follows this.

Ontology

The study adopts critical realist ontology to understand the nature of its inquiry and ground its design. Critical realism is a philosophy of science, that attempts to blend the realization of limits on human knowledge with the descriptive analytical power of scientific inquiry (Dobson, 2001). As such, critical realism declares that there is a persistent reality outside of our representations of this reality, that this reality includes social constructs, but they can be studied using the techniques of science as part of an enlightenment project. The finding of such projects can only be used in an explanatory or
predictive manner (Dobson, 2001). Such a stance relies on the following metaphysical declaration.

There is a material reality and a limit to what we can know about it (Kant, 1887). In addition to existing in space, entities also exist in time. These two facets of reality, time space and material space are perceivable by humans, filtered through a limited sensory and cognitive system. Objects exist in material time and space. Abstracts are things that exist in time but are not material. Abstracts are as a causal relationship between objects, expressed over the passage of time. Reality, in both a material and temporal context, can be described by a set of statements. This set of statements, being a set of verifiable constants, is truth. Both objects, and abstracts have truth. This can be extended to the ways that the human cognitive system perceives abstracts in both an internal mental, and an external social/communicative sense. However, because humans have limited cognitive resources and perceptual abilities, our ability to perceive this is limited, and often hampered by heuristics reinforced by social factors.

Denzin and Lincoln (2005) describe a view in qualitative research, called critical realism, which this study embraces in line with the ontological beliefs stated above. Critical realism is a philosophy of science described as being skeptical of claims of universal truth, but acknowledging a reality. While, Denzin and Lincoln reject it on the grounds that it is unhelpful to their project of social change, critical realism is constructed to leave space open critical social criticism. It merely asks for some degree of fidelity in such arguments. As a result of critical realism’s orientation, knowledge is seen as both a thing, that has shape and power, and something that is constructed from the result of a continuous product of structuration. Structuration, here, is the interplay between agent
and structures, in which social structures are transformed and reproduced by actors. As a result of its critical realist ontology, it is understood that there are methodological processes of abstraction and reproduction, at play in any research endeavor, and acknowledged that individuals may have direct awareness of the structures and mechanisms that intersect with their life.

This view necessitates an understanding that experimentation is a relatively ineffective way to understand the subject of investigation within social sciences. As a result, it calls for skepticism of quantitative methods that put claims of transcendental realism into their studies. As a result, qualitative methods were used for this research. Because information practices is a explicitly a social constructivist approach (Savolainen, 2009b), it recognizes the role that language plays in constructing the idea of language, and reorients the study of information, away from object and towards effect (Tuominen & Savolainen, 1997).

**Inquiry Model**

A major challenge in designing qualitative research is the reconciling of the author’s theoretical viewpoint related to their ontology with the methodological choices in the design of the research (Maxwell, 1992). Given the wide variety of approaches, each with their own pitfalls, and suitability for the circumstances of the study, the alignment between ontology, methodology, and limitations, is important to explicate and take into consideration. Given the lack of research on the population of the study, and the general contextual environment (see literature review and problem statement), this study is exploratory in nature. With the explicated theoretical approaches outlined in the previous section, and the general ontological orientation of the researcher, this gap limits
the methodological choices of the study to a research design focused on developing a rich
textual record based on semi-structured interviews and an analytic model focused
primarily on shared meanings across interviews developed using a phenomenological
data analytic framework.

Description of Population of Interest and Recruitment Procedures

Population

One of design’s definitions is, the changing of an existing state into a more
preferred one (Simon, 1968). Simon’s is an accurate definition of design, but it also
suffers from being overly broad, in the sense that, anyone who contributes to the making
of a thing is its designer. Because the study pairs design with profession, and the specific
instance of creating websites, the study demands that the scope be parameterized down
into the context it arises from. In this case the scope is an economic one, linked to a set of
commercial activity, with the addition of links to a specific situation, medium, and
repertoire of tasks performed. The context of “web” further restricts the scope to a certain
type of output, meaning a thing built on the socio-technical framework of the World
Wide Web. Within these constraints design is linked to aesthetic aspects of objects on
the web, forming the basis of selection for the population to be studied.

Participants were selected using purposeful sampling based on status using self-
identified work tasks. In order to answer the questions at the heart of this study, those
whose work consists of undertaking the aesthetic design of websites, or managing that
process, were recruited. A screening question of, “Is 50% or more of your work tasks
related to the aesthetic design of web sites, or the supervision of the design activities of
those who design websites?” was asked at the start of each interview. This ensured that the majority of the work tasks related to the endeavor in question, regardless of job title.

In order to understand information and knowledge within the context of the professional construction of web sites, the study looked at a subset of the knowledge work required to build websites. That set of work is that possessed by web designers and creative directors. Web designers are individuals who spend 50% or more of their professional time on the aesthetic design of websites. Creative directors, often times being senior designers, who may design less as the result of managing design on multiple projects are considered those who spend greater than 50% of their time managing web designers. However, their professional knowledge is still centered on the practice of designers. Schön describes such an individual in, *The Reflective Practitioner* (1983), showing it to be an appropriate population for understanding the information practices, and knowledge involved in the phenomena of study. As a result they are treated as web designers for the purpose of this study. The reason for the focus on aesthetic design is that the role of designers emerged around websites alongside rough metaphors of printed work. Although those metaphors are inadequate, the aesthetic aspects of the practices that are predominant in the discourses continue to surround professional texts and criticism, even after the turn to the user identified by Ankersen (2010).

The second facet used for selection of participants was experience. Because expertise and experience have been found to be a factor in professional information behavior and design (Bonnardel, 2000; Cross, 2004; Dorst, 2011; Laing & Masoodian, 2015; Laing & Masoodian, 2016; Mishra, Allen, & Pearman, 2015), there is a need for a category for the study of design as expertise. Experience stratification was initially based
on a schema implied in analysis of A List A Part’s (2012) annual survey results: 1-5 years counting as inexperienced, 6-10 years counting as experienced, and 10+ years counting as very experienced. However, initial data gathering and data gathered in the pilot did not show significant divergence within designers in the 6-10 and 10+ years experience categories, so they were collapsed. Ultimately, 30% of subjects fell into the first category, while 70% had six or more years of experience.

**Recruitment**

Participants were be recruited through three primary means. First, through tapping into the researchers’ social networks with direct appeals. This included LinkedIn messages, Facebook solicitations, and a Twitter campaign. The impact of this campaign was difficult to quantify, given the multiple messages involved; however, three subjects were recruited using this method. Secondly, direct appeals, via email, from a list identified through market research conducted into web design, including search engine, LinkedIn, and Google Map searches. This generated 79 leads, of which approximately four respondents were recruited. Finally, participants were invited to participate as the result of snowball recruitment, done by asking participants to recommend others who might be interested in participating in the study; three subjects were recruited using this outreach method. In addition to the purposeful selection of subjects by experience, the researcher endeavored to assure some level of demographic diversity through active recruitment of female and minority designers. An attempt was made for each bracket to consist of at least 18% female and 13% members of minority populations, numbers reflective of the population of web workers (A List Apart, 2012). Ultimately, 40% of
study participants identified their gender as female, while all subjects identified their ethnicity as White, or Caucasian.

**Sample Size**

There is some debate as to the number of participants needed in qualitative research. For reasons discussed in the section of this chapter on data analysis, a range was set with the expectation that data saturation would occur within an unknown number within that range. The sample size was determined strategically, and capped at the point of data saturation. At the point where new information stopped coming, recruitment was ceased. Due to the exploratory nature of the study, this occurred after the 10th subject. This is in line with estimates from analysis of the number of participants in previous qualitative studies (Mason, 2010). However, it should be noted that significant bodies of literature using the qualitative data analytic framework adopted, and several of the major works that do exist examining web designers, use small sample sizes of less than five (Carvhalo, Dong, & Maton, 2009; Kennedey, 2014).

**Data Gathering**

**Study Site**

The study used a blend of in person and “Skype” interviews determined by convenience to the subject. The chart detailing participant characteristics (XX) shows the specific context of each interview and the technology used. The use of Skype in qualitative research interviewing has emerged as an acceptable practice over the past five

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1 The name “Skype” is used in the context of video conferencing of video telephony, and is often used as a stand in for those technologies.
years, and while not without its drawbacks and risks (i.e. technology failure, or last minute drop outs), it is a useful data gathering tool (Deakin & Wakefield, 2014; Seitz, 2016). However, with few exceptions, most during piloting, there was little issue with the technology involved. There are issues in the use of interviews collected via video telephony, beyond simple technical ones; in particular, rapport and intimacy suffer (Deakin & Wakefield, 2014; Oates, 2015; Seitz, 2016). However, research memos from this study showed no significant differences between the report of in person and Skype interviews.

This increases the skills required by the interviewer and reliance on the textual record of the interview as document as opposed to the situational subjective interpretations of the researcher regarding body language. The distance conversely makes the interview less manipulative and the interpretation of the data more subjective.

A pilot run of two interviews was using conducted Google Hangouts. While there was an increased risk in technological hurdles, both interviews yielded information and textual records which were similar to those found in face-to-face interviews. This is in part because rapport is possible to build, however, rather than looking at participants’ eyes the interviewer must establish “eye contact” through focusing on gazing into the camera. Gaze interpretations on the part of the research similarly need to be built around awareness of the camera’s position (Nehls, Smith, & Snyder, 2015). A subject who appears to be looking askew from the interviewer may not be distant, but actually engaged, as they may be looking directly at an image of the interviewer, rather than at their camera. Conversely, engagement through the camera may or may not be contact
with the interviewer. This serves as an additional factor increasing the oral nature of the interview text.

Because the social networks leveraged are also local to the researcher, and local subjects seemed more comfortable with face-to-face interviews, it was determined that the study would be split between online interviews and interviews conducted with video telephony technology. The interview tool developed for online interviewing is used as the basis for the face-to-face interview. The only significant change needed to the original instrument was explicit prompting to describe orally what is being drawn in the prompt for the sketching activity, changing it to be the equivalent of a concurrent think-aloud protocol.

**Interviews**

There are many studies looking at the information behavior of professionals focused on understanding information behavior in the context of work tasks. These studies rely heavily on the use of semi-structured interviews. The following studies serve as examples of research using semi-structured interviews as its main focus: Mirsha, Et al., studied the role information played in the decision making of FEMA Commanders. Freund (2015) studied context in the information behavior of software engineers. Laing and Masoodian (2015) used semi-structured interviews as the basis for much of their findings in their examination of information’s role in ideation amongst graphic designers.

The interview guide used in this study was adapted from Laing and Masoodian (2015). The guide was adapted to the broader and exploratory nature of this study, and piloted in a round of four interviews in April of 2017. As a result several of the questions were reworded and split up. Additionally, a sketching activity was moved within the
confines of the interview from a position before any questions from the interview had started. This interview protocol was deployed in a research trip to Seattle, where it was used in a set of six interviews gathered between September and November 1st of 2017. In January of 2018, a revised interview guide was tested on two separate Skype interviews.

The final interview guide was used to conduct the 10 interviews of the study. The guide, as in all semi-structured interviews, served as an inducement for conversation, and was adapted to each conversation’s context, as appropriate, and occasionally served as an entry point into asides not covered by the guide. In all of the interviews a conversation developed that typically took approximately 40-50 minutes. In both the piloting and the study two interviews exceeded this timeframe, lasting closer to 65 minutes, while 2 conversations were shorter. In the case of the pilot, these shorter interviews were due in part to a poor fit of the subject to the study.

**Interview Guide Revisions**

The interview has been structured thematically and developed to create a tempo between the interviewer and the subject. Each question serves to build rapport, provide context, and enable answers to the research questions to be articulated. Each of the following subsections relate to how each research question is answered by portions of the interview tool (see Appendix A). The interview begins with several screening and demographic questions, which are not numbered. These questions are meant to identify facets of potential importance to the research question: In particular, ideation or the generating of ideas, and framing, or determining the bounds of the problem and solution spaces (Bonnardel, 2000; Laing and Masoodian 2015).
The main reference question is a persistent driver behind every question in the interview. Each answer has a bearing upon it, starting with the second question in the interview guide, which inquires about the subject’s job title, and ending with the last question, which seeks to find further candidates to interview, each question builds a contextual environment for the individual life situation, or seeks to develop a direct answer. Many of the questions relate to creating context situated around detailed textual answers.

Three subquestions asks how web designers, as defined within the bounds of this study, discover, share, and use information in the professional design of website. Many questions provide contextually relevant information to this question; however, several directly interrogate each of the lines of inquiry. These questions yielded not only information about how discovery occurred, but also about what types of information and knowledge was used and what they were used for. Information sharing was less present in the interview guide. Knowledge and information use is present in nearly every question in light of Schön’s epistemic arguments; however, the connection is explicit in Savolainen’s definition, which extends use to the evaluation as well as deployment of information. Questions were asked explicitly to investigate the ways in which inspiration and success were evaluated.

Subquestion five seeks to determine the role of experience in the design process. It is drawn by using experience as a variable of consideration when analyzing differences in a designer’s process. Questions 3 and 4, as well as screening questions about experience play a role in determining experience. The questions, which seek to illuminate
practice, generate material for comparing between experiences brackets per the categorical models.

*Sketching Activity*

The sketching activity served as a stand in for the question, “Please describe your design process.” Its construction was purposefully different from the rest of the interview guide, for several reasons. Some of these reasons were based on hunches of the researcher, others based in existing research by other scholars. The main idea was that the sketching activity served as a reference aid and helped clarify understandings (Capra, Et al., 2104). Additionally, the sketching activity facilitated information sharing between the researcher and subject, and provided richer interview content as a result. Pfister and Eppler (2012) conducted a literature review of sketching and its role in knowledge management and found several benefits for knowledge sharing, including externalizing knowledge, and reducing cognitive load on working memory, which suggested that this would be the case in the interview. See figures 3.1 and 3.2 for examples of the sort of data that the exercise generated in addition to providing contextual richness to the interview data. This technique may take advantage of the mental processing effect noted by Kavakli and Gero (2001), allowing for richer interview responses. Byström (2005) reports diaries as a way to formalize *information use* in work tasks, and these sketches may present a way do so in the design setting without requiring extended participation of designers.

Piloting of the activity and the interview found the sketching activity to be a critical juncture for descriptive information about the structure of the design process. One hurdle caused by the shift in setting of the study, was the distance between the locations
where the sketching is taking place and where research is located. This necessitated a tweaking in the protocol and emphasizing the element of the activity that resembles a concurrent think-aloud protocol, making it more explicit, so that a similar amount of talking occurs around the activity. This talking while drawing served as the primary vector for mapping individuals’ design processes in both in-person and online contexts. Additionally, while the activity’s situation in the pilot data typically allowed for the researcher to collect the physical artifact that resulted from that process. Video telephony, did not, however, afford such physical artifacts; however, screen shots were taken. While this further relegates the data’s value to the conversation that occurs here between the researcher and the subject, the above benefits still apply, as many of them relate to a discursive situation and not to a specific set of analysis reliant on the physical artifact of the sketch.

Data Analysis

This section describes the way in which the analysis of data is carried out. It contains a procedures section, which is description of the steps taken in the description of way in which data is processed and turned into meaning. It also has a coding section, which describes how meaning is harvested from the different levels of abstraction.

Procedures

The primary data used for the study was collected through a semi-structured interview, containing within it the previously discussed sketching activity. The interview provided an audio recording, captured by a dedicated recording device, with a backup of the event captured by a computer in cases of Skype interviews, or phone in
Figure 3.1 - Example 1 from sketching activity

Figure 3.2 - Example 2 from sketching activity
cases of in person exchanges. Screen shots were taken of the resulting sketches, or they were collected as artifacts. The recordings were transcribed, and as part of the transcription the transcript is anonymized. This “clean transcript” was the data used in analysis. Field notes and memos are made after the interview, and during the transcription process.

After the text was constructed from the interview, the transcript was loaded into NVIVO, and then were coded in line with the emergent and thematic coding. Each pass resulted in a memo containing notes from that coding pass as well as annotations made within the text. Combined with reviews of the memos, the themes resulting from the coding were used to answer the research questions.

**Coding**

Coding conducted by researchers in the process of building understandings out of qualitatively designed studies necessarily involves a blend of data driven and bracket methods. The emic coding method developed as emergent coding, while a second pass was made where emergent codes were organized into themes. Those themes connected to the reference question, similar to the methodology described by Saldaña (2015).

This blend is more pronounced in exploratory research where the research extends disciplinary metaphors and frames into a population, or phenomena that is new or understudied. In such cases there is often a need to use understandings that exist to the researcher, while also lacking the quantity of data and previous analysis to impose analytic frames on the raw data early in the analytic process. Meaning was generated through a coding process that begins in a manner similar to grounded theory, honoring the emic nature of the narratives present in the data. Using codes drawn from the data, an
initial mapping of the phenomena present is developed. As themes and phenomena emerge from the data, etic frames embodied in the research questions were be imposed on the data. This approach acknowledge the blended nature of analysis in qualitative research based on interviews (Anfara, Brown, & Magione, 2002) and with an view of emergent meanings that allows for reflection to grow out of the data (Magnusson & Merecek, 2015).

**Quality**

Throughout the study, the researcher developed and kept a strong audit trail of memos and field notes documenting decisions and accounting for the construction of findings through emergent meanings in the data developed through analysis. This increased the trustworthiness of the result, and increased the usability of the data.

The study was extensively piloted. The piloting ensured a robust development of the instruments. Initial pilots included questions about the inquiry and member checks to ensure, that the study was developed in a way that was not harmful to the subjects, and that questions developed rich answers containing data that answered the research questions. The combination of piloting and research design ensured the building knowledge that triangulated the study between the various metrics of quality used for this type or research.

An example for the ways in which feedback was taken into consideration in the design of the study was the way in which time considerations played a role in the development of the interview protocol. Digital agencies often bill at an hourly rate. Like many professional firms that adopt such a structure, time becomes a precious commodity in such conditions. The importance of time can be even greater for independent and
contract designers, for whom there is a direct time trade-off in the interview situation, where time spent discussing practice is an opportunity cost of time not be spent on work that pays. Despite this care, the time asked of subjects resulted in difficulties in recruiting subjects. Part of building rapport and handling the research situation embodied in this study, is treating their time like a precious resource.

**Member Check**

After the results of the study were developed, study participants were contacted and invited to provide feedback on the results. Five participants agreed to participate in this check. These individuals were presented with the results, and given the opportunity to comment the study’s findings. Instances in which they were directly translated were read back to them with context for how they were being used, and they were asked if that text accurately represented their sentiments. Subjects agreed that their words were being accurately portrayed, within the study text. Four of the five agreed that the general findings aligned with their own experiences. One expressed, that while laudable, the revision stage noted in Figure 4.2 was an outlier in the context of app designs. Three of the five said that it was an ideal step within their context, and the fourth was the participant from whose interview text that stage was constructed.
Chapter Four - Findings

Introduction

This chapter discusses the findings of the study. The data were gathered and analyzed in accordance with the procedures described in Chapter 3. The findings are constructed from the relationship between the texts resulting from the semi-structured interviews, and analysis, which is tied to the research questions. The knowledge, knowing\(^2\), information frame, undergirds the structure of the results, and is expressed in relationship to each answer. The driving research question of the study, “How do designers use and construct knowledge in the professional design of websites?” is dealt with first. Then the types of information and knowledge used by subjects are discussed. This is followed by examining the discovery and use of information and knowledge by web designers in their work. The later section is heavily focused on the design process, and primarily draws from the sketching activity described in Chapter 3. Information sharing is discussed, and finally, the role of experience is discussed.

Designers Use and Construction of Knowledge

The primary research question of this study is: How do designers use and construct knowledge in the professional design of websites? This study found that

\(^2\) Knowing is generally used to refer to the concept outlined in chapter 2, knowledge in action. However, there are several instances where the word is deployed in its more common usage. Such instances are left unitalicized to set them aside from knowing.
participants used knowledge across four core design tasks in their professional work, in tandem with creating knowledge and information as artifact and learning. These tasks are: Understanding the problem, generating solutions to that problem, and validating their work. The relationship among these concepts, and examples of concepts relevant to each is displayed in Figure 4.1.

Figure 4.1 - Knowledge Activities in Web Design
This figure is a Venn diagram showing understanding, solution generation, and validation as unique elements. In the center of the diagram is an area labeled fitting. This
label refers to the task of fitting the solution to the problem space. Fitting, is the forth task found through analysis of interview transcripts. Fitting, especially where formalized iteration is taking place, typically involves all of these elements happening at nearly the same time, and so it is located in the space where the three circles overlap. However fitting activities typically lack a structured sequence and occur in response to unique contexts, and so need to be considered as a separate category. The steps are not sequential but tend to manifest cyclically, below the four categories are explored in more depth in the order in which they generally occur. Each of these stages is analyzed below in the context of the general characteristics, and the roles knowledge, knowing, and information play in the activities.

**Understanding the Problem:**

All study participants had phases of their design process that were either exclusively dedicated to understanding the design problem space or weighted heavily toward coming to this understanding. Generating this understanding involved a process of knowledge creation that enabled later action through the use of the knowledge being built. Constructing and using an understanding of the problem space helped to set boundaries and direction for the development of solutions, which played a key role in the activity moving forward. As Subject 4 related:

… any designer will tell you this, if they can see what they are going to do the process of design is very easy. If they can't see it in their mind's eye, the process of design is very hard. That's why looking at a blank canvas is

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3 The abstract nature of the exigencies of a web design project was frequently multifaceted and deep. This set of needs, requirements, and competing interests is referred to as problem space for the sake of consistency.
hard. Not because it's a blank canvas, but because you can't see the thing you are about to make. If you already know the direction you want to go and why, it is easier to design.

Below, knowledge, knowing, and information’s roles are examined in relationship to building an understanding of the problem. Understanding is used in the context of a set of knowledge that allows for agency through action; as such it is often a precursor to knowing. Here the knowledge is discussed in terms of the pre-existing frames that allow for investigation into the problem space to begin. Knowing is observed in the sense of the active exploration that builds the understanding of the problem space. Information is the externalized knowledge that results and the resources used as inputs.

Knowledge

Understanding is used in the context of a set of knowledge that allows for agency through action, a precursor to knowing. Subjects revealed three areas in which understanding of the problem space was focused: The clients’ interest, users’ needs, and the technological requirements of the project. The knowledge drawn on in creating understanding was primarily driven by the economic nature of the activity. Of primary interest to participants were the needs of the clients4 engaging their services. However,

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4 Clients and institutional stakeholders are used interchangeably in this section. The study primarily consisted of individuals working in a freelance or agency context, so client is used most often. While several of the subjects interviewed served in an institutional setting as part of in house teams, the ways in which they described their relationship to these stakeholders were similar enough to those of subjects working in commercial contexts to form a cohesive unit for analysis in this study. The final section on the role of experience and limitations section of chapter five discusses the contextual roles impact in more length.
there is also knowledge that clients do not have full understanding of their needs or the possible solutions. Subject 4, explains:

We forget a lot that clients don't understand this stuff. So being clear about scope is actually a service to them. It's why they are here to talk to us, because they can't do it.

Subjects also displayed a level of knowledge of the reliability of clients’ self-perception. Subject 5, indicated a skeptical eye towards identity expression:

Clients always tell you who they are, and then you're like, well that's who you say you are, but this is how I perceive you based on the research I've done about you. So, this is who I perceive you to be currently, let’s talk about who you want to be and what you want to do.

The knowledge of clients and their unreliability as partners and information sources was drop improving the processes of developing understanding over time, typically as the subject built knowledge based on what information is needed for completing projects. Such a process of change is related by Subject 8:

We still call it a discovery meeting, where we would meet the client and discover what their goals are, and what they want to do. Then I would just dive in and mock up a homepage. After looking at other websites, of similar companies or businesses as the clients, I would kind of get an idea about what was out there and what I could do, and then I would design a homepage and send it to the client. They would either love it or hate it and make changes. It was kind of painstaking. I would do one page at a time and keep taking them back to the client, do you like this one? Ok, how about this one. How bout this one? We did get some sites done, but its much better now.
Nearly every subject had some knowledge of *user experience* and best practices. The term “user experience” or some variation appeared an average of four times per transcript most often as either a source of, or a need for understanding. However, only three subjects interviewed had any sort of process built to develop this knowledge. Most relied on basic understandings of best practices, such as those found in Krug’s (2013), *Don’t Make Me Think!*

In addition to the client’s needs, and the users’ experience of using the site, subjects typically built technical knowledge of the capabilities of a variety of content management systems and frameworks to enable their work. The technical requirements of a project also played an important role in the subjects’ understanding of a problem space. Technical knowledge often related to the constraints imposed by technology, especially as it related to the project’s scope. For instance, Android and iOS apps, though developed primarily in JavaScript, are limited to the use of a set of specific fonts, constricting the subjects’ abilities to create hierarchical importance and tone via font family selection.

Subject 1 offers, more insight:

I can't expect something to animate and come in and do flips, and expect my developer to put it together in an hour. If they've got some technical need or they want to build it on a specific framework or something like that, it will help us to put it in the right direction or put it in the right pipeline or team.

This knowledge was characterized by levels of specialization in one or more content management systems. Freelance and agency subjects are typically specialized in one or more of such systems, providing a stable set of technical abilities when building sites. However, those same individuals were frequently expected to be flexible to
demands and pressures by peers and clients. For those working in an institutional context, such as a library, their system choices frequently represent a more definite set of constraints imposed by system administrators which changed over time, limiting their ability to build knowledge. Subject 9 has integrated these constraints as a particular phase in their process:

I'm also going to be talking to my sys admin folks; if there is a particular platform they want to use, if there are any sort of restrictions that will be in place. Some of that is depending on the audience and the amount of traffic, and all that is going to come into play. Because how much traffic we'll have and how lean the site has to be so that we can serve it up is an important consideration for that.

Knowing

For most subjects, when developing an understanding of the problem space, the deployment of knowledge in action was tied to a process that represented activities based on the discussion of knowledge’s role above. In this process they attempted develop an understanding of the problem for which the website would attempt to address or services it would provide.

The process of research and discovery involved in developing an understanding the problem space required the use of knowledge in action. Subject 5 described the process of acquiring the necessary knowledge to work as: “Usually it's just digging it out of the client, researching, googling.” The metaphor of digging is apt as Subject 5 elaborates: “So it's finding out who the competition is, its finding out what their history is, finding out who, trying to understand who they are…”
Knowing was typically when negotiation the differences between users’ needs and clients’ needs. Subject 2 expressed the value of the users needs in opposition to client’s knowledge of the problem space:

““I’m always going to go directly to the client because, you can't say they know the product best because they're not the end user, but they do have a lot of information. [Emphasis added]\n
The creation and refinement of such process was based on past poor experiences. Where the knowing process failed or was interrupted, there were consequences, both emotional, and practical. Subject 7, related their feelings with working around these edges of understanding and the value that they put on developing understanding early in the process:

Frustrated, and honestly a little helpless, because at that point, I've done everything I can so I have to go back to this person. Which is frustrating, to try and pull more from them. There are times when not every person knows what they need or want, or if they do, then they think they do and change it. If it gets to a certain point where I have to be like, I need some more content from you guys. I get frustrated, I get slightly annoyed, and a little helpless there. Until I can initiate that conversation, but it’s so much easier to get more from the beginning, rather than hit that point.

Subject 2 related their experience of knowledge of clients needs being mediated by a middleman and the consequences to the project:

That led to missed deadlines; because we're building one thing and then finding out they're telling the client they will get something vastly different. They don't understand what they are promising. That was a case where the developers [“designers”] being in the room talking with the
client would have been awesome. But instead it was just, we're the people who are going to tell you what to make.

This was also the case for Subject 3, who had been left out of meetings with the client, and as a result of incomplete information had spent many hours producing work that was beyond the scope of the clients’ need. While there was trust in one intermediary, trust in another was lacking, as a result there was high levels of trepidation around understandings of the problem space. There was an exception to the trend where mediation and distance from a direct understanding of the problem space caused anxiety. Subject 6 worked with a team in which there was a large amount of trust and a continually refined process. The knowledge of their team’s ability was embodied as knowledge-in-action, as trust.

Creating understanding represented a set of activities where subjects created the prerequisite knowledge to be able to navigate the design process. Creating understanding (knowledge creation), allowed for action to be taken, and often involved a cyclical relationship with action. The above section illustrates the importance and manner of activities related to the task of understanding.

*Information*

Information typically results within understanding as the result of either the use or creation of knowledge. The roles played in facilitating understanding are varied. Sometimes they may be discrete information, used for particular understandings. Such pieces of information represent specific understandings and are often used for generating solutions or validating ideas. One such example are the personas discussed by Subject 1:
A lot of times that can lead into like personas, or this may be another tier of research, typically it will help out with, and predominantly products, and stuff I'm not familiar with. We'll build out the ideal or different personas. They're kind of related to their problem. We deal with one client that has their own personas built. They have one that is the maintainer of their product, and one that is the user, Max and Dave.

However, the information developed can be used for understandings of constraints and create mutual agreements between parties, information locating such a position is represented by Subject 3’s description:

So my project manager and I need more compressive specs, a large detailed outline about functionality about the final app, that's signed off on by both parties, so everyone understands what they're getting. It's kind of a process that we're going through as a company now. Just trying to make sure that there is a mutual complete understanding.

In some cases information associated with understanding was a full product in itself. Such as documents relating to users experience and contextual inquiry. Subject 4 incorporated this documentation as a full deliverable to sell to clients:

…And we're creating something called a UX Roadmap, and this is a compendium; of goals objectives, of user personas, that we have actually had users help us make. I can't overstate that enough. We have a content, design, and technical imperatives, dos and don't, early UX and technical requirements, basic timeline basic budget, things of this nature.

Understanding the problem engages knowledge, knowing, and information on a relatively level playing field. This equity amongst epistemic concepts makes understanding the problem, one of the most integrated stages for knowledge, knowing,
and information frame. Knowledge is used to create scaffolding for evaluation, and compare context. *Knowing* is seen in the active integration of findings into an understanding of what the problem that needs to be solved is, the intended audience for the solution, and the constraints present in the context of the project. Information is the currency of this process drawn from communication, and documentary evidence of context, sometimes resulting as an artifact from the active integration found in the *knowing* process. The end results are used later forming the knowledge and information to be used in the generation of solutions and fitting processes. Such processes can begin at the moment that understandings are formed.

**Generating Solutions**

Solution generation can generally be described in three aspects: Early, general, and specific. Each of these processes, involved an interplay between the knowledge of the subject, and knowledge being created and used in process of creating the website. The ideation of the design process is based on the understanding, where it is found lacking in validation, the process either moves back in a deliberate cycle to understanding or shifts into a period of rapid and varied steps, characterized as fitting. When understanding yields to generating solution the knowledge, *knowing*, and information shifts from the knowledge, research, documentation balance described in the above section, to one which involves an interplay between the knowledge of the subject, and knowledge being created and used in process of creating the websites. Knowledge here often refers to the skills of generating solution. *Knowing*, as defined in Chapter Two, is knowledge-in-action and typically comes from manipulating the environment. Information at this stage is often times a prototype or specific piece of website.
Study participants reported drawing on a large amount of previous knowledge. This is reflected in the knowledge built via careers, and also from educational background. With one exception all of those interviewed had some sort of design or art training. A typical example comes from Subject 3, who described her design degree as:

So we spent a lot of time discussing, print design basics; like spacing, typography, color choice. There was a lot of fundamental background work that you get; in things that are a little bit more closely related to fine art than design. So we took a lot of drawing classes, a lot of color theory classes, painting, stuff like that.

Table 4.1 - Tools used by designers

<table>
<thead>
<tr>
<th>Tools</th>
<th>Category</th>
</tr>
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<tbody>
<tr>
<td>Instagram</td>
<td>Social Media</td>
</tr>
<tr>
<td>Drupal</td>
<td>Content management System</td>
</tr>
<tr>
<td>InDesign</td>
<td>Application</td>
</tr>
<tr>
<td>Podcasts</td>
<td>Media File</td>
</tr>
<tr>
<td>JavaScript</td>
<td>Programming Language</td>
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<tr>
<td>Wordpress</td>
<td>Content Management System</td>
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<tr>
<td>Sublime Text Editor</td>
<td>Application</td>
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<tr>
<td>Slack</td>
<td>Application</td>
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<tr>
<td>Photoshop</td>
<td>Application</td>
</tr>
<tr>
<td>InVision</td>
<td>Application</td>
</tr>
<tr>
<td>Flash</td>
<td>Programming Language</td>
</tr>
<tr>
<td>Illustrator</td>
<td>Application</td>
</tr>
<tr>
<td>CSS</td>
<td>Markup Language</td>
</tr>
<tr>
<td>Android</td>
<td>Operating System</td>
</tr>
<tr>
<td>React JS</td>
<td>Programming Framework</td>
</tr>
<tr>
<td>HTML</td>
<td>Markup Language</td>
</tr>
<tr>
<td>github</td>
<td>Application</td>
</tr>
<tr>
<td>PageMaker</td>
<td>Application</td>
</tr>
<tr>
<td>iOS</td>
<td>Operating System</td>
</tr>
<tr>
<td>Sketch</td>
<td>Application</td>
</tr>
</tbody>
</table>
While few subjects reported experiences with web design in school, those that did often had used technology that was outdated. As an example, both Subject 2 and Subject 5 had training in new media design, but learned and started working with flash, and outdated technology that managed interactive layers. Most described some sort of self-education and continuing education built on top of design basics. Subject 1 relates a common sentiment about this self-education:

They have a whole college of arts and design that was kind of the main reason I went there. It didn't have much backing in web. I think they have changed and have some now, but even in 2006-2010, when web was big part of design or growing part of design, they hadn't built on that. So most of my web practice was built on foundations learned in school, and then developed from there. So that's probably the only real formal design training I have. But that's just how the nature of design goes.

In addition to the fundamentals of design applied at a conceptual level subjects also had specific knowledge of programs they used in their practice. Table 4.1 lists these programs. Such knowledge is deployed as knowing, explored in more details below.

Part of the knowledge involved in the development of solutions was knowledge of the constraints forced by either the technological platforms these subjects specialized in, or restrictions for subjects embedded in institutions engaging with preexisting color schemes. These two constraints represent half of the study population. Subject 3 describes the limitations of applications platforms on font:

Android has a prescribed font, and iOS has a prescribed font, and so you use San Francisco, or you use Roboto, and you use it in the size and the
weights they tell you, and that’s it. I miss being able to play with type, and
experiment a little bit more. Hand letter stuff like that.

Subject 10 explains, the restraints within an institution:

… a lot of the time with websites we run; I am inheriting color schemes, I
am inheriting logos, things like that. If it’s college related I don't have a
choice. Its #666000, is the official college red. You need that red color, so
that’s all you got.

The context of the conversation and design of the website, and the subjects’
experience play a role in shaping the development of solutions. As details emerge and
understanding grows, constraints limit the number of possibilities. Primary factors in
eyear solution generation are identity, technical requirements, and audience. At some
point these discussions begin to evolve from early ideas into general designs, though the
transition is often an internal and fraught one on the part of the subject. Subject 5, when
asked when they had enough of an idea to start designing said: “You never know. You
just have to have a little trust there, because half the time, you have to start putting it
together, and that is an inner approach. [Emphasis added]”

Knowing

Subjects employ their knowledge through a knowing process. This process is used
in solution generation to create hypotheticals. First, these hypotheticals operated as a
general early abstract for concepts. An example of how early abstract information
evolves is related by as Subject 7:

So, somebody comes to me, and they have a concept they have an idea in
their head, and they can talk about it, one of the things that is kind of cool,
I like to really get a sense and feeling of what they are feeling about the
project. I've actually had a former coworker tell me, that you can even give
me a feeling and somehow I can just design something for that feeling. So
people can give me a sort of abstract concept, and I like to mull it over.

This primarily inner approach begins to manifest as solutions are generated in
early design documents solidifying the general design of the site. This involved
developing some form of rough prototype, and then moving forward, more detailed
analysis about the material generated is in the section below.

General designs frequently resulted in specific problems being discovered, and
knowledge being deployed to develop specific solutions. Knowing where to look for such
specific sources was important. Returning to the client was generally seen as the least
desirable option. Frequently, issues, which instigated this course of action, were major
and resulted in huge changes. Subject 7 relates the impact on one such redirection: “We
had to scrap what I had created to that point, and start over. So, knowing as much as
possible at the beginning is important.” Rather than search strategies for coming up with
solutions which involved clients, many subjects expressed a desire to explore technology
enabled search that eliminated a human factor.

The use of off the shelf solutions has diminished the amount of technical skill or
information resources needed to find potential solutions to specific solutions and allowed
for the subject’s knowing to be employed to evaluate the solutions found. When
searching, subjects preferred solutions’ that fit, that they liked, and that they thought they
could implement, or improve on. As Subject 4 explains:

Usually, Something inspires me because it has this combination of
usefulness and elegance to it. It feels like an immensely appropriate
solution to a problem, and it feels obvious, and those things make me feel
both inspired and jealous. I am inspired by their utility, and interaction, and instantly I am kicking myself because I didn't do it. So those things are what motivate me.

Echoing Subject 4, Subject 2 provides a framework that shows how subjects employ knowledge to improve upon the solutions found in the search process:

Frequently it is something like, oh I like how they did it, but like they should have done, this, this, and this instead. That's where the originality comes from.

Where there was difficulty in employing knowledge in the generation of specific solutions subjects frequently recounted stepping away from the problem. Subjects often expressed an affinity for nature, walking, or driving as a way to generate solutions to particularly difficult specific problems. Knowledge was deployed here in stepping away rather than towards certainty. When asked the question, “Do you have any practices that you use to help you find or come up with new ideas?” The overwhelming majority of those interviewed in both the pilot study and the full study, mentioned some form of stepping away as part of their practice. Subject 5 elaborated on the experience, in their case centered on the shower:

...like just being out and about, sort of unplugging from design. Still it’s like, I think inspiration comes when you are not looking for it. So like, a literal interpretation is like, any time you sort of figure something out, you need to do something that is not based on figuring something out. Basically your brain will help you figure it out, and it will just come to you when you are doing something you are not thinking about. So everybody always says ideas come to them when they're in the bathroom, the shower, whatever. It's because you're not thinking about it, you're thinking about
doing a task while you’re there, and then suddenly it comes to you. That's your inspiration really. Because you're kind of distracted for a minute by doing something else, and then like [smack] it hits you what you needed to do. So like even though it's kind of dumb, most ideas happen in there.

**Information**

The knowledge practices outlined above generated documentation for creation, refinement, and communication. These pieces of information are in the forms of sketches and style boards (or mood tiles) at the early design stage, and typically move to wireframes and prototypes, at the point of general design. The creation of these documents may lead to the discovery of specific design problems, needing specific solutions. Documents from early, specific and general solutions are used at points throughout the process. Sketching is addressed in detail below.

Mood boards are also known as style tiles, document basic aesthetic elements of the design practice. Mood boards served to structure the solution space along the lines of the identity of the clients. This practice frequently came up in pilot interviews; however, was less explicit in the interviews analyzed for this document.

Subject 8, provides an overview of style boards and wireframes:

Then I will take that information and build a wireframe, and more thoroughly map out the UX and the positioning of everything, and just a real basic layout. I'll align that with style board. Colors and fonts…

The metaphor of mapping is appropriate and supported by Subject 2, who uses wireframes in a process which develops the borders of the solution: “I think the wireframing helps because, then its like, now I'm not worried about design. I'm just moving stuff around and defining general borders for where the idea is going to come.”
Subject 9, indicates that this border setting process is similar to sketching, in that it develops the ideas further: “Then I will start to design those pages out. Typically; in an ideal world, I am going to wireframe those first. So simple sketches at least for me.”

However, while wireframes, are useful for generating solutions, they are not without their problems at other points. When it comes to validating ideas, clients sometimes have issues understanding the nature of a wireframe as a document of the process. Subject 2, articulated this point:

Some clients can only see, some clients cannot understand what a mock up wireframe is. They can only, like if it’s not in the browser, unless you have a literal Photoshop mock up, they don’t know what they are looking at. So sometimes, handling them is trying to define and understand what they can perceive. We've got a client right now that is like that. They can't understand the wireframing process. They want to see some design, but you need to know what you are going to design, in the wireframe process so that you know what you can create.

As a result of the creation of wireframes and prototypes, there was a tendency to engage information systems, in which case Google was typically used as a way to find those solutions. In particular, Google Image Search supplied a large amount of examples with a relatively low cost.

Knowledge was also deployed in action to create solutions based off social problem solving. These social processes involved reaching out to other subjects or team members. In such instances critical information is transmitted via communication. Subject 6 relates the value of team members:
My project manager and writer really do that. They talk to the client the most. They have an hour long meeting in the beginning and then are getting documents from the client, writing it up for me, so that's not really my job too much. We have great communication internally so I get information for them, and know what to do.

Generating solutions is focused on producing. While knowledge plays an intimate role in such activities, the balance shifts away from knowledge and information and towards knowing in this section. Knowledge becomes input, information output, knowing the activity that generates that transition. This creates a linear dynamic that stands in contrast to the relationship found in understanding.

**Validating The Work**

Many subjects had a process that involved frequent validation of the work being produced. This validation served as a point of generating social or real capital, as well as cementing feelings of self-efficacy, the latter being the most tangential benefits for professional subjects. Knowledge in validation was often hidden. Knowing was present in the social transitions that accompanied the validation, while information’s role in validation was often the material being validating, or the designs being moved forward in the process.

**Knowledge**

Knowledge employed during validation is often the result of experience. Hidden within the process, knowledge is often expressed in who is shown work and how they are listened to. Sometimes this is even expressed as an awareness of information being left out of the validation process. As Subject 5 says:
Always, every single time, the client has not told you an important piece of information, back history, requirement that is necessary. So every single time, they will leave out a key piece of information. It's not that they are hiding something, but they just don't think it's important, and it's super important.

Additional warrants for understanding the role knowledge plays in identifying blind-spots in validation are offered by subject 5:

Clients always tell you who they are, and then you're like, well that's who you say you are, but this is how I perceive you based on the research I've done about you. So, this is who I perceive you to be currently, let’s talk about who you want to be and what you want to do.

And subject 2:

I'm always going to go directly to the client because, you can't say they know the product best because they're not the end user, but they do have a lot of information.

Knowing

The majority of interviews had some sort of expression of the importance of validating ideas for the benefit of users, though only a handful of processes and subjects involved actual user tests. Frequently, subjects expressed interest in understanding the user at some level. Subject 7 elaborated on the effect such a perspective can have on design:

I've learned a lot about user testing, and so just because I think that these patterns should be grouped there, or these buttons should be grouped here, or this navigational system should be organized in this way, it doesn't
mean that the people who are going to be organizing it are going to think that. I'm not my users, and so I need to constantly revise that.”

User tests involve learning about the lived experience of users engaging with the site. Subject 4, a principal of a user experience consultancy, explained the value of using user tests to validate ideas when asked about successful design:

The best way to evaluate is to get it in front of people who will use it.

There are techniques we employ to get as much empirical feedback as we can from that process. It’s no good to us just to say do you like this. It’s irrelevant to us, because we focus on use. So we have to figure out how people might use a thing. So I want to know to the best of our ability if we are in the right ballpark for use. There's certain things we can do early on to learn that, but you can't really evaluate your own stuff, because you're not the judge.

While user experience techniques were generally seen as a desirable form of validation, not all validation was based on user formalized user tests. The active learning involved in employing knowledge in validation can rely on a variety of information sources and practices. Subject 9, relates other forms of social validation used to evaluate the success of their design choices:

There is a lot of decisions in web design that are very data driven, but I don't feel that success is one of them. Unless you’re starting out with the goal of increasing the amount of blanks that happen on the websites; I need to increase the submissions of feedback forms, for instance.

Obviously I am making design decisions, and if there is an increase in the amount of feedback then it’s an obvious win, but a lot of it, is for me personally, feedback I get; feedback that usually comes not from inside the
library. I think the people in the organization are habituated to something, and because they’ve seen it grown from the onset, so they might say they like something or not. But when someone completely out of the blue from a different organization is visiting for a conference or is looking over your site, or you just get some random feedback from someone online, that says wow, I really like what you did here, or your site is so easy to use, or those kind of comments go a long way.

**Information**

While affirming that a design choice was good for users was a significant form of affective validation surrounding the idealized notion of success, the majority of instances of validation centered on the economic and professional context of design. These instances of validation rely on explicated information exchanged between parties. Institutional subjects might draw up a project plan or have specifications laid out in a formal memo. Individuals in an agency, or freelance contractors had frequent check-ins with clients to ensure the process was working and validated ideas. Subject 3 provides such an example: “…a large detailed outline about functionality about the final app, that's signed off on by both parties, so everyone understands what they're getting.” These approval processes have an important role in managing the economics of design projects. Subject 6 elaborates on the impact of such formalized validations:

Basically we want to make sure that every page that we've said covers everything, so that the client can't come back and say, oh I need this and this and this and add hours to the project. I wait until it’s all approved and then start designing, with the homepage, and then I get my team to approve, and give feedback, and we go from there.
In the validation phase we again see the relationships between knowledge, knowing, and information shift. Information becomes a currency, at both the start and the end of the process. Knowing again forms the process portion of this activity. Knowledge provides the basis for that process to be enacted.

**Fitting the Solution**

As this thematic coding was applied, the categories of understanding the problem, generating solutions, and validating them, became clear immediately. However as coding progressed there emerged a substantial body of codes that fell in between these concepts, often dealing with processes with unclear timelines and orders of actions. The codes that fell into this category oftentimes overlapped with the core tasks, and they typically resulted in the creation of many artifacts. These processes were often grouped around iteration. Thus, fitting involved generating solutions, validating solutions, and understanding the problem by working in tandem with each other to develop a solution that fit the problem space.

The responses relevant to fitting appeared commonly where the subjects interviewed were involved directly or indirectly in the building of the final product. This typically involved changing subjects’ hypothetical solution to fit the constraints of the real world, the unspoken needs of clients or users, or overlooked roundabouts. As a result the contextual factor of the behaviors, and their clustered relationship form an intersection between the other facets in the diagram (Figure 4.1).

Subjects typically described activities that fall into this category as black boxes, taking knowledge, skill, and need, and using them to enhance each other through making something. Such behavior frequently involved moving from multiple fuzzy ideas and
bringing the forms selected into being. Knowledge in this context related to the tools needed, the design vision, the self, and the context of the creation as a whole. **Knowing** is intimately involved in fitting, especially demonstrated by the need to adjust to responses in the environment and users to changes in the design space. Much like in generating solutions the information involved in fitting was often in the form of prototypes and proof of concept demonstrations.

**Knowledge**

Knowledge’s role in fitting is in the framework that allows it to happen. In fitting activities the subject is typically involved in creation and iteration, going from either rough to finished details or working through a potential problem to a specific solution (i.e., a widget). Such action requires knowledge of the possibilities of such process. Subject 5 describes that knowledge employed:

Iterate. Rough it in. Basically it’s kind of like sculpture I guess: You rub it in. You get feedback. Tighten up, tighten up. Refine refine. Iterate iterate iterate. And then usually, you have a pretty good project there at the end.

Fitting also involves employing the knowledge discussed in relationship to the other concepts as an amalgamation of both the knowledge drawn from, created, and is related to the facets of the other activity types being invoked.

**Knowing**

These descriptions show a process that substantially integrates the other facets, but does so in a single activity. Fitting activities operate in a series of entangled steps. Subject 2’s description of being able to generate ideas rapidly, and narrow down on the good ones, indicates a process through which knowledge is created and used.
simultaneously in a way that reacts with and enhances existing understandings. In order to accomplish such a task the rapid deployment of knowledge and the reaction to the environmental changes wrought by action knowledge is actively deployed. The creation and refinement of rough models emblematic of fitting activities enables an increase in understanding that empowers solution generation, in line with an earlier excerpt from Subject 4’s transcript: “If you already know the direction you want to go and why, it is easier to design.” This process is contained within the problem space.

The integrated and iterative are hallmarks of fitting behavior. In addition, these behaviors are also viewed as unstructured, or happening simultaneously. Subjects frequently expressed both that stages overlapped around prototyping and that this overlap was seen as contextually dependent. Subject 1 explains:

And then low fidelity and high fidelity overlap a little bit, but they're always pretty consistent, they may differ. I sometimes, I may not need to do the low fidelity mock-ups. Sometimes I know I have more time, I can do all of it, or sometimes we're pushing things. If it's a really complex process, I'm probably going to have to draw this a couple times. Then do low fidelity wireframes, get everyone to check it, and they still may have to come back to here [Gestures to the discovery phase indicated in sketch of design process].

Prototyping is one such example of knowing through iteration. Prototyping focuses on interplay between, generating solutions and validating them. Building understanding is a secondary side effect of this interplay that often marks transition points within such processes. The role that Subject 5 describes prototyping plays, in the context of describing their design process:
So if we have basically, to figure out the scope, everything that needs to be involved, and then a lot of times there is a prototype that needs to be involved. So for instance, right now we have got a game, and games need to be fun, and you also have to make sure that they work with whatever you need to do. Just usually with requirements you make a prototype. So we made a prototype for what we are doing. We have to run it by the client, get revisions, get their buy in. Iterate. Rough it in. Basically its kind of like sculpture I guess.

Sketching, typically involving the creation of rough examples, is used to build an understanding of the problem space and generate solutions. Validation plays a secondary role as a channel of the development of understandings and fitting of potential solutions within constraints. In many ways sketching is an ideal example of how knowing is used when fitting activities occur. Sketching is a place where the blank canvas is filled and a direction is shaped. Subject 3 describes sketching in reference to building an understanding and solving a specific problem:

I find that sometimes I have to make myself sketch. I am a kind of an impatient person, which is sort of one of the reasons why I start the way that I start. If I go through and figure out every single screen before I start, than I will never actually want to start. So sometimes if I get stuck, and I can't find the image I want to find, or something close to what I want, then I make myself sketch, and then, that's usually when ideas will start percolating and generating. I can narrow down on a good idea, and start discarding the bad ideas pretty quickly.
Information

Information in fitting activities was generally transactional, alternating between generating solutions, as output, and validation as input, and often assent. Assent refers to information in the form of messages or documents which were integrated into the knowledge structure in accordance with the subjects knowing its worth, and then adjusting the process and product accordingly. The role that information can play in the fitting process is illustrated in an explanation provided by Subject 5:

Everybody understands something when you sketch it out. It can show master levels of a topic. So if clients are in the room it’s good to go to the white board, draw something on the paper, and talk about what you are doing, that is probably the best example.

As fitting is a combination in many respects of the other action types in the model

<table>
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<tr>
<th>Table 4.2 - Effect of KKI on Design Activity</th>
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<td>Knowledge</td>
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<tr>
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As fitting is a combination in many respects of the other action types in the model, its constitution is variable on the particular mixes of interplay happening. As Subject 5’s discussion of sketching illustrates, knowledge, knowing, and information may be deployed in a variety of contexts within the same instance in fitting stages. This level of opaqueness is a hallmark of such fitting activities.
In answer to the main question posed by the study, four activities were identified and used to construct Figure 4.1. The relationship between these concepts was explored in light of the knowledge, knowing, and information frame. As part of the conceptual construction of that model, the following sections investigate the subquestions used to focus the study. Each is examined in light of the knowledge, knowing, and information lens. Table 4.1. Summarizes the different ways in which knowing, knowledge, and information were expressed in each of the above stages.

**Types of knowledge and Information**

The first subquestion asks: “What types of knowledge and information are used by Web Designers in their work?” In analyzing this question a typology of three themes was developed: Social, document based, and experiential. Below each theme is a description, and examples are provided. The contextual relationship between this typology and use is explored in the section looking at how information and knowledge is used in web design. These types are outlined generally below and examples discussed within the knowledge, knowing, and information frame.

**Social**

Knowledge, knowing, and information, as part of social practices, were often found in the interviews in responses involving communication. These interactions were found in transcript texts occurring both within formal and informal settings. Formal process where most common in team contexts, where multiple individuals worked on projects. Participants generally expressed a primary concern related to this type of information in cases of validating their work. Subject 7 expressed a common sentiment when asked about success: “If the person who is overseeing the project, or if I am
working with a freelance project, if they're happy, that makes me happy.” These processes had the characteristics of constructing understandings of needs, goals, and strategies of the individuals and organizations involved in the design process. These instances occurred within teams (where teams existed), between subjects and clients, subjects and users, and between subjects and their communities of practice.

The prominence of social knowledge, *knowing*, and information is illustrated by a quote from Subject 9’s transcript: “Obviously I am going to be talking to people. If it is someone who is pitching an idea to the library, obviously we're talking to that person, maybe that person’s colleagues, or students.” In the typology, social knowledge is characterized by the ways in which communication and social *knowing* were dealt with and valued. Social *knowing* was often seen in *codesign*, educating clients and employing understanding which artifacts to employ in communication. Social information was consistent with communication between team members on the particular needs of projects, or the social validation of ideas.

*Knowledge*

The level of importance placed on acquiring information from social interactions was in large part based on knowledge of the fraught process of communicating with stakeholders. Subjects knew that social information had to be negotiated, and that the success of the project relied on the quality of these social processes. The identity negotiations involved in this information type frequently extended beyond the interpolation found in communication processes at and interpersonal level, and involved strategic (and often wicked) problems that served as the exegeses of the design process. Subject 5 relates such a situation:
We've got this client right here. He wants to take an office park, and make it a more work play live type park. Right now it's just corporate, corporate, corporate, but they've got hotels, they've got a bunch of new retail coming in. They've got some condos, town houses, and homes coming in. In like a year they want to have a movie theater coming in. So they want it to be like a hub of excitement, and it’s not that yet. It's still stuffy corporate office park, but they want to be the new thing. But it’s lets design for who you want to be, not who you are. They're having an identity crisis right now, and they still haven’t texted me back about it.

Knowing

The knowing of social knowledge and information is the everyday practices that individuals are engaged in in communication. Knowing when to evaluate and change with clients represents a continual process of check-in and revival moving. This includes dealing with situational changes on the part of clients and handling those changes and what they mean for design. Even where knowledge is created and used effectively strategic objectives of sites are driven from clients changing their minds about projects over time. Subject 7 provides an example:

I had a freelance client who, when I first met her, wasn't planning on selling anything on her website. It was just going to be a portfolio, and then halfway through, she wanted to sell things on it. The platform that we had chosen together, I was very limited at that point. We had to scrap what I had created to that point, and start over. So, knowing as much as possible at the beginning is important.
Within such a situation, subjects have to know when to continue to work with a client or move on.

*Information*

Social information is typically embedded in communication situations, or as people with in a system. A key type of social information found was team communication, which was also important for subjects within teams or organizations. Subject 8 expresses the benefit of such communication: “I have to show it to other people, because I have been staring at it for too long. If they're good with it, then I am good with it.” Subject 8 also expressed the ways in which individual knowledge can play a role in enhancing others’ skills through social interaction:

- She's our creative director. She's had a lot... She's been a graphic designer for pretty much as long as I have, but here experience is a lot wider. She's done way more than just yellow page ads. I was kind of limited. So I go to her for advice a lot.

Social and individual knowledge are often documented and transformed into information. *Knowing* meanwhile forms a process phase marking the transformation of social *knowing* into both other forms of this typology, or the knowledge, *knowing*, information frame. Due to the fact that these subjects work in social spaces, and humans are social beings, social information is often extremely present in the activities examined by the study.

*Documental*

Document based information is used in the same sense as Buckland’s (1991) information as thing. Documents were frequently used as examples for inspiring
information or communicating concepts to other team members or clients. Because documents are the definition of information used in this study, knowledge and *knowing* govern their uses, and affect where subjects go to find such information. Subjects frequently used documents for inspiring information or communicating concepts to other team members or clients.

The most common forms of documents used in the design process were other web designer’s work; i.e., web pages, apps, or screen captures. Nearly all subjects mentioned browsing, seeking or using others work to inspire. The same sorts of documents were also referenced in the context of building understandings, looking at other websites to understand the problem space and it's potential solutions. These documents themselves generated more documents as they were stored in digital collections such as Pinterest boards, or abstracted into metadata, as they were bookmarked.

The formalization of knowledge present in the design process also resulted in the creation of documents. Scope was frequently documented and required a sign off by the client in order to formalize an agreement about the nature of the work to be undertaken. The scope documents themselves, such as a UX roadmap described by Subject 4, were created through a process of formalization.

As an object of externalized transcendental knowledge, document based knowledge, *knowing*, and information is flattened just into information. Its importance to the other too should not be underestimated in that it is an important transactional object within web design projects.
Experiential

Experience was frequently valued as a currency of knowledge and formalized as a source of information. The need to occupy the headspace of clients and users preoccupied many subjects, as was the context around these experiences. This focused less on declarations of affect and more on the phenomenological experience of being. In some ways this could be seen as phenomenological knowledge and information. Subjects were primarily interested this sort of knowledge for the purposes of navigating their clients’ identity and understanding users.

Knowledge

Experiential knowledge allows for empathy and an expanded understanding of the design pace. Even while users were oftentimes, not the primary focus of information gathering or use, for economic reasons, empathy with their experiences, and understanding that had a primary role in driving design, as well as increasing satisfaction. As Subject 2 relates:

Really fun site I did in 2016, it was for a couple, and they're both comic book writers. And so we're thinking about what this website is, and it's like what is the one fact we know about these users, who are coming to this website? They like the product. They're not there for, it's not like customer service, they're not there to air this grievance. They want to know what you are. They are buying what you are selling. Let's tell them what you're selling and how they can get to that, as easily as possible.”
Knowing

The role of this knowledge is also seen in typically in the ways in which subjects were able to embody the concerns of their clients, and use that knowledge to transition to experience of users. Such knowing can often be seen in a transition from thinking about need to thinking about product; this often involves placing themselves in deploying knowledge of the action of being in experience. Subject 2 provides such an example when they continue to reflect on the project mentioned in the above:

I'll go back to that example I gave, about the website for the couple that are comic book writers. I was stuck and didn't have it. I was in that fraud complex phase. I'm not hitting the idea, oh my goodness, you told them you would have something. Then just literally looking at a logo they had had designed for their company, everything clicked into place, and the line that hit me was, it’s a high school yearbook for a conspiracy to take over the world. I was like yep, that’s the line. I didn't know what it was going to look like completely, but I had that sentence in my head, and now we got stuff to work with. I've got high school yearbooks; let’s start getting some high school yearbooks. Oh wait, it’s not any high school yearbook, it’s a high school year book form the sixties, because I've seen my mom's high school yearbooks from the sixties. [Emphasis added]

Information

The information related to experiential knowledge related to either customer identity artifacts relative to the businesses brand, or documents typically developed as part of a process to understand the user. The latter was typified by documents developed
under what is commonly known as user experience research. The former typified by documents like logos and organizational mission statements.

Documents related to branding allow subjects to occupy the experience of the client, though they sometimes move beyond simple referencing of documents. Both the referencing of such pieces of information and going beyond are present in Subject 1’s statement:

So that research phase for me, a lot of times is research on content\(^5\). This might be subjects I'm unfamiliar with. Let’s say a client comes in, and is... we had a client talking about golf. Golf is something I know very little about, so, luckily I have a friend. But I had to gain a better understanding of what golf is, and what his problems might be. I had to put myself, into his headspace.

While many subjects, including Subject 1, used documents for personas, Subject 4’s process of developing information on users was extensive, constituting an entire set of deliverables. Subject 4 describes the output of this process: “We're creating something called a UX Roadmap, and this is a compendium, of goals, objectives, of user personas, that we have actually had users help us make. I can't overstate that enough.” Such documents allow for empathy, but more than mere affective sympathy, it generates an appreciation for experience.

Each of the information types in the typology were by their nature involved in a transformative process. The nature of the work meant there was a continual cycle where

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\(^5\) Content is a term typically used in the web services industry to denote information.
social knowledge became formalized and documents became experiential as they were built on, validated, and drawn on in future work. As Subject 4 said:

So to continue to make things, to continue to think about new things is the key to making great things. Because not all the things you start will work, but the way that designing things, from my perspective, is an evolutionary thing. I'm not going to be the same person 10 years from now that I am now, but the only way I'm going to be really good at what I am going to do ten years from now, is to be doing it now. All of the iterations and changes, and inspirations that happen along the way will make me the person I will be in 10 years. So to be constantly doing, and constantly coming up with new ideas, even if they're no good, will ultimately make you better later.

**Discovery of Information and Knowledge**

The second subquestion posed asks: “How do web designers discover knowledge and information when engaging in the design process?” In order to answer this question each facet, knowledge, *knowing*, and discovery are discussed below.

**Knowledge**

Knowledge was revealed to subjects as the result of social processes. Subjects discovered that they possessed knowledge through either co-creation of meanings or through validation of their work. Social knowledge was present harvested through dialog and revealed through discourse. These discoveries typically happened in the contexts of meetings, and took place in business settings, and as a result of *knowing* were applied into social contexts.
Knowing

The meetings where knowledge is discovered via knowing included client/stakeholder meetings, team meetings, and formal check-ins. Subject 8 describes these meetings in the context of her work tasks, where they serve to set up the design process:

Normally my usual job is when a project starts; we start with a strategy meeting. After we've met with the client, and they've told us about everything, then it’s a lot of meetings. We do a strategy meeting, where we kind of map out the information hierarchy of the site and do a real basic mock up wireframe of what some of their pages will look like, what pages there are going to be and where they are going to live.

As a process that typically was involved in either the discovery of knowledge through interaction with social actors or the environment, or the finding of documents using information networks, the discovery of knowing as a phenomenon was difficult to unearth in the transcript, it was found; however, where subjects answered questions about revisions to their process. The reflection involved in the process of improvement through reflection represents a point where subjects faced the role that knowledge in action played in their process. Subject 8 illustrates this phenomenon:

I guess every project is a learning experience. There is going to be mistakes on each one. I'm trying to think how best to put this. The same kinds of challenges are present on each project, but they are not always handled the same way. There are different approaches. It's just kind of build a repertoire of things you can do. It's frustrating when you come across the same problem and you want to solve it the same way, but you don't want to keep repeating yourself, so that's a challenge.
Table 4.3 Websites Used By Designers

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Social knowledge revealed through the meetings was often formalized after it was gathered, this formalization harvest being the embodiment of knowing within this process. Where knowing was weaker, discovery lacked a formalization process. After such instances subjects often sought to revise their process. Subject 2 expresses such frustration:

So my project manager and I need more compressive specs, a large detailed outline about functionality about the final app, that's signed off on by both parties, so everyone understands what they're getting. It's kind of a process that we're going through as a company now. Just trying to make sure that there is a mutual complete understanding.

Experiential knowledge was found largely through social processes. Because experiential knowledge was internal in nature, it was visible through generated documented understandings, or directly relayed in the interview through knowing. In the
case of understanding the experience related to the client meetings were often held, which, as Subject 8 indicated in the social part of the section, the goal is to get “everything” from the client. Subject 5 outlined, what that everything could be, in that it involved who the client was, what they wanted to do, and who they wanted to be. However, as nearly all the subjects working in an agency and freelance context said, clients leave out key pieces of information, indicated the friction normally present in communicating internal identity based knowledge.

The other type of experiential knowledge and information was the experience of the user. While all of the subjects interviewed indicated the value of user testing to empathize with users, only subject 4 engaged in it as a principal matter of craft. Subject 4 had a fully realized process around which understanding the user's experience was key. As Subject 4 said when outlining their design process:

So our design process is centered on the user and is about really learning something before we can make a prescription, following all the way around to the point where we are proving we did something good. Part of that proof might be how the user interacts.

Subject 1 had an ad hoc process of focus groups and tests, and others tried to occupy that space through a variety of ad hoc means. One, other notable example of behaviors in this area was Subject 6 had outsourced the discovery of experiential information to other team members. Part of these ad hoc methods was typically referencing other team members or colleagues, and bouncing ideas off them. However, most recognized this as a poor stand in, as Subject 9 said:

Table 4.3 Websites mentioned by Subjects in the study
Obviously I am making design decisions, and if there is an increase in the amount of feedback then it’s an obvious win, but a lot of it, is for me personally, feedback I get; feedback that usually comes not from inside the library. I think the people in the organization are habituated to something, and because they’ve seen it grown form the onset, so they might say they like something or not.

Subject 10 agreed and elaborated further when asked about what made good or bad feedback:

I consider a couple things. I tend to try and weigh who is giving the feedback. That sounds too personal, but in the sense, that sometimes you get a lot of feedback from someone you know doesn't use the site that much, or isn't the key audience we're going for.

Other subjects were frequently referenced as a source for furthering craft through shared experiential knowledge. As Subject 8 relays: “Then going to the Meetups and talking to other people is really helpful. Find out what other people are doing. This is an ever-changing industry and I don't want to ever get behind left behind.”

**Information**

Information (see the section on documentary knowledge and information above) was largely found via electronic information systems. Subjects used a set of favorite curated websites that collected and highlighted other subjects’ works, such as Behance, Design Trends, Design Observer, Dribbble, etc. (see table 4.2 for a full list) to discover information through a browsing based behaviors. Subject 6, Subject 8, and Subject 10 reported browsing specific designers and product blogs to discover examples and ideas. This was often based on designers they knew of, rather than search results from a web
crawler because as Subject 10 reported, there were a lot of “SEO” based webpages on
design out there that cluttered the results.

Search was used when looking for examples related to a specific issue, such as
researching a client and their competitors, and finding similar sites. Google’s Image
Search was typically referenced when looking for examples of solutions for a specific
problem. Subject 8 describes how such search results are processed:

Sometimes it's just good to type something into Google images. Like if
I'm looking for different ways of designing a form. Because they're so
boring. So I typed it into Google images. So, online form design, and all
these images pop up, and most of them are more interesting with some
color, others of them were the same old boring stuff, but every fifth one
was good.

Documents discovered in such a manner are typically stored in a personal digital
collection for reuse later, this took the form of a folder on their computer, which served
as a junk drawer. Bookmarks were often organized to aid in retrieval. Documents were
stored in a personal digital library, such as Tumblr, or Pinterest. The most common forms
of documentary information referenced were visual artifacts, and hypermedia (the live
websites themselves or code demos) were also frequently mentioned.

Use of Knowledge and Information

The use of information and knowledge lies at the heart of this study, forming one
of the clauses of the main research question. It served as the basis for the subquestion:
“How do web designers use information and knowledge in the design of websites?” In
order to answer this question, the interview was constructed after consulting existing
research regarding inspiration and framing, which led to several questions being created
in the interview. This also included a sketching activity designed to elucidate explicit processes each subject used in their process. The responses that illustrated the process served as the basis for the answer to this question. The resulting answers from participants were mapped in Figure 4.2. This diagram shows the processes each subject explicated and the points in the process where they occurred. This section will start off with an overview of Figure 4.2, and will then discuss use patterns related to the themes present in Figure 4.1, integrating the knowledge, knowing, and information frame.

**Information Use Across the Design Process**

The analysis of output from the sketching activity yielded a series of stages, related to the sequential way in which subjects expressed their process and abstracted from the transcripts of each subject. The only exception was Subject 8, who provided an extensive break down of their design process; in response to a question about work tasks (Appendix A, Question 5). The replies were analyzed into stages numbered by the order in which subjects mentioned them. The activity that occurred at each stage was analyzed and themes developed around similar activities.

Representing the foundation of the design practice, figure 4.2 outlines the activity described by subjects and the step at which subjects discussed that activity as occurring. Most subjects had a design process consisting of five or more steps. In the analysis of process each break in the activity set that transitioned to another type of activity being discussed was coded as a step. The activity in steps was coded using emergent coding, and then cross code analysis was performed. Thematic coding followed this analysis; these themes were then placed in the context of the diagram.
Typically each process began with what many subjects called a discovery phase in which information was gathered to provide understanding. General research, learning, gathering technical requirements, and communicating with clients were all meant to create an understanding to serve as the foundation for the rest of the process. These understandings were then subjected to refinement, validation, and formalization in the second step. Many of the processes described an explicit deliverable that required sign off, or the creation of a project plan that represented a move away from understanding general problems and towards generating and refining solutions.

![Design Process Activities](image)

**Figure 4.2 – Subjects’ Processes**

Prototyping typically began as early as the second step; this was case for Subject 2, who had the simplest expression of a design process. However, most subjects in
freelance, agency, and institutional contexts held off on formal prototypes until at least the third stage. For many, this involved moving between tools, and translating crude diagrams and sketches into more detailed prototypes. Client communications at this stage moved from being oriented around understanding the problem space to validating and providing feedback. While there was still some framing activity occurring in the third step in many subjects in agency contexts’ process, it was largely centered on administrative tasks, the resolution of which marked the start of a design project.

The fourth step in many design processes was a mixed stage. About half of the subjects concluded their work at this stage, validating it with clients and handing it off to developers to build. The other half this stage was a fitting stage where iteration, validation, client feedback, etc. were happening around their work. Stage 5 had a similar mixed characteristic amongst responses, however more subjects were finalizing their work, and very few were still engaged in behaviors fitting. By step six nearly all of the participants had finished their design work and were wrapping the project up.

Interestingly one subject had a set of activities around proving value to their clients explicitly, which made sense given the subject’s agency context. Only one subject had a process where they expressed a seventh step. While that subject worked in an institutional setting, the member checks revealed that both freelancers and agency based subjects endorsed the idea that; refreshing designs and starting the process anew made a strong capstone step in the design process.

**Understanding and Use**

The information and knowledge used in diagram 4.2 were used to create understandings of the design problem space in early stages. These were typically resolved
by step three, though occasionally extended further, and as Subject 1 indicated could always be returned to. This included technical requirements related to potential solutions as well as the audience and identity for the site. As described in the section discussing the main reference question understanding the problem, was a key precursor to action and the application of knowledge in generating solutions or fitting solutions to the problem space.

Knowledge

The knowledge needed to design a website was specifically addressed in the interview (Appendix A, question 15). The variety of information gathering activities early in the Figure 4.2, are reflected in the different knowledge tapped into in this process. Subject 10’s response shows a laundry list of knowledge needed before design could take place:

Let’s see I need to know; well it depends on what we are talking about. I need to know the applications that I will be using and incorporating. I need to know the audience. I need to know the functionality that that audience will expect. So, on a digital library, that is browsing and sorting options. On a library website that is a bunch of search boxes and access to third party, things, like the catalog, discovery services, all that business. Any institutional affiliations, because a lot of the time with websites we run, I am inheriting color schemes. I am inheriting logos... Things like that.

When asked about designing that started before they had all the information they needed (Appendix A, question 15), subjects indicated that a lack of social and experiential knowledge and information frequently an area where they had less information than desired. That knowledge was key to developing and selecting appropriate activity paths further in the process.
Knowing

The knowledge of what subjects needed often existed in a sidebar of knowing that information and knowledge was missing, though not always knowledge of what was missing. This knowing propelled them forward with continual reinvestigation and created a slight antagonism with clients that were especially prevalent in subjects working in a freelance context. Subject 5 provides a strong articulation in a response to a follow up seeking to clarify this realization:

There's something that is missing in that, oh, if you had told us that it would have changed a bunch of things. They didn't think it mattered, and you explain why it does matter and they're like, "I'm sorry." It's not like they were lying, they just didn't think it was important so they didn't disclose it. A lot of times that happens. Or, they thought they gave us all the information, but it's like oh, we didn't send that document. I'm like, no you did not. They say, Oh, I could have swore, and then they look through their email, nope didn't send it did I. "Could you please send that to us so we can see it." That happens almost every single time. Or they have a goal, and you try and help them meet that goal, and they keep pushing back on you. Well, we're trying to do this but we're really not this yet. We'll we're trying to design for who you want to be, not who you are. So, yes. It's going to be weird for a while.

Knowing was also deployed in understanding activities in the creation of documents related to the experiential and social knowledge used in understanding the design problem, was formalized in document form (see communicating with clients and UX roadmap in Step 2 of Figure 4.2). These documents were constructed through knowledge of form, and adapted as the situation dictated on the fly. When it came to
those documents related to the projects being worked on, subjects expressed dismay at their ability to get content from their partners. Subject 8 expressed such disaffection when they said: “And then ideally, this is kind of a pipe dream, we would get content. But that never happens. We never get the content first, so…”

*Information*

The gap, between the knowledge of what was needed and *knowing* that the path would be obfuscated often lead to the creation of processes to make such information, and provide independence from the client. Two highly formalized and very different strategies emerged to deal with the lack of document-based information were developed in the case of Subjects 4 and Subject 6. In the case of subject 4, the research process became a full-service deliverable that serves as a revenue stream in addition to design services. In this case, experiential knowledge from users is taken and used to formalize an understanding of the problem space into a UX roadmap product. It’s staging in the process is reflected in stage 2 of Figure 4.2.

In the case of Subject 6, other team members gathered that information in their discovery process and then relayed that information in a social setting where co-design happened. This resulted in a content strategy document, then the team produced the necessary documentary evidence based on this socially constructed understanding of the problem space. Most subjects used a combination of social, experiential, and ad hoc document information (often acquired through a Google search) to build their understanding of the problem space. Ultimately the information needed to understand the problem space, was essential to the endeavor and had to be created or found, either way.
Use for Generating Solutions

Use behaviors observed in generating solutions followed the pattern described in the section on generating solutions from this chapter dealing with the main research question. Use of knowledge and information was primarily experiential and document based. These were used for framing and inspiring solutions and spurring work forward, as this phase dealt primarily with the making of things. Generating solutions is reflected in the early stages of prototyping, and in the moving between tools task found at step 3 of figure 5.2.

Knowledge

Knowledge provided and enabled action when used to generate a solution. Playing the role of an input, knowledge lays the foundation for the other action to come. This knowledge was hard-won for many of the subject. While many had experienced some form of formal training, with few exceptions that background focused on knowledge of creative tools and frameworks for thinking about design generally, not on focusing on web design in particular. Subject 3 provides a common sentiment expressed by those with some sort of formal education:

It was very print based. So we spent a lot of time discussing, print design basics, like spacing, typography, color choice. There was a lot of fundamental background work that you get, in things that are a little bit more closely related to fine art than design. So we took a lot of drawing classes, a lot of color theory classes, painting, stuff like that. Then once we actually got into the design classes we never touched digital work ever. I did for my senior project, I taught myself basic HTML and CSS and I
made a really basic website. But, if I hadn't done that I would have graduated not knowing nothing about web work.

Knowing

Knowing is in its own way the use of knowledge and information. However, an example of knowing’s specific use is stepping away from a problem, and specifically the contextual factors around that choice. This phenomenon is examined in details at the start of this chapter in response to the way that knowing was used in the generation of solutions. Stepping away was frequently used in design practices to generate ideas, typically this involved evoking some other experience such as walking. Interestingly, this serves to decontextualize information in the design process and allow new solutions to emerge by jiggling the frames. A subject in the pilot study discussed such practices in terms of a palate cleanser.

Information

Subjects expressed the use of document-based information primarily in the context of inspiration for solutions. Additionally, facets of hypertext and visual information like color and form are used for inspiration. These are typically drawn from examples of other designers’ work. As Subject 8 relates when asked about knowing when they have found inspiration: “Sometimes I will come across a site that is perfectly awful, but has a rocking color palate and I will make a note about it. Or another site doesn’t function very well, but the imagery and image treatments are great.” This document-based information use involved evaluating others’ works. Here, solutions are generally generated to specific problems, though subjects report that general forms, and color
schemes are often abstracted as a type of information in and of themselves. Subject 9 explains, the value that other sites plays in generating solutions:

> With site design, there is a lot of looking at other people’s sites. Being able to see how they solved particular challenges or problems that are unique to me. So just being out there and looking at sites and seeing a site that did this, and then using that as inspiration and ground work for either a particular feature or a whole site itself.

### Use in Validation

The use of knowledge and information in validation activities was heavily linked to either affirming choices for the direction of design, or in finalizing approval of a finished concept. This validation tended to be heavily social in both choices. As a result, *knowing* and knowledge played a major role.

### Knowledge

Nearly every subject discussed some form of validation coming from the knowledge of peers. Subject 9, described how when working with others, they shied away from direct *co-design*. Rather, they relied on co-validation instead. Subject 7 relied on team members and an older mentor, as did Subject 3 and Subject 6. Subject 5 had a new business partner to bounce ideas off of, and Subject 2 relied on Subject 5 and other friends to validate their work. Both Subject 1 and Subject 4 were senior designers and more often relied on subordinate reactions for validation. Generating solutions is reflected in the early stages of prototyping, and in the moving between tools task found at step 3 of figure 5.2. These processes are seen in the validation, production, and handoff activities in Figure 4.2, they occurred between steps 3 and 6 in many processes. When
clients were involved in the validation process knowledge filters drawn from knowledge had to be applied. Such instances are described, in relation to *knowing*.

**Knowing**

Validation also required applying knowledge in action for interpreting events. A pilot study participant described this as a key point. A point backed up from Subject 10 when they explain how the source and tone of the feedback matters for how they process that as validating their work:

> That sounds too personal, but in the sense, that sometimes you get a lot of feedback from someone you know doesn't use the site that much, or isn't the key audience we're going for. In that case, I have to go, “Thank you, that's interesting I'll keep it in mind.” Maybe there are some good points there; you're not the key group. So I can't redesign the site for how you want to use it. Scope can be a thing, because people who have feedback do not typically understand the difference in complexity, from one thing to another. Often it's like, “can we have a slider?” We could, but that's very artisanal and a lot of work and is going to break later. So things like that. If it's a valuable, or easy to implement, I will typically, offer at least exploring it. But, especially, when we're in beta and we're approaching the launch of a site, I'm not super interested in big infrastructure changes or idea that are going to push us back too fare. That can be like a maybe in the next version, or something else.

**Information**

The information and knowledge used in the validation activities discussed by subjects were rarely based on documents, beyond the signing of final approval documents
with economic consequences, making it conversely hugely important within the process. One exception was analytics. Analytics were the most explicitly referenced information used in validation. Several subjects’ answers related to success or process indicated that, while they relied on a variety of sources to measure success, ultimately the way that ideas performed using analytics to measure web traffic was the ultimate source of information justifying decisions. As subject 7 said about success:

One of the things we do at [institution], is we have full usage of Google analytics, and I love looking, looking at the statistics. So if certain people are drawn to certain pages I kind of want to know why. And just generally, usage; if people are using it.

Use During Fitting

Hypothetical solutions are developed through sketching and prototyping; they begin to interact and be tested by the problem space. This process validates or invalidates features of the design. Here many different types of information and knowledge are used, as understanding, generation, and validation interact as process moves along. Subject 4 provides insights in the amount of activity and use that occurs in this step:

Depending on the client we might be building on an iterative cycle. So we might go from define and design, or build, we might go back and forth on that cycle. Building pieces and parts as we need to and then coming back around to testing, which is hugely important for us. This might be sort of rigorous technical testing, or more user testing.

Because fitting behaviors involve the traversing of boundaries in the other three, information and knowledge use in the fitting context is characterized by drawing from all of the types of knowledge and information. The iteration and prototyping stages are
where this activity occurred the most, particularly later on. Many designers described the jumping back and forth embodied by fitting in relations to stages in the middle but towards also ends, in particular steps 3-5 in Figure 4.2.

**Knowledge**

Knowledge in fitting is used to guide the activity. Relying on previous experience, including systems and knowledge gained during the project, subjects used knowledge in fitting to provide guidance to these activities. Subject 1 provides an example of how using knowledge gained from validation of the fitting activities begins to take shape:

> Based on validation and testing we can go back to any number of spots. In kind of the design process. Hopefully, we're not going back to research, because that means we've done something really wrong. Most of the time it's probably going back towards high fidelity mock ups or somewhere in between where we're doing something of this nature, and then going there, and then if we have the feedback and validation. It's like everything is great, I just don't like this one icon, ok great. Go back to the high fidelity mock ups and adjust them and we're good. Hopefully we don't have to go back here, and back to the drawing board. So that's kind of the rough process, at least for me, for ux ui web, any digital user interfaces. For the most part, but that’s pretty delineated.

**Knowing**

Knowledge was frequently used in actions during fitting activities. Sketching, prototyping, and co-design all involve the interaction of potential solutions with the understanding of the problem spaces in the construction of a hypothetical solution, which
can then be tested, and serve as the basis for a revised framework. Subject 7 discusses what this looks like early in the process:

    Sometimes I will take out a piece of paper, or get on my whiteboard, and I will start scratching things out, and I will start writing things, drawing things, anything that really comes to mind. If it's something that deals with wireframing, or organization or something like that, I will literally map it out and move things around.

    While many subjects expressed playing around with code early in the process, their practices had a bit in common with sketching, frequently resulting in demos and trying things out. When asked about practices used for coming up with new ideas Subject 2, explained:

        …you're stuck, on should I do A or B, and you're really trying, and it's in the creativity stage, just pick one and go with it. Don't waste the time and the energy trying to somehow suss out the right one. If it's a 50/50 choice, you have a 50% chance of being right the first time. If you go down the wrong path at this stage, it’s easy enough to get back. Ok, I know where the fork went wrong. I'll just go back there and go the other way. Or maybe it’s you have no idea at all, it’s just push forward on an idea. Again, maybe you guessed right, or maybe this sucks, but I know something else I would rather be doing by now.

*Information*

    These artifacts of sketching activities are themselves seen as documents capable of inspiring design. Their value as such is illustrated by the way in which Subject 1 treated their sketchbooks:
I keep a pretty solid sketchbook of stuff, which for me in a digital age, seems crazy, but if I don't have this. [Holds up Sketchbook] I'd rather lose my wallet than lose my sketchbook. That's not because the pictures in here look pretty, or anything like that. Because this is where I put all my thinking down. I've kept every sketchbook from 2008 on. I just finished cataloging them, and putting them in a fireproof safe up in my attic. I'm like yeah, cool I've got everything very detailed and cataloged.

Sharing

Research question 4 asked: “How do web designers share information and knowledge?” Subjects engaged in sharing information and knowledge as a matter of professional information practice. However, sharing was almost entirely done for money, and/or for validating design concepts. Below, the ways in which knowledge, knowing, and information were shared is described.

Knowledge

The economic motivation and purpose for sharing knowledge information was exemplified in the way that subjects shared knowledge beyond a client-designer or inter-team context. Only two subjects interviewed were engaged in sharing knowledge, both in an economic context. Subject 4, was involved in actively sharing information about best practices as a way to tap into new business. When asked about his work tasks, Subject 4 said: “Day to day, I am doing an awful lot of writing and communicating with potential customers, customers, like-minded people, I'm doing a lot of public speaking.” This aligns with behavior noted by Laing and Masoodian (2015), where developing a stance on best practice served as a business marketing tool and differentiator.
Success depended on the fact that as subject 5 said: “the client needs to sort of have buy in in terms of design goals and whatnot.” Part of this was educating clients. Sometimes knowledge had to be shared and communicated to educate clients. Subject 5 continued, explaining that such knowledge transfer was often not as successful as desired:

They can update the blog, but they will use this awful clip art on there. I feel like I have failed to inform them on what they have to do to make it look good. So there is some of that too. You have to cover communication, and there's failing on somebody’s part, probably ours. We haven't taught them what to do to make graphics that look appropriate for the website. How to resize them and make them look good.

Knowing

Within teams there was some divergence with knowledge sharing was an action, of knowing applied within team structure, often based on roles in the organization. In such cases knowledge in action was a medium where knowledge was applied to shared information in a work validation activity. Subject 1 and Subject 4 were two senior designers, working with design teams. They shared their knowledge to validate the work transmitted to them through design critiques and reviews of information produced by subordinates. Other subjects, notably Subjects 2, 6, and 8, shared knowledge with a developer or other team member working on the same projects to validate ideas in an ad hoc manner. Subject 4 said:

The biggest thing we have done over the years, the biggest theme of change in all of our process has been the degree, nature, frequency, and quality of internal communication, and the mutual responsibility we take
for it. So, a designer is better if they are constantly on the lookout for anything that could affect the intended purpose of a design. That could just be all words, but it affects a design. So we don't want our people to think I am a cog in a great machine, it’s more like we're all sort of meshed together making something. If content strategy goes wrong, sure the content strategist is the main responsible person, but the whole team is responsible for that, which is why we call everyone essentially a UX person, developers, content, design, front end, business analysts.

**Information**

Subjects shared their information with clients as a way to validate design concepts and earn money. It’s also reflected in a comment previously discussed by Subject 10 about the SEO’d nature of web design content on the web. Thus, information was normally shared in a validation framework, often sharing prototypes or design concepts with others for their approvals. Subject 5 found such sharing of information helpful for further generating ideas:

Recently it's being able to bounce ideas off of other folks. Um. Being a one-man show is always hard because I have to find somebody to bounce ideas off of. It's sort of like, I think this is a good idea, lets go for it.

In terms of economic transition, such information sharing is usually embodied in some form of client sign-off. Subject 6 provides an overview of a typical interaction and the rationale for why:

We write down everything we want on each page, and what we need the client to provide, and what we will write or come up with ourselves. Then we get that. That leads to a document, which the client approves. That
includes a wireframe... I wait until they approve. Basically we want to make sure that every page that we've said covers everything, so that the client can't come back and say, oh I need this and this and this and add hours to the project. I wait until it’s all approved and then start designing, with the homepage, and then I get my team to approve, and give feedback, and we go from there.

Experience

Question 5 asked: “What role has experience played in the design of websites?”

This was intended to examine the way that career experience played a role in developing subjects design process. While this factored into the study’s results and is expressed below, the difference between experiences and inexperienced subjects was less than what would be predicted if experienced was a major differentiator when it came to the relating of practice.

Knowledge

Knowledge changed how individuals designed. All subjects with more than one year of experience expressed that they had improved over time. This improvement tended to be in how they handled information but also reflected the applications of skills in other areas. Subject 9 reflected:

When I first started I was designing for myself. So I could spend as much time on a site, as I wanted to, and really tweak until my heart was content. I am more disciplined with that now, working for other people. Trying to rein in their expectations and develop, and try and get into a better sense of how long it takes me to do things. What types of decisions are important at different parts of the process, and also how to deal with different types of
clients, whether internal or external. Some of that is personality based. I
know certain people I have to show a certain amount of detail, before they
are able to give me the feedback I need. Other people I can have a quick
conversation, and say I am thinking about doing this. Then they're like
great. Other times I will need to create full fledged mockups of a site
before they are ready for it. Understanding how to navigate that series of
personalities, and make sure that everyone is reasonable happy with not
just final product but the process. I feel like I have gotten a lot better with
that.

**Knowing**

While subjects learned over time, very few had an active process of review and
evaluation. This is reflected in divergent answers to the question, “Has your design
process changed since you started? How?” and “Do you have a process to try and
recreate successes?” While answers to the former tended to look like the quote from
Subject 9 above, answers to the latter generally were expressed in lines like this quote
from Subject 2:

> No, I never try to do the same thing twice. It’s all unique to me. It’s just a
> waste of time to try and recreate what you've done before, it never works.
> Do something new, its better anyway. Everyone who tries to recreate the
> success from before fails. Like if they do something cool the second time,
> it is because they did something different.

This shows that, while knowledge is built, the practice of building knowledge
actively is less common.
**Information**

As externalized knowledge information played a less active role in subjects’ responses, in large part due to the bias expressed above. While many designers had collections of various sorts, few used them. Subject 2’s valuable sketchbooks remained in the attic. Personal knowledge management amongst subjects was haphazard when present. Suggesting a general dearth of material needing to be managed.

**Other factors**

Questions around experience illustrated that firm structure and specialization, as well as personal style, is likely to be a stronger variable for future studies. For instance, Subject 2 and Subject 3 had ten years difference in their experiences, but many stylistic similarities, including a fairly ad hoc and condensed design process. Subject 1 and 4 also had much in common, especially in terms of articulation of user testing; however, Subject 1 had only eight years of experience compared to Subject 4’s 25 years (see Appendix B for a demographic comparison of subjects).

One structural element may be the way in which firms think of their services. In attempting to explain the difference between their approach and others, Subject 4 characterized an approach they called, commodity based web design:

Web is a commodity industry. The price pressure on creating websites ever since I've been involved in it, so that is the whole time, has been relentlessly downward, relentlessly. To the point now, where web is essentially free; and pretty darn good stuff is free. So, if you are just a person who has just a small business, you are not thinking of a web budget of thousands of dollars, you're thinking in terms of hundreds of dollars, sometimes less than that. So in order to combat that downward price
pressure the web design industry has become highly commoditized over the years, and increasingly more so. So the rule is how fast can you get something solid out the door, in order to make margins and have a company like this.

Subject 4 also elaborated as to what opportunities they think a service plus model offers opportunities for engagement, in their case the added service user experience research:

That makes us a little bit different from your typical web design shop, because we don't even call ourselves a web design shop. We call ourselves a UX consultancy because that’s what we are, so while a lot of our work is rendered on the web we don't really approach it that way. We approach it as a user centered problem to solve. So we work on a lot of larger projects. We're set up to be able to handle those. We are not a commodity driven shop that punches out lots and lots of websites. Although there's nothing wrong with that, and it’s a good business model, our business model is just different. We're trying to solve really deep challenges for users of what we call digital products.

This classification does explain some of the difference several similarities and differences between freelancers (Subject 2 and Subject 5), those in institutions (Subject 7, Subject 9, and Subject 10) and the differences and similarities among those in an agency context (Subjects 1, 3, 4, 6, and 8). Because the economic structure affects so much of team dynamics (ability to communicate with clients, etc.), the context likely has a large role in how websites are designed and designers build their professional information practices.
Chapter Five – Discussion

This chapter extends the findings discussed in Chapter Four. It begins summarizing the findings. Then, the chapter examines the findings’ impact on the field of information science and design studies. It then bounds on these claims within the context of the research through examining the limitations of the work. Finally, it suggests future work and avenues for exploration opened by this study.

Summary

The study was constructed to provide an exploratory analysis of knowledge use and construction in the professional design of websites. The relationship between the questions is such that the answer to the main question is supported by the analysis of the subquestion. By beginning with an information practices perspective and drawing on the model proposed by Savolainen (2008)(figure 2.1), the series of subquestions was developed to create a focused analysis at the level below the main research question. This section summarizes the results, beginning with the main question, and working through each of the subquestions. At its end is Table 5.1, a summary table that further serves to visualize and serve as a reference to the findings of the study.

Analysis of transcripts from the interviews conducted for this study yielded a descriptive model for design tasks used by study participants in their design practices. The tasks in this model included: The understanding of the problem space, generating
possible solutions to the problem, validating those solutions, and fitting solutions to the constraints of the problem space. The model is visually expressed with example codes in Figure 4.1. The process model shows a general continual and iterative set of categories that the design practices of subjects are being described within. This model is reminiscent of models used by investigations into creative endeavors by gestalt psychologies (Rowe, 1987). The analysis of knowledge, knowing, and information in each subtask, illustrates an additional way to differentiate between stages, as each stage engages the three concepts differently.

The first subquestion examined what types of information and knowledge subjects in their work creating websites use. This work showed a set of three types of information and knowledge used. Firstly, subjects relied on knowledge constructed through communications and social processes. Social knowledge and information, on its surface, was hugely important; communication issues drove this with stakeholders. Secondly, subjects used information in the form of documents, or information as thing in their work. Uniquely, the document type was entirely defined within information, as it related to the definition of information provided in Chapter Two. Finally, subjects relied on sympathetic and reflective knowledge based in the experience of others in order to create experiences for end users. This was typified not by empathy, but rather a phenomenological charter of enabling an understanding of the lived experience of the user. The knowledge, knowing, and information required was complex.

Subquestion Two examined how knowledge and information were discovered. The discovery of knowledge as well as information was centered on social practice. In particular, knowing played a major role in the understanding and formalization of the
knowledge being discovered, and the development of informational embodiments of that knowledge in documents. Where documentary information was sought out and discovered it was primarily done for inspiring the generation of potential solutions. Subjects mainly reported using Google to search for documents, though a handful of websites were browsed as well.

Subquestion Three examined how information and knowledge were used. Drawing from the sketching activity that looked at the design process, the resulting process map (Figure 4.2) anchored the understanding of the section. Using this map, the knowledge, knowing, information frame was employed to enrich the analysis and further linked to the main research question. This section found that knowledge and information use was heavily involved in understanding, while knowing, was used in mostly in generating solutions. In validation situations, social knowing and knowledge were typically employed. However, where information was used in validating an idea, it typically signified that that validation was significant. Fitting remained as always an ad hoc process, each instance characterized by its own circumstances.

Subquestion Four asked how knowledge and information were shared in the professional design of websites. Where many subjects shared information, it followed a pattern typical of social knowledge and information in the study. However, the sharing of information and knowledge was heavily tied to the economic activity. An exceptions was inter-team communication, where codesign was evidence of knowing being shared amongst a group of people.

Finally, Subquestion Five examined the role that experience played in the professional design of websites. This section found that experience played a role in how
subjects thought about their process. However, this role was primarily based on an increase in knowledge. Subjects’ expressed varied opinions on the value of capitalizing experience, which illustrated a decreasing focus on recreating success. Information generated by experience was generally not referenced, as subjects moved on to new projects. While the role experience played was in line with existing findings, it was tempered by the large influence that work context played in how subjects structured their process. It seemed that what type of setting they were in and how large their team was played a more important role in how their processes and practices were structured.

Implications

Knowledge Lens

The knowledge, knowing, information frame discussed throughout Chapter Five, represents an applied use of the knowledge lens. The knowledge lens, proposed by Freeburg (2017), is applied to information literacy and developing frameworks to improve information practices of individuals involved in communities of practice. This study applies it differently, in that rather than applying the frame after an intervention, it examines the lived experiences of participants in the context of their lived professional realities. Despite the methodological differences, the application of the lens reveals similar phenomena to Freeburg’s, the integration of knowledge, the struggle of working through imprecision, and the creation of knowledge through social relations. This study also shows how that knowledge is in the economic contexts, and in the creation of new products and information.
Table 5.1 - Summary Table

<table>
<thead>
<tr>
<th>Use and creation</th>
<th>Knowledge</th>
<th>Knowing</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use and creation</td>
<td>Used as an enabling factor, often is either being created or is being applied in action as knowing.</td>
<td>Knowing plays a key role in the activities of subjects. It often serves as a transitional point between knowledge and information.</td>
<td>Information is often used as the output.</td>
</tr>
<tr>
<td>Types of Knowledge and Information</td>
<td>Social, Experiential</td>
<td>Social, Experiential</td>
<td>Document, Social, Experiential</td>
</tr>
<tr>
<td>Discovery of Knowledge and Information</td>
<td>Revealed through social processes and validation.</td>
<td>Key to the discovery of knowledge and applied to social and experiential information and knowledge.</td>
<td>Generally, found in similar way to knowledge. When explicitly sought, common search technologies were used.</td>
</tr>
<tr>
<td>Use of Knowledge and Information</td>
<td>Used primarily in the creation of understanding, plays a heavy</td>
<td>Used throughout the process as the main factor governing action on the part of the subject.</td>
<td>Information was primarily used for inspiration,</td>
</tr>
<tr>
<td>Knowledge and Information</td>
<td>Knowledge was mostly shared for commercial reasons related to financial exchange.</td>
<td>Knowing played the role of a governing force in the sharing of knowledge and information.</td>
<td>Mostly shared as transactional element or for validation purposes.</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Experience</td>
<td>Used by all especially in regards with clients, and also mastery of tools.</td>
<td>Typically not captured. Bias towards the next project.</td>
<td>Hardly documented due to lack of extensive reflection by subjects on past project on the part of many of the subjects.</td>
</tr>
</tbody>
</table>
The *knowledge lens* as applied in the study set it apart from previous information behavior studies in areas of use, sharing, and discovery. Below, the opportunities offered by this study employing the *knowledge lens*, situating the impact of this study within knowledge and information discovery, use, and sharing, the active forms of Savolainen’s (2008) three facets of everyday life information practices (see Figure 2.1). The ultimate power of such an approach is seen the summary table (Table 5.1).

**Discovery**

Information seeing is a common frame in information sciences, drawing from the research concern for effective retrieval systems, however, the early 2000’s saw a move towards studying the creation of knowledge resulting from information found in any context, not just that of a search (Erdeldež, 2000; Foster & Ford, 2003). That work has been important in understanding information behavior and the creation of information systems (McCay-Peet & Toms, 2011). Adopting a phrasing of discovery creates a frame of study that incorporates, the two. This more naturalistic approach couches discovery at a framing level. A simple shift that allows for more phenomena to be integrated into the understanding of how found information is interacted with, in particular preserving a certain agnosticism about the direction knowledge moves in when confronted with information. This section explores knowledge and information discovery, by situating the findings in the context of knowledge, *knowing*, and information discovery.

A key facet of this study are the ways in which knowledge was constructed; such construction was often the result of the discovery of some already known thing, which was able to allow for the integration of new knowledge, or for action to be taken. This study found that knowledge construction was frequently observed, of an integration
process and as the result of external information and feedback creating new space. These external signals illustrated that the knowledge construction found in the study also aligns with work by McElroy’s knowledge life cycle model (Firestone & McElroy, 2005). The alignment is particularly clear within the bounds of knowledge production space within the knowledge lifecycle model. Subjects were continually engaged in creating and validating understandings. This relied on the production of both formalized communicable knowledge and an individual understanding. This illustrates both the potential for the knowledge practices approach to be integrated with knowledge management research, and also for new knowledge management techniques to be applied to design organizations, and organizations seeking to innovate (McElroy, 2005), as well as the creation as result of social relation described by Freeburg (2017).

An interesting finding was subjects’ use of stepping away to make major innovative leaps. This particular process of discovery engaged the knowingly monitoring internal state vs. progress in a generating solution. Far from information avoidance (Bawden & Robinson, 2009; Case, Andrews, Johnson, & Allard, 2005) such behavior appears to use time and distance to create understanding. Cole (2012) invokes mental frames as a way to understand the linked concepts that are stored in a knowledge system. Such factors may be important when integrating new understandings and making innovative leaps in solving problems.

The ease of use of readily available image search, in particular Google’s product, lead to search rather than the encountering behaviors outlined by Erdeldez (2004) to be the dominant strategy of discussion for discovering information. Subjects did report browsing behavior generally restricted to a set of curated sites. However, in the
interviews no solid example of such behavior influencing design was brought forward, while numerous ones were of search. The study shows how search is becoming increasingly relied upon for the information discovery of visual information and examples of interaction design patterns. The general reliance on visual information and rapid pace of technical change was the likely driver of the subjects interviewed having a significantly simpler time seeking and encountering frameworks than those described by Erdelez (2005), or Freund (2015), in their studies of software consultants.

Use

The knowledge lens employed in this study showed that individuals used knowledge and information throughout various phases in the design process. This was examined both in response to the main research question and to Subquestion Three. The knowledge lens added knowing as an explicit point of analysis yielded. In particular, the use of stepping away from the problem to solve it was very interesting because it is so different from conceptions of how knowledge is constructed, especially in relations to stated goals and commercial activity. This section again explores the subject of knowledge and information use within the knowledge lens, addressing knowledge use, the use of knowing, and the use of information.

Knowledge use is the reaction to the successful integration of any knowledge, as that basis is reapplied to the outside world. Cole’s (2012) information system shows a cycle of integration and validation, very similar to that of McElroy’s knowledge validation model (Firestone & McElroy, 2005). That same cycle of input, validation, enabling, was seen in study participants as they related the ways in which they needed to
build understandings in order to design. The experiences that are brought to the table, and
the learning they did on each project, ultimately were what enabled subjects to work.

*Knowing* was used in the very making of the objects built. The study’s
participants were actively engaging in the making of something deploying their
knowledge in action. *Knowing* was present in every part of their professional practice,
much like the knowledge in action model developed by Schön (1985), the work of the
subjects mirrored that described in Schön’s description of architects. The fitting activities
described in the use section of Chapter Four illustrate, the potential for a reflective
practice to be extremely beneficial to practitioners.

The study was heavily driven as a reaction to Laing and Masoodian’s works on
graphic designers (2015). Unlike their study however, this study went beyond visual
information and ideation, focusing instead on the broader, *knowledge lens* frame of
knowledge, *knowing*, and information. It also extended beyond idea generation and
showed the ways in which developing an understanding of the problem space was
involved in the work of design and the role that information use played in developing
websites.

Kari (2010), identified six conceptualizations of information use in a review of
work on information use. Despite the identification of these six forms, many had
overlapping facets, raising questions about the classification of concepts behavioral
typology. Case (2012) similarly struggles to place information use in context in his work
examining information behavior. The construction of knowledge use as a type of analytic
object has been difficult and uneven perhaps due to this inability to drawn information
use apart from the integration of information into a cognitive system. Perhaps this is why
many knowledge use studies looking at policymakers’ use of information focused on
documents and relevancy. The use of the information use framework limited the
knowledge possible to be gained when looking at conceptualizations of information
located within subjects. The knowledge Lens focus adopted by the study added precision
that differentiate between the epistemic activities involved in navigating the world using
information. The study demonstrated the value of the shift to knowledge use, by placing
informational objects and experiences aside. The above concept of experiential
information was developed directly out of such a semiotic shift in understanding applied
epistemology.

Sharing

Laing and Masoodian (2015) asserted that designers developed understanding of
their process in light of commercial considerations. The findings of this study back up
their assertions. While designer’s frequently reported encountering knowledge about
technologies, techniques and trends through social interactions, the sharing that occurred
was nearly always in a commercial capacity. The sharing of this know-how when
observed was always tied to either a financial exchange, or the prospect of drumming up
future business. Where subjects did share involved applying knowing within team
contexts. This aligned with Freeburg’s (2017) creation in relation, but also extended to
the way such teams handled imprecision regarding what was known, and integration of
new knowledge (in the form of technologies and techniques).
Human Information Behavior Research

The findings offer several contributions to work on information behavior associated with creative professionals. Unlike Makri and Warwick’s (2010) study actual practitioners are used, this might be the reason that, while visual information was found to be an important type of information reference, it was more valuable for the knowledge provided, and that most prized information that was phenomenological in nature. This work also helps explain why Hemmig’s (2008, 2009) and Laing and Masoodian’s (2015) use based typologies of information differ for artists and designers.

Mason and Robinson (2011) found that emerging artists and designers had similar practices to those noted in established designers, with the exception that cost played a more limiting factor. This finding is backed up by the findings related to subquestion five, where experience emerged as a mitigated, though still important variable. The commonalities and differences between novices and experienced professionals bears further looking into and may be an ideal area of analysis for the cognitive task analysis discussed below.

Relevant to the broader implications to the profession research in human information behavior are one of the ways in which subjects are comfortable with change. This relationship suggests that a certain social orientation reduces cognitive risks and anxiety when dealing with technology, backing up Li and Lin’s (2016) finding of the lack of a relationship with social anxiety and posting on Weibo. The subjects interviewed generally displayed a strong satisfaction when dealing with new challenges and problems to solve. Rather than avoidance, they seemed to possess, or have developed, practices of engagement. If such attitudes are the result of development, an understanding of this
could lead to the development of pedagogy that increases agency on the part of individuals.

**Information and Knowledge Practices**

Information practices focuses on the ways in which individuals construct a series of routine structures around their interactions with information. Drawing from Savolainen (2008), this study was designed around a conceptualization of information practices, specifically, engaging with the model explicated in Figure 2.1. The activities of seeking, use, and sharing, were the basis for subquestions two, three, and four. Savolainen’s work (2008; 2009a; 2009b) provided those interested in information behavior a way to fully embrace the critical turn. Within the study of information, one aspect of that has continued to be increasingly embodied within a set of externalized artifacts of knowledge. As a result, studies of information practice, if they are to remain related to other studies of human information behavior, will begin to resemble a number of already existing and established disciplines focused on the relationship between humans and artifacts without adding much to those conversations. Faced with this reality, the study provides a way forward to investigate human information interaction in light of complex social realities without becoming a series of works within in a particular artifact set.

The *knowledge lens* approach to understanding information practices has several advantages over an information practices approach: First of all, precision, mentioned above. Secondly, it recognizes the internal dynamics of knowledge, the unique contexts of knowledge in action, and encapsulates information within the context of an object of analysis. The latter of which is useful for understanding information systems, from a document perspective. The dynamics of knowledge in action allow for information
systems to be understood in line with the concept of affordances and constraints as social facets of information systems. Such understandings are key to understanding agency and control as it relates to the world wide web (Kitzie, 2017).

**Professional Practices**

In 2002, Wilson critiqued knowledge management as non-sense. Wilson’s point was that the study of knowledge management had several fundamental flaws, which revealed that knowledge management uninteresting as a vehicle for was understanding information behavior. The intervening years have shown that the theoretical advances offered by knowledge management are not insignificant (Eib and Miller, 2006; McElroy, 2000); however, methodologically speaking, knowledge management is still largely bound in case study research, which prevents the benefits of using its theoretical advances from understanding organizations. Using inquiry based on a group of professionals’ shared practice allows for a broader understanding of knowledge, and especially specialized knowledge, allowing us to understand the lived experiences of the professionals working in that space, the work that they produce, and learn from their experience to change the way that people think and the way that people process knowledge. The application of scientific and engineering concepts by novices is one obvious example. In the case of subjects’ professional work, there are lessons around the use of metacognition to understand communication situations, developing solutions to problems, and understanding the experience of the other in meaningful ways.

**Limitations**

This study was developed as an exploratory effort to understand the context of professional web design. Because of this, the research itself is bound in particular
ontological boundaries, which combined with the implementation of the study provide a set of boundaries for the study itself. These issues can be categorized across three axes: The ontological limitations expressed in Chapter Two; the strategic choices in surfacing evidence, and the practical methods of conducting research studies.

The study was bound within a critical realist framework. This framework explored in the ontology section of Chapter Two. While useful for exploring interactions between phenomena of social and physical events, such as those at play in professional activity, the ontology itself acknowledges the limits of knowledge construction (Walsh and Evants, 2014). Critical realism, however does serve as a basis for scientific, and academic knowledge creation, but asks for self-reflection and criticism to be employed on the part of the research (Dobson, 2001). The study is the result of the experiences of ten individuals, and is reflected through a meaning construction process on the part of the researcher. While the agency of the users was respected through the conducting of a member check of the research findings with participants, the relationship between reader, researcher, and subject creates a level of distortion that needs to be taken into account when dealing with the study. As an exploratory work it is meant to provide a baseline and create a pathway to future work, noted in the section below.

The strategic choices made in surfacing meaning also place a limitation on the study’s overall trustworthiness. By using emergent coding, the initial generation of meaning, and emergent themes, are based in the text of the participants’ own words. However, the researcher’s own interpretation plays out in the naming of the codes, and the framing of the themes. In addition to checking the developed meanings, the researcher drew on a significant set of knowledge about field and extensive readings in
literature about web design. That bracketed knowledge may have made the meanings more palatable to subjects, not more generalizable or trustworthy. The limitations of this investigation in regards to its claim are found in Wilson’s (2016) object to a practice vs. behavior paradigm for the study of human information interaction. Practice does not encompass the entirety of human behavior; as a result, this study should be read as limited to practices reconstructed in the bounds of the interviews’ conduct.

Both Gill and Kennedy have pointed out the impact of web designers existing as part of a Precariat class. The economic pressure of business strategies, such as the commodity based design described by Subject 4, made recruiting subjects difficult. While time was treated as a precious commodity, many balked at the time requirements. As a result, many of the subjects at the heart of the study were closer to the researcher’s social sphere, than would be desirable if the ontological demands extended to findings beyond an exploratory level. This limited generalizability is checked, on two levels: First, there was a general homogeneity, within responses groups; this is elaborated on in the experience section in chapter 4. This homogeneity showed that there was a saturation of general practices of subjects, meeting a minimum for the ontological positioning of the study. Additionally, several participants were recruited outside of the researchers immediate sphere via direct outreach and snowball recruitment. Those subjects mirrored the responses of the individuals in the researcher’s direct network. This hedges this limitation, showing that despite a proximity to many of the subjects, the trustworthiness was not significantly affected. While the geography was similarly centralized, respondents beyond the core location reflected the sentiments and themes of the localized core. Additionally, these were in line with literature, presentations, and other artifacts of
rhetoric around professional web design. While attempts were made to recruit subjects who belong to racial and ethnic minorities, these efforts were unsuccessful. Further study is needed with this population before declarations about social power relations can be established.

**Future Work**

**Validating Sketching Activities in Investigating Knowledge Use**

Within the context the study, the sketching activity was used instead of the question, “Please describe your design process.” The use of the activity was justified in the context of existing research and served its purpose. Based on the work of Pfister and Eppler (2012) it was suggested that the use of sketching in the interview as a data-gathering instrument might have improved the quality and depth of the data. Whether this was because of the mental processing effect (Kavakli & Gero, 2001), as a result of a formalized *information use* (Byström, 2006), confirming whether the sketching activity improved interview responses could be done via an experiment involving multiple coders and examining depth of responses across several different axes.

Figures 3.1 and 3.2 for examples of the sort of data that it generated. This study relied on the audio that accompanied the sketches produced. Additional analytic techniques could be applied to the sketches to further deepen knowledge, especially if the validation of the increase in interview quality is validated.

**Professional Information Behavior**

The study of professional information behavior undergirded this project, drawing on the work of Leckie, Pettigrew, and Sylvain (1997), as well as Fidel and Pijtersen
(2004; 2005), to examine the professional culture. Placing professional information behavior in such a critical role went against the existing literature. Work by Carvalho, Dong, and Maten (2009) showed that new media, or web workers (Gill, 2007), had little epistemic cohesion when it came to knowledge legitimation. However, this arrangement showed that web designers had a surprisingly cohesive set of knowledge practices. The success of the study to generate meaning is an argument for a professional culture of web design existing. This culture, in addition to being a cohesive professional identity, also has practices and behaviors that can be analyzed within information science. This intellectual cohesion provides findings that show the possibility for a new combined model to emerge. Such a model was used broadly in conceptualizing the research in this study. A validated professional knowledge practices model would be structured through combining, Savolainen’s model of information practices and Leckie, Pettigrew, and Sylvain’s model of professional information seeking, and filtering it through the knowledge/epistemic focus of the study. A model for professional knowledge practices (Figure 5.1) is proposed. The following section will explain the facets of that model.

At the top of the diagram, work roles, the rules and norms of the professional identity, serve to govern the process. This baseline knowledge often constructed within constraints of the professional context, serve as a foundation for any professional’s practice. The study showed that web designers were no different, from the doctors and lawyers examined in Leckie, Pettigrew, and Sylvain (1997). The subjects interviewed had several commonalities at this level, which served almost as rhetoric of practice. This was especially true when study participants discussed users and clients/stakeholders. These commonalities were tempered by the contexts of each individual, showing that in
addition to being transcendent, rules and norms are not the end of professional practice but the beginning.

These baselines were in turn applied to individual contexts and constraints, represented by the typical unit of work of the individuals involved. These moderating sets of circumstances are represented by projects. The study found that designers across
contexts grouped their projects around specific sites. Each of these projects contains a set of tasks. In order to achieve success, the professional must engage knowledge practices.

The blending of the model emerges at this point, aligning the professional information seeking model (Leckie, Pettigrew, & Sylvain, 1997), the everyday life practices model (Savolainen, 2008), and the knowledge lifecycle model (Firestone & McElroy, 2005). While the general structure is taken from the professional information-seeking model, the structures within that framework are envisioned, and context is placed around the workings as a constraint. The overall trend illustrated by the lower half is that within the context of the project, professionals engage a repertoire of practices to navigate to a set of desired outcomes. This study found web designers typically engaged in a set of skills that were refined over time to reach desired outcomes with fewer frustrations.

As the model moves lower, professionals engage their baseline practices (labeled as the characteristics of knowledge practices) to create and use knowledge. This is illustrated by the cycle between the elements within the context triangle. Professionals draw from their knowledge of their work area to understand the possible knowledge (represented by knowledge horizons), and use that same base to access pathways (knowledge pathways) of knowledge (often in the form of information) in order to create knowledge that is either a) practical, or b) appropriate regarding the contexts.

As professionals produce project results through the wielding of knowledge (knowledge use located in the center of the lower half) they in turn discover more knowledge (knowledge discovery is for this reason at the end of the knowledge use arrow). This process is moderated through learning, which expands or contracts the
possible knowledge (knowledge horizons), or through the validation of discovered knowledge, which may require the professional to re-engage the channels through which they access required information (knowledge pathways). Where work produces knowledge that has been validated or learning occurs, the project tasks are completed and outcomes are generated. The ways in which designers structured validation, and engaged in learning demonstrates this content. Through continually checking in and keeping up to date on available trends and technology, designers validated the work that they produced which lead to project completion.

To validate, this model, a series of studies across professional groups would need to be conducted and compared with the claims of the model. A series of five studies could be conducted using the three professional groups targeted in Leckie, Pettigrew, & Sylvain’s (1997) review, as well as web designers, such as those examined in this study and one to two other professional groups, such as librarians, project managers, and nurses.

**Cognitive Task Analysis**

Cognitive task analysis (Fidel & Pejtersen, 2004, 2005) represents a contextual line of inquiry that examines the ways in which cognitive resources are brought to bear in a professional situation. This framework was designed to help understand cognitive work and design systems for such tasks (Fidel & Pejtersen, 2004;). The method requires embedding in an organization, and deploying ethnographic techniques to build understanding centered the method’s focus.

Using a cross case study /action research methodology, embedding in multiple design contexts would yield general and context specific sets of cognitive tasks involved
in professionally designing websites. Such a study would allow both for social science research to penetrate deeper, as well as provide a solid grounding for HCI researchers and companies to develop better tools for web designers. Moving to the cognitive level is desirable as it brings more rigors to the research and allows for individual findings to become the basis for more detailed experimental research. Additionally, the Cognitive Task Analysis method, calls for contextual inquiry and action research, providing a check on research into the subject from getting too distant from the real world (Brydon-Miller, Greenwood, & Maguire, 2003).

**Affect in the Creation of Knowledge**

The study contained questions that dealt with the affect of information, and knowledge on the design process. Affect also came up within the answers to other questions. These answers however, sat on the edge of the research design. The affective patterns tended to disconfirm Kuhlthau’s six stage ISP model (Cole, 2012; Kuhlthau, 1993; Kuhlthau, Heinström, & Todd, 2008). In particular, many respondents tended not to express feelings of confusion, frustration, or doubt while engaged in exploring. Many, in particular Subjects 2, 3, 5, 6, and 10, expressed, doubt while engaging in formulation stages, also contradicting the model. Given Kuhlthau’s model’s extension into multiple domains (Cole, 2012; Lawal, Stilwell, Kuhn, & Underwood, 2014; Kuhlthau, Heinström, & Todd, 2008), this suggests that such extensions may not be warranted. Further research is needed to confirm the affective relationship to stages in information seeking by web designers. Interestingly, given the high satisfaction of web designers in their work, and their enthusiasm for learning and making (traits many see as economically advantageous), this line of research may initiate a pedagogical shift for how students are
trained to create knowledge. Imagine a generation of school children who, rather than wrestling with anxiety when learning, embrace discovery.

**Conclusion**

In Chapter One, an argument was advanced that without understanding how those who create sites for the World Wide Web go about their work, we cannot fully understand the objects produced. This is especially important if we have a concern about the values, norms, and power embedded in and supported by these artifacts. This study has advanced the understanding of the knowledge use and construction of professionals in the work of designing websites.

The study is an exploration of the question, how is knowledge used and constructed by those who design websites as their profession. The characteristics of knowledge use and creation in this context explored in the study provided insights into the practices of web designers, and yielded insights into the study of professional practices as well. Such information is useful to those who do this work as professionals and to the hobbyists who develop websites for a variety of projects that exist in spades on the web. The Web began as an open scholarly platform, and today much of the WSeb is made and maintained at the level of serious leisure. However, the insights of professionals are valuable to hobbyists, scholars reliant on it as a way to conduct research, and the professionals themselves.

From the perspective established by this study, more work can be undertaken to develop a richer understanding of the activities. To understand how things are made is to understand the culture that values them and for which they are made. Such understandings are key to any media or information literacy, where the ability to read and
evaluate must be intertwined with an understanding of how things are made. What will be discovered as the understanding of those who build technology expands? What will be found when that mirror is gazed into?
References


Appendix A: Interview Script

OPENING: Thank you for agreeing to be interviewed. This interview is part of a research study exploring the way that knowledge is used and created in the professional design of websites. The interview takes approximately 60 minutes, and will be transcribed, anonymized, and then analyzed. As part of your participation you’ll receive a research report. Have you had a chance to read and sign the consent form?

INTERVIEW

Demographic questions

What is your name? (first last)
How old are you
What racial or ethnic group do you identify as?
How do you identify your gender?
Is 50% or more of your work tasks related to the aesthetic design of web sites, or the supervision of the design activities of those who design websites?
How many years of experience do you have in web design?
How many years of experience do you have doing web work?

START—5-10 minutes

1. Could you introduce yourself?
2. What is your job title?
3. Do you have any formal design training?
   a. Tell me about your education?
4. Please describe your work history in design?
5. What the kinds of work do you performed regularly?

Sketching 10-15 minutes
6. Next, would you sketch your design process for me? That way we can use it as a reference point at a later point if we need to. However, you want to represent your process is fine. Because this interview is being recorded, could you tell me what you put down as you do it and maybe tell me a bit about it?
   a. If online: Can you please hold it up to the camera for a moment so that I can take a screenshot of it.
   i. Do this even if they offer to scan or send a picture.

Design Process Clarification: 0-5 minutes

7. Does your process have distinct, separate stages?

8. How has your process changed from when you started?
   a. Why?
   b. What caused you to do that?

Ideation 5-15

9. What inspires you?

10. When you look for inspiration how do you know when you have found it?
    a. What does that feel like? (gut extension)

11. Where do you look for inspiration?

12. "Do you have a collection of imagery or objects for inspiring the development of ideas?"
    a. Do you ever consult this collection? When?
       i. What is an example?
       ii. Do you have any issues when you use it?
       iii. How is it organized?
       iv. How do you figure what should be included?
    b. Are there any online sources that you frequently reference?

13. "Do you have a set of practices that you find helps you generate ideas?"

14. Do you feel different about the work you are doing when you are particularly inspired?

Framing 5-10

15. What information do you need to design a website?

16. How do you know when you have enough of an idea about the requirements of a project to begin designing?
    a. Do you ever start before then?
    b. How does your work feel when you don’t have enough information

17. How do you find the information needed?
18. Tell me about a time when poor communication created issues with a client?
   a. How did what you change how you designed?
   b. What steps did you take to help you prevent that from happening again?

Success in design/MISC - Needs to be less than 5.

19. “How do you decide that an example is useful?”
   a. What types of examples do you use the most?

20. “How do you evaluate the success of a design concept?”
   a. How do you feel when you hit on something that you think works really well?
   b. Do you try to recreate that success on other projects?
      i. How?

21. Could you provided me with the names of 3 other designers I should talk to?
Appendix B: Study Participants Overview

<table>
<thead>
<tr>
<th>Subject</th>
<th>Gender</th>
<th>Formal Design Training</th>
<th>Race</th>
<th>Experience in Web Design</th>
<th>Experience in Web Work</th>
<th>Formal Job Title</th>
<th>Location</th>
<th>Interview Technology</th>
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<tr>
<td>1</td>
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<td>Yes</td>
<td>White</td>
<td>7</td>
<td>8</td>
<td>Creative Director</td>
<td>Columbia, SC</td>
<td>Google Hangouts</td>
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<tr>
<td>2</td>
<td>Male</td>
<td>Yes</td>
<td>White</td>
<td>11</td>
<td>11</td>
<td>Front End Developer</td>
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<td>Google Hangouts</td>
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<tr>
<td>3</td>
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<td>Yes</td>
<td>White</td>
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<td>2</td>
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<td>In person</td>
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<tr>
<td>4</td>
<td>Male</td>
<td>Yes</td>
<td>White</td>
<td>25</td>
<td>25</td>
<td>Partner, User Experience Strategy</td>
<td>Columbia, SC</td>
<td>In person</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>Yes</td>
<td>White</td>
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<td>18</td>
<td>Partner and Principal</td>
<td>Columbia, SC</td>
<td>In person</td>
</tr>
<tr>
<td>6</td>
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<td>White</td>
<td>8</td>
<td>12</td>
<td>Word Press Web Designer</td>
<td>Greenville, SC</td>
<td>Zoom</td>
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<tr>
<td>7</td>
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<td>8</td>
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<td>Google Hangouts</td>
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<tr>
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