Professional Design Feedback: Types and Expert Preferences

by

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Abstract

Feedback is a critical part of the design process. Every designer works with key stakeholders, such as clients, users, and developers, who contribute information needed for a project's success. This thesis presents interviews with 18 expert designers to gather their perspective on design feedback. Using the phenomenological qualitative research method, data from interviews were clustered into themes. Firstly, four feedback roles in the professional design setting were identified: (1) determining a project's true goals, (2) collaboratively improving the design, (3) strengthening business relationships, and (4) securing project payments. Secondly, feedback was categorized into four types: reactive, evaluative, explorative, and prescriptive feedback. Thirdly, participant preferences on feedback were discovered to depend on *who* provided the feedback, *how* the feedback was acquired, and *when* designers received the feedback. These led to the development of a new framework outlining expert feedback preferences throughout a 5-stage design process.

Keywords: professional, design, feedback, types, preferences

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Chapter 1. Introduction

Whether it's from an employer, client, colleague, teacher, friend, or even a video game, people seek information about their performance. "Feedback is information provided by an agent regarding aspects of one's performance or understanding" (p.102, Hattie, 2007). The feedback we receive helps us adjust our knowledge, behaviour, and actions to reach the goals we desire to achieve (Locke & Latham, 1990; Kluger & DeNisi, 1996; Shute, 2008).

Designers are inventors that desire to creatively solve complex problems (Lars, 2015). These complex design problems tend to have no right or wrong answers, but do have better or worse solutions (Boradkar, 1992), such as a more usable software, a more comfortable interior decoration, a cleaner page layout, or a more ergonomic chair. In other words, designers do not reach an 'ideal' resolution, but work to achieve the *best possible solution* they can within their resources. An 'excellent' designer can accomplish this by "truly understanding the problem, the customer's...current and future [needs]" (Lars, 2015), and the stakeholders' interests, all having diverse perspectives (Conklin, 2006). Thus, designers continually pursue feedback throughout their process from clients, co-workers (Lars, 2015), target users (Elkins, 2012; Greenberg, 2015), and technical experts to iterate their work towards reaching best possible designs (Gould, 1985; Mantei, 1988; Axelsson et al., 2015; Dow, 2009).

In this thesis, design feedback broadly refers to the responses designers receive throughout their projects from various stakeholders (e.g., customers, users, clients, other designers).

Feedback is important in most fields (Boud et al., 2001), but it is a critical aspect of the creative professional design process (Boud et al., 2001; Feldman, 1981; Hundhausen, 2012; Xu, Huang, & Bailey, 2014; Boud et al., 2001; Cross, 1982; Schön, 1992) and design education

(Parnell et al., 2007; Shulman, 2005; Lymer, 2010; Hokanson 2012; Dannels, 2008). Feedback is necessary for reaching intended goals, empathizing with users (Elkins, 2012), brainstorming (Nijstad, 2006), collaborating (Dow, 2011; Hui, 2014; Dannels, 2005; Boud et al., 2001) and improving the overall quality of the design (Dow et al., 2009; 2011). Receiving crucial feedback can guide designers towards more effective and creative solutions.

Therefore, to maximize the outcome of a design project, designers and their collaborators should work together in asking the right questions and giving constructive responses throughout the design process. Good design critique involves keen observation, knowing what aspects of the design to review, and expressing the feedback in an appropriate way (Lawson, 2006).

Yet, designers continue to run into challenges with receiving desired feedback (Xu, Huang, & Bailey, 2014; Tohidi, 2016; Hui, 2014), such as irrelevant or unfeasible suggestions from users (Xu, Huang, & Bailey, 2014). Very little work has been done to examine the significance and characteristics of design feedback, which is needed before studying the efficacy of the process.

1.1 Purpose of Study & Research Goals

Feedback is essential to the design process (Boud et al., 2001; Feldman, 1981; Hundhausen, 2012; Xu, Huang, & Bailey, 2014; Boud et al., 2001; Cross, 1982; Schön, 1992). Despite this, there is currently little empirical research on feedback specific to the design field (Dannels, 2008), although there are several recent notable exceptions discussed in the Literature Review section (Xu, Huang, & Bailey, 2014; Greenberg, 2015; Dannels, 2005; 2008; Marbouti, 2014).

To address the gap on feedback in design research, this thesis involved qualitative analysis of data that was collected from professional designers centered around the role of feedback during the design process. Our purpose is to systematically analyze the nature of and preferences in design feedback in a professional setting and develop a framework to guide feedback interactions throughout the design process.

To understand the aspects of design feedback, this thesis will focus on exploring the three following research goals:

RG1: Understanding the significance of feedback in professional design settings.

RG2: Identifying the characteristics of design feedback that expert designers come across during their design projects.

RG3: Exploring professionals' preferences in design feedback based on: *who* provides the feedback, *methods* they use to acquire feedback, and *when* they seek different types of feedback throughout their design process.

In conclusion, this thesis will focus on understanding the significance of feedback, its characteristics, and expert preferences.

Chapter 2. Literature Review

Henry Ford famously quotes: "Coming together is a beginning. Keeping together is progress. Working together is success." This perspective has been in focus by the professional design community in the last two decades (Danzico, 2011). Rather than viewing the designer as an independent expert, designers have focused on working with others throughout their design process (Danzico, 2011; Axelsson et al., 2015) – the crux of which is feedback. This section will first look at literature regarding the nature, typology, and preferences in design feedback. To ease the comparison, our literature review arrangement will mirror the study's research goals.

2.1 Significance of Professional Design Feedback

Studies have shown that feedback throughout the design process improves the quality of the design (Dow et al., 2009; 2011) and business success by:

1. Identifying ways to improve the current design towards a desired solution with (Elkins, 2012; Acevedo, 2008);
2. Empathizing with target audiences to understand (Elkins, 2012) and meet their needs (Lars, 2015);
3. Receiving creative ideas (Amabile, 1996; Nijstad, 2006; Dow et al., 2011);
4. Collaborating with people across the world, different cultures, and non-design experts (Dow, 2011) to acquire technical information (Xu, Huang, & Bailey, 2014) and strengthen business relationships (Beatrice, 2012);
5. And selling their designs to clients (Hui, 2014; Dannels, 2005; Boud et al., 200; Greenberg, 2015).

While the literature relating to the role of design feedback is rich, as a recent area of interest, there is a lack of information about the different types of feedback and designer preferences on these types within the design field.

2.2 Feedback Characteristics

Even if there is an unanimous agreement on the value of feedback in design, the provision of feedback is not sufficient for a positive change in performance (Kluger, 1996). Whether the feedback is useful depends on its type and the designer's needs (Dannels, 2005; Xu, Huang, & Bailey, 2014; Greenberg, 2015). Sometimes even accurate feedback can obstruct a designer from discovering a novel solution (Lars, 2015). Henry Ford famously stated that if he "had asked people what they wanted, they would have said faster horses". Furthermore, Steve Jobs claimed "creativity comes from spontaneous meetings, from random discussions" – implying that even an irrelevant information can sometimes inspire designers to think outside-the-box and come up with novel solutions. Thus, it is not easy to identify which feedback can be constructive for the designer. To determine the effective kinds of feedback, it is essential to first identify the various types of feedback and categorize them based on their common advantages and disadvantages for professional designers.

Four studies have been found that explored the different types of feedback in design, summarized in Table 1 and Appendix 1. Firstly, Dannels (2008) observed critique sessions in design schools to categorize 9 types of feedback from instructors to students: critical assessment, interpretations, recommendations, asking questions, discussing the design process, comparing designs, using metaphors, brainstorming, and inquiring about the identity of the designer.

Dannels concluded that students in higher levels received more brainstorming, investigative, and interpretive feedback while lower levels received direct recommendations and critical feedback.

Secondly, Marbouti (2014) organized 9 feedback types into three categories based on whether feedback focused on the design's strength, weakness, or neutral feature; whether the level of detail in the feedback was generic, semi-specific or specific; and whether the content of the feedback was about the design lessons, creative ideas, or how the student communicated their presentation. Marbouti discovered that experienced designers gave more feedback about the designer's presentation and the weaknesses in their design than non-designers.

Thirdly, Greenberg (2015) coded the feedback professional designers receive from crowd workers into 4 types and 3 additional codes to distinguish the level of detail: critique, nuanced critique, praise, nuanced praise, suggestions, nuanced suggestions, and feedback summarizing the presentation. This study showed that nuanced feedback was considered more specific, actionable, and preferred by the designers – a sentiment echoed by several other studies (Bangert-Drowns, 1991; Greenberg, 2015; Xu, Huang, & Bailey, 2014). Studies have suggested that because designers seek feedback to learn about which aspects of their design to fix (Dow, 2009), if the information provided is too general, such as "I don't like this page", designers cannot identify the next direction of action (Greenberg, 2015). What part is disliked? Is it the colour? Is it the font? Or is it the size of the font? With the uncertainty of too many options (Kluger, 1996), designers tend avoid making a change altogether (Greenberg, 2015). In contrast to favouring specific feedback, Goodman (2004) argued that sometimes overly specific feedback could discourage the creativity and exploration of the designer.

Lastly, Xu, Huang, & Bailey (2014) interviewed graphic designers to discover 5 types of feedback they sought from non-designers: elements that were noticed in the design, whether the

design met the technical guidelines, the design's communicative goals, impressions of the design, and first noticed aspects of the design. They discovered that while technical suggestions from non-designers can be irrelevant, the feedback helped designers understand how users view their work and identify problems with their designs (Xu, Huang, & Bailey, 2014).

As summarized in Table 1 and Appendix 1, all these studies have indicated that feedback in design can vary in content, specificity, and how it is delivered (Dannels, 2008; Marbouti, 2014; Greenberg, 2015; Xu, Huang, & Bailey, 2014). Furthermore, they showed that these differences are important in differentiating the feedback that designers prefer throughout the development of their designs. Thus, this thesis will identify various types feedback designers receive and systematically categorize them based on their purpose, advantages, and disadvantages. Once the characteristics are established, the next step will be to explore the conditions in which designers prefer each type of feedback.

Table 1. Literature Review Feedback Type Terminologies

Study	Dannels (2008)	Marbouti (2014)	Greenberg (2015)	Xu, Huang, & Bailey (2014)
Participants' Design Field	Landscape Architecture, Art & Design, Industrial Design, and Graphic Design	Design	Graphic Designers	Graphic Designers
Feedback Types	Judgment Comparison Free association Identity invoking Interpretation Process oriented Investigation Direct recommendation Brainstorming	FOCUS OF FEEDBACK Strengths Neutral Weaknesses LEVEL OF SPECIFICITY Generic Semi-Specific Specific SUBSTANCE Communication Design concepts Design ideas No code	Elements Technical Goals Impressions First Notice	Corrective Nuanced critique Critique Nuanced Praise Praise Nuanced Suggestions Suggestions Summarization Other Indifference

2.3 Design Feedback Preferences

Although they have not categorised their results based on feedback types, studies have explored designer preferences related to feedback. In general, the research has shown that people prefer consistent (Leung, 2001; Sargeant, 2007), straight forward (Archer, 2010), and actionable feedback (Greenberg, 2015). Regarding the content of the feedback, studies found that feedback is more beneficial when it is about the task rather than the individual (Narciss, 2004), does not threaten the receiver's self-esteem, and is not an unconditional praise (Kluger, 1996) or overly negative to make the recipient feel lost, burdensome, criticized, or controlled (Baron, 1988; Sargeant, 2007), which could paralyze the designer's progress (Sargeant, 2007). These findings resonate with Lars' (2010) discovery that expert designers strongly prefer a work environment

where positive feedback encourages them to be creative. While these results are general and intuitive, other studies have found more specific designer preferences on *who* provides that feedback, *how* feedback is received, and *when* they have acquired it throughout the design process.

Regarding *who* provides the feedback, studies have shown that feedback from a crowd of users provided a wide range of unbiased responses (Acevedo, 2008) about the problems in the design (Greenberg, 2015; Xu, Huang, & Bailey, 2014), but provided minimal (Acevedo, 2008) or irrelevant (Xu, Huang, & Bailey, 2014) suggestions for improving the design. UK Design Council (2005) further specified that “while consumers can react to what exists and relate back to what they know, some designers felt that consumers are less able to contribute to the development of completely new product or service” (p. 10). They explained this is due to majority of consumers lacking the ability to envision the future possibilities of a design concept (Council, 2005).

In contrast, feedback from stakeholders knowledgeable about design (Xu, Huang, & Bailey, 2014) or from a credible source were found to be highly valued by designers (Kluger, 1996) because they have the experience to support their claims (Greenberg, 2015). Acevedo (2008) further explored the differences in feedback from participants with different specializations. When seeking feedback about scientific visualization methods, the participants valued feedback from visualization professionals due to their knowledge and experience in solving visualization problems, but considered them too biased towards their own techniques. Scientific domain experts were favoured for their feedback about the educational content, but they provided minimal creative suggestions. Lastly, visual design experts were valued for their

creative feedback, but required training on the subject matter to contribute effectively (Acevedo, 2008).

In addition to who provides the feedback, studies have shown *how* the designers acquire that information also impacts the kind and value of feedback received. Several studies showed that feedback should ideally be discussed face-to-face, with a trained facilitator, in a small group, and with visualizations, such as sketches (Gardner, 1993; Hewson, 1998; Nicol & Macfarlane-Dick, 2006).

Another common method found in literature for acquiring design feedback is user testing – the most popular method for designers to gain usability feedback (Gedenryd, 1998; Nielsen, 1993; Retting, 1994; Liljegren, 2006). User testing is where a user interacts with the design “to test how the design stands up under realistic circumstances, by having a representative user work with the prototype ‘live’ and on a realistic task” (p. 166, Gedenryd, 1998). Through user testing, designers gain key information about the design’s usability, learnability, and efficiency with their target audience under realistic circumstances (Gedenryd, 1998; Nielsen, 1993; Liljegren, 2006) to guide further iterations in their designs (Gedenryd, 1998).

Gedenryd (1998) and Retting (1994) added that the type of visualizations or prototypes used during user testing affected the content of feedback designers acquired from their target audiences. With a complete prototype of the designs, users criticized the finer details such as fonts, colours, and buttons, while a hand-made paper prototype focused the user’s attention on the content and functionality of the design. Gedenryd and Retting argued that complete prototypes are not advantageous during the early design stages where the fundamental functions of the design are in question. Gedenryd explained that “before more time and effort is invested in a bad solution. Smaller details are easily fixed earlier on; deeper problems are not” (p.167).

Thus, in addition to *how* the feedback was acquired, Gedenryd and Retting specified that *timing* of the feedback also impacts its value.

Other studies further support the importance of *when* different kinds of feedback are given. Crowd or user feedback was shown to be sought by designers during the earlier stages of design projects (Greenberg, 2015). In contrast, UK Design Council (2005) found that design companies preferred user feedback when their prototype was developed because they did not consider users capable of seeing future potentials in early design concepts.

2.3.1 Design Process & Hypothesized Feedback Preferences

Greenberg, (2015), UK Design Council (2005), Gedenryd (1998), and Retting (1994) found that designers preferred different kinds of feedback depending on their design phase. The design process requires designers to move through cycles of asking questions, researching, analyzing, developing ideas, and iterating until a final design solution is reached (Dorst & Cross, 2001; Maher, Poon, & Boulanger, 1996). To better understand the role that feedback plays throughout the process and why certain feedback is preferred, it is important to comprehend the process itself and the goals of each stage.

A model that popularly represents design process in the professional setting is the four-stage process developed by the UK Design Council (2005). UK Design Council developed the four-stage design process by finding similarities across eleven world-leading design companies through in-house research. The model is comprised of four stages in which the designers had different goals and pursued different types of information, as summarized in Table 2, and further described below.

Table 2. Summary of the UK Design Council's 4-stage design process

Stage	Discover	Define	Develop	Deliver
Goal	Discovering the nature of the problem.	Defining the area to focus upon.	Developing potential solutions.	Delivering solutions which work.
Information	Researching markets, users, technology, and design; Empathizing with users; Potential project goals and directions.	Analyzing and synthesizing information; Project constraints, management, and goal selection.	Ideation; Expert reviews; Testing and prototyping; Design refinement.	Final testing, details, and approval; Production; Launch Outcome(s); Evaluation and further modifications.

1. **Discover:** The design process began with an inspiration to develop a new product or service, or to refine an existing one. Through observational and ethnographic research, the designers gathered new contextual information about current and future user needs, trends, competitive and market data, and identified potential project challenges. The goal of this stage was to gather information about market gaps and potential project directions, concepts, and strategies (Council, 2005).
2. **Define:** During the second stage, the designers rationalized and synthesized their ideas from the Discover stage into feasible concepts with the highest chances of success. They created the best possible concept by collaborating with interdisciplinary experts about business, technology, and production strategies. Their goal in Define stage was to complete a project sign-off which "shows the concept, confirms its logic through research and information from internal experts, and demonstrates tie-ins with the overarching corporate objectives" (pg. 19, Council, 2005).

3. **Develop:** The third stage was where designers iterated one or more of their approved concepts with continuous feedback from stakeholders. During this stage, design teams used "creative techniques and methods such as brainstorming, visualisation, prototyping, testing and scenarios" (pg. 20) and advice from multi-disciplinary experts to develop a detailed design for its production. This was the longest stage and varied greatly in procedure across companies and project goals (Council, 2005).
4. **Deliver:** The final stage was where the "final concept is taken through final testing, signed-off, produced and launched" (pg. 23). Here, the designers polished their work using the information they received about standards, regulations, damage testing, compatibility testing, marketing, communications, packaging, and branding. By collaborating with production and business partners, designers made final adaptations to create the most fitting solution. Furthermore, some institutions gathered post-launch metrics about the solution's performance to prove their design's credibility, guide improvements, and inspire future projects (Council, 2005).

Although the UK Design Council does not directly organize the differences in feedback across each stage, their results showed that as each stage differed in tasks and purposes, so did the information that the designers needed, the people they collaborated with, and the methods they used to gather that information (Council, 2005).

Though few studies indicated different feedback preferences across the design process, due to different information designers need to accomplish the goals for each stage, we hypothesize that designers seek different kinds of feedback throughout their design process. Furthermore, because the types of feedback should vary, so should the method and stakeholder from which they seek that information from. Having a systematic analysis about the various

types of feedback and differences in feedback needs throughout the design process, would be one of the first steps towards researching constructive feedback interactions in the design field.

Although the role of feedback in design is emphasized in prior work, the characteristics and professional preferences need further investigation. Very few existing studies used empirical methods and a broad range of design professionals. Only three of these studies, Greenberg (2015), Xu, Huang, & Bailey (2014), and UK Design Council (2005), had professional designers from different disciplines as participants.

Chapter 3. Research Methods

3.1 Methodological Framework

Although designers highly value the role of feedback, there is little understanding in terms of the theoretical nature of design feedback within the design discipline (Groenewald, 2004). Due to the lack of theory and previous research on types of design feedback, the field is too immature for quantitative research of feedback efficacy and requires further exploratory qualitative research (Morse, 1991; Creswell, 2013). Thus, our three research goals involve collecting designer experiences and providing a qualitative description of design feedback and expert preferences on different feedback typologies.

The qualitative method chosen for this thesis is based on the phenomenological framework (Groenewald, 2004; Welman and Kruger, 2001) outlined by Groenewald (2004). According to Welman and Kruger (2001) “the phenomenologists are concerned with understanding social and psychological phenomena from the perspectives of people involved” (p. 189). The aim of phenomenological research is to *describe* (Groenewald, 2004; Giorgi, 2009). More specifically, to describe an understanding of a concept as accurately as possible by relying solely on the perspectives of the people involved (Groenewald, 2004; Finlay, 2012; Seamon

2000). It is an approach used to explore complex concepts at a deeper level by drawing upon prior knowledge, experiences and reflections from individuals who share the same experience (Creswell, 2013). Since our research aims to explore and describe design feedback in detail without using past literature, a phenomenological framework is suited data-gathering and analysis method for this thesis.

3.2 Participants

Boyd (2001) and Groenewald (2004) indicates two to 10 participants are sufficient for a phenomenological study. Furthermore, to recruit participants who “have had experiences relating to the phenomenon to be researched” (Kruger, 1988 p. 150), the participants chosen for this thesis were required to have minimum of five years as professional designers to ensure they had sufficient experiences about design feedback. Ericsson et al. (2006), defines an “expert” is a person with a high level of knowledge and skills in a domain gained throughout their practical experiences. Suggesting a minimum of 10, 000 hours of practice, we calculated the participant requirement to be 5 years of experience with full-time employment (10,400 hours/year).

As shown in Table 3, the present thesis had 18 participants that ranged from 6-36 years and an average of 18 years in professional design experiences.

Table 3. Participant Demographics

ID	Design Field	Years of Experience	Medium	Duration (min)	Visual Material	Design Education
P1	Game Design	10	In person	29	None	No
P2	Exhibit Designer	20	In person	52	Figure 2	Yes
P3	Industrial designer	25	In person	52	None	Yes
P4	Game Designer	14	In person	58	None	No
P5	Interior Designer	6	In person	62	None	Yes
P6	User Experience Designer	8	In person	64	Figure 3	No
P7	Print, UI, Game Design	7	In person	67	None	Yes
P8	Interior Design	11	In person	60	Figures 4,5	Yes
P9	Interaction Design	12	In person	88	Figure 1, 9	Yes
P10	Interaction Design	18	In person	45	None	Undetermined
P11	Interaction Design	16	In person	58	None	No
P12	Industrial Design	35	In person	55	None	No
P13	Communication Designer	31	In person	65	Figures 8	Yes
P14	Graphic Design	20	In person	66	None	Undetermined
P15	Industrial Design	9	Skype	66	None	Undetermined
			Phone call	22		
P16	Industrial Design	36	Skype	48	Figure 6 (A-E)	Undetermined
P17	Interaction Design	16	In person	62	Figure 10	Yes
P18	Architect, Interior Design	30	Phone call	34	None	Undetermined

3.3 Procedure

We conducted semi-structured interviews – that were recorded and transcribed verbatim by the author. Based on Groenewald (2004), the summary of the overall procedure used in this thesis was as follows:

Data Collection

1. Recruited participants via snowballing.
2. Audio recorded semi-structured in-depth interviews.
3. Collected visual illustrations and transcribed recorded data.

Data Analysis

1. Repeatedly listened to audio recordings & developed a holistic sense of the phenomenon.
2. Isolated meaningful information and clustering these to form themes within each interview.
3. Summarized each interview to validate themes and modify where necessary.
4. Compiled information and themes across all interviews to find results based on most prevalent themes.

3.3.1 Data Collection**1. Recruited participants via snowballing**

The recruitment for this thesis was done by snowballing – a method of recruitment that involves asking either the participants or the third-parties to recommend others for interviewing (Babbie, 2015; Crabtree & Miller, 1992). Participants were contacted via email about participating in this thesis (Appendix 1) with the informed consent form (Appendix 2) and interview questions (Appendix 4) attached. Englander (2012) suggested sending out the questions earlier to give participants "time to dwell and ponder on the experience..." and "...aid the researcher in getting a richer description during the interview without the researcher having to ask too many questions" (p.27).

If their contact information was not available to public, Carleton University instructors or participants emailed design experts on the researcher's behalf. Once participants contacted the researcher to express interest in participating, an interview was arranged to be in person, phone, or Skype. In-person interviews are preferred for gathering responses in greater depth (Giorgi, 2009), but digital interviews were also conducted to gather more data from participants at a geographic distance. Table 3 shows that most of the interviews were conducted in-person.

2. Conducted semi-structured in-depth interviews

After introducing the goals of this thesis to the participants, oral consent was recorded (Appendix 3) and the participants were interviewed following a semi-structured protocol guided by the questions in Appendix 4.

A common phenomenological data collection method involves the semi-structured interview (Wimpenny & Gass, 2000). In a semi-structured interview, questions were used as guides but participants were asked additional questions to elaborate on their answers, especially when the answers were vague or subjective, using words such as 'good' or 'bad'. These additional questions were used to seek clarification, illustration, or further exploration (Parahoo, 2006), such as "what do you mean by...", "could you give an example of..." or "why do you ...". All research questions were "directed to the participant's experiences, feelings, beliefs and convictions about" (Welman & Kruger, 2001, p. 196) receiving feedback on their own designs. Consequently, sometimes questions were omitted due to time limitations, such as inquiring about the participant's design education, as indicated by 'Undetermined' in Table 3. The flexibility of semi-structured interviews enable the participant's unique view to gather rich and detailed descriptions about the phenomena (Parahoo, 2006).

As summarized in Table 3, 15 in-person interviews were voice recorded via phone recorder to be less visually intrusive, two phone interviews via phone application, and two skype interviews via computer recording program. Participant #15 was recorded initially via Skype and then later by phone due to technical difficulties.

3. Collected visual materials and transcribed recorded data

Upon completion of 18 interviews, all audio recordings totalling 17.55 hours were transcribed verbatim to 249 pages of transcripts and a total of 13 figures by the participants were collected.

3.3.2 Data Analysis

While conducting a phenomenological study, Groenewald (2004) warns that when researchers overly focus on the details of the phenomenon, they can lose sight of a holistic understanding of the concept. To avoid this, Hycner provided four steps of data analysis for "investigation of the constituents of a phenomenon while keeping the context of the whole" (1999, p. 161), which were followed in the present thesis. Steps 1-3 were conducted within each interview transcript separately and then all interviews compiled and analyzed together in step 4.

1. Repeatedly listened to audio recordings & developed a holistic sense of the phenomenon.

Hycner (1999) claimed that by repeatedly listening to each recording, the researcher becomes familiar with the interviewee's phrasing and perspective. As follows, all 18 interviews were listened 2-3 times by the author.

2. Isolated meaningful information and clustering these to form themes within each interview.

In this step, the relevant components of the phenomenon are extracted (Creswell, 2013; Hycner, 1999). Important information was identified based on how frequently the participant mentioned it, how long they talked about it, whether they clearly said it was important, and based on how they mentioned it (para-linguistic cues and emotional intensity) (Hycner, 1999).

In our research, notes about key information regarding each research topic were taken on each interview. The notes taken match the phrasing participants used, but greatly shortened data to summarize the ideas and simplify their clustering. See Appendix 5 for the notes taken for Interview #1 as an example of the 81 pages of notes taken from the 249 pages of transcripts.

Next, examining the notes within each interview, the author clustered the ideas by grouping similar topics together (Creswell, 2013; Moustakas, 1994) to create themes (Hycner, 1999). This stage calls for judgement from the researcher which Hycner refers to as "creative insight" in understanding the meaning of the phenomena (1999, pp. 150-151). As shown in Appendix 5, the notes were clustered based on the research topics and interview structure: general opinions on feedback, liked and disliked feedback, design method, techniques for acquiring feedback, and any additional points mentioned in that interview.

3. Summarized each interview in a paragraph to validate themes and modify where necessary.

Summarizing each interview in a paragraph forces the researcher understand a participant's overall viewpoint on the subject (Groenewald, 2004). Comparing each interview's summary to the interview's themes from the previous step ensures the overall essence of the interview has been captured in its notes. This process acts as a 'validity check' for the researcher to not lose the essence of the interview in the notes (Hycner, 1999) and adjust for any discrepancies (Groenewald, 2004).

In this thesis, a participant interview summary was written for each interview, which reflected the participant's general views about design feedback and the information they deemed most important. See 'Interview Summary' section of Interview #1 at Appendix 6 for an example summary. These paragraphs were then compared to the notes and themes of that interview. The participants were consistent with their claims, all content matched the summaries, and no additional modification was made on the notes or themes.

4. Compiled information and themes across all interviews to find results based on most prevalent themes.

Once steps 1-3 are complete for each interview separately, Hycner (1999) claimed that researchers can compare and cluster common themes between all the interviews. Coffey & Atkinson (1996) emphasized that "good research is not generated by rigorous data alone ... [but] 'going beyond' the data to develop ideas" (p. 139). At this stage, Coffey & Atkinson recommend researchers to compile and cluster information across interviews to discover the most prevalent themes and insights regarding the phenomenon.

In the present thesis, the interview notes were compiled across all the interviews. The notes were referenced by participants who supported that claim and any different information was added as a new point. The 'p's represent participant and numbered based on their ID in Table 3. That is, 'p1-3' at the end of a statement indicates that participants 1, 2 and 3 said that information.

As the interview notes were combined, new clusters formed within each theme to create sub-themes – see Appendix 7 for an example of a clustered sub-theme 'Evaluate & justify design progress towards design goals' under the larger theme 'Significance of Professional Design Feedback'. First set of sub-themes were the four different reasons professional designers valued

feedback. Second, the liked and disliked feedback themes were combined and rearranged to cluster into four types of feedback. Third, combining designer preferences for acquiring feedback formed sections differentiating *who* provided the feedback, *how* they acquired the feedback, and *when* they preferred to receive that feedback during the design process. Lastly, clustering participant's design processes emerged five stages of design process and feedback preferences across each stage. The results within these themes will be described in detail within the following Results chapter.

Two additional themes that were identified included the importance of how designers interpret feedback and differences between educational and professional feedback. However, due to minimal data on these topics, we have not included results for these themes in the main thesis (some are included in Appendix 9).

Chapter 4. Results

The qualitative analysis across interviews provided rich and diverse information about feedback's role in professional design. To manage this diversity, we will present the results as a compiled pool from all the participants. Each section answers the three following research questions: understanding the significance of professional design feedback, identifying four characteristics of design feedback, and participant preferences for acquiring feedback throughout the design process.

4.1 Significance of Professional Design Feedback

Our first research question involved understanding the role of feedback that expert designers receive in a professional environment during a design project. To become a successful professional designer, all participants indicated designers cannot “work in a vacuum” (p3, 4) and needed feedback from stakeholders to successfully design in collaborative professional environment (p1-18). To explain why feedback is important to them, participants provided four reasons why feedback is significant in a professional design setting, including: (1) identifying a project's true goals, (2) collaboratively improving the design, (3) strengthening business relationships, and (4) securing project payments. In this thesis, we will refer to all individuals participants collect feedback from as stakeholders.

4.1.1 *Identifying A Project's True Goals*

Feedback from the users and clients is key to identifying their true needs (p4-9, 10,11, 16-18). P9 illustrated in Figure 1 that for a project to succeed, the first step is to gather information about the target users and the market:

A design can't be right or wrong... there are definitely some solutions that are more effective than others... a good design has to meet a need. You look just at the IOS app store alone, there's like 1.3 million apps, and 1.29999 million of those are just complete garbage because they have no meaning. They are not addressing any need that users have (p9).

Many participants agreed with P9 that effective designs solutions address the target users' key problems or goals (p4, 5, 7, 6, 8, 9, 18) or improve an existing solution (p8, 10, 11, 17).

Figure 1. P9's drawing of design process. The first two sections are 'User/Target audience' and 'Market research' which P9 considered to be essential at the start of a project. The third section is 'Design', fourth is 'BETA' testing and fifth one is 'Release'.

While the concept of designing for the target audience was important for many participants (p1, 4, 5-9, 18), some (p5, 6, 9, 18) warned that a client's "problem might not be what they tell you at first" (p6). P17 gave an example where their clients planned to spend a million dollars to develop an MRI iPad app. After doing quick interviews with oncologists, P17 realized they had to the direction of the project because "the feedback was that [the oncologists] would never ever use something like that, because when they are figuring out the amount of

radiation to give a patient, they want to be looking at that tumor at a really high resolution on a big print on a wall that they can call one of their colleagues over and discuss it.” Additionally, the feedback from the oncologists revealed that what they instead needed was an app that manages information around doctor’s schedules. P8 told another example where the client’s request to a problem may not always be the most cost-efficient:

Clients were telling me they need 500 feet of counter, [but] maybe I just need to rethink how they store their stuff. Or someone will tell me that they have a really yellow light, and what they need is a whiter brighter light. It’s not taking everything they say at face value, it’s trying to figure out the things that can be fixed [while] always trying to save people money (p8).

Echoing these examples, other participants (p5, 6, 9, 18) also emphasized that designers must gather information via their clients and user feedback to discover the true goals of their design projects.

4.1.2 Collaboratively Improving the Design

Feedback from target users (p4-8, 9-12, 15) and collaborators (p1, 3-5, 7, 10, 18) is required to improve the design towards the project goals. Participants said they see design as a process in which a solution evolves to become the best it can be (p3, 7, 9, 13, 17). They did not view the result of their project as a finished product (p3, 9, 13), such as applying math problems to reach a correct solution (p9, 13). Participants considered design to be a ‘never ending process of change’(p7) where the designer constantly iterates to reach a stronger solution (p9). Since design does not have a single final correct solution (p3, 9, 13), participants explained it can be challenging to determine the quality of their designs (p5) and “can get very easily off track and believe that we are doing something good” (p10). P7 told an example where she initially assumed that doctors searched the patient registry by name until “actually talking to the

doctors...One thing that [I] discovered is doctors don't usually know patient names. They remember what problem that patient had. So, for them, having a search system based on patient names isn't super helpful." Echoed by other participants (p4-8, 10-12, 15), P7 demonstrated that feedback from users helped validate correct features or identify errors in the design to improve towards the project goals.

Participants claimed that while user feedback evaluates the design, feedback from project collaborators is also essential for designers to find the best design choices (p1, 3-5, 7, 10, 18). P3 said that professional design projects have "a lot of people who have invested interest in your design", are very complicated and will not "succeed without working with the right people to get the best information" (p3). All participants worked in interdisciplinary collaborative environments (p1-18), such as programmers (p2), marketers (p4), clients, design teams, and subject matter experts, who play different roles in supporting the design project (p1-18) and notice different subtleties in the design based on their expertise (p1). Due to being limited in ideas and knowledge when working alone, participants mentioned they needed collaborators to gather more ideas faster (p4, 5) and receive unbiased opinions from stakeholders outside of the project (p1, 4, 7, 10, 18) to make the design more effective (p1-3). For example, P1 said that one time "the scale of the game was completely off. And, there was a whole bunch of other problems too ... so I talked to Marissa [a graphic designer] and I said " this is a mess, what should I do?" ... She gave me some really good ideas on how to fix all of it, just by scaling up the characters!" Therefore, participants pursued feedback from collaborators to utilize their vast knowledge and experience when solving design problems to create the best possible solution (p1, 3-5, 7, 10, 18).

4.1.3 Strengthening Business Relationships

Building and keeping good relationships through feedback loops impacts the quality of design (p4,10) and future contract opportunities (p3). P10 emphasized design is about teamwork but “no amount of talking upfront does that. So, it’s about the execution throughout the feedback process”. Since the key is to design for the client and work collaboratively, maintaining good relationships is critical: participants argued that a designer who ignores important feedback from their employers and teammates will produce inferior work (p9), get fired (p1), or lose future clients (p5, 9). P3 articulated that maintaining good relationships involves not only applying stakeholder’s feedback, but also showing them the value of their input (p4, p10):

Be partner with [your stakeholders]. Show them that they are part of it that their input was very important to you and that you utilized their input to improve the product... I have had the greatest relationships with most of the partners and they say ‘When you are going to do another thing?’ Because you created a relationship (p3).

Therefore, participants viewed that the feedback process helps build stronger relationships (p3, 4, 10) which in turns leads stakeholders to become more invested in supporting the project and the design practitioner (p3).

4.1.4 Securing Project Payment

Documenting and tracking feedback from clients is a business necessity for securing payment (p5,12, 15). Given design projects continue to evolve through ongoing feedback, some of the participants stressed the necessity of documenting clients’ feedback ensure designers do not lose time and money during this dynamic process (p5, 12, 15). P15 stated that “every designer should take the feedback very seriously because that is the road to money... they are not going to give you all the money upfront and they going to value what you did before the next instalment. The feedback is the trigger to getting paid.” Participants emphasized that

documenting the feedback in writing ensures they will be compensated for their deliverables and not be charged for unexpected future changes to the agreement (p5,12, 15). Changes the participants claimed can delay or deter payment include: a client changing their minds about the requirements (p5, 12), requesting new features (p5), a change in the market (p12), client arguing that a feature is missing (p12), misunderstandings or miscommunications about the requirements (p15), or even changes in the project management (p15). P12 said that keeping a written feedback trail “is self-preservation”. For example, P15 warned that sometimes with clients:

They say ‘yeah you must be doing good’ go ahead’ and then when money needs to be paid they say ‘oh I never agreed to this design, so I’m not going to pay until I see correctly’... [Feedback is a way to say] ‘we are agreeing to do what we going to do’, and ‘I agree that you did what I wanted, and therefore I’m paying for the service’(p15).

P12 echoed P15 that clients can change their mind:

Now if we get down to the end of the final design and the clients say, ‘oh sorry something has changed in the market, we have to go back to concept,’ we’ll say ‘ok fine’ but all this work preliminary, CAD specifications is done, we’ve spent time on it, you have to pay for it,’ we’ll go back, change the [contract] and we’ll do it again but it will not be at our cost and expense (p12).

Thus, keeping a record of agreed feedback is important for the designer to receive a fair compensation for their time and efforts (p5, 12, 15).

In sum, all participants consider feedback as an essential component of their profession. Collectively, participants viewed that gathering and utilizing feedback from many agents plays a key role in the development of an effective design solution and a successful designer in the professional industry.

4.2 Characteristics of Professional Design Feedback

This section explores the second research goal: the characteristics of feedback that expert designers encounter during their design projects. Based on the data, we identified four different

categories of feedback characteristics: *reactive*, *evaluative*, *prescriptive*, and *explorative*

feedback. This section describes these four characteristics of design feedback and provides a general overview of professional's preferences across each type. See Table 4 for a summary of the four characteristics outlining participant's views on their advantages, disadvantages, and recommendations for utilizing that type of feedback.

Table 4. Four characteristics of professional design feedback and expert preferences

Type	Reactive Feedback	Evaluative Feedback	Explorative Feedback	Prescriptive Feedback
Description	Verbal or behavioral instinctual reactions to the design.	Feedback that has justifications using principles, research, and/or project restrictions.	Spontaneous ideas designers receive to explore creative directions their designs.	Suggestions about solving problems in the design or making it more efficient.
Examples	'I don't like the green' (p7); 'I really like that font' (p3); Enthusiastic smile (p2); confused silence (p11)	'Our analytics tell us ...' (p6); 'Everybody in the market wants this' (p11); 'head of security is looking at sharp corners' (p2)	'have you thought of putting the credenza over there?' (p5); 'play more with this part of the design' (p13); 'can we have a fold out?'(p14)	'that's not going to hold up, it needs support, you need to put a couple sheets of plywood behind that' (p5); 'well I have a solution that I have done in the past...' (p5)
Advantages	Unbiased, validates design decisions meet user needs, evaluate the 'feel' of the design, assess the 'wow factor' of the design	Based on concrete rationale, clear guide on how to change design	Encourage designers to think outside of the box and create unique designs	Efficient and effective solutions from professionals and seniors with foresight. Validates design decisions to clients.
Disadvantages	Can be vague or unusable if reactions are not justified.	Can disregard ideas that could potentially be successful.	Some ideas can be unfeasible, costly, and conflicting. There can be too	Ineffective suggestions from those inexperienced in design.

			many ideas if unmanaged.	
Suggestions	Observe stakeholder's reactions, ask specific questions and for more detail.	Don't be critical during the ideation stage.	Argue or visually demonstrate why the idea will not work. Have a leader or method for managing abundant ideas.	Inexperienced clients should provide information on their concerns rather prescriptive feedback. Designers should communicate to get the feedback they need.

4.2.1 *Reactive Feedback*

Reactive feedback corresponds to information about how an individual instinctively responds to the design. The terms participants have used related to reactive feedback include feedback regarding people's impressions, perceptions, expressions, attention, attitudes, feelings, behaviours, interactions, and preferences regarding the design (p. 1-18). By asking questions or showing sketches, mock-ups, and prototypes (p1-4 6 7), participants received reactive feedback in the form of stakeholders' verbal responses, such as 'I don't like the green' (p7) and 'I don't understand this part' (p11); or by observing people's natural interactions with the solution (p1-4, 6, 7), such as an enthusiastic smile (p2), making errors (p6, 7, 10, 11), hesitations or "silence [which] says a lot: because they are stuck" (p11). Reactive feedback has been mentioned to provide insights into the design's usability (p1- 4, 6, 7, 15, 11), learnability (p1, 4, 7, 11), functionality (p7, 16 17), intuitiveness (p1, 4, 7, 17), aesthetics (p3, 6, 15, 17), and preferences on product's competitor (p2-4, 6). All these insights relate to people's personal experiences and intuitive reactions to how the designs are received (p3).

Reactive Feedback Aspects Designers Prefer

Several participants mentioned they preferred observing reactions rather than obtaining verbal feedback because observing people tends to be less biased (p3, 6, 11), particularly given that most users don't have the design experience to articulate the errors (p7-9). P6 claimed it is important for designers to focus on "how the user interacts with the system, not how they feel they interact with the system". P11 also warned that sometimes people try a demo and "force feedback on you, that's where they'll say 'I'd never prescribe this drug for this patient'", focusing on the sample content rather than criticising the system.

As indicated in the section 'Identifying A Project's True Goals', meeting the target user's wants and needs are key to a successful design. Thus, most of the participants claimed they pay a great deal of attention observing how their clients and users reacted to their designs (p1-6, 10, 11, 15, 17). Some participants said that instinctive reactive feedback is essential (p3, 4) because people need to try, touch, play, and feel to evaluate (p2-4) and validate the design decisions (p3). Furthermore, reactive feedback provided key information about how the target audience will respond when a design is made public (p7). For example, P3 described a user's feedback on their hand tool prototypes:

I gave the tool to a person who was quite small, quite low percentile. And she started talking to me [about] everything like what she needed and what she wanted... We changed the tool to adapt to her for a little bit as well... You can change the handle position and stuff like that. It made the product incredibly productive and we had people asking for the product again and again. That was the end user (p3)!

Some of the participants also asked feedback from stakeholders who are not involved in the project to provide fresh reactive feedback (p1, 9, 7). Fresh points-of-view, are key in assessing the products' intuitiveness, ease of learning (p1), flow and usability (p9). P9 explained the importance of seeking feedback to mitigate designer's bias:

A designer has huge bias... We lose objectivity. It's hard. And this has happened to me over my career so many times. You work on this thing, this takes days and days right. You end up becoming so familiar with it that you just don't see certain things. It's kind of like a boyfriend or girlfriend, and they have a mole on their forehead or whatever and when you first met them, you are like 'you have a mole on your forehead', but then after four years you don't even see that. It's your baby, it's your project, you've been working on it, you've been so focused. And also, usually you are working really really fast, and it didn't even cross your mind (p9).

P7 echoed P9's claim saying "unless you as a designer are designing for you, then you kind of need to get other people looking at it to make sure your ideas are in line with other people's ideas, not kind of all over the place." Thus, reactive feedback from individuals outside of the team are important for the participants to ensure they are not overlooking design errors and are staying in line with the project needs.

Since fixing errors requires more work, some participants claimed their favorite feedback is positive client reactions (p3,4, 18, 14), such as 'I'm going to sell that!' (p3) or "we love it, go for it!" (p4). Unless a key error is being overlooked (p4, 5) receiving positive feedback means less work for the designers (p4) because they know which features to keep in the design (p14). For example, P14 described he finds "it is easier to work off of a positive rather than a negative because a positive is even more specific ... saying 'I don't like that font' means I have a million other fonts to choose from, whereas if they say 'I really like that font', [then] I can keep it and I can work off of that". In contrast, few participants said they disliked receiving solely positive feedback (p3) because the design can not improve if people always approving it (p5).

Other participants did not only prefer positive feedback, but also aimed for the 'wow factor' (p2, 3, 15, 16) – how much the design amazed the target users – as important feedback for validating the innovation of the design (p16). P15 said that "wow factor is important from a cognitive [aspect]. People always want the best in a product that they paid money. Human side of it wants the best. Nobody says 'can you give me the worst cellphone in the market?'"

Reactive Feedback Aspect Designers Do Not Prefer

Most participants emphasized they disliked when the reactive feedback was vague, unjustified, and non-directive (p1-6,9, 12, 14, 17, 18). All the examples provided corresponded to feedback where individuals verbally stated their personal opinions without any reasoning or justifications. Examples include “Uh yeah, you know, could you make it more exciting, could you make it look nicer?” (p1), “It’s nice...” (p2), “I don’t like it cause it’s pink” (p6), “oh yeah it is good” (p6), “I like green” (p7) “I don’t like the triangle” (p17), “I just don’t like it, do it again” (p6), or “make it better” (p9).

Since designers needed to justify their decisions to their clients (p17), participants stated that these ‘whimsical feelings’ (p7) did not help in providing the specific information they needed to iterate and improve their work (p4 7, 9). Participants claimed that since everyone has an opinion (p4, 15), it is not possible for designers to follow every feedback (p9) or justify which reaction to follow (p6, 17). Thus, when participants received emotional opinions without any reasoning, they could not operationalize on the feedback (p6, 9). For example, P5 said it can be challenging to work with clients who fixate on unreasonable ideas:

They are being very stubborn in their way without having anything to back it up. So, it is just, ‘I don’t see, I want this and I want this’, and it’s like, ‘if you want this, then this has to change’, ‘no I want both’, then I say ‘well it is not going to work your house is going to fall down sir, it can’t weigh a ton and fly at the same time’(p5).

P6 added that when a feedback conflicts with another, a reasonable feedback would overrule an unreasonable one — if “one person thinks it should be pink and one person thinks it should be blue, one person has a reason that it should be blue wins in that case”. P14 summarized “the feedback we get needs to be able to lead us somewhere - because you are not narrowing down any of the ideas. Ideas need to be narrowed down for us to be able to take it to the next step. If they don’t give you any specifics, you’ve got nothing to work off of.”

Participants preferred receiving feedback that includes an explanation because it provided a justification for the designer to pursue that response (p4, 6, 17) or clarifies which specific issue the designer should fix (p7). P7 emphasized this by stating:

When you're starting out, when somebody says, 'oh I don't like green'. At that point, you're just like, 'ok green must be bad'. Whereas ten years down the road, if someone says 'I don't like green', you will ignore that, because it's completely not useful at all. Whereas if somebody says to you, 'this part doesn't seem to stand out as much as it really should... I feel like this part here is overpowering... I'm not getting this message as strongly as I should', then that's a solid piece of feedback, that's something that's useful to you (p7).

However, some participants argued that the reasoning behind people's reactions may not come initially (p7), especially from people who are not experienced in design (p6, 7). They viewed that it is the designer's responsibility to look beyond the reaction (p6) and ask questions to comprehend *why* they reacted that way and understand their problem (p1, 3, 5-7, 13, 14, 17). Echoed by many other participants (p3, 5-7, 17), P17 recommended that with such vague feedback;

I would ask them '*why*?' To try and see if I can uncover if it's purely a personal thing, or maybe they are saying that because from their experience they have seen situations where that doesn't work well because it usually gets associated with a warning. So, if they say 'well I don't think you should use a triangle, I don't like the fact that you used a triangle.' 'Ok well why'. 'Well, you know, usually with medical complications, a triangle is used as a warning symbol and here you are trying, it's not a warning symbol, I think that's confusing.' Ok, well that's totally valid input. So, you need to dig a bit to understand why they are voicing that opinion (p17).

P3 also mentioned vague comments require further inquiry:

It is not giving me any information. Why do you like it? Have you experience with this product in the past? Do you think it is different from all the existing products out there? ... That's what I want to hear. I do not want to 'say oh that is really nice'. I hate words like 'nice. When somebody says 'that looks pretty' that is scares the bejeezus out of me. So, you have to ask '*why* do you think it looks pretty?'(p3).

The consensus across participants is that while reactive feedback is essential to creating good design that meets the client needs, without clear justification, reactive feedback can be non-

directive when deciding how to improve the design. Thus, designers must be cautious of the inconsistent nature of people's natural reactions and learn to ask questions to comprehend the reasoning behind them prior to modifying their work.

4.2.2 Evaluative Feedback

In contrast to reactive feedback, the evaluative feedback category entails what participants claimed to have objective justifications. This category does not include emotional reactions, but rather feedback that was said to involve principles, research, and project restrictions. Evaluative feedback examples included: 'there is a lot of dust in the arctic [during an arctic furniture project] ...' (p8), 'this follows our company principles, we need to use it' (p6), 'our analytics tell us X' (p6), and 'the corner of a graph panel is sticking out at just the wrong height [for safety purposes], can we make sure it's a rounded surface?' (p2). The terms participants have used to describe the feedback which was grouped in this category are: constructive criticism, project restrictions, contextual information, technical information, objective, impartial, logical, practical, rational, statistical information, negative feedback, and expert criticism (1-18).

Evaluative feedback is a preferred type by many participants (p1-3, 6-8, 12) due to being based on concrete rationale (p1, 2, 6) where personal factors or 'visions' are disregarded (p1, 2). Furthermore, participants have said they pursued evaluative feedback from specialists regarding their expertise (p1-3, 7, 9, 11). Participants have mentioned the following examples: "we have educational consultants and they advise us on what to do concerning the educational content, so those are our main stakeholders" (p1), "request that came from the sales department like requests from clients or customers" (p7), "feedback they get is from support and sales, so, sales if going

to go into a trade show and talk about something hot and new that they saw and say ‘everybody wants this’... or information you get from support, so support will complain about the things they see the most often”(p11), “head of security is looking at sharp corners, things that can poke little kids eyes” (p2), “a patent lawyer and they will do a [competition] search.. and say ‘oh this is similar to another product’” (p3), or your “professional network and ask people what they think about the market” (p9). All these contributors provide the designers with practical information to modify their work accordingly to project requirements, restrictions, and goals.

P2 stated with an illustration (Figure 2) that even if evaluative feedback is essential for guiding design towards the desired project goals, criticism during the ideation stage can be detrimental if it removes an idea that can potentially lead to a successful design.

We can’t make a good design out of a bad idea, that’s the conclusion. Its very hard to force, you can always get great execution, but if the initial concept was limiting, you know you have already mitigated the success [of the project] ... the limiting [or project restrictions] feedback comes in at the very last stage of the project. Usually when you are looking at value engineering, you are thinking about value cost... But you want to have a strong design before you get to that stage. You don’t want to cut too soon, because you are going to limit your options down the road (p2).

As shown in Figure 2, the line over the second dark circle represents criticism that blocks the ideas from further developing. Thus, although evaluative feedback is essential to meeting project requirements and goals, it should not impede with designers exploring ideas for creating novel designs.

Figure 2. P2's illustration of design sprouting new ideas. Each circle represents a design and the branching circles are ideas that stem from that. The line demonstrates a criticism which blocks the further exploration of ideas that stem from that design.

4.2.3 Explorative Feedback

Almost all participants considered people's creative ideas during the design process (p1-6, 8-13, 15, 16). Spontaneous suggestions participants received to explore creative directions for their designs will be referred to as explorative feedback. Explorative feedback can come in the form of a suggestion such as 'play more with this part of the design' (p13), question such as 'have you thought of putting the credenza over there?' (p5), or even as changing the mock-ups (p2) and drawing new sketches (p3). Participants have gathered ideas via in-house team meetings (p1, 3-6, 9, 10, 12, 13, 15), client meetings (p6, 8, 16), clients who created a scrapbook of their preferences (p8) or lists regarding their desires (p8, 16), and organized workshops where stakeholders participated in coming up with lots of ideas (p2, 11). The terms participants have used to describe the feedback which was grouped in this category are: brainstorming, design ideas, ideation, concepts, design directions, and suggested areas for the designer to explore (1-18).

Like some participants (p2, 6, 11, 16), P8 welcomed client explorative feedback "because those are the clients that push you the most, because they are constantly trying to get you to think outside of their box." However, many other participants ran into issues when receiving ideas from clients (p2, 4, 7, 8, 13, 14, 16, 18), perhaps due to their inability to seeing the longevity of

that design idea (p8). Participants did not use ideas that were technologically or logistically unfeasible (p1, p2), went against project or design guidelines (p6, 9), required too many changes to implement (p1), or did not make sense and was not relevant to the project (p2, 3, 5, 12). In such cases, participants recommended designers should sometimes look beyond the idea clients say (p7) because they can give information about the client's preferences (p8). P5 told the following example:

I had a client who wanted a backsplash with a rooster in a modern kitchen. I tried to talk her out of it, but rooster meant good luck for her and so she wanted it in her kitchen and I understood that. So, I did my own research and she still put her rooster in there but I found this really modern looking one (p5).

If clients are eager about their ideas that have corresponding issues, participants suggested explaining the costs that come with the client's idea (p16, 18), demonstrating the idea with a graphic example (p13), applying the idea in a different way (p14), or suggesting to move the idea to a future stage (p3, 4). For example, P5 mentioned "sometimes the client will think they have a great idea, which can be a great idea, but just may not be applicable in this situation, so I will keep it in consideration but I'll evaluate how real it can be and then sometimes I will tell the client, I don't think we can do that." P13 added that "sometimes people will say things like 'I really want this thing to be bright, I want it to really be beautiful but my boss loves black on everything'. Sometimes you have to make sense of it - sometimes you show them [graphically] exactly what they said - which looks bad."

When clients disagreed with the design decisions, participants stated it is usually due to misunderstandings (8, 10, 17) that can be resolved by the designer convincing the client by listing pros and cons of the options (p8, 17), showing clients an application of the designer's ideas via pictures (p5) or sketches (p17), or justifying the designs (p10). For example, P10 said to use research when explaining the reasoning being their design decisions:

We bring back to the users' goals, requirements and that kind of things mixed with industry expertise and say, 'look, here is a bunch of examples that have been done for these things or this industry is moving away from this or moving towards this thing.' So, I do not make it my design versus your design (p10).

If they are not still convinced, P8 claimed it can also help to give clients about a week to absorb the information before deciding. Nevertheless, participants mentioned they either had to follow a client's bad direction to receive payment (p5, 6-8, 17) or refused the job (p5, 12). For example,

P12 explained a common misconception clients have:

Usually safety is not something that most clients bring up in the discussion, for some it is implied, but for others it is not in their consciousness. We put that at the top [of our priority], make sure we do that and if they say 'we got to take cost out', we say 'ok' but if you had safety at the top, and they say 'we want to take it away from the top, we want to move cost up there' and we say 'ok so you are willing to hurt someone to make some profit?' and the smart people go, 'no'(p12).

Due to such challenges from clients, P14 and P5 added that receiving explorative feedback can be better from collaborating designers since they are aware of the project, technical and design restrictions (p14) and can have more applicably creative ideas (p5). P14 said that in-team designers provide more feasible suggestions:

So, we won't come up with an idea that we know can't be done. Whereas if you go to the client goes 'oh can we do that but can we have a fold out?', [we respond saying] 'well, we can't do foldout because your budget won't allow it, that'll increase the cost, you know by a couple thousand dollars.' Whereas internally, because we know that and we know what budget, we won't even discuss those things because we have the technical knowledge and shorthand things, the foresight. But even we will know not to raise certain ideas because it doesn't fit within the parameters of the job (14).

P5 added that feedback from designers are also more creative since that is their job:

Theirs is more technical but also very creative, they will say, ... 'have you thought of putting the aquarium over, I don't know in the floor?' The client won't have like an odd ball idea that has just never been done, right? ... because that is what we are supposed to do, right, like we are supposed to have innovative ideas. So, other designers will sometimes give you different types of feedback, either very technical or very creative (p5).

By gathering many pieces of ideas, participants (p2, 6, 13) then combine to create their drafts as illustrated by P6's drawing in Figure 3.

Figure 3. P6's illustration of design elements forming a draft. The smaller circles are elements of a software labeled as 'E's. These elements then combine to make three ideas labelled as VA, VB, and VC, which further combine to make the 'Draft'.

P4 and P9 warned there can also be issues with too many ideas and recommended a leader who can maintain focus and progress the project. P9 mentioned that although it is important to have an autonomous environment for designers to ideate, the leader is important for the progression of the project:

Google talks a lot about this and they have a design sprint that they do.... You get this group of people together, they are all equals, and it creates a really healthy environment, where you can get these ideas out really quickly. Now I think that at the very beginning that's really important, but I do agree... that eventually somewhere there has to be someone with some kind of decision. And that's typically the Art Director or Project Lead (p9).

P9 described this is because of how subjective preferences can be in design and there are time restrictions deterring a designer's ability to explore all:

You might not finish the project if you keep chasing different ideas. Most of the times it is not too many bad ideas per se. Maybe you do not have the budget to do everything. Maybe it will take the game in a different direction. It still maybe interesting but you

have got to do a lot of other things... [with creative ideas] it is really very personal... Some people like something some people don't. So, at the end of the day it is important that there is someone who is in charge and who decides. What I used to do, when I was the creative director, everybody can tell me ideas, and it is great, the more ideas the better, but at the end of the day I am the one who makes the final decision. And that helps me in the feedback. Everyone understands what to expect. There are no hard feelings (p9).

Overall, with good management of explorative feedback from clients and internal team, almost all participants consider explorative feedback an essential component of their design process.

4.2.4 *Prescriptive Feedback*

While explorative feedback is aimed towards discovering different creative directions, prescriptive feedback involves practical suggestions aimed to solve issues or improve efficacy. For example, 'oh I have worked with a material similar to this and you should consider it not being the best material for longevity' (p5), 'scale up the characters [sizes to balance the game]' (p1), and 'that's not going to work, that's not going to hold up, it needs support, you need to put a couple sheets of plywood behind that' (p5). The terms participants have used to describe prescriptive feedback which was grouped in this category are: suggestions, solutions, fixing a problem, solving an issue, insights, professional experiences, feedback from their seniors (1-18).

Such feedback can be suggestions from in-house design colleagues during their internal reviews (p1, 4, 6, 10, 11, 17, 18), from their design seniors (p5, 9), or from specialists that collaborate on the design project (p1-3, 5, 7, 16, 18). While the people that participants sought prescriptive feedback from may seem a broad audience, many are professionals who are experts in their own field, giving feedback regarding their own expertise regarding effective and reliable solutions (p1-3, 5, 7, 13, 16, 17, 18). Having the foresight of the consequences of their suggestions (p3, 7, 9, 18), P7 argued "then obviously, you are going to think about their

suggestion a bit more. Because they have experience, they know what they are doing. They know what kind of things will happen if you change x, y, z. They have the foresight that the suggestion will work out in the end”. This is echoed by P5 who stated:

Everybody has their own baggage as designers and as people and if they offer a feedback it might be a different experience that you have never had... because you can't know everything about everything... So, if I was to design say a kitchen cabinet and somebody way just like, 'oh, look at the corner here it is going to be hard to access' and then somebody would say, 'well I have a solution that I have done in the past, I've done sort of a swing-out thing and these are the specs that I used you can use those'. So, then that works really well because it saves time, I know it works so I don't have to do a bunch of research about it, so it's great feedback (p5).

P17 also claimed that by seeking colleagues with experiences in that industry, they “quickly bring in the best practices from other things that have already been done. So, it's looking for other examples of how to solve the same problem... let's say like healthcare or aviation.”

As an example of prescriptive feedback from a senior designer, P5 stated that:

When you are a junior designer in a firm, you do your technical drawings but you are always supervised by a senior person. So, the senior person actually reviews your drawing before it goes to the client, so in that particular stage it is great, cause if you've made a mistake you are not too far along in the process. So, other designers, which are senior, give you feedback on more the technical aspect” (p5).

P9 echoed this claiming the advantage of having a senior provide feedback based on their experiences:

If I've got someone senior I'm working with, if I can get feedback from them on the best direction, it saves me a lot of time. If they say instead of going right go left, because left is not only going to save you time, but it's meeting the users needs better or it's more efficient, or whatever. That kind of foresight. They know from past experience that left [option] is better than right [option] (p9).

In addition to helping improve designs, P13 added that referencing expert feedback to clients improves legitimacy;

That's what is making the difference between I would say young designer and older designer who the way that you make your presentation, the way that you make your recommendation you can feel there's a lot of knowledge in the back of that”. For

example, with the help of a patent lawyer “you create [a design with a] stronger IP. Then through that IP you can get some funding... They will say ‘you have a strong enough thing and we are really interested because we can see that validness of the product and we will see you about the funding for that’ (p3).

Thus, gathering prescriptive feedback from knowledgeable collaborators regarding their fields improves the quality of the designer’s solution, saves time and costs, and improves the business success of the project.

In contrast, some participants disliked suggestions from stakeholders who are inexperienced in the design process (p3, 7, 10, 11, 15, 17). P15 stated clients with limited design knowledge or experience can be more supportive as experts in their own fields. However, P15 agreed with other participants (p4, 7) that a client who has experience in design projects and process tends to give “very useful feedback... will be happy [with our design], and pay us the money” (p15) because they have a better comprehension of the design, realistic expectations, and know what would improve it (p15). Stakeholders who are inexperienced in design project have less foresight on the consequence of their suggestions within the context (p7), as P10 stated:

People are good at proposing ways to improve single part of a product, they are usually horrible suggestions. They would say ‘for this screen I would like much better if this was here,’ but then that might not be true for that same screen that exist in two or three other parts of the product... they might not understand how that might cause problems and inconsistency in across the whole thing... I want to get to the root of what they are asking for and then you can apply that more broadly (p10).

To mitigate this challenge of working with detrimental ideas, P13, P10 and P17 said they preferred “feedback on the problem or the needs [of the client] rather than a solution, that’s the things I’m looking for” (p17), and “what designers try and do is not get them too tell us what to do, we are trying to get them to tell us what they need and what they know... and what the big challenges are...” (p13). P10 indicated this is “because the designers do not exactly know what the actual problem is, but they know different ways of solving it.” Thus, they encouraged

inexperienced clients to provide information about the issue rather than giving suggestions.

However, P8, P11, P13, P15 and 17 argued that one of the designers' role is to help their clients communicate better. P13 provided an example to explain that it is natural for a client to give inexperienced suggestions and that it is the designer's duty to guide them in giving design feedback:

A designer's client is just as out of water as I was in court, I'd never been in a court, didn't know what to do, my lawyer just said 'don't say this, don't say that', so I didn't. But I just realized I was completely ignorant about it, I didn't know anything about the process. If I went ten times, I'd still be pretty ignorant and I think lots of clients are like that. They wouldn't know how to design a thing, they don't know how to be a good client for that process, they have no idea what you want from them, you tell them and they don't quite get it, they tell you what they can (p13).

Therefore, seeking prescriptive feedback from those who are experienced in design or knowledgeable in their field is of great value to designers for quickly finding an effective solution to the problems in their designs. Nevertheless, important information can be hidden behind ineffective suggestions from people inexperienced in design. Just as a designer can feel out of place in a court setting, clients can feel similarly in a design setting and may need hand-held guidance when providing feedback.

Regardless of the feedback type, be it reactive, evaluative, explorative, and prescriptive, participants need all kinds of input for their projects to succeed and run into challenges regardless of the characteristic. Now that the main characteristics of design feedback and their roles are identified, the final goal of this thesis is to analyze the various factors that impact the benefit of these types of feedback.

4.3 Preferences for Acquiring Feedback

What preferences do designers have for acquiring effective feedback? Participants (p8, 11, 13, 15, 17) argued that guiding their clients through the design process and feedback process

is a part of their job. As P11 illustrated, people may not be able to explain the concerns they have with a design the same way: “you can’t expect somebody to walk into a garage and explain to a mechanic what’s wrong. [The mechanic] can ask questions, ‘does the car do this...?’ So, the designer needs to tell, at this moment, this is what I need to know.” Thus, designers should be conscious of the specific questions they ask and how they acquire the feedback they need (p1, 3, 5, 6, 8, 11, 13, 15, 17). P11 stated the feedback needs to be driven by the designer “and never do we ask: did you like it?” we ask ‘can you find this? did you understand this? did the terminology fit what you expect? would you do this? would you prefer to do this on paper or to use the system if this existed today? why? Questions like that.” P3 echoed P11 by stating:

I find that if you want good feedback you have ask some questions... You can’t just go in and say: ‘Is it pretty or is it nice? Do you think this is a good product? Do you think it has market potential or it does not have market potential? Did you find the usability good or bad?’ You can not use that. You’ve got to ask: Why? Why does it feel good in my hand? Is it balanced? Does it feel better? Does this tool operate better? Do you like that the feature is allowed for more adaptations? All those things are very important to develop the product (p3).

However, just as it is important for the designers to acquire and apply feedback regarding their designs, some participants argued it is also important for the clients to give designer the autonomy to decide how and if to apply the feedback (p5, 10, 12, 13, 15, 17). P10 claimed conflicts can occur when designers’ roles are not defined since “it is easy for people to think that design is something that anyone can do... [and problems occur] when roles have not been identified well upfront” (p10). While participants (p10, 15, 17) welcomed suggestions or questions from non-designers, “that does not mean that [clients] are the ones making the decision about design things” (p10), which is what designers were hired to do (p17). P9, P10 and P13 suggested the project leader or client “should be giving the designer a fair amount of responsibility - People need to know the designer is not there to get directions, they are there to

get feedback” (p9). For example, P6 claimed clients tend divert the discussion towards aesthetics of the design:

Normally [aesthetics] is where [the discussion] goes because that is where people are most comfortable. So, we want to talk about users and how [the design] is going to affect them and what the research says, but that is not what people want to talk about, they want to talk about what it looks like... labels are the biggest point of conversation, it's like, 'that button that link should say X', 'okay, but could we talk about that later, let's just look at this for now' (p6).

P8 also told a story where client's fixated on an irrelevant aspect at that design stage:

People fixate on the weirdest things. So yes, you go into detail about things that are completely irrelevant ... I will present this image [Figure 4] and the bath tub is here... but then they ask 'where is my towel rack going to go?' And you're just in there going, 'no I want to make sure you can reach everything thing [in the toilet] first.' And they are like, 'but the towel rack!' ... and this is a part of the communication (p8).

Thus, participants preferred a feedback process as a collaborative interaction where the client should follow the designer's lead and the designer to lead the interaction to make the feedback process more efficient.

Figure 4. P8's illustration of a bathroom layout. While P8 wants to discuss where the toilet, sink and shower goes, the client is stuck on the towel rack location. The squiggle lines at the right are where P8 temporarily put the towel rack so the client can move on to discuss other features.

To assist designers in getting feedback, our participants have provided some guidance on how to acquire feedback effectively. This section will explore participant preferences regarding *who*, *how*, and *when* aspects of feedback: *who* they acquire feedback from will discuss the agents

that provide information to designers, *how* they acquire feedback will explore different methods and techniques participants use, and *when* they acquire feedback section will map what information designers seek during different stages of their process.

4.3.1 Who: Acquiring Feedback from Different Stakeholders

As indicated in section ‘Collaboratively Improving the Design’, designers receive crucial feedback from a large range of people who are important to the design’s success. However, this does not imply everyone’s feedback will be considered equal (p3, 7, 9, 18). P7 said “When you are just starting out, everybody’s feedback seems equally as important. And because you don’t have a lot of confidence in your own opinions, or just don’t have as much foresight or past experience to help guide you... about what’s going to happen”. Participants (p3, 7, 9, 18) encouraged designers to evaluate the reason and the person behind where the feedback comes from; “I like to assume that my CEO has a much better understanding of what the needs of things are. So, at the same time, as much as I don’t want to favor certain people, I also know that certain people know more about what’s important than other people do” (p7). Thus, designers should consider the stakeholder who provides the feedback and what information to seek from each agent. Participants in this thesis have mentioned four categories of agents they indicated seeking different information from - clients, specialists, teammates, and users. Table 5 summarizes the feedback content and characteristics participants preferred from each of the four stakeholders.

Table 5. Four stakeholders for providing design feedback and expert preferences

Stakeholder	Clients	Specialists	Teammates	Users
Preferred Feedback Content	Project goals and specifications (budget, regulations, company guidelines, market, users)	Depends on the specialty of the professional, ex. marketing, sales, content, branding, aesthetics, market, and users	Aesthetics, texture, feasibility, functionality, usability, implementation, and project process	User's needs, lifestyle, environments, desires, perspectives, past experiences, opinions, and concerns
Preferred Feedback Characteristics	Reactive Evaluative	Evaluative Explorative Prescriptive	Reactive Evaluative Explorative Prescriptive	Reactive

Participants also mentioned seeking feedback from their clients to identify a project's true goals (p4, 6, 10, 11, 13-17) and project specifications (p5, 13, 15) - such as budget (p5, 14, 15), regulations (p11), company guidelines (p7) and information regarding the market and users (p8, 10, 13, 15, 17, 18). Thus, the feedback type preferred from clients include reactive feedback regarding their desires and needs, and evaluative feedback regarding project specifications. P13 highlights the importance of utilizing client feedback using a metaphor of a mesa:

If you think of a mesa—one of these big things sitting in the middle of the desert getting pummelled by sand for millions of years, it gets designed by that force—you'll find the client is the force and you're the mesa, or the designers, [and] the feedback is the sand sculpting the mesa on the desert... if you aren't dealing with [the client] then you are dealing with somebody else who is not really a force at all that doesn't have much at stake... a client and a designer—there is a mutual interest, there is a lot at stake, and the client may feel that there is even more at stake, so you want to be able to talk to the person that has the final say and that is how you sculpt a design (p13).

As mentioned in 'Collaboratively Improving the Design' and 'Prescriptive Feedback' sections, feedback from multi-disciplinary specialists, outside of their main development team, are essential for gathering key information to develop the design (p1-3, 5, 7, 16, 18). Here, specialists include professionals the designer requires information from throughout the project

regarding the individual's field of expertise, such as aesthetic suggestions from graphic design. While users may be viewed as experts in target audience, they are not professionals, in contrast, participants considered collaborators as professionals in the field they are providing information about. Participants mentioned seeking a broad range of content from specialists, including marketing, product management, sales (p2, 4, 11), include educational (p1) and content consultants (p13), branding (p11), aesthetics (p11, p3), market or user perceptions (p2, p11) and user needs (p7). P11 summarized that the specialists' value:

So marketing and product management will come in and say 'kay what you've done might be super usable and nice and the doctors understand it but, it doesn't fit our branding' or 'we can't sell this, it needs to be more impressive' and I know it sounds like a silly request but it is one of the constraints—they need to be able to sit at a trade show and sell this to people... and that is part of feedback and it is important because if you build something that nobody buys it doesn't matter that it is very useful (p11).

Overall, the feedback participants preferred from specialists tend to be either evaluative and prescriptive feedback, but can also include explorative if their field is related to design.

Almost all the participants work with a development or design team (p1-3, 6, 9-11, 14, 16-18), including project managers, programmers, manufacturers, and developers (p1-3). Knowing the design side of the project, their feedback was said to be generally practical and within budget limits (p14). The developer feedback involved aesthetics, texture, feasibility, functionality, usability, implementation, and project process (p6, 11, 14). Since the participant's team knows design side of the project, all characteristics of feedback tend to be effective and within budget limits when given by their team (p14).

Sections 'Identifying A Project's True Goals', 'Collaboratively Improving the Design', and 'Reactive Feedback' indicated the impact that target user feedback has on the success of a design project. All the interviewed designers collected feedback from users throughout their design process (p1-18). From target users, participants pursued information about their needs,

lifestyle, environments (p3, p9), desires, perspectives, past experiences, opinions (p1-3, 6, 9) and concerns (p6). P9 claimed the first thing he does is “to figure out who is the user, who are these people. And I want to empathize with them, we have a whole bunch of methods for doing that, but basically figuring out who the target audience is and what their needs are.” P3 described empathizing with users as “that is the best thing about designers: opening up their minds and getting that feedback and listen to them and hear the stories”. Thus, participants primarily sought reactive feedback from target users.

4.3.2 How: Methods for Acquiring Feedback

In addition to what content to acquire from each agent, designers also adjust how they acquire information from these agents. Whether it is grabbing someone to ask them for a quick feedback (p1, 2, 17), during weekly meetings (p6, 10, 11, 17, 18) or watching people use your product for the first time (p1, 9), participants claimed that how the feedback is acquired makes a difference in the information it provided (p1, 2, 4, 6-9, 11, 12, 17). The methods our participants have mentioned include one-on-one or group meetings and user testing as summarized in Table 6.

Table 6. Three methods of gathering design feedback and expert preferences

Method	1-on-1 Meetings	Group Meetings	User Testing
Advantages	More time to receive feedback and acquire more specific feedback. Avoids feedback to be impacted by group mentality.	More efficient meetings and feedback to be more controlled, focused, and well-rounded	Receiving unbiased reactive feedback on a design. Validating design decisions to clients.
Disadvantages	Reactive feedback can get unreasonable or the discussion can go off track.	Feedback can be swayed by group mentality or the most important person in the room.	Broad range of reactions which may require statistical analysis. Data can get skewed if researcher interferes.
Suggestions	Plan the meeting, ask questions, and design the presentation based on the feedback sought.		Observe all interactions with minimal influence, ask further questions, record all data, and track frequencies.

During meetings, participants tend to introduce the focus of the meeting, present design work and then ask questions (p1, 2, 7, 6, 9, 11, 12, 17). These participants argued designers need to have strong communication facilitation skills to focus and guide the meeting (p6, 7) and get the specific feedback they need at that moment (p8, 9). P17 emphasized professionals should customize their presentations accordingly:

You want to design the presentation, to help focus the conversation on the things you want to talk about. And that's something that junior designers tend to have challenges with. So, there's the design of the product, but then there's the design of the presentation, or the conversation to get you the information that you are looking for (p17).

For example, having "Latin placeholder text instead and stay away from color when you are presenting wireframes," (p17); or not to introduce a final design to get unbiased reactive feedback (p1, 2) because "it should deliver by itself. And I shouldn't be there to help it along anymore. It needs to live on its own" (p2). Another technique is by P12, who used a one-page document summarizing project requirements as way to manage presentations, have a reference

point, and helps focus their feedback on those specific requirements. P9 echoed the need for focus with an example:

I have been in product meetings where we are figuring out what we are doing or we are getting feedback on certain things. If you don't make it very clear, what kind of feedback you are looking for, it can be a nightmare. Because you are going to start getting stuff up left field that is really not helpful. Let's say you are prototyping a product, you have to go in with something very specific, like 'I need you to give me feedback on the navigation bar', or 'I need you to give me feedback on this...' It gets really focused. If you just go in there and give them the thing and say 'give me feedback', [the feedback] can be so all over the place, with no value, and also [lose] time. Time is huge. I guess you could go through general feedback and identify trends and themes, but it's more effective to look in knowing what you are looking for (p9).

It indicates that requesting specific focus or the goal of the meetings prior to the meeting would be critical for to receive productive feedback as well as saving time.

The number of individuals attending a meeting also has an impact. There are different types of method or setting for gathering feedback - whether participants preferred on 1-on-1 meetings (p1, 2, 9, 11, 17) and group meetings (p6, 7). Firstly, 1-on-1 meetings are preferred due to being able to spend more quality time (p7), receive more specific feedback (p1, 2, 9), and not to have group mentality direct the feedback (p9, 11, 17). Particularly, P9 mentioned that a 1-on-1 meeting is more advantageous for specific feedback, in a case of making a design decision while making prototypes:

If I was looking for specific feedback while making that prototype - I would probably want one on one [meetings]. The problem with when you design by committee, there is nothing worse than (and this has happened to me so many times with clients) you got some ideas, you roll in, you sit at a boardroom table and you have like Joe VP of sales criticizes something and then the whole table agrees with him, and it's like all the table against you, and now you have to do this thing that is not the right thing to do (p9).

In addition, P17 insisted that "[in] focus groups, the loudest voice tends to sway opinions, so, one-on-one gets you better input and feedback from end users." P11 echoed the challenge with group mentality saying:

When you deal with doctors and they don't want to be wrong, ever. So if you ask in a group they'll say things only if they are certain, so if you do one-on-one they'll say things to you as a researcher that they wouldn't say in front of their colleagues... Often they'll do things like pick out typos in your screens or they'll say you misspelled this cause those they are sure about, so you get a lot of feedback about tiny little things... but as one-on-one, you ask them to complete a task, then you observe. You don't have the problem of the loudest person in the room winning (p11).

To benefit from group design feedback meetings, P9 advised appointing a good leadership who “makes it clear that when his designers come into a meeting, sets the stage; ‘this is why we are here...’ A good director will do that [and] be a bit of a buffer to fend off bad ideas.”

In opposition, although group feedback can be susceptible to group mentality, P6 and P7 argued 1-on-1 meeting's feedback could provide too much unreasonable reactive feedback (p6, 7) or go off track (p7). They viewed group meetings to be more efficient and feedback to be more controlled, focused, and well-rounded due to being more self-aware of other's listening. To describe this, P6 said the following

When working on something one-on-one with my manager or colleague, the ideas are a little bit more uncontrolled—so, ‘well, I don't like that colour’, ‘I don't think it should be positioned here’... these opinions and bias can be heavily influencing feedback, whereas in a group, the biases can be a bit more in-check... [and] it is a lot more rational so, ‘I don't like it being there because it breaks a design principal’, and there will be a lot more thinking behind the feeling opposed to just ‘oh I don't like’(p6).

P7 echoed P6 and argued group discussions are more valuable due to collectively creating a more concrete direction:

I tend to find that if you have too much conversation with one person, you end up going in a direction and then this person has this opinion, and then you go in this direction, and then this person has this opinion... so you sort of tend to sway between opinions. Whereas if you have a group discussion, everyone has a piece, they all talk together, people kind of compromise on their ideas they might say ‘oh yeah, I see what you're saying I've changed my opinion’, and you end up with a more rounded opinion (p7).

Therefore, while group meetings are useful in efficiently collecting and focusing feedback, group mentality can misguide them.

Unlike the meeting structures, the participants were more unanimous in how they conduct and value user testing. Almost all participants conduct user testing, which entails having users interact with the design, observe their reactions, ask further questions, and record all data (p1-4, 6, 7, 9-12, 15-17). User testing is highly valued in validating designer's assumptions and decisions for the clients (p2-4, 6, 7, 12), such as whether the user can accomplish a task on their own (p4, 6, 7, 9, 10, 17) or how the users will react once the design is published in a competitive setting (p2, 4, 11). P7 explains that:

To be honest, users don't really say what they think very often. Usually the information that is useful is the information that you get, just watching them do something. They are looking at something for a while, they get to the screen, have puzzled look on their face, they are not really sure where to go, then you know right away 'oh okay, we didn't make something obvious enough', and that's the feedback that's really great, because they won't tell you that. They'll feel stupid and think 'I'm too dumb, I didn't understand how this would work'(p7).

Providing mainly reactive feedback, user testing primarily provided designers with information about the design's usability (p1- 4, 6, 7, 15, 11), learnability (p1, 4, 7, 11), functionality (p7, 16 17) and intuitiveness (p1, 4, 7, 17). To do so effectively, participants advises designers not to interact with users during testing (p1, 2, 4, 7, 17) to get an accurate reaction "because in the real-world situation, the researcher isn't going to be there telling them what to do" (p17).

In addition to observing user reactions without interactions, participants encouraged designers to keep statistical records and listen to the majority of their target users (p2, 6, 9, 12). Statistical information helps identify trends, repeated errors (p9) to ensure small group individuals, do not drive the direction of the design (p12); "you can't iterate your work to outliers... you'll be iterating forever" (p9).

Results have shown that user testing was conducted mainly to acquire reactive feedback. No information was gathered on the characteristics participants prefer from 1-on-1 and group meetings, implying that designers did not have specifications on the type of feedback they sought from meetings. However, since managing the feedback interaction was important for some participants, the feedback type and content preferred during the meetings depended on the questions participants asked in that meeting.

4.3.3 *When: Acquiring Feedback Across Design Stages*

In addition to who and how feedback is acquired, participants proposed that *when* designers receive feedback impacts its value and use (p1, 2, 4-8 15-17). While few participants believed that feedback should be provided as early as possible to save costs from making large changes (p1, 4, 14, 16), others (p1, 6, 8) argued that feedback given too early, when directions may change completely, can waste time. P4 provided an example of a feedback given too late in the process:

So, we have this marketing guy who does not know much about developing. We working on this project. It was an ice fishing game. It was a very simple game for people who play for a few minutes and get their fish. And this marketing guy came out, we are almost done with the project, and he is like, 'You know what would be cool? If we put a polar bear in the game and it will attack you if you are not a careful and do not give him a fish every once in a while.' I thought, 'That would be cool but then I would have been better if you had come in the monster developing stage. You can not come at the end [of the project] and say that.' That is an example of bad feedback. It was good idea but a little late in the process. In the end, we did not do it. I managed to convince him that it was not feasible (p4).

In contrast, P8 claimed sometimes stakeholders fixate on small adjustments too early on when the structure is still being established. P8 said that "the important things become important depending on the stage that you are at. So, I'll get clients who will say 'I really like these colors and I really like these tiles...' and that's great, but I'm not looking at that until the very end [Figure 5]."

Figure 5. P8's illustration of their design process. The bottom bar illustrates the time spent on each stage where stage 5 is majority of the time with black/white designs and the colours are discussed near the final 5% of the process.

As mentioned in the 'Designer's Role in Acquiring Feedback', it is a part of the designer's job to guide the feedback process and inform the clients on the stages and goals in the design process (p5, 14, 16). P16 described that they guide their clients through the design process because the feedback is important and dependent on the client:

Yes, it depends [on the timing] so that's why we trying to cover by our design processes. We trying to make sure that we have different level feedback, that they come at the proper time in the process... Since feedback is part of our role, we have to make sure that we explain properly that some feedback changes are easy to do to at the beginning of the project, and become more complicated at the end of the process... a designer without a good client can not do a good project, and feedback is very critical to make sure that our design process will be linear (p16).

Thus, like P5 and P12, P16 claimed to have a very structured design process they have posted in their client meeting spaces, shown in Figure 6 (A-E), ensuring the clients comprehend the process and stay focused on the specific goals when giving feedback.

Figure 6. P16's 5-stage design process. P16 guides their clients which indicates the goals of each stage and the information the designers seek. Note that image (B) title is 'Conceptualisation'.

While some (p7, 9) had a similar 5-stage structures as P16 (Figure 6) and P9 (Figure 1), most of the participants had a 4-stage design process (p1, 2, 4-6, 8, 10-14, 17, 18). Almost all participants (p1,3-18) had similar structures and progression. Combining their process, the following five stages or phases emerged: (1) research phase, (2) concept phase, (3) design phase, (4) development phase, and (5) post-launch phase. Figure 10 is a diagram illustrating these five stages summarizing the processes described by the participants.

Table 7. The 5 stages of professional design feedback. Chart below indicates the most common stakeholders, methods, content, and characteristics of the feedback gathered by the participants.

	1) Research	2) Concept	3) Design	4) Development	Post-Launch
Stakeholders	Clients, Users	Clients, Team, Users	Clients, Specialists in team	Development team, Users	Users
Methods	Meetings, User testing or observation	Meetings, Brainstorming, User testing	Meetings, Prototypes	User Testing, Production Testing, Implementation	User Analytics
Content	Project goals and limitations, User needs	High-level design concept	Progressively more details of the design - function to aesthetics	Final design details, production & development issues	Sales, Usability
Characteristics	Evaluative, Reactive	Explorative, Reactive	Evaluative, Prescriptive	Evaluative, Prescriptive	Reactive

Figure 10 and Table 7 shows the participant's preferences regarding the feedback throughout each design stage – the stakeholders whom they sought feedback from, the methods they used to get feedback, the information they needed, and the characteristic of feedback participants preferred during each stage.

1. Research Phase

The goal of this stage entails what was described in the section 'Identifying a Project's True Goals'. In this stage, participants indicated they preferred feedback about the client goals and user needs (p4-6, 8-13, 15-18) project requirements and limitations (p1, 4-6, 10-12, 15, 17, 18) and trends in the market (p3, 9, 11, 15 17). Like many other participants, P7 also claimed to begin the design process by researching:

The first steps are requirements gathering. You need to know what the most important elements are, depending on whether you are using print design, then you obviously have cost constraints for how much paper you have to use, and that kind of stuff. It really affects what you can do with your design, so knowing that upfront is really important. It's good to do a little bit of research about the company... you need to know their branding guidelines, and what they expect and so we obviously need to know who you are designing for, working purposes, the goal [of the project] (p7).

At the end of the research phase, some participants sought an approval to confirm their proposal on the project goals and proceed to the next phase when approved (p6, 11, 12, 16, 17). P10 summarized the goals of the research phase:

We are just doing some sort of gathering or the requirements, people's needs, showing us what they are currently doing, what they are currently working on. So, we are trying to understand how things are right now and how people wish things were. That is what we are trying to get feedback on. Sometimes that involves reiterating that to people and saying 'so if I understand you correctly you want this, this, and this,' and then they say 'No, that is not what I want.' [or] "Yeah, exactly". So, that is the first part and that involves, usually, the end users, [and] the people who will be paying for it ... Sort of decide what we can do, realistically, in the time that we have. (p10).

The majority of participants met with clients (p4, 5-18) – some also collected information from subject matter experts (p1, 3, 6, 11), such as educational consultants for a learning game (p1) or lawyers for ensuring IP (p3). Many participants also observed users or conduct user testing to gain insight into their needs (p5-7, 9, 10, 11, 15) as described in 'Identifying a Project's True Goals'. During this stage, most participants also privately researched about project goals and user needs (p3, 5, 6, 8-11, 17) and which tools would be useful during the project (p3, 5, 9 15) to build trust with their clients (p3, 5, 6, 11). For example, P5 described the importance of justifying design decisions with research:

I back up my decisions with concrete information and sometimes I will have to send them the list that 'this is a laminate, the is a marble, this is a quartz and....and this is why I chose this', and I'll have to justify myself to certain people because if it's the first time they've worked with me, then we need to establish that trust. But I find that if you've done your research and you've done it not just thrown together than usually you can answer those and appease the client's concerns (p5).

The overarching purpose for participants is to collect as much information as possible when they begin a new project. P16 advised designers to first collect as much information as possible on the problem and “don’t try to draw too soon because you don’t know exactly what you’re going to be drawing. Just try to understand your context, try to understand your goal, try to define what your client needs, what your market position is. Then you have all that, now you can start drawing.”

Few participants mentioned they also ideate while they researched (p5, 6, 11), but a majority indicated generating design ideas after completing their research.

2. Concept Phase

Once all the foundational information is collected, almost all participants mentioned the second phase involves developing high-level concepts for the design based on the project goals (p2, 4-8, 10-18). The goal in this stage is to figure out a design concept that would achieve project goals (p7, 13), present proposals to clients (p4-8, 10-13, 15-18), and receive approval to proceed with that concept (p2, 12, 13, 18), especially in writing to avoid future conflicts (p12). P10 described their goal in this phase is to identify client’s expectations to ensure everyone is on the same page:

By the time [clients] hire us they usually have some ideas. So, we want to find out what that is because some of it is good, some of it is ill-informed. So, we want to find out what all the stakeholders have in mind because the sooner you get that out the better... So, the feedback that we are looking for there is ‘what are your expectations. Pre-conceptions? What the relationship between the elements of design? So, what unknowns we are working with?’ Usually, when we do this, we kind of find ourselves realizing that we are working on a whole pile of assumptions (p10).

P5 echoed P10 by stating

At this point my goal is to get the clients to agree on a concept so I can move on the to the next step. So, most clients, even though they think they know what they want, and some are pretty close, until they see it and they tell me ‘yes’ I am always wondering if

my interpretation and their interpretation is different... I am trying to get them to agree on a concept and move forward (p5).

During the concept phase, while most the participants started with ideating and brainstorming with their internal design teams (p1, 3-5, 9, 10, 12, 13, 17), some carried out the initial ideating alone (p1, 6, 7, 12) or gathered ideas from clients to understand their preferences (p5). Next, participants merged their collected explorative feedback to make high-level concepts to demonstrate design directions (p2, 6, 8, 10, 15-17), like P6's example in Figure 3. Like P7, many participants said they would review their concepts with their in-house design teams to refine it prior to sending it to clients (p6, 7, 10, 12, 13, 15, 17):

I tend to do the rough kind of wire frame and then we do a small internal discussion about it, so we can show it to my boss, or other people I'm working with. We talk about that. Then once we are at a point where we're pretty happy with the wire frame, then we move on to doing sort of the more polished mock-up and then send those out to a bigger group [or clients] (p7).

P15 added that doing in-house team reviews "brings us a very holistic approach [to the design] because our designers come from different cultural backgrounds, and different age groups, so they have seen a lot of things in life."

Some of the participants (p2, 3, 10, 9, 11, 17) said they validated their concepts with users, for example by asking them to complete a task with a prototype (p11, 17). P11 claimed that creating a quick prototype during this phase can be useful for validating design directions:

It's the first way to validate the hypothesis we formed. For example, doctors want to know if the patient is insured before they prescribe medication because they will prescribe a different medication; it's a hypothesis. Doesn't mean it is true, so validating it is asking them to fill an e-prescription form, offering this [insurance] information, and observing if it would change their behaviour or not, or asking them 'was that useful?', 'did you notice so-and-so on screen?' [they can say] 'yes, I noticed it.' [then ask] 'what did you think it meant?' and then if they understand the usefulness of it, you end up validating hypothesis (p11).

Once the concepts are ready, participants present their design concepts to their clients in review meetings with visual design (p4-7, 11, 13, 18) and research justifications on their design decisions (p4, 6, 12). This is to ensure client and designer visions are in synch (p5, 10, 13), the concept entails the project goals and requirements (p14, 16, 17) and aspects of the concepts they like or dislike (p4-6, 14, 16). During this presentation, participants recommended designers to present their design proposals without colour or graphic detail to keep focus on the overall concept (p8, 12, 14, 17) and present multiple concepts to clients (p5-7, 13, 14, 16, 18). Providing multiple directions for clients to choose from (p6, 18) with pros and cons (p18) ensures the clients they are informed about all their possibilities (16). P8 recommended 3 options because it is where “people feel they have had enough choice, but they are not overwhelmed.”

In contrast, some participants (p2, 12, 13) preferred not to present their visual design concepts to clients prior to signing a contract that ensured their collaboration on the project (p12, 13). P12 said that presenting visual designs before a contract is detrimental to designers:

In principle, we will not do design in advance of a submission. It is not good for the design community. We used to have clients that would go out and ask 5 firms to do [design] submissions. Each firm would spend about 5 thousand dollars to do the proposal, and so that client sucked 20 thousand dollars out of the design community [from those they did not work with]. That is a recipe for disaster. So, in the end we said we are not doing this anymore and that’s the policy we have now (p12).

P8 added that “because a lot of the time, for the first interview, people are trying to get as much information out of you as possible because they want to go do the work themselves. They just want your ideas. Which is why I have started charging for that interview.” Thus, these participants signed contracts or charged fees to ensure their ideas and efforts on their concept will be compensated.

Once their concepts were presented and clients provided feedback, participants adjusted their design, sometimes combining pieces from multiple options (p4, 6, 14), until clients were sufficiently happy with the concept (p4, 5, 6, 12, 14) to proceed to the next Design Stage.

3. Design Phase

After selecting a project concept, participants progressed to the Design phase where they refined their design through iterations (p2-4, 6, 7, 11-18). The goal of this phase was to polish the design to combine its shape, material, ergonomics, aesthetics, and function (p5, 9, 12, 16) and validate the design to proceed to the next phase (p5, 6, 12). P2 contrasted this phase to the previous by saying:

I think in the conceptual stage I've been looking for more casual conversation style exchange with colleagues and supervisors about the work in developing. But their finances stages in a project where I need a more formal, there's a decision process required, and I need a much more formal feedback. So, what I'm looking for is very specific information about is this approved, is this okay, you cannot proceed with this, do I have the flexibility to change this or that down the road or is this finalized. Which parts of the project are frozen and which are not (p2).

Participants have mentioned feedback during this phase becomes less emotional (p5, 6) and explorative (p4). The feedback during the design phase is focused more on technical errors in the design (p3, 5, 6) and whether the designs meet the client's needs (p10) and requirements (p2), such as "how well is the case sealed? Are there any risks of any pests getting inside them? Are they airtight? Can we measure humidity and light and all that entering the case?" (p2). However, many participants mentioned that the content of the feedback varied based on their progress in this phase.

Many participants claimed the feedback they receive tends to progress from general to specific throughout this phase (p4, 5, 7, 8, 9, 12-14, 16). The general content, or more foundational aspects of the design, would include the mechanics (p4), structure (p8), layout (p5),

functions, and ergonomics (p16). The specific content, which are the surface features or more detailed aspects the design, were mentioned to entail aesthetics (p4, 8, 13, 16), manufacturing, and materials/texture (p5, 16). Some participants resembled it to a funnel where the design starts from the big picture and gets funneled down into more fine tuning (p7, 9, 13, 14, 16) as shown in Figure 7. While drawing the largest funnel in the middle, with each small circle representing design ideas, P13 said:

We get an initial briefing up here (red circle) that just let us know where we are at. When we go in and we interview them and then we get all this key information from them and then we turn that (yellow circle) into something sort of broad (blue circle) and then we explore that (light green circles) we explore that (dark green circles) and maybe we get something like this moving forward (pink circle). Now that we have this, we're actually further out, and now this is really the idea for the year that has been developed through a series of complex reductions and now we are going to show 3 different types of way of seeing it (purple circles), it is not like it is so linear. Once you have a sort of good ballpark definition (yellow circle), now you can go and be really obtuse but you know that you are still within this area (orange lines) (p13).

Figure 7. (A) P13's illustration of a design's funnel-shaped progress: from general to specific progress in the design stage. (B) Colour was added to match the drawing to the quote.

P12 and P14 claimed this progression from more general to specific feedback is due to project limitations, where it's inefficient to go into detail for all the concepts, which may get scrapped right at the beginning. Like P12, P14 explained that the design's progress:

Is like a funnel, you start with the big ideas, the big concepts and then you once you've narrowed that, then you visually represent that concept. It is more efficient that way instead of coming up with, say 4 concepts and then showing them two [visual] layouts of each concept. So, that is 8 concept you've got to layout, so that's a lot of time and it's a lot of money. I guess a lot of clients didn't want to spend all that money, they have budgets, so in order to do that you try and keep the as much of the design work to a single concept and layout so that you aren't wasting a lot of time and money on others. So, it's more just a way of narrowing down through our whole process, so you narrow it down to one concept then you show them 3 ideas of layouts (p14).

While participants P5, P12 and P16 followed a similar general to specific design method, they took a more 'gated' approach - where the design phase has multiple stages requiring client confirmation. These gates, where the clients' approval locked down the current design, are to force clients to focus on the important parts at that stage (p12) and manage project timeline (p5, 12, 16). Echoed by P5 and P12, P16 described 'the gate' structure of their feedback process:

Because feedback depends on the timing, we trying to go by our design processes. We're trying to make sure that we have different level feedback, that they come at the proper time in the process. You can give me a feedback, but if it's put on the table at phase 3, it could be integrated, but it means I have to go back. So, that's why we call 'the gate'. It's a concept to push the gate from phase 2 to phase 3, but the gate is closing back, so It means when you are trying to go back you have to reopen the gate, and you have to reopen the schedule and the budget. So, that's the concept of the gate. Feedback is part of our [designer] role to make sure that we explain that properly [to clients] that some feedback of some changes are easy to do to at the beginning of the project, and become more complicated at the end of the process... like I said earlier, a designer without a good client can not do a good project, and feedback is very critical to make sure that our design process will be linear because if it's too curvy then that's a problem (p16).

Many of the participants worked in an interdisciplinary team (p1, 3, 4, 10, 13-15) where they divided tasks to each professional (p1, 10, 15) and received constant feedback from their teammates (p1, 4, 14, 17). Participants sought feedback when they need help (p17), such as

technical team providing suggestions on usability, interaction (p6), or appearance (p14) or writers regarding the text space they need (p13, 14).

In addition to their team, some participants also tried to get as much feedback from their clients as possible (p4) with weekly or biweekly meetings (p10, 18) during the design phase. Although they may not provide any feedback on the technical aspects of the design (p5), they are important for confirming design decisions (p5, 6, 12). While some could meet their clients, other participants claimed it can be a challenge to gather everyone involved (p7, 8, 10), so they acquire feedback can be via email (p7, 8) or virtual meetings (p10).

Another common method used to gather feedback during this stage was to create prototypes of the design (p2, 3, 9, 11). For example, P9 drew flow-charts, as shown in Figure 8, to get feedback on how the app is used:

What we are talking about is flow in app design. And so, I want that feedback to be focused on flow... ok here's the app, it has two features, here is [button] A and B, when they tap on A, and you can see... and we can quickly start having a conversation about what's working... I want [stakeholders to say 'P2, that's ridiculous that you are making them hit a button and then go to another screen. Forget hitting a button (P2 draws an X mark on the lower left screen) and go directly to the next screen.' We have just eliminated a screen, so that feedback is related to flow right and usability (p9).

Thus, prototyping during the design phase allowed the participants to test the physical or digital form of their designs by observing user reactions (p2, 9, 11) to see which ideas were working (p2, 9), evaluate ergonomics (p3) and usability (p2) to iterate or evolve ideas (p2).

Figure 8. P9's illustration of an app's rough flow chart they would do to test and demonstrate how the app could work.

Furthermore, P16 explained that they make three different prototypes to ensure focused feedback on each essential component:

The third phase as the technical, what we call 'industrialisation' [as shown in Figure 6 (D)]. So, from there it is really a combination between engineering and designing. To finalize all the details, colors, texture, signatures, graphic applied, functional. We do maybe two or three steps prototype for validation... The first prototype will be an engineering prototype... that we don't care about the visual at all. It's just to validate the functionality [and] what's the innovation in it... The second one would be a visual [prototype] - a mock-up that would show more precisely what the prototype is going look like for marketing purposes... The third one is kind of a final prototype to give to the client and get their feedback (p16).

When testing their prototypes and designs during this phase, some participants also included users (p9, 10, 11, 17) for their unbiased feedback on whether the designer will meet their needs (p10). P11 provided an example about the advantages of low-fidelity prototypes:

Depending on how much time and budget, we will have a small prototype... Now, let's say we decide to implement [a button] so they can prescribe narcotics using the computer. We add right button, and go through a proposed sequence with a doctor, and say 'okay, now you need to prescribe this particular medication for this particular condition to this particular patient'... They either will notice the new [button] or we will point them to the button and they'll walk through it. And often this I really low-fidelity, it

might even be on paper, and we sit them down and say ‘what would you do here?’ And they say, ‘I don’t know, I might push here’... Just enough detail for them to recognize that it belongs to the existing system that they are used to, but that it is new. Often it is not interactive and it has to be driven by the tester. And never do we ask: ‘did you like it?’ We ask ‘can you find this? did you understand this? did the terminology fit what you expect? would you do this? would you prefer to do this on paper or to use the system if this existed today? why?’ Questions like that.... So, if it is very low-fidelity, we usually just listen to the words. But, it really depends, silence says a lot and often they’ll say, ‘I don’t know’ or they’ll ask questions and this is when their reaction is important (p11).

In general, P10 matched most of the designers’ views and summarized the first three stages as follows:

The first one [stage] is really to make sure we are doing the right thing. To make sure we are focusing on the right areas or solving the right problems. That is kind of the learning, defining and scoping part. It is making sure that everyone that is involved knows what we can do realistically with the money and time that we have. So, the first one is to make sure we are solving the users’ needs. The second one is to make sure we are taking off the chunks that the client wants us to take off [by focusing on one concept] and everyone agrees what will be done and what can get done. [Third one], in the designing and reiterating our goals, we come with a whole bunch of ideas that can be evaluated and then refined to more and more suitable and effective solutions for the problems that we have set out at the beginning (p10).

Continuing from P10, P16 claimed the design phase ends with final designs ready for production:

During this phase, we also make sure that we specify all the processes, all the material used, all the assembly, hardware... things like that, so we have a final bond and material to make sure we know exactly how much the appearance is going to cost... By the end of that we have a fully functional prototype, we have a complete set of drawings, 3D files, if we redraw a FEA made, it’s already begun its already made. So, we are ready for production (p16).

In contrast to the majority, some participants designed and developed simultaneously (p4, 16, 17). For example, P17 combined the design and development stage by breaking apart their software design into parts. They designed and developed each part separately based on the level of risk and demand that portion required. Demonstrated in Figure 9, the three ‘Detail Design Implementation’ circles at the right shows the loops, which P17 called ‘sprints’, are the design,

development, feedback, testing and iteration on different parts of the software. They order which part will be developed was based on which features demanded most technical work, important for client's needs, most complicated, novel, or important for beating its competing products, as stated by P17:

[The ordering of the sprints] is based on a combination of technology requirements, the end user's need, and our clients' business needs... From the client's customer perspective, maybe it this [feature] is the most important feature for that oncologist. That [feature] is going to be the most important thing first, so we can test it and make sure its their needs. And from a business perspective, it could be, in order to beat our competition, we really need to have slack integration, so we really need to get that in first to make sure it absolutely makes it into the product (p17).

Figure 9. P17's illustration of their design process.

4. Development Phase

The majority of participants developed the physical or digital form after most of their design is complete (p1-3, 5-9, 11-14, 16). Even when most of the design is complete, participants were not hands-off during the development phase and considered it an important part to be involved in. The goals of this stage are to ensure the design will be implemented as intended (p2, 5, 7, p6 7 11 12) by conducting user testing (p1-4, 6, 7, 9-12, 16, 17) and collaborating with the

development team during production (p2, 3, 5, 7, 11, 16, 17). As shown in Figure 6 (E), P16 talked about the importance of a designer's role in a products development with an example:

The 4th phase is the production support which is where all the fields are transferred to the partner, because we have to support our decision made during the process. So, when you're not there, you can be guilty of everything. So, that's why it is the most critical phase, because [the design] has to be adjusted, but most of the time clients don't know exactly what it means to be adjusted... it doesn't work properly the first time, which is totally normal and sometimes they get stressed by that. We have to do it, it is our responsibility... That phase you can move from the hero in your project, to a zero... Let's say you have 2 parts that need to snap together, let's say we [made the design to] have certain resistance to unsnap. So as a designer, were going to make it what we call 'steal safe', we have to make it loose... because if you do it too tight, it's going to be complicated to adjust. So, when we have the first part in our hands it doesn't snap together perfectly, the client says 'oh it doesn't work!' But no, it's under control, it's under *our* control. We know how to adjust it. When you receive parts, manufactured parts are never 100% like expected, they always have to be adjusted (16).

Like P16, other participants argued that the implementation rarely performed as assumed in the designs (p2, 5, 7, 16), which can frustrate clients unaware of this part of the innovation process (p5, 16). To mitigate their stress and ensure success of the design's execution, participants gathered feedback by conducting development testing (p3) with developers (p11), manufacturers (p16) and constructors (p5) to make precise adjustments on how the design is executed and implemented (p2, 5, 16, 17).

Thus, the feedback content in the development phase relates to the aspects of the design impacted by how it is built or launched. The feedback that participants preferred during this stage are about: aesthetics and ergonomics (p3, 6, 16-18), safety and accessibility (p2), cost-efficiency (p11), and marketing or sales (p11, 16) on whether the product will impress the users (p2, 11, 16) to ensure people will want to buy the design (p10). For example, P11 described:

When we get into development, we will get feedback from developers. So, they might say 'this is really difficult to do', 'what you designed here might be really nice and super well tested with users but it will take us a year to build. So how about we do this [other feature] instead?' Then we iterate on different options that might be less expensive to build, or they have a readymade piece [of the feature], then we'll compromise (p11).

To ensure that the product is ready for public, majority of the participants conducted their final user tests during the development phase (1-4, 6,7, 9-12, 16, 17). P2 claimed this is important to keep the attractive essence of the concept:

We may have a mock-up that tests well with the visitors, but when we actually get to the final stage, it's always good to have another final go at it with visitors. Sometimes you can lose the essence of a concept simply by taking it from a rough stage to a final stage. As you refine the details of it sometimes you're taking away the magic [awe-factor] that was there in the mock-up, so you have to make sure that that's preserved (p2).

Participants said that in addition to testing whether concept goals are kept in the final stage (p2, 10, 12), the final prototype is also to test people's adaptability to novel design features (p10), ease of learning (p1, 10), usability (p6 7 10) appearance, interaction (p6, 16, 17), functionality details (p7, 17) intuitiveness, and comprehensiveness (p7, 16). However, there should not be major feedback during this phase (p4, 6, 7, 9), but rather to focus and iterate the fine-tune details of the design (p2-4, 7, 8-11, 14, 16-18) to ensure it is ready for production (p16). P9 described that it is very expensive to make large changes at this point of the design process:

In beta testing, you are hopefully if you have done your job properly [the feedback] is smaller. Like 'the button needs to move a few pixels to the right, or needs to be bigger, it's the wrong style of button'. Hopefully in beta, the heavy lifting should have been done in that prototyping phase beforehand. You wouldn't want to say 'actually we need the whole new feature' in a beta, because it would be so freaking expensive! Really, if someone said that, like you missed a feature, you would have to go all the way back and start prototyping it again. It would be a nightmare (p9).

Overall, participants aimed to test the quality and validate their final design solutions (p6, 7, 11, 12) from stakeholders with a fresh perspective on the advanced prototype with no support from researcher (p1, 6, 7, 10, 17). Like P6 and P17, P10 claimed solution's use should be self-explanatory at this stage and the stakeholders should be able to accomplish assigned tasks without the researcher's guidance:

We have to tell [users] why we are doing what we are doing. Of course, there is the balance of giving away the answer. It is just careful choosing of language that you don't bias the result. The usability test should be self-explanatory because the idea is that we are showing them a product that we are testing out. We give them a series of tasks usually and we evaluate whether they accomplish them or how easy or hard it was. How many deviations they had from the easiest path? (p10)

In addition to their verbal feedback, the participants looked for where the stakeholders are making errors, how long it took them to complete the task (p6, 10), their facial reactions, frustrations (p6), and with what emotions they said what they are thinking (p10). P10 gave an example of a task-based user testing and the importance of observing the user's behaviour:

The researcher will prompt [the user] and ask 'what are you thinking right now?' so they talk as they are going and say, 'So because I wanted to ... because I am looking to find this thing ... because I am looking at this menu. That made me think of ... I think this is the right button, but I am not going to click on it because...' And you see where the mouse is moving. Then you also ask them how easy or hard [accomplishing the task] was on a rating scale. It is funny when they take five minutes to do a very simple thing but then they say, 'Oh, that was very easy.' So, you need to evaluate those things (p10).

P9 termed the development phase as the 'BETA' stage, as illustrated in Figure 1, which summarizes most participant's views of the development phase:

This is what I would call a beta phase, where you have the product roughed out and in the beginning, you're just prototyping with design tools, but it's not an actual built product. So, near the end of that, this beta phase, you've engineered a product, it's real now, it's on a phone, you can use it, it's [fully] functioning, and now again you start, and companies famously do this, they release it to small groups that can use it. And again, the beta phase is very much iterative, feedback phase where you are putting it out there, asking people to use it and tell you what they think. Hopefully in this beta phase, your product should be pretty close. You're just ironing out little creases. Once you're confident that the product is good to go you release it as version 1. And hopefully everything you've done here (P9 circles all the prior stages with finger on the illustration) has been effective, and you've reached it (p9).

5. Post-Launch Phase

While most participants reach the end of their project after the development, some mentioned they continued to receive feedback or observed the results of their designs after

implementation of their work (p3-7, 9). They aimed to ensure the business success of their product by showing their product in exhibitions so others don't steal their IP (p3) and gathering user feedback (p4-7, 9), such as an app with analytics (p4,6,7). These activities result in a much larger data set (p7) useful for assessing if the design is successfully making money (p4, 6, 9) and for making small adjustments (p5) for future updates (p4, 6, 7, 9). As P7 explained the importance of the post-launch phase:

Once you release, it's not the end, the whole process happens again. Because you watch your analytics, and you see what people are doing, and make adjustments from there. It's really great to have analytics about how people are moving through the app and what screens they spend a lot of time on, and what's most important to them and what flows they go through. So, it's sort of a never-ending process of change. And you kind of hope that you get to a point where something is good, let's not change it, [but] that never happens (p7).

P9 concluded that mastering the design process is something even top companies struggle with, but polishing the process is important for decreasing the uncertainty in the success of the design:

This [design] process is tricky. After all of this [process], and I'm talking about companies that have billions of dollars, like Apple, they will release products and it will still be a miss. After all of that! And that's why this whole process is so important, but also very difficult to master. Let's say that sometimes, all this [process] is forgotten. And some dude just had an idea, and it just boomed and it does amazing, and they've done none of this [process], so there's definitely outliers to this whole process (p9).

To summarize, majority of the participants viewed the phase of design process, method of acquisition, the provider of feedback, and the type of feedback provided impact how useful that feedback is to the success of the design project.

Figure 10. The 5 stages of professional design feedback

Chapter 5. Discussion

5.1 Significance and Characteristics of Professional Design Feedback

Feedback's four main roles were identified in this thesis, which included: (1) identifying project's true goals, (2) collaboratively improving the design, (3) strengthening business relationships, and (4) securing project payments. The second and third feedback roles match the five mentioned in literature (Elkins, 2012; Acevedo, 2008; Amabile, 1996; Nijstad, 2006; Axelsson et al., 2015; Dow, 2011; Xu, Huang, & Bailey, 2014; Beatrice, 2012; Hui, 2014; Dannels, 2005; Boud et al., 200; Greenberg, 2015). Prior work stating that feedback is important in design for identifying shortcomings (Elkins, 2012; Acevedo, 2008), providing creative support (Amabile, 1996; Nijstad, 2006; Dow et al., 2011), acquiring technical information (Xu, Huang, & Bailey, 2014), and improving the designs sales (Hui, 2014; Dannels, 2005; Boud et al., 200; Greenberg, 2015) are entailed in the second role identified in this thesis related to collaboratively improving the design. Articles claiming feedback improves business collaborations (Dow, 2011; Beatrice, 2012) strongly matches the third role this thesis finds: strengthening business relationships. Although the literature indicates a part of a designer's role is to discover the client's true needs and that feedback is an important part of understanding those needs (Lars, 2015), there were no studies found that link how feedback plays a role in identifying the project's true goals – the first role that design feedback that this thesis finds. Lastly, to the best of our knowledge there does not exist prior work related to the fourth practical importance of managing feedback identified here - to secure project payments. Therefore, while it may be common knowledge to adjust one's work according to people's feedback and collaborate with business associates, the experts in our study added that feedback is essential for determining project goals and documenting client feedback to ensure their payments.

Regarding the feedback categories identified here, there is some degree of overlap with prior work, but there are also novel aspects brought out by the present analysis. As far as reactive feedback, prior work has identified some related aspects: free associations from Dannels (2008), elements that were noticed in the design, design's communicative goals, impressions of the design, and first noticed aspects of the design by Xu, Huang, & Bailey (2014). Evaluative feedback corresponds to critical assessment that has been discussed in prior research and is the most mentioned design feedback type in literature (Dannels, 2008; Marbouti, 2014; Greenberg, 2015; Xu, Huang, & Bailey, 2014). Prior studies refer to evaluative feedback as critical assessment (Dannels, 2008), design's strength, weakness, or neutral feature (Marbouti, 2014), critique and praise (Greenberg, 2015), and how the design technically meets the guidelines (Xu, Huang, & Bailey, 2014). Several studies indicating brainstorming (Dannels, 2008) and creative ideas (Marbouti, 2014), which correspond loosely to explorative feedback identified in this thesis. Prescriptive feedback is also categorized as recommendations (Dannels, 2008) and suggestions (Greenberg, 2015). Furthermore, Dannels (2008) creates categories for asking questions, using metaphors, and comparing designs, which are types for framing feedback that can fit into multiple of this thesis's four feedback categories.

Although prior work mentions all four characteristics mentioned in this study and preferences on specific feedback, only one study researched designer preferences on these four characteristics. While, Dannels (2008) and Marbouti (2014) researched the frequency of each type of feedback provided, Greenberg (2015) and Xu, Huang, & Bailey (2014) studied professional designers' preferences on crowd feedback. Greenberg (2015) primarily found, along with others (Bangert-Drowns, 1991; Xu, Huang, & Bailey, 2014; Diefes-Dux, 2012) that designers preferred specific feedback, which matched our results discussed in the Reactive

Feedback section. This thesis also found feedback specificity to be preferred based on the timing during the design process, and echoed Goodman (2004) who viewed specific feedback to be harmful during ideation. However, feedback specificity is not categorized as a feedback type in this thesis since it can apply to all types and content of feedback.

Thus, the only study that was found to research designer preference on the four feedback characteristics is Xu, Huang, & Bailey (2014). Compared to this thesis, Xu, Huang, & Bailey's (2014) findings echoed the advantages of reactive feedback from users to evaluate the 'feel' of the design and the disadvantages of receiving prescriptive feedback from inexperienced stakeholders. This thesis expands prior work by identifying the advantages and disadvantages of each characteristics as summarized in Table 4. Organizing feedback based on advantages and disadvantages, rather than content or framing allowed for a more suitable categorization when assessing the factors that impact preferences for acquiring feedback. While the feedback types identified in prior literature could fit across many stakeholders, methods or design stages, this thesis provided further distinction in terms of feedback characteristics and its impact on designer preferences.

It is unclear whether these four feedback types are completely distinct from one another. That is, reactive feedback could blend with evaluative feedback, as can explorative feedback with prescriptive feedback. While reactive and evaluative feedback focus on the current state, explorative and prescriptive are information about the future potential of the design. When receiving feedback on the current state, if the feedback is an instinctual reaction, it is reactive, if it is based on evidence, then it is evaluative. Future studies can also explore what differentiates a designer's opinion about subjective or objective feedback and how this plays a role in applying that information to their designs.

Regarding information about future directions of the design, the distinction between explorative and prescriptive feedback could be a matter of framing or whether an expert provides that information, such as ‘have you thought about making this green?’ compared to ‘In my experience, I’ve found it’s more clear when the button is in green.’ These categories require further study and perhaps additional categories.

Therefore, not present in prior work, this thesis finds that feedback is significant for professional designers to identify a project’s true goals and secure project payments. While other studies mentioned the four characteristics of design feedback categorized in this thesis, this thesis also explores and systematically organizes participant preferences on all the different types of feedback.

5.2 Preferences in Design Feedback

The third goal of this thesis is to identify the factors that affect designers’ feedback preferences. Our results echoed past studies that designers preferred consistent (Leung, 2001; Sargeant, 2007), straight forward (Archer, 2010), actionable feedback (Greenberg, 2015) that guides them to the next step in the design (Gedenryd, 1998) without being harmfully critical or controlling (Baron, 1988; Sargeant, 2007; Axelsson et al., 2010). Furthermore, although some participants favored positive feedback, other aspects of our analysis support Kluger’s (1996) findings that solely positive feedback can be indirect for the progress of the design. In conclusion, regardless of the feedback type, designers not only need, but expect and welcome feedback that helps move their designs towards a successful result.

Similar to the literature, this thesis also found that *who*, *how*, and *when* the feedback is acquired impacts on the value of the feedback. On *who* provides the feedback, our findings support Acevedo’s (2008) for favoring unbiased reactive feedback from users, but not

prescriptive feedback. Our results also support other studies that designers preferred specialist feedback for their insights (Acevedo, 2008; Xu, Huang, & Bailey, 2014; Kluger, 1996; Greenberg, 2015), but differentiate between design experts who were preferred for their prescriptive suggestions and non-design experts who assist in evaluating whether the design meets the project restrictions (Acevedo, 2008).

Table 5 summarizes the findings on the type of information designers prefer from each stakeholder. They consider clients, specialists, and teammates to be professionals who have the knowledge in their domain to provide evaluative feedback with justifications. Furthermore, participants thought that because specialists and teammates were experienced in design projects and knew the implications of their suggestions, they provided applicable prescriptive or explorative feedback. This contrasts with the clients and users inexperienced in design projects. Due to their lack of experience in design, most participants thought clients and users did not have the foresight to provide applicable recommendations. Since the role of the designer is to make their clients and target users happy, their reactions to the design were of high importance. Seventeen participants have not mentioned seeking feedback only reactive feedback from users. However, several participants mentioned that they do not consider any feedback to be ‘useless. These participants claimed that it is the designer’s role to interpret and apply the feedback to achieve the best design possible.

These stakeholder categories and preferences can also depend on the project. That is, while a game designer argues that users don’t have the programming knowledge to provide suggestions, a medical product designer views doctors to be both users and specialists. Thus, future research can explore the different interactions between stakeholders and designers based on different design fields.

How the feedback is acquired from various agents was also found to affect the value of the feedback. Our findings echoed the literature that designers preferred in-person meetings, rather than virtual, to explain their decisions and ask further questions (Gardner, 1993; Hewson, 1998; Nicol & Macfarlane-Dick, 2006). Our results, however, found a difference between experts' preferences for group vs. one-on-one meetings; the efficiency of group meetings can be harmed by group mentality while the depth and valuable detail of feedback gained from one-on-one meetings can get derailed.

Focusing the feedback was found to be important during user testing. Echoing past literature, our results showed user testing is valuable for gaining reactive feedback from users (Gedenryd, 1998; Nielsen, 1993; Retting, 1994; Liljegren, 2006) to gather information for the next set of iterations (Gedenryd, 1998; Retting, 1994). Furthermore, how the prototype design(s) is presented impacts the content of the feedback stakeholders provide (Gedenryd, 1998; Retting, 1994). Our results additionally discovered that design presentations or prototypes should be customized during meetings as well when gathering feedback from clients and other stakeholders.

Regardless of the techniques used, participants argued designers are responsible for managing how they acquire information and customizing their designs, interactions, and questions based on the feedback they need. They do add, however, that stakeholders should be mindful of the designer's role and allow them to lead the feedback process to keep the process efficient and effective.

Participants claimed that allowing designers to manage the feedback sessions is especially important since they know the design process. The overall process described by participants has similarities and differences to the UK Design Council's (2005) four-stage design

process. The main difference is during the initial two stages where our participants received the focus of the project but did research to confirm whether the goals are appropriate and how to best achieve those goals. Furthermore, the second stage in the present analysis was used to confirm the project goals and concepts to the clients rather than the UK Design Council's process that does not include ideation or concept designs until the development stage. Although in different phases, the order of tasks between the UK Design Council's process and our findings are similar; first is to research and gather data on project goals and constraints, second to analyze information to create a goal or concept to focus on, next to iterate and refine the design from more general to greater detail, then to adjust the design's development and implementation, and lastly to update after launch analytics for designers working with software.

No literature was found that organizes the feedback that designers pursued throughout the design process. Our findings have shown that feedback preferences varied across the five design phases and how they differ. This thesis created a novel framework on the 5 Stages of Design Feedback, as shown in Figure 10. To meet the different goals at each phase, designers have different stakeholders they preferred feedback from, methods for acquiring feedback, the content of feedback they need, and the characteristics of feedback during each phase. This framework can be used as a preliminary guide to inform novice designers and stakeholders on how to make their feedback interactions more linear and efficient. By understanding the process and how feedback plays a role, designers can be more aware of the information they need during a given design stage and how they can best acquire that feedback.

Therefore, while many studies described factors that affect the value of design feedback (Acevedo, 2008; Xu, Huang, & Bailey, 2014; Kluger, 1996; Greenberg, 2015; Gardner, 1993; Hewson, 1998; Nicol & Macfarlane-Dick, 2006; Tolbert, 2016; Gedenryd, 1998; Nielsen, 1993;

Retting, 1994; Liljegren, 2006; Gedenryd, 1998; Nielsen, 1993; Retting, 1994; Liljegren, 2006), this thesis is novel in identifying and organizing the factors that affect expert designer preferences throughout the design process. We contribute to the work on design feedback with a systematic analysis of expert preferences on the four characteristics of feedback (Table 4), agents who provide the feedback (Table 5), techniques for acquiring feedback (Table 6), and the timing for receiving feedback throughout five design phases (Table 7 and Figure 10). These findings impact the design field by creating a starting framework, the 5 Stages of Design Feedback, for systematically analyzing feedback interactions throughout a design process.

Chapter 6. Conclusion

This thesis provides a systematic understanding of feedback in a professional design setting. Participants indicated that feedback is critical for identifying a project's true goals, collaboratively improving the design, strengthening business relationships, and documenting feedback to secure project payments. This feedback can come in four different types: 1) Reactive Feedback based on people's instinctual responses, 2) Evaluative Feedback that entails objective justifications, 3) Explorative Feedback that opens new creative ideas, and 4) Prescriptive Feedback that provides practical suggestions to the designer. Each feedback category has advantages which can meet the designer's needs. Lastly, our analysis provides insight into the benefits and challenges of *who* provides the feedback, *how* the feedback was acquired, and *when* the designers acquired the feedback they need throughout the design process.

The 5 Stages of Design Feedback is a novel framework summarizing designers' feedback preferences throughout the design process. Since design is a collaborative process, having a framework that guides the feedback interactions can assist in unifying the expectations of participating members. Although more work is needed to evaluate the efficacy of this framework, the findings are a starting point for novice designers and collaborators in the workplace to improve its efficacy in design as well as for researchers to further investigate the use of feedback for improved design efficacy.

As always, work remains. There are several limitations that impacted the findings of this study. The phenomenological framework was chosen to explore the field of design feedback due to its broad qualitative approach. While this approach is appropriate for a relatively young field, other approaches may yield more specific feedback categories different from those presented in this thesis. Due to the explorative nature of this study, participants were recruited from various

design backgrounds. While this creates a broad view of the design communities, it reduces consistency across interviews, such as software analytics being the only design background that has a fifth design stage.

Nevertheless, it is due to the findings from this qualitative explorative thesis that these alternative approaches for future studies can be identified. Each of the analyzed topics are open to further investigation to make the feedback system in design more efficient. Are there additional feedback characteristics not indicated in this thesis? What are the most effective ways to deliver or acquire each type of feedback? What are the most effective ways of seeking feedback from each stakeholder? How should feedback be managed to make the design process more efficient? How do designers interpret and effectively implement the feedback they acquire? Are there differences between the feedback characteristics observed in the professional design setting versus the academic? How can design education prepare students for the professional feedback challenges they face? These questions await future research to optimize professional and educational design feedback.

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Glossary

Feedback: information provided by an agent regarding aspects of one's performance or understanding.

Design feedback: responses designers receive throughout their projects from various stakeholders (e.g., customers, users, clients, other designers).

Design solution: The result of a design project, such as a software, tool, or building.

Reactive feedback: Verbal or behavioral instinctual reactions to the design. Ex. 'I don't like the green'; Enthusiastic smile.

Evaluative feedback: Feedback that has justifications using principles, research, and/or project restrictions. Ex. 'Our analytics tell us ...'

Explorative Feedback: Spontaneous ideas designers receive to explore creative directions their designs. Ex. 'Have you thought of putting the credenza over there?'

Prescriptive Feedback: Suggestions about solving problems in the design or making it more efficient. Ex. 'I have a solution that I have done in the past...'

Stakeholders: All individuals that participate in a design project.

Clients: Stakeholders who have hired the designers for a project.

Specialists: Professionals that designers seek guidance from at some point during a design project.

Teammates: Professionals designers work with throughout the whole design project.

Users: End users of a design solution.

Appendix 1 - Literature Review Feedback Type Terminologies

Dannels (2005)

Judgment: critical assessment on particular aspects of the design.

Comparison: strategic (focused, intentional) comparisons of specific aspects of the design to another example.

Free association: reactive, spontaneous comparisons about the design to represented the ways viewers see the design. (e.g. "Reminds me of...").

Identity invoking: comments or questions about their professional identity as a designer.

Interpretation: making sense of the features or concept of the design.

Process oriented: comments or questions about the design approach or process.

Investigation: asking questions about the design or the design process as investigation.

Direct recommendation: Specific suggestions about the design.

Brainstorming: Rhetorical questions, suggestions, or comments about future imagined possibilities.

Marbouti (2014)

FOCUS OF FEEDBACK

Strengths: complementing the strengths of the team or design work.

Neutral: "Stating a fact without any explicit evaluation of work or need for change."

Weaknesses: refers to issues in the design work that needs to be changed.

LEVEL OF SPECIFICITY

Generic: General statement about the whole design.

Semi-Specific: "focusing on one or more aspects of the design but without any explicit evaluation, what needed to be changed, or what is well explained."

Specific: "focusing on one or more design aspects, provides evaluation, or gives specific direction."

SUBSTANCE

Communication: content refers to writing or presentation of the design work.

Design concepts: content explicitly refers to one of the design concepts taught in class by using terminology taught in class.

Design ideas: content refers to design ideas specific to this team's project work, using terminology that is specific to the problem this team chose to work on.

No code: Does not fit in any of the above codes.

Xu, Huang, & Bailey (2014)

Elements: noticed features of the design including colors, shapes, objects, and activities.

Technical: assessing how well the design meets known guidelines in the domain (Williams, 2008).

Goals: whether the design meets its communicative goals.

Impressions: observer's first impressions of the design.

First Notice: refers to the visual hierarchy in which people notice different parts of the design.

Greenberg (2015)

Corrective: communicating what needs to be corrected.

Nuanced critique: Describing specific issues.

Critique: General negative evaluation.

Nuanced Praise: Telling what they specifically like.

Praise: General positive comments, can include encouraging remarks.

Nuanced Suggestions: Suggests a context-specific change.

Suggestions: Suggests a nonspecific change that would apply to any situation.

Summarization: Makes an overall synopsis on the matter.

Other: "Comments do not fit any of the code categories; the comments are ambiguous, or a rating was given without written comment."

Indifference: No preference on the matter.

Appendix 2 - Recruitment Email

Subject: Design Research Participation Request - Carleton University

Hello;

This email is to invite you to participate in a study, called **Characteristics of Professional Design Feedback**, that aims to analyze what types of feedback professional designers consider useful. The study is conducted by Isinsu Sakalli, a Master of Design student at Carleton University, and her supervisors Dr. WonJoon Chung and Dr. Kasia Muldner.

The study involves a **20 to 30 minute interview** asking professional designers with minimally 5 years of experience about their preferences on design feedback. It is to help design students in their training and professionals to be more self-aware of their feedback. Please see attachments for interview questions and informed consent form.

This project was reviewed by the Carleton University Research Ethics Board - B (Protocol #15-279), which provided clearance to carry out the research.

If you would like to participate in this research project, have any questions, please feel free to contact me or Isinsu at isinsu.sakalli@carleton.ca.

Sincerely,

Isinsu Sakalli

Master of Design Student

School of Industrial Design

Carleton University

isinsu.sakalli@carleton.ca

isinsusakalli@email.carleton.ca

Appendix 3 - Informed Consent Form

Title: Characteristics of Professional Design Feedback

Date of ethics clearance: To be determined by the REB (as indicated on the clearance form)

Ethics Clearance for the Collection of Data Expires: August 31st, 2016.

I _____, choose to participate in this study on characteristics of professional design feedback.

This study, called **Characteristics of Professional Design Feedback**, aims to better understand the types of design feedback professional designers consider useful. By analyzing the types of feedback designers consider useful for improving their designs, designers can be more attentive to the feedback they need to provide and questions to ask. The lead researchers for this study is **Isinsu Sakalli**, a student in the School of Industrial Design (SID), supervised by **Dr. WonJoon Chung (also in SID)** and **Dr. Kasia Muldner** (in the Institute of Cognitive Science).

This study conducts a semi-structured interview with professional designers with at least 5 years of work experience and above 18 years-old. Participation will take approximately **20 - 30 minutes**. With your oral consent at the beginning of the interview, interviews will be audio-recorded. You can refuse to answer any questions asked. You may submit any drawings or provide additional visual components to the interviewer. These images might be used to gain insights and may also be used for documentation and publication. Once the recording has been transcribed, the audio-recording will be destroyed. There are no anticipated risks for you to participate in this study.

Your participation in this study will remain confidential, and your identity and institution will not be stored with your data. All research data will be coded based on your chosen pseudo-name, encrypted and password-protected. Any hard copies of data will be kept in a locked cabinet at Carleton University. Research data will only be accessible by the research team. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

You have the right to end your participation in the study at any time, for any reason, but you can only withdraw in person during the experiment (since we do not have a master list linking pseudo-names to the data, we cannot destroy data after the study). If you withdraw from the study, all information you have provided will be immediately destroyed.

If you would like a copy of the finished research project, you are invited to contact the researcher to request an electronic copy which will be provided to you.

This project was reviewed by the Carleton University Research Ethics Board (Protocol #XX-XXX), which provided clearance to carry out the research. Should you have questions or concerns related to your involvement in this research, please contact the Carleton University Research Office at ethics@carleton.ca.

CUREB contact information:

Professor Shelley Brown, Chair (CUREB-B)

Professor Andy Adler, Vice-Chair
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Appendix 4 - Oral Consent Script

As you know, I am Isinsu Sakalli, student at Carleton University. I am conducting a study called Characteristics of Professional Design Feedback and I would like to ask you some questions about your experiences and preferences with receiving feedback on your designs. The interview will take 20-30 minutes. I would like to record our conversation, so that I can get your words accurately. If at any time during our talk you feel uncomfortable answering a question please let me know, and you don't have to answer it. If at any time you want to withdraw from this study please tell me and I will erase the recording of our conversation. I will not reveal the content of our conversation beyond the research team. Your participation in this study will remain confidential, under your chosen pseudo-name, stored encrypted and password-protected. Now I would like to ask you if you agree to participate in this study, and to talk to me about professional design feedback.

Have you read and understand the Informed consent form? Do you have any questions about the information in the consent form?

Do you agree to participate under the conditions described in the consent form, and to allow me to record our conversation?

Appendix 5 - Interview Questions

The initial questions asked during the interview are below. As per semi-structured interview protocol, participants may be asked additional questions based on their answers. All questions will relate to their experiences and preferences with receiving feedback on their own designs.

1. Which kinds feedback(s) from others do you find most helpful in improving your designs?
2. Can you provide an example for this type of feedback and how you improved your design because of it?
3. Why was this feedback useful to you? In what situations is it useful? I.e. stage of design, questions you asked, product type, design field...
4. When would this kind of feedback(s) not be useful to you? Why?
5. Is your feedback experience with others uni-directional (one-way feedback) or bi-directional (discussion).
6. Can you think of any unexpected/interesting experiences with the feedback you received from others?
7. Did you receive design education? If so, how does the feedback differ in professional vs academic settings.

Appendix 6 - Interview #1 Notes & Theme Clustering

Interview Notes:

General Opinions on Feedback

- to the point, blunt
- suggestions
- logical/mechanical & not emotional feedback
- nature of the industry - harsh language
- collaborative
- must be impartial, can't stick to your 'vision' - it's about the team & collaboration - fired otherwise
- disagreements resolved through arguments

LIKED Feedback

- negative - things to change
- actionable
- suggestions for fixing issues
- specific
- different POV from another expert (artist, designer) - they see subtleties you may not catch
 - o artists: catch lighting, colours, object placement, how things look.
 - o level designers: game play type problems
 - o programmers: rules and game mechanics
 - o educational consultants (paramount, main stakeholders): educational content
- blunt , not afraid to hurt feelings
- practical - this is needed to get to the goal
- fresh perspective
 - o observe interaction with game - how learnable the game is with no info (avoid instruction manuals
 - o is it intuitive?
 - o mimic how it will be used
- what is working
- verbal, observational, questionnaire response, discussion (especially if need to give info), email/forum, presenting & feedback, one-on-one, group
- objective, impartial, logical - what people think is right
- content requirements

DISLIKED Feedback

- vague
- emotional
- 'can you make it nicer? Can you make it more exciting?'
- sugar coating, sandwiching
- formal
- emotional
- sticking to personal 'vision' - it's collaborative work

METHOD

1. Project Goals and Content analysis
 - a. CEO orders a bunch of game topics (ie. geometry)
 - b. Edu consultants give requirements & how to teach them
2. Concept Development
 - a. brainstorming sessions with the whole team
 - b. me up with some basic ideas
 - c. I (designer) chooses which one to go with - one main vision
3. Design & Project Planning
 - a. pick the challenging parts - programmers start prototyping that & looking for technology
 - b. Designer figures out the design, art needed, and schedule & duration
 - c. Artists look into overall colour, look & feel - reference material (ie. candy land)
 - d. Designer gives list of all the features needed
 - e. Programmers done prototyping
4. Development
 - a. Programmers start building the technology for the game
 - b. Designer does Voice over, and creates the actual game environments:
 - i. levels on paper (doesn't show it to anyone, 'nothing to show yet' & fairly easy to change since small games)
 - ii. blocking out the levels
 - iii. 3D models coming in- block them out, decorate, lighting (show at the end of this)
 - c. designer & programmers collaborate a lot on the scripting - functionality gets put in

Techniques for Acquiring Feedback

- asks for help on specific issues & seeks general feedback
- start with a general positive feedback, then get into the specific issues
- grab someone and get feedback (with peers, artists and designers for one-on-one)
- Usability testing in-house
 - o not a designer, mix of experts (artist, programmers...) & in another team to get fresh perspective
 - o 4-5 people in same room with no talking - observe how they interact with the game, learn ability
 - o do a small questionnaire about the game (e. anything they didn't understand)
 - o everyone discusses what they thought in a group
- Overhear others talking in the open concept room, give feedback to programmers as they talk about what they're doing (about the script)

Reflecting on Gathered Feedback

- meet with team & go through feedback & make a list of the issues we want to change
- Eliminate:
 - o not practical (against stakeholder requirements - CEO & content specialists)

- technologically unfeasible
 - too many changes to implement
- Use:
 - try to take a lot, very impartial & open
 - feedback givers are professionals to usually good feedback
- If contradictory feedback: look at the repercussions of adapting the feedback - even the smallest changes can have large affects
 - if hard to see, then weight pros and cons on implementing it

Additional Points

- you can't have thin skin in the gaming industry
- common to have arguments - screaming matches, no one takes it personally, it's what's best for the project
- sit near each other - open concept - hear what each are saying
- wait until later staged to get feedback,
 - hard to give feedback because they can go in so many different ways at that stage
 - just blocking out geometry
 - small game company & easy to implement things. Maybe if large company then have consistent feedback stages
 - but maybe not a good thing
 - some feedback we get can be non-applicable cause it's too late in the stage

Appendix 7 – Participant #1 Interview Summary

Interview Summary: P1 works closely with her team and considers essential for a professional to be team player. Considers it important not to take disagreements personally or stubbornly sticking to one's ideas. Prefers direct and corrective suggestions. Views feedback to be logically driven and assist in improving the game by identifying & solving problems from user testing or experts. Tends to avoid feedback at the first stages of her design but gets increasingly more detailed feedback throughout her design process.

Appendix 8 - Compilation Note Example

Significance of Professional Design Feedback

2nd Reason of Significance - Evaluate & justify design progress towards design goals

- Point of feedback is to improve work and guide you towards your goal (p4, 5, 8)
- Can't tell if doing good design/idea (p5) you can't get any better if you don't get feedback (p6)
- Feedback helps justify design decisions or evolve it into something you're confident in (p5, 15, p11)
- identifies gaps in understanding so that I can pursue it further p6
- get feedback, adjust it according to the feedback (although some student don't anyways (p9)
- every step is getting closer to what you are looking to solve for (p6, 7)
 - o otherwise can get very easily off track and believe that we are doing something good p10
- Justify design decisions with user goals, research and expert points (p10)
- trying to get feedback where we are trying to get closer and closer to that best case scenario (the small details relevant to the current project's details – can't get any other way, even with research) p6
- ” insight into what the actual problem is. So you think you've got it and then they say, 'oh no we need it this way', and then you can adjust it and you are really getting closer every step is getting closer to what you are looking to solve for.” P6

Appendix 9 – Secondary Findings: Feedback Interpretation and Educational Feedback

Although design education aims to simulate workplace contexts through design projects (Broadfoot, 2003; Logan 2007; Schön, 1983; Waks 2001) and feedback from peers, instructors, and professional guests (Cennamo et al. 2010; Anthony, 1991; Oak, 2000; Dannels, 2008), Schön (1987) believed that the teacher-student hierarchical relationship conflicts with simulating autonomous and creative environments professional work in. In contrast, Dannels (2008) argued that the autonomous designer is a fantasy that happens in “idealized workplace contexts than of actual design workplaces” (pg. 152). To clarify this discrepancy, Dannels encourages researchers to study effective professional design interactions and feedback practices before crafting the educational design feedback practice. While this is not a key focus, to address this issue, this thesis will also inquire about potential differences between educational and professional design feedback.

In addition to the three primary goals of this thesis, couple of additional themes were discussed by the participants. One of the secondary findings was about the importance of how designers implement the feedback they gather. Some participants emphasized that feedback acquisition is a part of the design’s feedback loop (p3, 6, 9, 10, 16). These participants (p3, 6, 9, 10, 16) indicated designers must also filter, interpret, and implement that information appropriately to their designs for the feedback to be beneficial. While a couple of participants suggested using the most objective feedback (p9) or those that would get the most acceptance from clients (p12), other participants say that knowing which feedback to use is intuitive and developed through experience (p3, 7, 10, 16). P10 described how interpreting feedback can be instinctual:

A huge part of [interpreting feedback] is just instinct. Like you kind of coming into it as a new designer I think you feel really uncomfortable with everything, or convinced that you have got it all figured out, or maybe somewhere in between... So sometime it will seem like high conflict meeting with lots of polar opposite opinions... But I will realize that it is not actually a big deal. Other times you have people looking at the screen and saying, 'Yeah, yeah, that is right,' and my gut just tells me that their either saying that because they do not even know what questions to ask or they do not realize the consequences of the decision that they just agreed to. So, it takes time and experience to know when you have enough feedback to know which feedback is good enough or not good enough (p10).

The other secondary finding was about the discrepancies between educational and professional design feedback. Although we intended to touch on this topic, as indicated in the interview questions at Appendix 5, there was limited and bias information on this topic to be conclusive in comparing the feedback between the two settings. Only 8 of the 16 experts had design education and only 2 of those 8 are also design teachers who have experienced feedback from both sides.

While many participants claimed their design education helped prepare them for professional interactions, design process and tools (p2, 3, 5, 8, 9, 13), participants mentioned three discrepancies in the feedback they received at school.

Most common discrepancy between professional and educational feedback mentioned by participants is identifying and working within contextual constraints (p2, 3, 5, 8, 9, 13, 17).

While design education provides excellent development in designer tools and processes, such as user empathy, presenting, technical research, color theory, AutoCAD, sketching, and Photoshop (p2, 3, 5, 8, 9, 13), students don't experience the intensity of researching and creatively designing within real-context restrictions (p5, 8, 17). Although it varies across programs, participants state important information not explored in their educational settings are: market analysis and competition (p3), legal and technological requirements (p17), researching about target audience in more detail than a persona (p7), and learning from people unknowledgeable

about design, such as users and clients (p13). Some participants (p9, 13, 17) believe working within the context restrictions is “the real test to see somebody’s design skills, because design without constraint is kind of like art in a way. But it’s only when you actually have all these time and technology and customer needs that you really kind of show your design capabilities” (p17).

Although P3 accepted that educators provide less project restrictions on students, P3 also argued that this is due to an additional purpose that feedback has in the additional setting – to guide the student’s development in becoming a designer. P3 claimed that “because [students] are not caught up with all the other requirements [education] allows students to be very creative” during early stages of their growth as a designer. Therefore, the second discrepancy in education and professional feedback is the focus on a student’s development to prepare them for the challenges they will face in the professional setting.

The third discrepancy mentioned by P13 is that in an educational setting, design instructors give superior feedback due to being more experienced than designer’s clients in the professional setting:

A professor and a client are two different people and a professor is very knowledgeable about the design process while most clients aren’t. So, there is still a difference, even if they are trying to emulate what a client is like, they have a hard time being as potentially ignorant... teachers almost never going to say ‘I like blue, it’s got to be blue’ (p13).

Overall, almost all of the participants who indicated having design education mentioned differences between the educational and professional design feedback (p2, 3, 5, 8, 9, 13, 17).

Two of the three discrepancies match the feedback differences mentioned by past literature. Following Dannels (2008) and Marbouti (2014), participants say that academic setting focuses on educating the tools designer tools and thinking creatively. Secondly, participants support Dannels’ (2008) intuition over Schön’s (1987) regarding a designer’s autonomy in professional workplaces. Participants claimed that every project has contextual constraints and

designers must work within client's restrictions to get paid, even though they prefer working in autonomous and creative environment. However, participants added that being creative in such a situation is the true test to a designer's skill rather than a limitation. Last difference between educational and professional feedback was not found in literature – students who only receive knowledgeable feedback from design instructors are not prepared for acquiring and interpreting inexperienced feedback, such as from clients or users.

While these two secondary findings were inconclusive, they are presented here to instigate potential future directions of research.