Design Research Planning and Execution:
A comparison between undergraduate design students’ and design research practitioners’ processes of design research planning and execution

A Thesis
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Graduate School of The Ohio State University

By

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ABSTRACT

As more and more design students go into the design research field after their graduation, it becomes increasingly important to understand what students learned about design research at school and what design research practitioners are expected to achieve in industry, so different strategies can be created to better prepare design students to go into the design research field and grow as design research professionals. The process of design research planning and execution as the foundation of every design research project, however, is not well described in the existing literature.

In order to help fill this knowledge gap, this thesis research focuses on understanding and comparing design students’ processes of research planning and execution while learning at school and design research practitioners’ processes of research planning and execution in industry. Indepth interviews were conducted with fourteen design research practitioners to understand how practitioners with various levels of experience working in different companies plan and execute their research. Participant observation was conducted with junior design students in their Design Research II course to understand their process of research planning and execution. In addition, students’ presentations, documentations as well as their responses for the journal questions were collected and analyzed in an effort to understand what students learned and didn’t learn in their research course.
This research reveals the pattern among experienced practitioners, beginning practitioners and students’ processes of research planning and execution. A gap is identified between what current undergraduate education enables design students to do about design research and what design research practitioners are expected to achieve in industry. This research also has implications for the design research education and design research industry in terms of better preparing students to go into the design research industry and helping beginning practitioners make the transition to experienced practitioners.
DEDICATION

This thesis is dedicated to my family:

Just for being there…
ACKNOWLEDGMENTS

Now that this thesis is here, I would like to thank the people who have helped me throughout the research journey.

First and foremost, my graduate committee. Thank you to my advisor, Liz Sanders, for sharing your knowledge with me, for inspiring me to think outside the box, for guiding me through many “adventures” and for giving me encouragement many many times. It has been great to spend the last two years with you! I will miss our weekly meeting so much. Thanks to my wonderful committee members, R. Brian Stone and David Staley. Your critical insights and encouragement provided along the way were the essential support for me. It is a great honor to have worked with both of you.

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Finally, I want to thank my lovely family, especially my mom. I am forever grateful for your support and belief in me.
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Fields of Study

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CHAPTER 1: INTRODUCTION

1.1 Focus of This Thesis

1.1.1 Problem Framing
As more and more design students go into the design research field after their graduation, it becomes increasingly important to understand what students learned about design research at school and what design research practitioners are expected to achieve in industry, so different strategies can be created to better prepare design students to go into the design research field and grow as design research professionals. The process of design research planning and execution as the foundation of every design research project, however, is not well described in the existing literature. There is a lack of understanding about students’ as well as design research practitioners’ processes of design research planning and execution. Also, as a graduate design student who intends to go into the design research field herself, the researcher is interested in finding out what design research practitioners’ processes of research planning and execution look like and how they are similar and different from her own research process, so she can be more aware of what is expected from her when she goes into the design research field.

1.1.2 The Research Goal
The first goal of this thesis is to understand and compare design students’ processes of research planning and execution while learning at school and design research practitioners’ processes of research planning and execution in industry. By comparing design students’ and design research practitioners’ processes, the researcher aims to
reveal what the current undergraduate design education is able to equip students with in terms of design research and what the students are not able to grasp within the existing course structure but are essential for design research practitioners. It is important to note that the intent of the researcher is not to criticize the existing educational system but to fuel more conversations concerning how to better prepare design students to go into the design research field and grow as design research practitioners.

1.1.3 The Research Scope
This thesis research focuses on front-end design research which includes experiential design research (i.e., understanding participants’ current experiences) and generative design research (i.e., exploring participants’ future experiences). It doesn’t address evaluative design research (i.e., evaluating participants’ current experiences). The researcher choose to focus on front-end design research because the context for front-end design research is usually more diverse and complicated; also, planning front-end design research tends to be more challenging for both students and practitioners than the planning for evaluative research. The scope of this research is predominantly within the United States. Since the context and development of design research is very different between the U.S. and other parts of the world such as Europe and Asia, in order to keep the research focused, the researcher decided to study design research practitioners and design students in the U.S. Also, within the design students group, this research focuses on the undergraduate design student, since the experiences and background of graduate design students vary greatly and some graduate students already have had years of experiences conducting design research in industry. Lastly, the focus of this research was on design research planning. During the planning stage of this thesis research, the advisor of this study, Liz Sanders made the comment that it was also important to look at how people execute their research plan and see if the actual executed research plan is
the same with the original research plan. This point proved to be very instrumental during the course of the research. In the final research plan, the researcher decided to focus on research planning but look at the research planning and executing as a whole process. It is important to note that when using the term “execution”, the researcher focuses on the execution of the research plan rather than specific research methods and techniques practitioners and students applied while conducting their design research.

1.1.4 Research Question
The focus of this research is to understand, compare and contrast practitioners’ and undergraduate design students’ processes of research planning and execution. This leads to three main research questions:

1. What are design research practitioners’ processes of research planning and execution?
2. What are undergraduate design students’ processes of research planning and execution?
3. What are the similarities and differences between their processes and what are the factors that makes their processes different and similar?

1.1.5 Definition of Audience
This thesis is mainly intended for academics and educators who teach design research at various different levels. Also, the researcher believes the content can be relevant and beneficial for practitioners who practice design research in various industries and students who are interested in going into the design research field.

1.2 Thesis Structure
To gain insight into design research practitioners’ and undergraduate design students’
processes of design research planning and execution, the researcher conducted interviews with design research practitioners and she served as an apprentice in an undergraduate design research course. The data collected from the research process were analyzed, synthesized and visualized. Based on the comparison of practitioners’ practice in industry and students’ practice of design research while learning at school, the researcher identified and described the gap between what students are capable of doing based on their learning at school and what design research practitioners are expected to achieve in the field. In the end, a research planning tool is proposed as one way to fill the gap and fuel more conversations among the design research and design education communities.

This thesis research begins with a review of the development of the design research industry over the past fifty years in Chapter 2. The state of design research education at the start and end of this time period is also described. In addition, Chapter 2 highlights, compares and contrasts the factors that promoted and hindered the growth of design research during this time.

Chapter 3 provides an overview of design research plans and design research planning. The importance of having a well-crafted design research plan is explained and seven key components of a design research plan are identified. Also, information in regard to research planning is summarized and categorized based on how it contributes to helping students and practitioners plan their research. Both Chapter 2 and Chapter 3 together establish the context for the primary research.

Chapter 4 introduces the primary design research. First, fourteen interviews were conducted with design research practitioners to understand design research practitioners’ processes of research planning and execution as well as their rationale behind the
processes. At the beginning of the interviews, the researcher created a detailed research plan which was executed in the first nine interviews. Then after the first nine interviews, an interim analysis was conducted to consolidate the collected information and the researcher fine-tuned a few interview questions for the remaining five interviews accordingly. Once all the interviews were completed, an in-depth analysis was conducted to make sense of all the data. Meanwhile, the researcher also served as a design research course apprentice with nine groups of design students at The Ohio State University to understand undergraduate design students’ processes of design research planning and execution as well as their understanding of the process. Participant observation was conducted during the research course and students’ course work was reviewed at the end of the semester as part of the research data. Similarly, an in-depth analysis was conducted to make sense of students’ work as well as the researcher’s observation notes.

Chapter 5 first summarizes the current context of the design research industry, based on the interviews the researcher conducted with the design research practitioners. Both the positive and negative consequences that have resulted from the rapid growth of the design research industry are revealed in this chapter. Also, chapter 5 extracts the information from students’ responses to their final journal question and describes their perceptions towards design research in general. The information provided in this chapter supplements the secondary research provided in Chapter 2.

Chapters 6 and 7 provide the main results. They describe the findings from the primary research (i.e., the interviews and design research course apprentice). In Chapter 6, different design research practitioners’ processes of research planning and execution are described, visualized, compared and contrasted with each other. In Chapter 7, the undergraduate design students’ research processes are described and visualized. Students’
reflections regarding their research processes are summarized in this chapter as well.

Chapter 8 draws the overall conclusion of this study, discusses future work and reflects on the entire research process.

1.3 Background of the Research Question

1.3.1 The Initial Idea
The initial idea for my research was inspired by the overwhelming feeling I had when I discovered the large number of design research methods currently available. In my first design research course at The Ohio State University, I was exposed to a variety of design research methods. I practiced some basic research methods such as interviews and observations and tried a few novel research methods such as design probes in the class. However, by the end of the class I still found myself having no clue when to use which methods. There were many books available at the time that were focused on individual methods. Admittedly, these books were all beneficial resources which explained how to execute the methods and described advantages as well as disadvantages of each method, but none of these books really addressed the issue of method selection. Since I was planning to start a career as a design researcher after graduation, I understood that in order to be a design researcher, as most of the job posts described, I should “be familiar with a variety of design research methods” and “be able to plan the research”. I didn’t want to fall into the trap of only using the methods I was familiar with over and over again, so I decided I would take the opportunity of my thesis to fill the knowledge gap of “method selection” and better prepare myself and other students to go into the field of design research.

1.3.2 Pilot Test and Focus Shifting
With the ambition to “understand how to select the most appropriate design research methods in a given situation”, I started my research planning. My initial research plan consisted two parts. The first part of the research was planned to involve junior design students at The Ohio State University, since these students all had some basic design research knowledge gained from the Design Research I course they took in their sophomore year. It would be a great opportunity to observe how they chose various design research methods in their group projects in the Design Research II course. The goal of this part of research was to gain a deep understanding of how researchers selected their research methods and what challenges they had with method selection. I believed this part of research would offer me more perspectives from design students and prevent me from being restricted by my personal experience. The second part of the research would be interviewing design research practitioners to understand how they selected their research methods. I assumed that since those practitioners were working in the industry, they must have their own strategies for method selection. I was hoping this part of the research could give me some ideas to fill the knowledge gap students would have in order to become a design research practitioner and help me explain to other students how to select the most appropriate design research methods. In the back of my mind, I was envisioning the design of a method selection tool that would tell the tool users (including students) which methods to select and how to use them after they input some variables such as time, budget and what he/she wanted to understand. At the same time, the tool would also show the process of how those methods were selected, so the tool users could learn from the process as well as get direct suggestions from the tool.

I started my research by conducting some pilot interviews with design research practitioners. After the first four pilot interviews, I realized that I couldn’t and shouldn’t provide a “cook book” for students to select methods. I learned that first of all, we
should always start with the problem and think about what we can do to solve the problem rather than start with the methods and focus on which methods to choose. None of the researchers I interviewed started a project with all the research methods listed in front of them (and it is not because they knew all the methods already). They all started with the research questions. One of the researchers explained that every time they had a project, the team got together and brainstormed research methods that could answer the research questions. The way some of the methods were planned out by the research team may not be the same as what was written in any books or any websites, but they were the methods that made the most sense for the projects. Sometimes, the research team invented their own research methods. I learned that when researchers started with the questions, the process of inventing methods just happened organically. The pilot interviews also revealed that the field of design research methodology is constantly developing and there will always be new methods coming up. It is impossible to provide an exhaustive list for researchers to choose from. When I posed the question “what abilities would you expect design students have when they apply for a design research job?”, all four design research practitioners in the pilot test expressed the idea that they wouldn’t expect students to know all the research methods but they thought students should have the ability to ‘think through’ ways to answer the research questions. These four pilot interviews made me realize that the concept of “selecting methods” was not the right question. Instead, I learned that being able to think through research questions is the skill design researchers should have. Therefore I shifted my focus to understanding and comparing how undergraduate design students and design research practitioners think through the research questions and plan research methods.

1.3.3 Fine-Tuning

Then my official research started. One part of my research was to serve as the Design
Research II course apprentice. I conducted participant observation to understand how undergraduate design students plan and execute their research. Another part of my research was interviews with design research practitioners. The purpose of this part of the research was to understand how practitioners plan and execute their research. It is important to note that, although I used the phrase “plan and execute research”, what I really had in mind was “plan and apply research methods.” At that time, I thought “planning and applying research methods” was at least the main part of, if not the entire, “research planning and executing” process. Also, I thought the entire research planning process was just happening in the design researchers’ head by thinking through how to answer the research questions. However, after the first nine interviews, I realized that my assumption was wrong. Admittedly, planning the research methods was the core of the research planning process, but the practitioners’ research planning processes also involved other critical activities such as the internal discovery conducted at the beginning of research projects to build empathy with various stakeholders. The information gained from the internal discovery was used to help practitioners better design the methods that not only answered the research questions but also engaged stakeholders in the process and got their buy-in for the research. I realized that the process of planning research methods was only part of the research planning process and that I should not look at it separately. Therefore, I did the final fine-tuning with my research by having a broader focus on “plan and execute research” rather than “plan and apply research methods.” The research methodology was kept the same for last five interviews, but a few interview questions were changed to be focused on the overall research planning and executing process. The final research goal was stated as “to understand and compare design students’ and practitioners’ processes of research planning and execution thus revealing what the current undergraduate design education is able to equip students with in terms of design research and what the students are not
able to grasp within the existing course structure but are essential for design research practitioners.”

1.4 Glossary of Selected Terms

In order to make the work discussed in this study accessible to readers from a variety of disciplines, definitions of selected terms are provided in this section.

**Bridging:** making the connection between research thinking and design thinking (Sanders and Stappers, “Convivial Toolbox” 299)

**Data:** (in DIKW) samples from the real world (Sanders and Stappers, “Convivial Toolbox” 300)

**Deliverable:** something the design research team hands off to stakeholders as way to communicate the design research outputs

**DIKW:** Ackoff’s model of organizing scientific thinking in four layers: data, information, knowledge, and wisdom (Sanders and Stappers, “Convivial Toolbox” 300)

**Ethnography:** anthropological method for intensively studying people’s lives (Sanders and Stappers, “Convivial Toolbox” 300)

**Experiential design research; Generative design research; Evaluative design research:** “Figure 1 shows a simplified view of the design development process that can be used to talk about the development of all types of “products” (e.g., hardware, software, systems, and spaces). We can also consider services to be a form of “product”. Products start as ideas that are then transformed into one or more prototypes, which eventually become products. The research that informs each of these stages differs in intent and in form. Research done to assess prototypes is called evaluative research. Research that is done to explore what happens to products when they are used by people in the real world is called experiential...
research because it is focused on exploring experience. And finally, research that is conducted in order to generate ideas or to uncover new product opportunities at the fuzzy front end is called generative research.” (Sanders, “Ethnography and the Empowerment of Everyday People”)

**Fuzzy front end:** earliest phase of the product or service development process (Sanders and Stappers, “Convivial Toolbox” 300)

**Information:** (in DIKW) the interpretation of a data item; often in the form of a symbol or word (Sanders and Stappers, “Convivial Toolbox” 301)

**Method:** a method is a combination of tools, toolkits, techniques and/or games that are strategically put together to address defined goals within the research plan

![Diagram of the design and research development process](image)

Figure 1 *A View of the Fesign and Research Development Process from “Ethnography and the Empowerment of Everyday People”*
New views: ideas that emerge through interpretation and abstraction of information (in DIKW). (Sanders and Stappers, “Convivial Toolbox” 205)

Participant observation: an immersive, ethnographic method for understanding situations and behaviors through the experience of membership participation in an activity, context, culture, or subculture (Martin and Hanington 124)

Photo studies: invitation to the participant to photo-document aspects of his or her life and interactions (Martin and Hanington 134)

Pilot testing: short test to validate and improve the basic functioning of a (research) procedure or materials (Sanders and Stappers, “Convivial Toolbox” 302)

Shadowing: the researcher follows participant closely throughout his or her daily routines (Martin and Hanington 158)

Stakeholders: “Stakeholders are the people in your organization (or your client’s organization, if you are an outside consultant) who fund, build, test, market, seek and support the product, plus anyone else who will influence the product’s direction. Who these people are varies from company to company, but the most influential are usually a product marketing or product management executive, the technical lead, and—in an ideal world—an executive to whom both of those people report.” (Kim Goodwin 65)

Techniques: Describe how the tools and toolkits are put into action. For example, many different techniques can be used with a deck of image cards. They can be sorted, categorized, prioritized, used to make a collage, tell a story and/or used to spark conversations (Sanders, Brandt and Binder 2)

Usability test: design research method, in which the ease of use and learnability of a produce (or prototype) by users, typically from the target group, is evaluated (Sanders and Stappers, “Convivial Toolbox” 303)
CHAPTER 2: THE DEVELOPMENT OF DESIGN RESEARCH AND DESIGN RESEARCH EDUCATION

In order to establish a background for the primary research, literature produced throughout the years about the state of design research in the U.S. was reviewed and an overview of the development of design research and design research education is provided in Chapter 2. Based on the analysis of the secondary research, a visualization was created in Figure 2.1 to illustrate the development of design research over the past fifty years in four distinct eras: Era I, Beginnings, before 1975; Era II, Convergence and Development, 1976-1990; Era III, Booming Growth, 1991-2005; Era IV, Explosion, 2001-2014. The following sections describe the context of design research in each of these four eras and compare the resistance as well as impetus for the growth of design research in each era. Also, since there is very little published material on the history of design research education, a close look is taken of the state of design/design research education in Era I and in Era IV to see how design research education has evolved over the years. Finally, the development of design research and design research education is summarized as a whole and the implications for growth are described.
Figure 2 *The Development of Design Research over the Past Fifty Years*
2.1 Era I, Beginnings, Before 1975

Before 1975, design research was still in the incubation stage. The discipline of design research hadn’t formed yet. There was only limited field research being applied in the design process, specifically in the industrial design process. During a personal conversation with Liz Sanders, Sanders said that industrial design was the first design field that involved research in its design process. In James Arnold’s article Big Ideas: A History of Field Research in Industrial Design in the United States, Arnold explained that the specific types of research involved in industrial design before 1975 were human factors and market research. The human factors research mainly served to inform the designers about anthropometric issues and fitting the product to the user. Market research also had close ties with industrial design. Market research focused on the tail end of the design development process, after the conceptual development and the prototyping had taken place, to ensure that the stuff being designed and developed would be relevant in the marketplace. Market researchers asked whether or not people would be interested in buying the product and how much they would be willing to pay for it (Sanders and Stappers, a draft of “From Designing to Co-Designing”). At the same time, industrial designers also conducted their own brand of “marketing research”. However, this research conducted by designers was very informal and not well structured. The main methods used by designers were: consulting the literature, visiting the location where the product would be used or sold, asking customers questions, and consulting experts in the field of inquiry (Arnold, “Big Ideas: A History of Field Research in Industrial Design in the United States” 2). During this era, field research continued getting incorporated in the industrial design process, but as Arnold pointed out there were still many industrial designers who insisted that the use of research limited their creativity (“Big Ideas: A History of Field Research in Industrial Design in the United States” 3).
During Era I there wasn’t any formal research education incorporated in the design curriculum. Design education was very art-focused at the time. Many of the design programs were housed in, had strong roots in, or were closely aligned with traditional visual arts training. An industrial design department or program was likely to have coexisted in the same department, college, or school as graphic design, interior design and in many cases, painting and sculpture (Arnold, “Design Evolution: A Story of Reconciliation Between Creativity And Research In Industrial Design” 667). With the art-oriented design training, designers “tended to rely upon their own taste, training and judgement as to what was appropriate to make the public respond in a given manner” (Capitman 47) and they were known for rapid visualization and form giving. However, gradually, several design educators started to realize the need for integrating social sciences such as psychology, sociology and anthropology into design education. These pioneering educators included Jay Doblin from IIT Institute of Design and Walter Schaer from Auburn University (Arnold, ““Big Ideas: A History of Field Research in Industrial Design in the United States” 3).

During Era I, the resistance to research, especially market research, came mainly from designers themselves. First, there was a strong conflict of intuitive/art-based thinking vs. research-based thinking between designers and researchers. A number of designers persistently felt that research constituted a “straight-jacket” on their creativity (Fleishman, “Market Research- Part I” 27) and they believed industrial designers should allow subjective feelings to override research results (Burridge 6). Also, many designers questioned the usefulness of research. Research was viewed as “a fancy way of telling him (the designer) something he already knows through long experience” (Fleishman, “Market Research - Part II” 35). In addition, due to the type of design work designers were asked to do, extensive field research didn’t seem necessary at the time.
For example, designers were typically asked to incorporate a new feature in the existing product line or update styling for the upcoming year (Arnold, “Big Ideas: A History of Field Research in Industrial Design in the United States” 1). Also, clients often came to the design team with a description of what was to be designed and what features it was to possess. Designers didn’t really need to explore what to design but how to design what the client asked for (Sanders and Stappers, “From Designing to Co-designing”). All these factors created barriers for designers in accepting and/or integrating research into their design process.

Meanwhile, there was also some impetus for change that pushed the field research to continue growing. These catalysts mainly came from social science researchers and pioneering designers calling for more integration of social sciences in design research at the end of this era (Arnold, “Big Ideas: A History of Field Research in Industrial Design in the United States” 3). For example, in 1971 William Capitman, a leader in market research, called for it by saying, “the designer is desperately in need of serious social science study …” (48). Also, Walter Schaer, a design educator at Auburn University, called for industrial designers to be concerned with behavioral and psychological areas of study in 1975 (62). Some of those conversations later on had an influence on the convergence of different disciplines and the development of design research in Era II.

2.2 Era II, Convergence and Development, 1976-1990

From 1976 - 1990, there was a strong convergence of interdisciplinary activities with regard to incorporating research into the design process (Arnold, “Big Ideas: A History of Field Research in Industrial Design in the United States” 4). Leaders in product development began to realize that they knew too little about people to be able to design and redesign for customers effectively (Reese 17). In the early 1980’s, design
firms began experimenting with the social sciences by hiring anthropologists and/or psychologists to bring the sociocultural perspective into the new product development process. Liz Sanders participated in one of those experiments. She was hired by RichardsonS’mith, a design consultancy, in 1982. As Sanders described in her draft of From Designing to Co-designing, she served as the spokesperson for the customer/consumer and often evaluated design concepts with designers. In addition, her role was to know and to empathize with the people who would use the product and to translate that knowing into principles and prescriptions that the designers with whom she worked could understand and use. The other prominent social scientists who participated in those experiments were Jane Fulton Suri at IDEO, Lucy Suchman at Xerox PARC, Rick Robinson at E-Lab and Steve Wilcox at Design Science (Reese 21). These earliest practitioners originated the methodology for what we call design research today. They adapted traditional ethnographic methodologies to better understand people through the perspectives and practices of their cultural and social contexts (Sanders, “Ethnography And the Empowerment of Everyday People”). Different from traditional ethnographic studies which require several months to years of field research, the ethnographic studies used in the design field were generally done within a short amount of time and they had direct application and relevance to design. Although the awareness of research had increased in this era, Arnold said many industrial designers were still not aware of the value of field research and conducting field research was still unpopular (“Big Ideas: A History of Field Research in Industrial Design in the United States” 4).

Similar to the barriers that design research had in Era I, the primary resistance to design research still came from designers who continually resisted design research being incorporated as part of the design process. For example, in Arnold’s article Design Evolution: A Story of Reconciliation Between Creativity And Research In Industrial
Design, he mentioned that

“Darrel Rhea, a leading design researcher and current CEO of Cheskin, who conducted design research for ID2 (currently known as IDEO) in the 80’s found that designers ‘either resisted it, or were highly ineffectual about it.’ ...From the perspective of Arnold Wasserman, former design leader at NCR and Xerox, many industrial designers felt that they had the “expertise required and all the knowledge that they needed without having to go systematically to the field, and find out information about people.”

Meanwhile, there was another resistance brought by market research. As Sanders said in the draft of “From Designing to Co-designing”, market research was in full swing in 1984 and if there was to be research done that involved current or potential consumers or customers, market research consultants were likely to be called in. At the time, in order to survive and grow, design research had to fight with market research for the limited budget.

The impetus for the growth of design research came from the interest in interdisciplinary collaboration in the design process and the evolution of the research approaches. These early design research practitioners’ work greatly heightened designers’ and business decision makers’ awareness of consumer experiences. It brought a great deal of credibility to the notion of design research and resulted in the research getting much more accepted by designers as well as business decision makers. The earlier design research practitioners not only adapted scientific research methods to make them fit in the design process, but they also invented new methods and tools (such as generative tools for participatory design developed by Liz Sanders) that better met the needs of practice. The development of these methods made the research more relevant to design and designers were more able to apply the research into their design process.
2.3 Era III, Booming Growth, 1991-2005

This era was marked by a booming growth of design research. Most of this resulted from an increasing amount of usability testing being applied in various technology companies. The boost of usability testing started when personal computers became available to everyone who could afford them and people found these computers were difficult to use. Then as the dot-com bubble arrived in 1997, usability testing experienced a sharp growth and it was widespread among computer companies.

Meanwhile, the shift from seeing people as consumers and customers to seeing them as users started happening (Sanders and Stappers, “From Designing to Co-designing”). The user-centered design approach became popular in this era. In the user-centered design process, the focus was on the thing being designed (e.g., the object, communication, space, interface, service, etc.), looking for ways to ensure that it met the needs of the user. (Sanders, From User-Centered to Participatory Design Approaches”). As users, people were still recipients of artifacts of the design process, but they played a more active role in their interactions with such products (Sanders, “Scaffolds for Building Everyday Creativity”). As the user-centered design approach became prevalent, the type of design started to shift from art/intuitive based design to more research based design (Arnold, “Design Evolution: A Story of Reconciliation Between Creativity And Research In Industrial Design” 669). In addition, during this era, there were a lot more methods and tools being developed for design research. The majority of them were derived from ethnographic methods and market research methods, the most common being interviews and observations. What’s more, design research was being applied in areas that were beyond industrial design such as user interface design and human computer interaction design. However, it is important to note that, at the time, most design research being conducted was evaluative research (e.g., usability testing) and there was still a lack of appreciation for experiential and generative research.
During Era III, the battle between design researchers and market researchers was still ongoing. Sometimes companies refused to conduct design research because they had already conducted market research and they thought that their market research included all the information they needed. Also, the cost and the time needed for design research was another reason that kept companies from adopting design research in their design development process. However, on the positive side, there were now fewer designers resisting design research. Admittedly, there were those who still discounted research as a mere distraction, but those were perhaps in the minority (Arnold, “Design Evolution: A Story of Reconciliation Between Creativity And Research In Industrial Design”, 669).

Meanwhile, as the concept of “user-centered design” became widely accepted by more and more people, design research was able to continue growing and evolving. The current definition used in the annual Participatory Design Conference, held in 2012 in Roskilde, Denmark, describes Participatory Design, “as a diverse collection of principles and practices aimed at making technologies, tools, environments, businesses, and social institutions more responsive to human needs” (pdc2012.org). Participation in the design process “legitimizes and validates the ideation phase and encourages open discussion, shared collaboration and ultimately ownership of solutions” (Bødeker, 2004). Through collaborative engagement, participants are able to address personal, social, political and ethical concerns in “powerful and sensitive ways that can empower them” (Brandt, 2012).

2.4 Era IV, Explosion, 2006-2014

From 2006 to 2014, the field of design research continued growing rapidly. Evaluative design research and the user-centered approach has still been prevalent during this era. Meanwhile, front-end design research, i.e., experiential research and generative
research, has gained much more acceptance as well. Designers and design researchers started being called upon to get involved in exploring what to design and not only how to design it (Sanders and Stappers, “From Designing to Co-designing”). Today, design research is applied all along the design development process and the interest continues to grow in front-end design research. A number of companies are now conducting their own front-end design research to explore emerging trends and unmet needs of people.

At the same time, a human-centered design revolution has been taking place. It has been recognized that the end-user is only one person among many others (such as caregiver, trainer, purchaser, maintainer, assembler, etc.) whose needs and dreams need to be addressed in product/service development (Sanders and Stappers, “From Designing to Co-designing”). It has also been recognized that everyday people are not simply the recipients of the artifacts of the design process, but they are capable of adapting products to better meet their own needs and they can be actively involved in the design development process, as well (Sanders, “Scaffold for Building Everyday Creativity”). What’s more, during the past eight years, an increasing number of conferences with a focus on design research have been organized both in academia and in industry, such as Design Research Conference held by IIT Institute of Design and Epic Conference which is mainly attended by applied ethnographers. The size of these conferences has become larger each year as well. Meanwhile, many conferences held by design organizations, such as IDSA, AIGA and IXDA, have also incorporated an increasing number of design research components and invited more and more design researchers to speak at their respective design conferences. In this era, there are a growing number of design research and analysis methods being developed and used. These methods include design probes, video ethnography, scenario building, experiential sampling, Velcro modeling and so on. The field of design research has become more sophisticated. In addition, a number of books that organize and describe large collections of design
and design research methods and tools have been published (Sanders and Stappers, “From Designing to Co-designing”). Some of them are text books, such as “Convivial Toolbox” by Liz Sanders and Pieter Jan Stappers and Universal Methods of Design by Bella Martin and Bruce Hanington. Others are more practitioner-oriented, and designed to be used as practitioner guides or training materials, such as 101 Design Methods by Vijay Kumar and Innovating for People by LUMA Institute. There is also a large amount of information about design research being shared by educators and practitioners on the internet.

As demand for design research in industry has increased, some design departments have started to offer design research in their core curriculum. For example, in an email from Katherine Bennett, an associate professor at Art Center College of Design, Bennett described that there were two dedicated courses in Art Center College of Design solely focused on design research at the undergraduate level. One is a college-wide survey course required for all design students majors in their freshman year with sections that specialize for each design major. This class was offered starting about five years ago. Another one is a required advanced course for industrial design students on qualitative research using generative tools and it is taught at the first half of the junior year by Bennett herself. Compared to the survey class, this class is more hands-on and it has been taught in Art Center College of Design since 1991. Also, in a personal conversation with Liz Sanders, an associate professor from The Ohio State University, Sanders pointed out that a dedicated research course has always been required of design students at the undergraduate level at The Ohio State University. She has been teaching it since the 1980’s. Currently, at The Ohio State University, there are three dedicated design research courses being taught at the undergraduate level. One course is offered in the fall semester of the sophomore year for all the design majors (i.e., industrial design, visual
communication design and interior space design). The goal of this course is for students to learn how to conduct research for the traditional design and development process with a focus on designing for people. Another course is offered in the fall semester of the junior year for all the design majors. Built on what was taught in the sophomore year, the goal of this course is for students to learn how to conduct research for the design and development of products, services and spaces with a focus on fuzzy front end of design with a participatory mindset: designing with people. The third design research course is taught separately for each major and focuses on the design research stage of the senior thesis.

In addition to the dedicated design research courses, many design programs now cover design research in other courses. For example, in an email from Bruce Hanington, an associate professor from Carnegie Mellon University, Hanington mentioned that all the sophomore students at Carnegie Mellon University are required to take his “How People Work” course which is a combination of introduction to human centered design, human principles of design and human factors. It includes a significant exposure to human centered design research methods in one section of the course (about three weeks of 15), with a team project where they apply the methods. Moreover, “a research emphasis toward design is inherently in the blood of the School and seems to be part of many courses and studios”, Hanington said. Design research is also integrated as part of the design courses at The University of Cincinnati, Arizona State University, Art Center College of Design and The Ohio State University. This is not an exhaustive list. There may be others that have incorporated design research as part of the design curriculum, but reporting on that would be the goal of a different thesis.

However there is still no undergraduate program that specializes in educating design
researchers in the U.S. Design researchers are now coming from many different educational backgrounds (Sanders and Stappers, “From Designing to Co-designing”), but compared to the earlier eras, it appears that today there are more design researchers coming from the design field than from the social sciences.

During this era, the main resistance to design research is no longer coming from designers but other stakeholders in companies. At this point, many designers have already bought-into design research. Designers often act as design researchers’ closet allies and partners (Sharon, “It’s Our Research”). However, many other stakeholders such as product managers, marketing people and those in upper management still don’t quite understand design research or trust its outcomes. For example, some of them are so used to quantitative market research that they think the results coming out of the qualitative design research aren’t reliable. Some other stakeholders have had positive experiences with evaluative research but are not open to any other research methodologies that might better answer their questions. Also, sometimes, the research results provided by the design research team are not actionable enough. Stakeholders who get this type of research results end up spending a lot of time they didn’t expect to digest the research results and turn them into actionable ideas. This experience frustrates stakeholders and they may refuse to support it the next time.

An impetus for the growth of design research is that companies have started to realize the new role everyday people play in the design process. It has become increasingly evident that everyday people are no longer satisfied with simply being “users” and “consumers”. They want to be “creators” and want to be involved in the design process as well. To satisfy this need requires the use of a human-centered approach and the act of co-creation between designers and everyday people (Sanders, “Scaffolds for Building
Everyday Creativity”). Also, in a personal conversation with Liz Sanders, Sanders pointed out that stakeholders now realize that design research can actually help them shorten their product/service development process, making the money spent up front a good investment. This positive result has also contributed to the growth of design research. Today many companies have seen the value of design research and many consultancies have started to offer design research services. Therefore, in order to be relevant and competitive in the market, companies have decided to hire design research practitioners or pay for design research services to experiment with design research and see how design research benefits their design and development process.

2.5 Conclusion

Based on the review of the development of the design research field, it is evident that over the past fifty years, design research has been through tremendous change and growth. It has evolved from some scattered informal research activities to an established discipline with well-articulated principles and a wide range of sophisticated methods. Many companies and individuals that were once skeptical about the usefulness and the credibility of the research now embrace the value of design research. Design research has become better integrated in various companies’ design processes now than ever before. Also, compared to the art-oriented design education in the 1970s, design education today has more research components integrated in the curriculum. There is also an increasing number of design students joining the design research field after their graduation. Meanwhile, the resistance to design research still exists. Different from the first three eras where the resistance to design research mainly came from designers, now most of the resistance to design research comes from other stakeholders. In order to keep the field of design research continually growing, it is important to overcome the barriers and to help various stakeholders understand the value of design research. It is also
important that we educate future design research practitioners to take on these new roles.
CHAPTER 3: FRAMING DESIGN RESEARCH PLANNING

Now that the context of the design research field has been established, chapter three introduces the concept of design research planning, as it is the focus of this thesis. Before getting to the concept of design research planning, section 3.1 will describe what a design research plan is and explains why it is important to have a well-crafted design research plan. Also, seven key components of a design research plan are identified. Then section 3.2 defines the concept of design research planning and dives into this topic by presenting a review of the current information on design research planning. The existing information is summarized and categorized based on its way of contributing to helping students and practitioners plan their research. Finally, a summary of all the information is provided and it indicates that there is still a lot of room left to understand students’ and practitioners’ processes of research planning.

3.1 DESIGN RESEARCH PLANS

A design research plan is a concise and clear description of what the goals of the project are, what the different parties involved are expected to do, what resources are needed, what results are expected and how and when they are to be delivered (Sanders and Stappers 127). To be clear, the research plans being talked about here are the plans for applied design research conducted in industry, not the research plans for academic inquiries. Based on various sources of information, the seven key components included in typical design research plans are as follows.

• **Project context:** The project context includes the bigger picture in which the
research project sits and “what led to the research” (Sharon, “The UX Research Plan That Stakeholders Love”). The project context shows “why the research is needed and how it relates to the stakeholders’ business problems” (Sherwin).

- **Research goal:** The research goal is essentially “the high-level reason(or reasons) for conducting the study” (Sharon, “The UX Research Plan That Stakeholders Love”). It is the research goal that drives the rest of the research plan. How the research questions are structured, how the methodology is crafted and how the participants’ characteristics are defined are all based on what the research goal is. Having a well-defined research goal keeps the research “focused and streamlined” (Ginsburg).

- **Research questions:** In addition to the high-level research goal, defining specific research questions that support the research goal is essential. The research questions provide guidance for the researcher to craft the methodology, such as formulating a discussion guide for an interview (Ginsburg) and building a toolkit for a generative design research activity. It is important to be mindful about how many questions you ask. “If you are proposing a question, you will need the time, method, and recruiting necessary to aid you in answering it” (Sherwin).

- **Participants:** The types of participants recruited in the research will determine the types of data that come out of the research. It is important to “provide a list of the primary characteristics of the people you will be recruiting to participate in the study. Have a good reason for each and every characteristic” (Sharon, “The UX Research Plan That Stakeholders Love”).

- **Methods:** Methods describe how the researcher will achieve the research goal with specific activities. This includes what will happen, how long it will take and where it will take place (Sharon, “The UX Research Plan That Stakeholders Love”). In terms of how many details are involved, it depends. In a conversation the researcher had with Liz Sanders, Sanders pointed out that her research plan was often intended for clients
and junior researchers to understand how the research would proceed, so they could easily execute the research with her. Therefore, in the case that the research execution involves more than one person, the plan needs to be more detailed in order to ensure that everyone is on the same page.

**Schedule:** Schedule is basically the timeline for the research. It connects different research activities together. Usually, the schedule will “inform stakeholders of at least three important dates: when recruiting starts, when the study will take place, and when they can expect results” (Sharon, “The UX Research Plan That Stakeholders Love”). Outlining the schedule ensures that there won’t be any surprises for all the involved parties regarding when the research will be happening and helps the team with logistics planning, so they won’t “end up in a pinch” (Sherwin).

**Deliverables:** It is important to clearly describe what the deliverables will include and how they will be shared. The description of deliverables should be “as clear as possible” (Sanders and Stappers 132). “But that does not mean that they should be described in too much detail because there is no way of knowing exactly what you will deliver before the research has started” (Sanders and Stappers 132). Deliverables vary in different projects. For example, in digital user experience research, deliverables could include “personas, content/site/application maps, user flows, wireframes, prototypes, design sketches, and/or a project creative brief” (Sherwin).

It is important to keep in mind that the listed components are the key sections included in most research plans, but this is not to say that every research plan has or only has these components. Research projects vary from each other and their respective research plans reflect this. For example, in the user experience (UX) research context, “a plan prepared for an audience new to user experience processes will be different than a plan for a more UX-savvy audience. People new to UX probably can handle less jargon
(which is recommended in many cases) and need more details in plain language when describing the process” (Sharon, “It’s Our Research” 69). The contents of a research plan can vary in terms of sections, length, detail and format. These variations depend on different factors such as: who is the audience for this research plan? Is the audience familiar with design research or not? What’s the purpose of writing this research plan? Are the budgets defined or does the researcher need to propose a budget based on the research plan?

Despite these variations, having a well-crafted research plan lays the foundation for the success of a research project in different ways. First, a research plan is a guide and alignment tool for the project team (Lextant 21). It makes sure that everybody is on the same page. Second, a good research plan helps the research team to become focused and stay organized. It allows the research team to “refer back to the research plan periodically throughout the project to make sure that the initial objectives are being met” (Lextant 21) and the research sessions conducted by multiple researchers are consistent and reliable (Schumacher 24). Third, a research plan prepares the research team to get ready for the upcoming field work. Proactive and anticipatory action is always time well spent prior to fieldwork (Schumacher 24).

As explained above, it is important to craft a good research plan. The following pages will focus on exploring the question “how to craft a good research plan”, i.e., the process of research planning, using information available through the secondary research.

**3.2 DESIGN RESEARCH PLANNING**

Design research planning includes all the activities that are conducted to produce the research plan, such as defining the research goal, deciding which methods to use, setting
up a timeline and so on. The researcher reviewed the existing information sources (e.g., articles, presentations, blogs, company’s training materials, etc.) focused on design research planning and summarized how each of them provided guidance for students and practitioners on design research planning in different ways: 1) to guide students and practitioners about how to plan out different design research methods; 2) to encourage students and practitioners to break down big projects and complex problems into actionable steps; 3) to help practitioners define the research objectives and the types of research needed to achieve the research objectives; 4) to provide detailed guidance on planning design research projects in practice.

3.2.1 EXISTING INFORMATION ON HOW TO PLAN OUT DIFFERENT DESIGN RESEARCH METHODS

Planning out methods is core to research planning. Especially, with the explosion of research methods coming out around 2012, there has been a lot discussion lately around planning and choosing methods. Several research planning frameworks have been developed to enable students or practitioners to plan out their methods appropriately. Here the researcher will discuss three of them as examples.

The first planning framework was developed by Katherine Bennett in 2009. Bennett calls it “the tool picker” (Figure 3.1), in her blog “Design Investigations”. While teaching at Art Center College of Design, Bennett realized that students always used a fixed set of design research methods and tended to treat design research as a standard process. However, in industry, design research was going through a rapid development and had evolved into a complex landscape of approaches. In order to help students break out of a narrow set of methods and yet negotiate the complexity of the myriad methods in practice today, Bennett developed this tool picking framework. This tool
acts as a decision tree that is intended to help beginners and widen their view beyond a limited single-thread process. In Bennett’s online blog, “Design Investigations”, Bennett explains that

“the tool was designed to lead students to the most appropriate choice, by no means the only choice possible. Once students have used the tool for a few projects, they will begin to gain knowledge of the wider set of approaches and begin to see how the different methods work in different cases. Once they begin to see that the tools

Figure 3.1 The “Tool Picker” Developed by Katherine Bennett in 2009
This “tool picker” is a great framework that helps students to break out of a narrow set of methods and understand what methods could be effective to understand different things. However, the researcher thinks there is a danger that students may rely too much on the decisions provided by the framework without enough critical thinking. In fact, not only are the methods listed in this framework limited, but depending on the way design researchers apply the methods, some of the methods can also be used to uncover more types of knowledge than what is shown in the framework. It is important to remind students about the limitations of the framework and encourage them to think beyond the decisions made by the framework, as they gain in design research experience.

The other two frameworks were developed by Liz Sanders in 2002 (Figure 3.2) and in 2012 (Figure 3.3) to help students and practitioners understand “how categories of design research methods can be put into action” (Sanders, “Collaborative Innovation”). Both frameworks are focused on the participatory design development process with the mindset of designing with people. These two frameworks operate at two steps of the participatory design development process: 1.) experiential research (i.e., understanding participants’ current experiences) and 2.) generative research (i.e., exploring participants’ future experiences). In experiential research, Sanders believes that “all research techniques in use today for understanding people’s experiences fall into one of three categories (see Figure 3.2) — what people say, what people do or what people make — or they fall into the areas of overlap between the categories” (Sanders and Stappers 66). The say methods include interviews, questionnaires, surveys, etc. They are widely used in traditional market research to provide the research team...
with explicit knowledge that participants can articulate and want the research team to hear. The do methods range from “quick immersions in the environment of use to lengthy ethnographies” (Sanders, “Collaborative Innovation”). Specifically, the do methods include participant observation, photo studies, shadowing, etc. Traditional design research methods were focused primarily on observational research (Sanders, “From User-Centered to Participatory Design Approaches”). These methods allow the researcher to understand what actually happens in the context of use. The make methods are borrowed from the intersection of design and psychology and they “involve participants by having them perform a creative act with respect to the subject under study” (Sanders and Stappers 70). Make methods include 2D collages, experience maps, 3D modelings, etc. Make methods enable researchers to understand deeply what participants think, feel and dream about for the future. This is understanding of participants’ “tacit knowledge, i.e., knowledge that cannot readily be expressed in

Understanding current experience

Figure 3.2 A Framework for Organizing Tools and Methods for Understanding Participants’ Current Experience in Participatory Design Development Process (Sanders, “From User-Centered to Participatory Design Approaches”)
words” and “latent needs, i.e., needs not recognizable until the future” (Sanders, “From User-Centered to Participatory Design Approaches”). By applying all three approaches in one research plan, researchers will be able to converge via different perspectives, thus “readily understanding and establishing empathy with the people who use products and information systems” (Sanders, “From User-Centered to Participatory Design Approaches”).

The second step in the process is generative research (i.e., exploring participants’ future experiences). Sanders proposed an iterative cycle (see Figure 3.3) of making, telling and enacting (Sanders, “Collective Innovation”). “If you use all three of those (the making, telling and enacting) it gives all kinds of people a chance to participate in a way that easiest for them and gives people an opportunity to imagine and play out future experiences” Sanders said in an interview contributed to the Industrial Design Reporter.

![Exploring future experience](image)

Figure 3.3 Framework for Organizing Tools and Methods for Understanding Participants’ Future Experience in Participatory Design Development Process (Sanders, “From User-Centered to Participatory Design Approaches”)

36
website. In Figure 3.4, Sanders put many of the published design research methods that are used for working in participatory design in a triangle framework (Sanders, “Collective Creativity in Design”). In the paper “Prototyping For The Design Spaces of The Future”, Sanders explained the three categories (making, telling and enacting).

“In making, we use our hands to embody ideas in the form of physical artifacts. The nature of the artifact changes from early to later stages in the design process. Artifacts made early in the process are likely to describe future experiences while artifacts made later in the process are more likely to resemble objects and/or spaces.

Telling is a verbal description about future scenarios of use. We might tell a story about the future or describe a future artifact. But telling can be difficult for people
who don’t have verbal access to their own tacit knowledge.

Enacting or pretending refers to the use of the body in the environment to express ideas about future experience. Acting and performance can also be considered forms of enactment that are particularly useful later in the design process.”

The three categories of methods complement and reinforce each other and it is recommended that they are applied together as well as iteratively. “Researchers can enter the model at any step and travel around the model” (Sanders, “Collective Innovation”) to plan and execute the design research. For example, a researcher can start with having participants making props with the materials provided and then ask them to use it in telling stories about their dream future. Or a researcher can invite participants to first enact a scenario about the future and then make props to help make the enactment more real. By going through this iterative cycle, ideas get stimulated or further developed in various ways. Overcoming the numerous obstacles and successfully completing all these projects with students had a profound effect on the entire Bertie County community. The students shared their concerns for the future in classes by using their new understanding for design thinking and making. Solutions for reaching out into the broader community to help in creative ways became apparent. The idea of introducing poultry farming as a sustainable farming method into the local community resulted in the design of chicken coops for families, followed by a farmers’ market that provided a location and stalls for local vendors in town.

In the researcher’s opinion, the “say, do and make” and “make, tell and enact” frameworks help to organize the proliferation of design research methods and put them into “toolboxes” (Sanders, Brandt, and Binder 2010), which makes it easier for students and practitioners to learn, compare, discuss and apply different methods. Also, these two
frameworks sketch the principles of conducting experiential research and generative research with a participatory mindset. They provide the knowledge base for students and practitioners to establish an effective plan for experiential and generative design research in the front end of the design process.

**3.2.2 EXISTING INFORMATION THAT ENCOURAGES STUDENTS AND PRACTITIONERS TO BREAK DOWN BIG PROJECTS AND COMPLEX PROBLEMS INTO ACTIONABLE STEPS**

Planning for large-scale projects with complex problems can be very challenging and sometimes intimidating for beginning design researchers. In order to help beginning design researchers start with research planning process, different frameworks have been generated to encourage them to break down a large project into small actionable steps. Here the researcher takes a close look at the logic model developed by Sarah Rutherford from Kent State University.

The logic model Rutherford developed was intended to be applied in educational practice by students or student groups individually or with the instructors’ guidance. It allows students to create their own structure for approaching a design research problem. In Rutherford’s paper “Logic Models in Design Research Planning”, she described

“the model (see Figure 3.5) is comprised of inputs (participants, time, and other resources), outputs (actions), and outcomes... Each project stage is built around a step or goal and then broken down into actions, outcomes, timeline and personnel. The process looks something like this: first, a project step is identified, then the activities required to accomplish that step are recorded, the expected outcome of that activity follows, a timeline for the activity is identified, and personnel are assigned.”

Figure 3.6 shows an example of how this model can be applied to a specific project.
Figure 3.5 *Sample Logic Model Step (Rutherford)*

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Why is the step being performed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>What are the actions required to complete the step?</td>
</tr>
<tr>
<td>Outcomes</td>
<td>What are the expected outcomes of the action?</td>
</tr>
<tr>
<td>Timeline</td>
<td>How long will the action take?</td>
</tr>
<tr>
<td>Personnel</td>
<td>Who will complete the action?</td>
</tr>
</tbody>
</table>

**SOCIAL ISSUES**  
Project Schedule

<table>
<thead>
<tr>
<th>STEPS</th>
<th>Research</th>
<th>Define Scope</th>
<th>Develop Topics</th>
<th>Develop Concepts</th>
<th>Concept Deliverables</th>
<th>Create Identity</th>
<th>Create Deliverables</th>
</tr>
</thead>
<tbody>
<tr>
<td>PURPOSE</td>
<td>Inform mission statement</td>
<td>Audience</td>
<td>Focus project</td>
<td>Define objective</td>
<td>Define mediums and components</td>
<td>Unity campaign</td>
<td>Final product</td>
</tr>
<tr>
<td>ACTION</td>
<td>Online campaigns, magazines</td>
<td>Research</td>
<td>Brainstorm, research</td>
<td>Brainstorm</td>
<td>Brainstorm</td>
<td>Brainstorm</td>
<td>Sketching/design</td>
</tr>
<tr>
<td>OUTCOME</td>
<td>Define mission statement</td>
<td>Structure for concepts</td>
<td>Define topics</td>
<td>Have a slogan</td>
<td>Define deliverables</td>
<td>Have identity</td>
<td>Final product</td>
</tr>
<tr>
<td>TIMELINE</td>
<td>1 week</td>
<td>1 week</td>
<td>1 week</td>
<td>2 weeks</td>
<td>1 week</td>
<td>2 weeks</td>
<td>6 weeks</td>
</tr>
</tbody>
</table>

Figure 3.6 *Logic Model for Social Issues Project. Source: Glyphix, Kent State University School of Visual Communication Design, 2013 (Rutherford)*
In this project, students broke down a big research project into small steps and the logic model helped students to think through their specific actions — how it would be conducted, the expected timeline and who would participate. Also, the outcome of each step was planned to influence the next.

The researcher thinks this logic model can be used to encourage students to break down complex problems into small steps and support them to turn each step into action. Also, the logic model serves as a great tool for students to flesh out their thoughts on how to accomplish each step after they identify the steps. However, the logic model doesn’t provide any guidance on how to identify the steps and how to turn steps into actions, which are usually the biggest challenges for students when they try to come up their research plans. The lack of information limits the usage of this logic model.

### 3.2.3 EXISTING INFORMATION THAT HELPS PRACTITIONERS TO DEFINE THE RESEARCH OBJECTIVES AND THE TYPES OF RESEARCH NEEDED TO ACHIEVE THE RESEARCH OBJECTIVES

Defining the research objectives is the foundation of a research planning process and it drives the rest of the research planning activities such as planning the schedule, methods, budget and so on. In Figure 3.7, Kelly Costello and her colleagues at Doblin, an innovation consulting firm based in Chicago, developed a research planning worksheet to help design research practitioners “build an initial research outline” (Doblin). It guides practitioners to think through what’s known and what’s unknown about the project, prioritize which missing information is the most important, identify what kind of research is needed and define the research objectives.

In the researcher’s point of view, this planning worksheet provides a great guidance for
practitioners to identify their research objectives by going through the process of listing down the knowns as well as unknowns and prioritizing the importance of the missing information. Also, the worksheet gets practitioners started thinking what they can do to achieve their objectives. Since the listed types of research on the third column stay at a high level, after filling out this worksheet, practitioners will still need to think through specific actions to “uncover the unknowns and validate the knowns” (see the research planning worksheet on Figure 3.7).

3.2.4 EXISTING INFORMATION THAT PROVIDES DETAILED GUIDANCE ON
Also, in order to help beginning practitioners quickly learn to plan their research, several consulting firms have written papers and training materials that provide detailed guidance and specific tips on creating a research plan.

For example, Lextant, a design research consulting firm in Columbus, Ohio, created a

![Design Research Planning Worksheet](image)

Figure 3.8 Design Research Planning Worksheet (Lextant 29)
set of training materials for beginning practitioners to learn about design research. One of them includes a design research planning worksheet (see Figure 3.8) which contains three sections — methodology, fielding and timeline. Each section has a detailed set of questions or checklists which help to guide the beginning design research practitioners through the planning process and prevent them from leaving out important details.

The researcher considers this planning worksheet to be a very practical guide for beginning practitioners to use in their research projects. The probes and examples in the planning worksheet help practitioners to get their planning process started and the blank lines provoke practitioners to think beyond what was listed in the worksheet. However, it is important to keep in mind that the approach on the planning worksheet is one of the many ways of planning design research. There are many different approaches to think through the methodology and to plan out the timeline. Practitioners who use this framework need to be aware of getting too used to this single approach and treating it as the only process of planning design research.

To conclude, many educators and practitioners have been providing information to help students and beginning practitioners better plan their research projects. Different information contributes to the knowledge of research planning in different ways. Some information is more theory-based and provides high level principles of design research planning, such as the two planning frameworks developed by Liz Sanders. Some information is more practice-oriented with a focus on helping junior practitioners come up to speed and make a research plan more quickly, such as the planning worksheet created by Lextant. Also, some information is focused on a specific part of the research planning such as defining the research objectives and some information covers research planning as a whole. Still, there is a lot of room left for more research to be done on
understanding practitioners’ and students’ processes of research planning, in order to help students as well as beginning practitioners better learn to plan their research.

3.3 CONCLUSIONS

This chapter has established the concept of design research planning and reviewed what has been done to help students and beginning practitioners on the process of design research planning. It also has revealed that there is a lack of knowledge and studies on students’ and practitioners’ processes of research planning. This chapter together with the last chapter serve as the background for the primary research.

The next chapter will address the primary research studies. After that, the findings of the primary research will be revealed. Then the conclusions will be drawn based on the findings of both the secondary research and the primary research.
CHAPTER 4: RESEARCH AND ANALYSIS

The previous two chapters has established a basic understanding of the design research field and the processes of design research planning. This chapter presents the primary research study which focuses on understanding undergraduate design students’ and design research practitioners’ process of design research planning and execution. First, section 4.2 presents the fourteen interviews conducted with design research practitioners with various levels of experiences working both inside and outside the companies. At the beginning of the interviews, the researcher created a detailed research plan which was used in the first nine interviews. Then after the first nine interviews, an interim analysis was conducted to consolidate the collected information and the researcher fine-tuned a few interview questions for the remaining five interviews accordingly. Once all the interviews were completed, an in-depth analysis was conducted to make sense of all the collected data. Second, section 4.3 presents the researcher’s experience serving as a design research course apprentice with nine groups of design students at The Ohio State University. In this part of the study, participant observation was conducted during the research course and students’ course work was reviewed at the end of the semester as part of the research data. Similarly, an in-depth analysis was conducted to make sense of students’ work as well as the researcher’s observation notes.

4.1 RESEARCH OVERVIEW

This thesis research consisted of two parts. The first part of the research was conducted to understand how design research practitioners plan their research and execute their
research plan today. Considering the limited timeline and proprietary issues within most of the companies, the interview was chosen as the only research method in the first part. Fourteen interviews were conducted with design research practitioners having varying years of experience both inside and outside of companies.

The purpose of the second part of the research was to understand how novice design researchers plan and execute their research. In this thesis research, the researcher took a closer look at how undergraduate design students, as the representatives of novice design researchers, plan and execute their research in class. This part of the research was conducted in the Design Research II (Design D4200) course at OSU with junior students from mixed design disciplines — industrial design, visual communication design and interior space design. D4200 is a required course for all design majors. As the teaching assistant of this class, the researcher participated in the class for the entire semester. In addition to conducting observations during all class periods, the researcher reviewed students’ presentations, final documentations and responses to journal questions.

An exploratory approach was applied to both part one and part two of the research. For the interviews with design research practitioners, an interview guide was prepared. Interviewees were encouraged to drive the conversation, but the researcher made sure all the predetermined topics were covered consistently among all the interviews. For example, questions in the interview guide came up in different orders based on the flow of the conversation. Questions were often paraphrased based on the context of the research. The researcher believed that the interviewees were the experts of their own experience. Different interviewees may have more insights on one topic than another, depending on their job descriptions. By having the interviewees guide the conversation, more deep insights could be gained from these interviews.
After the first nine interviews with the practitioners, the researcher synthesized all the data to see how the respondents answered the research questions. This synthesis process helped the researcher realize that the design research planning process for practitioners was much broader than what the researcher originally thought. With the insights gained from the first nine interviews, the researcher fine-tuned the research questions for the remaining five interviews.

For the design research course apprentice, the researcher took into account the complexity and variables of real projects, such as various starting dates of the projects and different engagement of the clients, instead of isolating those variables. The reason for doing that is because those variables also exist in real world projects. By also investigating those variables, the researcher gained rich insights into a variety of contexts.

Based on the understanding of how both the design research practitioners and undergraduate design students planned their research and executed their research plan, the researcher intended to identify the gap between these two audiences and to propose strategies to fill the gap.

4.2 INTERVIEWS WITH DESIGN RESEARCH PRACTITIONERS

4.2.1 RESEARCH PLANNING

The purpose of conducting the interviews with design research practitioners was to understand how design research practitioners plan and execute design research. However, it is important to note that, at the beginning of the project, the researcher assumed that planning research methods was the main part of research planning or even the same as research planning. Several research topics were defined around this research
goal.

- What is the educational and professional background of the design research practitioners?
- How did the design research practitioners plan their research (particularly focused on planning design research methods)? What was the rationale behind those decisions?
- How was the actual research the same or different from the original research plan?
- What do design research practitioners think are the trends in the design research field today?

These research topics were used as a guide to develop the main interview topics as well as to organize the analysis process. Considering the need for a wide range of participants across the U.S., the researcher decided to use interview as the data collection method. The main interview questions that were developed included the following:

- Can you start with your background? How did you get into the design research field?
- Can you introduce what you do in your job generally?
- How do you come up with a research plan? What is your rationale behind it?
- Can you give me an example?
- What are the steps/process of ** project?
- What’s the overall goal you tried to achieve by going through all these steps?
- Why did you decide to go through these steps specifically?
- Are there any trade offs you made while making the research plan (deciding which methods to use)? If yes, what are they?
- Have you ever made any changes to your plan in the field? If yes, what are they?
• What are the overall challenges in terms of planning a research project in your job?
• What do you see as a trend in the design research field? What did the field look like before and in what direction is it heading?

This list of questions was not used as a script but as a guide to prepare the researcher to be flexible during the interviews. Questions weren’t asked in this specific order or in this exact language. The questions were addressed in a conversation with the interviewee. If interviewees were not comfortable sharing specific cases, they could either stay at a more general level or put together information through different cases.

The researcher recruited the interview participants through her professional network as well as through introduction to design research practitioners by other members of the Design faculty at her university. A recruitment letter with the introduction of the research was sent to the potential participants via email. In the case of participants who responded and agreed to participate, the researcher sent them the interview guide to review before the interviews. Skype was planned as the main tool for the online interviews. The interviewee was orally consented at the beginning of the interview.

The interviewees can be separated into four groups, design research practitioners with more than six years of experience currently working inside a corporation, design research practitioners with more than six years of experience currently working as a consultant, design research practitioners with less than six years of experience currently working inside a corporation and design research practitioners with less than six years of experience currently working as a consultant.

4.2.2 DATA COLLECTION AND FINE-TUNING
1) DATA COLLECTION

The interviews were audio-recorded. Notes were taken to document key points during the conversations.

2) INTERIM ANALYSIS AND FINE-TUNING

After the first nine interviews, the researcher synthesized the data to identify preliminary patterns and themes and to determine how the rest of the research could proceed in order to better achieve the research goal.

From the interim analysis, the researcher saw an emerging theme — the research planning process wasn’t the same as the method planning process. The research planning process entailed more activities than just thinking through the methods. In fact, deciding about methods was much less of a concern than how to get stakeholders’ buy-in and get them engaged in the research, so the research could eventually make an organizational impact. Also, during the first nine interviews, the researcher found that it was hard for interviewees to articulate their rationale behind their choice of planning methods. For the most experienced design researchers, the rationale had already become part of their tacit knowledge. The less experienced design researchers tended to use a standard process and apply a specific set of methods to every project.

Because of these discrepancies, the researcher did the final fine-tuning of the interview guide by putting a broader focus on “plan and execute research” rather than “plan and apply research methods”. The research goal was reframed as “based on the understanding of how both design research practitioners and undergraduate design students (as the representatives of beginning researchers) plan and execute their research, identify the gap between these two audiences and propose strategies to fill the
gap”. The interview questions were kept the same, but without the focus on delving into specific methods.

In order to make sure that the sample was well distributed and covered a range of scenarios, the researcher mapped all the interviewees in a quadrant graph (Figure 4.1) The graph was defined by two dimensions— practitioners’ years of experience in design research and whether they work as a consultant or an in-house design researcher. Each dot represents one interview. The grey dots represent interviewees recruited

Figure 4.1 The Distribution of All the Interviewees
for the first round of sessions. As the graph shows, very few interviewees in the first round had many years of experience. Plus, the researcher had observed that the more experienced researchers tended to have more insights on research planning. Therefore, the researcher recruited five experienced researchers both from inside corporations and from consultancies to fill out the interviews. As can be seen from Figure 5.2.2.1, the five blue dots represent the five interviewees recruited for the second round of sessions.

4.2.3 DATA ANALYSIS AND BRIDGING

1) PREPARING FOR ANALYSIS: STORING, ORDERING AND LABELING DATA

Before starting the analysis process, the researcher first transcribed all the interviews from the audio-recordings and entered the interview notes into an excel spreadsheet. As you can see from the spreadsheet (Figure 4.2), each row of the spreadsheet contained information associated with one interview note. The interview notes were broken down from the transcripts based on content. Each interview note was labeled with a participant number, a note number, a content code and a researcher’s note. The participant number was used to identify from whom this note came. The note numbers were ordered in a chronological sequence within each interview. Also, a content code was generated for each interview question based on the topic of each interview question. For instance, the code for the question “Can you start with your background? How did you get into the design research field?” was “work background”. The research note included the researcher’s first reaction to the interview note and additional explanations of the context of the interview note.
2) CONDUCTING ANALYSIS ON THE WALL

At first, the researcher attempted to analyze the data in the excel spreadsheet. However, after several rounds of sorting, the researcher realized it was hard for her to make connections among data within an excel spreadsheet. Therefore, the approach of analysis on the wall was adopted. During analysis, the data were taken to increasingly higher levels of the DIKW hierarchy (the letters D, I, K, W, standing for Data, Information, Knowledge, and Wisdom)(Ackoff,1989) and eventually bridged over into the conceptualization space, as is shown in the variation of the DIKW scheme (Figure 4.3) that Sanders and Stappers(2012) developed to explain the analysis of messy qualitative data. The left-hand side of the figure represents the process of gathering and analyzing data. Small pieces of data gathered from the field are interpreted, yielding information
and patterns are then sought among the information in order to generate knowledge. The right hand side represents the process of conceptualization which is bridged to the analysis process by generating ideas and drawing implications. The bridging between analysis and conceptualization can happen at any level of the analysis process — data, information and knowledge levels. In Figure 4.4, the magenta arrows show the actual analysis and bridging process that happened in this thesis research. Each step will be explained in the following paragraphs. At the end of the thesis journey, the researcher took the implications a step further and developed a tool which is shown as a dot in Figure 4.4. More information about the tool will be explained in Chapter 8, section 8.2.

Figure 4.3 *The Analysis and Conceptualization Space Model by Elizabeth B. -N. Sanders and Pieter Jan Stappers (2012)*
A) BREAKING DOWN THE DATA

The researcher first printed out the entire excel spreadsheet containing all the transcripts and cut out each interview note separately. Then the researcher read through each interview note line by line and highlighted the key phrases and sentences. In order to move the interview notes around to look for patterns, each interview note was glued on a pink post-it note. On the pink post-it notes, the researcher wrote down what she thought was the focus of each interview note, as you can see in Figure 4.5. In that way, the researcher could quickly relate to what was contained in the interview note by scanning the words on the pink post-it notes. This process helped save a lot of time for the researcher in later stages.

After reading through all the interview notes, the researcher started breaking down each interview note even more. Key phrases and quotes were extracted and written on
Figure 4.5 Interview Notes Glued on Pink Post-its that Also Contained Notes about the Focus of Each Interview Note

Figure 4.6 A Visualization of the Analysis Process Thus Far
the blue, green and red square post-it notes to increase the readability of the data array (see Figure 4.6). Blue and green square post-it notes were used to represent positive or neutral experience. Blue square post-it notes mainly came from the interim analysis. Green square post-it notes mainly came from the final analysis. Red square post-it notes were used to represent negative experience. They came from both the interim analysis and the final analysis.

**B) INTERPRETING DATA YIELDING INFORMATION**

By reading through the complete transcriptions several times and breaking them down into key quotes and key phrases, the researcher became very familiar with the entire data set and started to interpret what quotes and key phrases meant in context. During this interpretation process, the blue and green post-it notes with their associated interview notes were moved around to form groups with similar meanings. The grouped data then started to become clustered information. Small yellow post-it notes (see Figure 4.7) were placed on top of the clusters with notes that describe the cluster as a whole.

Figure 4.7 *A visualization of the analysis process thus far with the current process highlighted*
C) BRIDGING INFORMATION TO NEW VIEWS

As more and more information clusters emerged, the clusters started to relate to each other. Clusters were moved around on the wall to physically represent their relationships. The more strongly clusters were connected with each other, the closer they were put on the wall. Abductive reasoning was applied in this process to form new views (Sanders and Stappers 205) from big groups of information clusters. Abductive reasoning is a step of adopting ‘the hypothesis that makes the most sense given observed phenomena or data and based on prior experience (Kolko, 2011). The new views were established by generating inferences and giving the “best explanation.” Each new view was written on a large blue rectangular post-it note, as is shown in Figure 4.8.

Figure 4.8 Picture of the Analysis Process
D) REVEALING THE BIG FRAMEWORK FROM THE NEW VIEWS

After the new views were generated, the researcher took a step back and looked closely at the relationship between each information cluster under every new view. The small yellow post-it notes which represented the information clusters were placed next to each other and arrows were drawn among them to identify their connections. By doing so, small frameworks started forming among those information clusters (see Figure 4.11). Meanwhile, connections were sought among the new views to reveal how each new view related to the others. Similarly, groups of new views were moved around on the wall and arrows were drawn between them to reveal their relationships. Gradually, a big picture emerged among all these post-it notes. Later on, the researcher created a framework to visualize all the connections within the big picture.

E) REVISING THE FRAMEWORK BY CONNECTING IT BACK TO THE DATA

This big framework was revised a few times through the discussion the researcher had with committee members. Many important changes were made by connecting the framework back to the raw data. Eventually, the big framework was finalized. It revealed patterns that weren’t identified before and provoked new ways of thinking which led to the development of the planning tool (see chapter 8 section 8.2).
The entire analysis and bridging process is summarized in Figure 4.12.

Figure 4.10 Picture of Analysis in Progress with Small Frameworks Identified among Information Clusters and Relationships Established among New Views
Figure 4.11 A Visualization of the Analysis Process Thus Far with the Current Process Highlighted

Figure 4.12 A Visual Summary of the Entire Analysis and Bridging Process
4.3 DESIGN RESEARCH COURSE APPRENTICE

4.3.1 CONTEXT OF THE COURSE

During the fall semester of 2013, the researcher worked with Dr. Liz Sanders as a Teaching Assistant for the Design Research II (OSU Design D4200) course. This is a required course for junior design students in all three majors — interior space design, visual communication design and industrial design. Before having this course, all the design students in their sophomore year have already had their first required design research course — Design Research I (OSU Design D3200) in the fall of 2012. In the Design Research I course, students learned how to conduct and analyze evaluative research and experiential research with the traditional mindset—designing for people. They worked in interdisciplinary design teams. They had one project focused on evaluative research and another one focused on experiential research. The projects they did in Design Research I course were all hypothetical projects. There was a participant pool set up with all the foundation design students in it to help with the recruiting process. In terms of design research methods, students were exposed to various interview and observation methods as well as some basic “make tools”, such as collaging and experience timelines.

In the Design Research II course, the main learning objective for students was to learn how to plan, conduct and analyze experiential research and generative research with the participatory mindset—designing with people. Students in this course worked in nine interdisciplinary design teams with at least one person from each design major on the team. There was one semester-long project and it was conducted with community organizations whose participants were from outside the ‘participant pool’. All the nine projects were formed around the Franklinton area. Franklinton is a less developed neighborhood in Columbus, Ohio, which is now going through a multiyear
transformation to become a vibrant educational, cultural, residential and retail district. Organizations that were involved in the nine student projects were either in the Franklinton area or would move to the Franklinton area soon. Each organization had a representative who volunteered to help students connect with more people in his or her community. The instructor made the initial contact with each representative to set up the project. Also, a “project proposal” was written by the instructor to inform these representatives about the project, when events needed to happen and who would be involved. In Figure 4.13, the researcher summarized each team’s focus of their research projects. It was the first time this course was ever taught at OSU. Also, it is the only (known) course in participatory design research at the undergraduate level in the U.S. At the beginning of the course, students practiced some of the design research methods they learned from the previous year. Lectures about participatory design research and tools for making, telling and enacting were given before the team projects started. Also, a required textbook — Convivial Toolbox (Sanders and Stappers, 2012)— was assigned to students. It covered generative design research theory, methods and case studies.

During this course experience, the researcher assisted the instructor to generate and to grade course materials such as journal questions and design research portfolio pages. The researcher provided feedback and took notes during all the in-class group meetings, the interim presentations and final presentations. Also, the researcher went to some of the students’ generative sessions to better understand what students were doing in the field. At the end of the semester, the researcher helped the instructor to review and assess students’ final presentations, documentations and journal questions.
<table>
<thead>
<tr>
<th>NAME OF THE STUDENT TEAM</th>
<th>NAME OF THE COMMUNITY GROUP</th>
<th>THE FOCUS OF THEIR RESEARCH PROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Stark</td>
<td>Columbus Idea Foundry</td>
<td>To understand how Columbus Idea Foundry currently attracts new members and explore new ways to help them better attract future members.</td>
</tr>
<tr>
<td>Wolf Pack</td>
<td>Columbus Idea Foundry</td>
<td>To discover what would make an inviting and engaging space for potential members, investors, and collaborators.</td>
</tr>
<tr>
<td>The Idea Founders</td>
<td>Columbus Idea Foundry</td>
<td>To understand members’ daily experiences in the Columbus Idea Foundry’s current spaces and explore ways to improve their experiences in the new space.</td>
</tr>
<tr>
<td>The Dinin’ Hall</td>
<td>Dinin’ Hall</td>
<td>To understand how Dinin’ Hall currently attract new customers and explore ways to help Dinin’ Hall reach a larger audience.</td>
</tr>
<tr>
<td>Artist: Donatello</td>
<td>Artist Group in 400 West Rich</td>
<td>To understand artists’ current experiences in their studios at 400 West Rich and explore their ideal future community experiences.</td>
</tr>
<tr>
<td>Artist: Ink</td>
<td>Artist Group in 400 West Rich</td>
<td>To understand how artists currently interact with their community at 400 W. Rich and to explore how to improve their experiences in the future.</td>
</tr>
<tr>
<td>The Steam Team</td>
<td>The Steam Factory</td>
<td>To help the Steam Factory continue to grow &amp; develop while maintaining stability.</td>
</tr>
<tr>
<td>The Kids</td>
<td>Boys &amp; Girls Club</td>
<td>To understand what the kids attending the Boys and Girls Club would like to see in their future community and how they as individuals will affect their community as they grow older.</td>
</tr>
<tr>
<td>Harmony Project Team</td>
<td>The Harmony Project</td>
<td>To understand the current experience of those who participate in and are associated with The Harmony Project, and identify how to improve their experiences, including their future space, events, communication, and community interaction.</td>
</tr>
</tbody>
</table>

Figure 4.13 An Overview of the Nine Team Projects in Design Research II Course
4.3.2 RESEARCH PLANNING

The purpose of the second part of the research was to understand how undergraduate design students plan and execute design research. Based on the available resources and timeline, this research was conducted in the Design Research II (OSU Design D4200) with junior design students. The research questions for the purpose of this thesis included the following:

- How did the undergraduate design students plan their research? What was the rationale behind those decisions?
- How was the actual research the same or different from the original research plan? If they were different, what was the rationale behind the plan is changing?
- What were the undergraduate design students’ perceptions toward ‘design research’?
- What did undergraduate design students learn in the process? How was what they learned similar to or different from the learning objectives?

These questions helped the researcher to stay focused, while looking through all the notes, presentations, documentations and journal questions.

The researcher introduced her thesis research topic in class and provided students with the recruitment letter and consent form. Students could volunteer or decline to participate in the research. After the signed consent forms were acquired, the researcher started to review students’ interim presentations, final presentations, final documentations and journal questions. The researcher also took notes during the in-class meetings as well as during the project presentations. The research data collected from this course were all part of the existing course requirements.
4.3.3 DATA COLLECTION

The data included group interim presentations, group final presentations, individual journal questions and notes the researcher took when meeting with students. Students submitted their presentations and responses for the journal questions to Carmen, an online learning management system used at The Ohio State University, according to the schedule on the syllabus.

At the beginning of this project, the researcher helped the instructor design a planning tool (Figure 4.14) to get students started. Every group was required to plan their research before they going into the field (Figure 4.15). During the research process, all the groups were required to keep track of their research plans. Changes to the plan were to be recorded along the way.

Figure 4.14 The Planning Tool the Researcher Assisted the Instructor Develop for Students in the Design Research II Class
1) INTERIM PRESENTATIONS

Before the interim presentations, students planned out their experiential research and executed their plans to understand their participants’ current experiences. During the interim presentation, each group presented their original plan for the experiential research and their shifted plan, if they made any changes during the research process. Reasons for the plan shifting were elaborated as well. Furthermore, each group explained their experiential research process and their findings from the experiential research. In the end, they presented the plan for their generative research sessions.

2) FINAL PRESENTATIONS

In the final presentations, each group first gave a brief introduction about their research topic and the organization they worked with. After that, they defined their research objectives and introduced their key stakeholders. Furthermore, each group described what they did during the entire research process including both experiential research and generative research, as well as what they learnt from both phases. Their
presentations included a summary of their participants’ current experiences and a summary of their ideal future experiences. While describing their research process, each group also compared their original research plans with the plans they actually executed. Furthermore, they presented their design implications and ideas/concepts that they drew from their analysis. In the end they reflected on their participants’ creativity levels and their own participatory relationship with their stakeholders.

3) JOURNAL QUESTIONS
There were two individual journal questions assigned in the course, one after the interim presentation and the other one (see Appendix A) after the final presentation. Both journal questions were designed to encourage students to reflect on their past research process individually. The interim journal question included two parts. 1) “Did your team’s experiential research inform and/or inspire your generative research plan? If yes, how? If no, why not?” 2) “Does your team have the information/insight needed to move into the generative design research phase? Please explain your answer. “ In the final journal journal questions, students were asked to rate different course components and choose three components to explain why they were rated that way. Also, students were asked to make suggestions about components that should be added next year and explain why.

4) RESEARCHER’S NOTES
The researcher’s notes included observations the researcher took during some of the groups’ generative sessions, discussion notes took during the in-class meetings and notes from interim and final presentations.

4.3.4 DATA ANALYSIS AND BRIDGING
The analysis process was driven by the four research questions (see Page 3) the
researcher defined at the beginning of the research. The last journal question, and the interim and final presentations were used as the primary data sources. The last journal question summarized the course as a whole and provided a lot of insights in terms of what students thought they learned or didn’t learn from the course. It was used primarily to answer the third and fourth research questions. The interim and final presentations documented detailed information about what students actually did in the research process. They were used primarily to answer the first and second research questions. The researcher’s notes were used to fill specific knowledge gaps in answering questions that the researcher couldn’t understand through the analysis of the journal questions and presentations.

1) ANALYSIS OF THE LAST JOURNAL QUESTION

The analysis of the last journal question was separated into two parts. The first part is the analysis of the course components ratings. Each student was asked to rate the usefulness of different course components on a scale from 0-3 (0=not useful, 1=a little useful, 2=useful, 3=very useful). The researcher tallied all the rating numbers for each course component (see Appendix D). The second part is the analysis of the open-ended questions where students were asked to choose three of the course components and discuss why those course components were rated the way they were. Similar to what the researcher did for the analysis of interviews, data were analyzed on the wall. The data were first interpreted to information, then patterned to become knowledge and eventually a big picture emerged. The analysis and bridging process that was used is shown in Figure 4.16. The researcher read through all the students’ responses line by line and the key quotes were written on square post-it notes to make sure all the data could be easily read from a distance. The yellow post-it notes were used to write all the negative experiences students had. The pink (both dark pink and light pink) post-it
notes were used to write all the positive and neutral experiences students had. Then the researcher started interpreting the meaning of those key quotes. Post-it notes with quotes having similar meanings were moved together and information clusters surfaced. The patterned interpretation of those key quotes was written on purple rectangular post-it notes. After that, the researcher began to look for patterns among those information clusters. The information clusters that were closely related to each other were then put together to become knowledge groups (see Figure 4.17). Then, all the knowledge groups as well as the information clusters that were not able to be patterned were put into a matrix (see Figure 4.18). In this matrix, the researcher organized all the summary statements from the knowledge groups and information clusters by the steps students have been through in the research projects. These steps were generated based on the observation of students’ research processes.

Figure 4.16 The Analysis and Bridging Process for the Open-Ended Journal Questions
Figure 4.17 *The Analysis of Open-Ended Journal Questions in Progress*
Figure 4.18 *The Matrix Showing Summary Statements that were Generated from the Analysis of Open-Ended*
2) ANALYSIS OF INTERIM AND FINAL PRESENTATIONS

The analysis of the last journal The researcher also reviewed her notes from all the mid-term presentations files and final presentations files. Key insights about what students actually did in each step were pulled out and mapped into a matrix (see Appendix E) with the same categories at the top as the matrix in Figure 4.18 had. In the matrix in Appendix E, the black characters represent neutral or positive statements; the red characters represented negative statements. The matrix in Appendix E is very similar to the matrix in Figure 4.18, except that the matrix in Appendix E summarizes what each team actually did during the course project rather than students’ thoughts, opinions and reflections.

Later on, both matrixes were combined and evolved into a big framework that supported the understanding of the students’ processes of research planning and execution. The big framework was then revised a few times by being connected back to the data and eventually the big framework was refined to become the final framework (see Figure 7.1).

4.4 CONCLUSION

Chapter 4 has presented the process of two primary research studies — interviews with design research practitioners and an apprenticeship in the Design Research II course. The researcher’s process being described here reveals that the actual research process is not as linear and straightforward as most frameworks of the process show. In fact, the actual research process is messy and iterative. The research planning process happens at the beginning of the process and in the middle of the data collection process as well in revisions. Also, the analysis didn’t all happen at once after the data collection was complete but it was conducted during data collection in order to consolidate
knowledge and make sure the research was on the right track. What’s more, in the actual analysis process, data were not simply taken step by step to the higher levels in the DIKW hierarchy. For example, sometimes the information directly informed the big picture; sometimes the information was analyzed to become knowledge first, and then evolved to the big picture. The data can take many different paths in the analysis and conceptualization model developed by Sanders and Stappers (“Convivial Toolbox” 27).

The actual research process the researcher experienced turns out to be very similar to the findings of the thesis research. In the following three chapters, the research findings will be discussed. The current context, the practitioners’ and students’ processes of research planning and execution will be revealed and described. Finally, in the last chapter, the researcher will look back to her own research process and connect it with the thesis research findings.
CHAPTER 5: CURRENT CONTEXT

Chapter 4 has described the process of the two primary research studies and how the data were analyzed to uncover the research findings. Before going into the details of practitioners’ and students’ processes of research planning and execution, chapter 5 establishes an overall context of what the practitioners felt is happening in the design research field today and what the undergraduate design students’ perceptions towards design research are, based on the analysis of the primary research data. First, section 5.1 discusses the current context of the design research industry. It highlights both the positive and negative consequences brought by the rapid growth of design research over the past twenty years. At the end, it also points out what needs to be done to help the field of design research to continue growing. Then section 5.2 extracts the information from students’ responses to their final journal question and reveals students’ understanding and thoughts about design research after they have completed two their first two design research courses.

5.1 CURRENT CONTEXT OF THE DESIGN RESEARCH INDUSTRY

5.1.1 THE BACKGROUND OF THE DESIGN RESEARCH PRACTITIONERS

The fourteen design research practitioners who participated in the interviews had very diverse backgrounds and work experiences. They came from various fields including photography, sociology, business and design. Some practitioners just started working in the design research industry a year ago and others had been doing design research over twenty years. Some practitioners are working inside corporations and others are
working as consultants. Plus, a number of these practitioners had both corporate and consultant experiences. The industries these practitioners have worked for include service, technology, design, and consumer products. The companies these practitioners have worked for range from small start-ups to Fortune 500 companies. Some of those companies have been doing design research since late 1990s and others have just started doing design research. With all these differences, the researcher gained a broad as well as deep view of what is happening in the design research industry today.

Most evidently, over the past twenty years, the design research industry has been through a rapid growth and today it is applied much more widely than it has ever been. However, according to the practitioners, this rapid growth has had positive as well as negative consequences.

5.1.2 DESIGN RESEARCH IS APPLIED AT MULTIPLE LEVELS OF SCALE NOW

If you look at the product or service development process as a pipeline, it starts with identifying opportunities, funnels down to a specific product or service design and ends with the launch of the product or service in the marketplace. As a positive result of the rapid growth, design research is now playing important roles at multiple levels of scale (see the yellow, orange and orange-red ovals in Figure 5.1).

1) DESIGN RESEARCH APPLIED IN THE DESIGN DEVELOPMENT PIPELINE

Much design research is being applied during the design development pipeline (See the yellow oval in Figure 5.1) to inform specific design decisions. This type of design research is often conducted to optimize the experience people will have with a specific product/service. The research requests for this type of research are often framed as “can you help us understand how people in school use our printers?” or “I want to design
an app for college students to find their roommates. Can you help us understand how college students currently look for roommates through their digital device?”. The corresponding research tends to be focused on specific products and services. Designers and engineers are the ones who are usually supposed to take actions using the research findings. The stakeholders involved in this type of research are primarily designers, engineers and product managers.
Most of the practitioners who participated in the interviews consider their stakeholders, being designers and sometimes engineers, to be partners in the research process. They work fairly closely with each other now. However, some of them did have trouble with getting designers involved in the research process when they worked at their previous companies. Designers contribute to the research planning stage by coming up with hypotheses, generating research questions and sometimes defining what the minimum viable products (Ries ***page number) are. During the design phase, design research practitioners often participate in the brainstorming activities and provide feedback for designers. Some companies even encourage their employees to be both researchers and designers. One practitioner mentioned that the design consulting firm she is working for doesn’t hire any design researchers in the U.S. any more. People in the company who have design research skills also work as interaction designers.

2) DESIGN RESEARCH APPLIED AT THE UPPER END OF THE DESIGN DEVELOPMENT PIPELINE

Design research is being applied today at the upper end of the design development pipeline (See the orange oval in Figure 5.1) to guide large-scale directional decisions about new product or service development. For example, this type of design research is often conducted to look for new product or service opportunities. The research requests for this type of research might be framed as “can you help me define the future TV entertainment experience? How will people interact with TV in the future?” or “here is the new technology, can you help us figure out how we could use it in our next product?”. Compared to the design research applied during the design development pipeline, this research typically stays at a higher level and is often more open-ended. For example, instead of asking what participants like about a specific communication application, the researcher would ask what is most important for participants when they
want to be connected with someone. The stakeholders involved in this type of research often include product managers, product teams, marketing people and sometimes those in upper management such as the CEO and the VP of Product Management. Product managers and product teams are often the ones that will use the research findings directly.

Since this type of design research is still emerging as a practice for design researchers and this type of work has traditionally been done by people from other departments such as R&D or marketing research, many stakeholders coming from various departments in the organizations do not really buy into this type of design research. Often times, design researchers have to take time out of their projects to convince the stakeholders about the credibility of design research and help them understand how design research could be helpful for their work. In order to get “buy-in” from different stakeholders, experienced design researchers always try to involve these stakeholders in the research process and adapt their research process to better engage the stakeholders.

3) DESIGN RESEARCH APPLIED AT THE FUZZY FRONT-END OF THE DESIGN DEVELOPMENT PROCESS

More importantly, design research is now starting to be applied at the fuzzy front-end of the design development process (See the orange-red oval in Figure 5.1) to guide even larger-scale directional decisions for the organizations. This type of design research has the influence on the design of a whole system. One example of the research requests practitioners might get for this type of research could be “can you help us understand how can we improve the insurance claim experience?”. In this example, the whole insurance claim experience is affected by various product owners both inside and outside the insurance companies such as people from call centers, the claims team, the
mobile application team, the e-mail team, repair shops and so on. In order to improve customers’ insurance claim experiences, the research team needs to coordinate with all these product owners, help them form a unified vision and make changes at the system level. Otherwise, customers’ claim experiences won’t be cohesive.

One practitioner told the researcher a story about how the role of her research team had changed over the past eight years. She works in a design research team in a Fortune 500 company. The design research team in her company sits under the User Experience team within a bigger team called Digital Marketing. When the design research team first started, their work was very website and mobile application specific. As they conducted more and more projects, they realized that they couldn’t design the digital experience without looking at the larger experience because their customers were not limited to having digital experiences. Most of their customers had cross channel experiences. “We cannot just design an app for something. We have to think about when is someone using this app and how does this app need to relate to the company website or the phone call that the customer received from the company or the e-mail that the customer get from the company,” the practitioner said. Gradually, her team started to broaden their scope, move up to the fuzzy front-end of the design development process and conduct research at a system level.

Conducting design research at a system level is much more challenging than conducting design research within a product pipeline. This type of research requires the research team to work closely with various stakeholders coming from different domains at the same time. These stakeholders all have different mindsets and their familiarity as well as openness towards design research varies. Plus, in a big organization, people often work in siloed departments. They often don’t see the bigger picture and they might not
be aware of how their product has a joint influence with someone else’s product on their customers’ experience. In order to make the research useful for these stakeholders, the research team has to align different stakeholders and help them see the big picture. In the meantime, the research team needs to build mutual empathy with these stakeholders to have them believe in the value of design research and to design the research that satisfies their needs as well as engages them throughout the process.

As you can see, over time, design research has evolved from being specific to the end product or service design to now being engaged in broader organizational activities that shape the development of an entire organization. The potential impact that design research can make becomes much more profound now. However, there is still a long way for design research to reach its full potential. In the meantime, design research practitioners need to not only be good at research and collaborating with designers, but also they should equip themselves with the skills to work in a broader context and collaborate with all kinds of different people.

5.1.3 INCONSISTENT TERMINOLOGIES IN THE DESIGN RESEARCH INDUSTRY

With the development of the design research industry, there is an exploding number of design research related terms coming out of the field. On the one hand, this is a good sign because it shows that more and more people who are coming from different fields have become interested in design research. However, on the other hand, a lot of design research terminology is used inconsistently. Not only does the inconsistent use of terminology make the communication difficult, but it can also lead to ineffective research, as will be explained below.

1) INCONSISTENT TERMINOLOGY MAKES THE COMMUNICATION DIFFICULT
The confusion caused by inconsistent terminology was an issue that was brought up in almost every interview either directly or in a roundabout way. It definitely complicates the communication among people in the design research field. One practitioner commented that “those terms are confusing even for people who are in the field. If you look at the job posting, most likely you won’t be able to tell what it means from a title and sometimes you still won’t be able to tell after reading the detailed descriptions.” During the interview process, the researcher experienced the communication difficulties caused by the inconsistent terminology many times herself. For example, some practitioners use the term “user experience research” as the reference to usability testing and some other practitioners use the same term to represent exploratory user research. Therefore, a lot of clarification was needed during those interviews. Since it is already hard for people in the field to understand each other efficiently, imagine how confusing it could be for an outside audience to understand the design research field. The inconsistent use of terminology could potentially (or maybe already does) hinder the development of the design research industry. It may be that the design research conducted by the practitioners won’t make any impact unless the outside audience, being project stakeholders, participants and general public, understands what the design researchers are talking about.

2) INCONSISTENT TERMINOLOGY CAN LEAD TO SERIOUS MISUNDERSTANDINGS

People tend to interpret different terms based on the names of the terms. This can lead to ineffective research and serious misunderstandings. One good example is about the terms “co-design” and “participatory design”. Many practitioners from the interviews considered “co-design” to mean literally letting participants take the role of designers by generating product ideas with designers. Thus their use of “co-design” can be very limited to certain categories of products. For example, one practitioner expressed
“Sometimes, we would like to take participants all the way to the ideation stage, but sometimes it is just impossible. For example, we want to talk about the ideal gaming experience. There is just no way for participants to quickly prototype a game. There are things that just simply cannot be achieved. “Also, with this perception, practitioners don’t feel confident enough in their skills to use ‘co-design’ in more open-ended front-end research. Another practitioner said “if I know I am going to design an orange bottle, I can hold a participatory design session. It is easy when you have a tangible product. However, a lot of time when I do research, I have no clue what we are going to make. So it is hard for me anyway to have a participatory design session without any constraints. We need to know if we are going to make a system or product and then we can get people to be creative around that product or system.” As you can see, by equating “co-design” with having participants play the roles of designers and literally design the products, researchers constrained their usage of “co-design” to certain categories of products and limited types of research.

However, other practitioners interpreted and used the term “co-design” or “participatory design” differently. They thought co-design or participatory design research was not having participants design the thing, but having participants express their dream experience. The whole point of the co-design exercises is to understand why participants make something in the way that they do, so design researchers can be inspired by what the participants make and so they understand which direction to go in. For example, if the participants say “I wish it had a handle”, it doesn’t mean the design team should add a handle to their product. Instead, design researchers need to uncover the underlying need behind the handle (e.g., “I need to move the product around easily”) and pinpoint the design criteria (e.g., movable) for the design team. Then designers can design to meet those design criteria as well as be inspired by participants’ ideas. These
practitioners argued that although participants are the experts of their own experience, it doesn’t mean they are the design experts. Asking the participants to design the actual products can be very challenging for them and the results may not be effective. Even if participants are capable of thinking through some product ideas, it is not thoughtful enough for the research and design team to literally take their ideas without diving into the why behind those ideas.

Moreover, some of these practitioners thought that the misunderstanding about the concept of participatory design as “having participants design something” could be harmful for the design research industry. One practitioner expressed her concern that “during the past few years, I have seen a lot more skepticism around that kind of stuff (i.e., co-design). The perceptions of participatory and co-design is that people think you are letting participants design. But we are not. We are understanding why they want certain things out of design. Designers are designing it. In fact, I hate the term co-design…Designers don’t like researchers because this notion. They think that we are saying ‘we don’t need you designers, we got people and they will design it’. It is not what we are saying at all. It is a fundamental issue how design research or co-design is explained.” Admittedly, there are some designers who get nervous with participatory design because the term itself implies that users will tell them what to design. If design research practitioners misunderstand and misuse terms such as co-design and participatory design, how can we expect others who are not specialized in design research to understand the field correctly?

This is just one example of the inconsistent use of terminology. There are certainly other more happening in industry. Inconsistent terminology usage confuses people inside the design research community and can result in difficult communication as
well as ineffective research. What’s more, inconsistent usage of terminology holds up the development of the design research field by making it hard for people outside the design research field to understand design research, not to mention getting their “buy-in” for design research. Design research practitioners should really be careful with their usage of different jargons — define their terms when they communicate and ask for clarifications when hearing terms they are uncertain about.

5.1.4 DESIGN RESEARCH IS BECOMING A COMMODITY NOW

Nowadays, there are a number of companies, ranging from large corporations to small start-ups, that have had the experience of design research. This is definitely a good sign and it shows that design research has been widely applied. However, along with this rapid growth, “a lot of the design research has been commoditized”, as a design research director said during the interview. Commodity is something that has no qualitative differentiator and generally comes down to the cost, such as toothbrushes in the grocery store. When consumers shop for commodities, they usually buy products they are on sale or buy products they always buy. Similarly, when many clients look for design research services, they either choose the consultancies that offer cheaper prices or go to the consulting firms they are used to working with. There is not that much difference for them in terms of the quality of the design research services that various design research consulting firms offer. One practitioner described the current situation in the design research consulting firms he worked at, saying “processes or methods are no longer a differentiation anymore. Most of our clients come to us because they have worked with us before…Increasingly we ended up only having one researcher going to the field. We used to have two. Increasingly the project budgets don’t allow for that (having two design researchers going to the field)”. As you can see from this example, clients chose the research consulting firms they worked before over the qualities the research
consulting firm could offer. Also, in order to attract clients to offer repeat business, the research consulting firm had to reduce its budgets and lower its service prices to be more competitive in the market. This situation looks exactly like a commodity market.

Based on the analysis of the fourteen interviews, the researcher identified two strategies of doing design research that may have caused or accelerated the commoditization of design research. The first strategy was following a standard process to conduct design research. One practitioner who works at a design research consulting firm said “we have a standard framework to prepare our methodology… We will always design our methodology around this framework and in that sequence. That’s the best way of getting the data you need”. The case described here is not unique. There are some other companies, especially design research consulting firms, that have developed their standard processes or methodology frameworks. Also, there are some practitioners who don’t necessarily have a standard process laid out but they tend to always use the methods they are most familiar with. One experienced practitioner said the most common problem he found when he was reviewing research plans was that a lot of people chose a method before they learned what the problem was.

Admittedly, a standard process makes it convenient for practitioners to sell their research, to reach consensus within the team, to shorten the time and reduce the time spent on research planning. This is a good strategy to use to increase profits for the companies. However, a standard process is not always a best fit for different stakeholders and participants in different contexts. In fact, any companies or individuals who have a standard process can be seen as evidence that they are not being driven by the research questions, not being empathetic about their stakeholders and not making the most effort to help participants express themselves. Consequently, it is very likely
that the research results that come from the standard process may not be the best answer for the research questions, the research may not get buy-in from stakeholders and not be able to make much impact in stakeholders’ organizations. Furthermore, a standard process eliminates the individual practitioners’ passion to explore better ways to conduct research. One practitioner who used to worked at a company that has a standard process said “when you give people steps to follow for research, their passion for research goes down and the results go down”. What she means here is that if a practitioner starts to follow a standard process, he or she will gradually lose the passion to explore different ways to approach different research scenarios. When the person who conducts the research starts to lose their passion for research, the quality of the research results will go down as well. Imagine that a beginning design research practitioner gets hired in these companies that have the standard process. They will be trained with the company’s standard process too. Without being exposed to other ways of thinking, it is very likely for those beginning researchers to believe the process they learned is the best way to collect data and stick with it. Thus, having a standard way of doing research not only leads to commoditized research, but it also eliminates the individual practitioners’ ability to explore better ways to conduct research.

The second strategy that may have caused or accelerated design research to become a commodity was cutting down the time that should be spent on analyzing data and making the research outputs actionable for stakeholders. Several practitioners shared their stories of experiencing this type of research. One practitioner who works as both an interaction designer and a design researcher at a design consulting firm said sometimes her team switched gears between research and design too fast. When the final deliverable was design and when the time was limited, they just jumped from field research straight to designing without really diving into the analysis and synthesis part.
Even after the design phase, they often didn’t have the opportunity to take a step back and see how the research could be connected with the design. Also, another practitioner said she used to work at a communication company where she got handed a lot of research done by various design consulting firms or the companies’ internal research teams. She was asked to translate the research into creative outputs for marketing purposes. While reading those research reports, she realized that a lot of the research was “made up” — lacking the component of analysis and synthesis. A lot of the research reports she got either didn’t have any actionable suggestions or had some suggestions that didn’t connect back to the data.

Certainly, cutting down the time for analysis and synthesis saved the companies’ budgets and allowed these companies to earn more profits. However, it resulted in ineffective research that stakeholders couldn’t make good use of and it is beginning to tarnish the reputation of design research. One practitioner who worked at a consulting firm said in her experience of selling research to corporate people, she found a lot of the clients had really bad experiences with design research and those bad experiences influenced their perceptions towards design research. When she suggested doing design research to these clients, they thought she was just going to charge them some money to conduct focus groups and come back with a bunch of pictures with people talking to each other. In these stakeholders’ opinions, they paid one consulting firm to do some design research and they got back a bunch of field research pictures which wouldn’t be much different if they had hired any other consulting firm. In their eyes, design research had already become a commodity.

Both these two strategies mentioned above have resulted in design research becoming a commodity. Companies who used these strategies gained more profits in the short
term, but in the long run, these strategies tarnished the reputation for the design research industry and they have exerted harmful effects on the development of design research. However, not all design research projects have fail. There are practitioners and firms that do useful relevant design research. The practitioners who conduct this type of research tend to have more design research experiences. They emphasized the importance of making organizational impact with their research and they really cared about how they could use their research to help their stakeholders achieve their business goals. Also, during the interviews, these practitioners stated that it was important to stop research from becoming more commoditized. In order to prevent stakeholders from losing faith in design research, the researcher believes that design research practitioners have to realize that just providing stakeholders with information about people is not enough and practitioners have to make sure their research can make organizational impact and empower their stakeholders to make better decisions.

5.1.5 CONCLUSION

In conclusion, over the past twenty years, design research has been through a rapid growth. It has reached more audiences and been applied in more industries than ever before. Now design research is not only used in the design development pipeline to inform the design of a product or service, but it is also conducted at the fuzzy front-end of design development process and the upper end of a design development pipeline to inform directional decisions on the design of a new system, product or service. The impact design research is making has become bigger and bigger.

However, this rapid growth also brought about some negative consequences. First, terminology is being used inconsistently. The inconsistent terminology has made the communication among researchers as well as stakeholders much more difficult than it
should be. Also, the inconsistent terminology has caused serious misunderstandings of research concepts, in ineffective research. Second, while more and more practitioners and companies have started conducting design research, much of the research has been commoditized. Some practitioners and companies have adopted short term strategies such as following a standard research process or reducing the time spent on data analysis to lower the cost of their research projects. As a result, lots of ineffective research has been produced. This research wasn’t able to make much impact in stakeholders’ organizations and the usage of these short-term strategies tarnished the reputation for the design research industry as a whole.

In order to help the design research field continue growing, design research practitioners not only need to be good at conducting research itself but they also should be able to collaborate with various stakeholders and make organizational impact with their research.

5.2 UNDERGRADUATE DESIGN STUDENTS’ PERCEPTIONS TOWARDS DESIGN RESEARCH

In the Design Research II course, the junior level design students at The Ohio State University conducted their first real world design research project working in interdisciplinary teams. This was their second design research course. They had already learned about evaluative research and experiential research in their sophomore year. In the Design Research II course, their focus was on learning experiential and generative design research with the mindset of designing with people. At the end of the Design Research II course, students answered the final journal question (see Appendix A) in which they were asked to rate the usefulness of different course components (such as the text book, in-class meetings, guest lectures, etc.), and then select three of the course
components to discuss why these components were rated as they were and suggest new components that should be added next year. While explaining specific ratings, many students expressed their thoughts and perceptions towards design research in general. The main themes will be described in the following sections.

5.2.1 STUDENTS HAD A HARD TIME RELATING DESIGN RESEARCH TO THEIR OWN MAJORS
Many students felt it was hard to connect design research to their own majors. It appears that not every design discipline has integrated design research well into their design courses. Students thought there was a discrepancy between what they learned in the design research course and what they were practicing in their design studio classes. One student said “This course has been difficult to relate to our major since we are doing it so differently in other classes”. Another student expressed similar feelings in stating that “design research is an abstract field for most of us I believe. Not many of us have had experience with this and some concepts are difficult to understand”.

Although most of the design research principles can be applied to all the design disciplines, many students wanted to learn how to apply design research to their own majors specifically. In the Design Research II course, the instructor created interdisciplinary student teams. The teams were asked to focus on understanding participants’ current experiences and exploring their future experiences rather than conducting research for designing a particular type of “thing” which may not be the best solution for the participants. However, not every student saw the value of working in interdisciplinary groups and focusing on experiences. Some students said in the final journal question that they wished they could have their research learning more catered towards their own major by working with people in the same major and gearing their
projects towards their respected majors. The need of wanting more major-specific content in the design research course was particularly revealed in students’ responses to the guest lectures. In the second half of the course, several design research practitioners were invited to give guest lectures about their experience working as design research professionals in industry. Most of the students really appreciated these guest lectures. However, since none of the guest lectures had the background of interior design or conducted research in the interior design space, many interior design students felt they were being left out and they said they didn’t know how to apply what they heard from the guest lectures to their own major.

The responses to the journal question showed that students wanted the experience of applying design research to their own design process. Without the experience, it is hard for students to understand design research and make the connection between design research and their own disciplines. However, it is not to say that design research needs to be taught in a major-specific way, but it is important to provide students with the opportunities to apply their research skills in their design projects. This could be potentially achieved by integrating design research into students’ studio courses.

5.2.2 STUDENTS WERE INITIALLY NOT AWARE OF THE NEEDS AND IMPORTANCE OF DESIGN RESEARCH IN INDUSTRY

Initially many students were not sure whether what they learned in the design research course would be useful in their future career or not. In students’ previous experiences, they were not exposed to much real world application of design research and some students didn’t even know that there were people working as design research professionals. In the responses to the final journal question, a number of students expressed their appreciation for the guest lecturers. The case studies they shared showed
students how design research was used to inform design in industry and illuminated the importance of design research, confirming the value of what students learned in class. Here are some of the key quotes from students’ responses. “Like to hear real world applications of design research. It makes design research seem more real when you hear the real projects going on.” “I like the guest lecturers because they make me confident in the skills I have learned in the past two classes.” “The visits gave credibility to the things we were doing in class.” Also, the guest lecturers revealed what it is like to work as design research practitioners. Students found the information really helpful since most of them were considering their future career options. One student said in the journal question that “having a specific job to reference when thinking about design research career is very helpful”. Similarly another student said “the guest lecturers were insightful about what to expect if you are planning on going into the design research field.” Moreover, some students suggested to have some field trips to different companies and have some examples of well-done design research portfolios, so they can know more about the profession and what is expected from them if they want to be a design researcher after graduation.

Based on these responses, it was very clear that students really need to be more connected with industry. Before having the guest lectures, many students were not aware of the needs, the importance or even the existence of design research as a profession in industry. After hearing the real world case studies, students became not only more confident about the skills they learned in class, but also more interested in design research. Some of them even started considering taking design research as a career path. Exposing students to what is happening in industry and what practitioners are doing in their daily jobs will help them recognize skills they need to learn in school, motivate them to acquire those skills and prepare them better to transition from students
to practitioners. This could be potentially achieved by having guest speakers, visiting different companies and reading related articles. Also, real world case studies that include research should be shared in other design courses to reinforce the needs of research in industry.

The junior students who participated in the research had already had two design research courses, yet they were just starting to understand why they needed to learn design research. Many of them did not have much experience of applying design research to their design process and neither were they exposed to much real world application of design research. Perhaps, it is not sufficient for students to only learn and conduct design research in two design research courses. Support from other design faculty members and contributions from practitioners are needed to provide students with opportunities to apply design research to design, to keep students connected with industry and to help students establish a well-rounded perspective towards design and design research.

5.3 CONCLUSION

It is evident that over the past twenty years, the field of design research has been through a rapid growth. In today’s world, design research has many opportunities to continue growing, but at the same time it faces challenges as well. There are more responsibilities for today’s practitioners to address in order to help the field to continue growing. Compared to what is introduced in Chapter 2, today’s design students definitely have more exposure to design research. However, within the current educational structure, it is hard for these undergraduate design students to grasp design research. Many of the students are still struggling how to connect design research with their own majors and figuring out why it is important for them to learn about design research.
The gap between what is needed in the design research industry and what the undergraduate education is able to allow design students to do starts to appear. This gap is even larger for undergraduate design students who do not take any required design research courses, as is the case at most universities.
CHAPTER 6: DESIGN RESEARCH PRACTITIONERS’ PROCESSES OF RESEARCH PLANNING AND EXECUTION

Based on the overall context of the design research field, chapter 6 dives into the design research practitioners’ processes of research planning and execution. The following pages describe how the patterns among these practitioners’ research processes were determined and what the patterns are. In order to compare these practitioners’ research processes, the researcher first selected three representative beginning practitioners and three experienced practitioners as the extreme cases to compare. Section 6.1 first visualizes both the three representative beginning practitioners’ processes and the three representative experienced practitioners’ processes as a whole. It then compares these two visual summaries and reveals the similarities and differences between the two extreme cases. Then in section 6.2, the researcher take a step back and reviews all the practitioners’ research processes. Finally, the patterns among all fourteen practitioners’ processes of research planning and execution are revealed.

6.1 SUMMARIES OF THE THREE EXTREME EXPERIENCED PRACTITIONERS’ AND THE THREE EXTREME BEGINNING PRACTITIONERS’ RESEARCH PROCESSES

6.1.1 AN INTRODUCTION FOR THE SUMMARIES

In order to look for patterns and differences among the fourteen design research practitioners’ processes of research planning and execution, three beginning practitioners and three experienced practitioners were selected as the extreme cases for comparison. They each represent the least or the most experienced practitioners among the fourteen
interviewees. When selecting these practitioners, their years of experience in conducting design research and their breadth of experience for having worked with various types of companies as well as industries were considered as the criteria for selection. The three beginning practitioners all had less than three years of experience conducting design research and their current job is also their first full-time design research position. The three experienced practitioners all had over eight years of experience conducting design research and they had worked at different types of companies within various industries. More detailed background information about the selected three experienced practitioners and the three beginning practitioners’ background information can be found in sections 6.1.2 and 6.1.3.

The researcher created visual summaries of the three experienced practitioners’ research processes in Figure 7.2.1 and the three beginning practitioners’ research processes in Figure 7.2.2. First, it is important to keep in mind that the summaries were created based on what the practitioners talked about in the interviews. The researcher went through the transcriptions of the interviews, color coded each paragraph by the conversation topics and visualized the size of each research step based on its corresponding length of transcriptions. Since what people say is not always equal to what people do and the focus of the interview was on research planning as opposed to the whole research process, there may be steps that practitioners conducted during the research process but were not mentioned in the interviews. In those cases, those steps were not documented in the visualizations. Second, both graphs were created based on three practitioners’ cumulative processes. The cumulative summary reflects what the three practitioners’ individual processes were in general but there may be some steps that one practitioner didn’t mention that are still shown in the cumulative summary.
6.1.2 THE CUMULATIVE SUMMARY OF THREE REPRESENTATIVE EXPERIENCED DESIGN RESEARCH PRACTITIONERS’ PROCESSES OF RESEARCH PLANNING AND EXECUTION

The three representative experienced design research practitioners all had more than eight years of experience working in the design research industry and they had a breadth of experiences with different types of companies and industries. One practitioner had been working as an in-house design researcher in a Fortune 500 company for four years. Before this job, she worked at a design research consultancy for more than eight years. Another practitioner had been working at a mid-size design research consultancy for six years. Before entering into the consultant world, he worked as an in-house design researcher for almost two years. The last practitioner co-founded her own “user-centered innovation” company two years ago. Before that, she had been working at various research consulting firms for over twenty years.

Figure 6.1 is the cumulative summary of the three representative experienced design researchers’ processes of research planning and execution. In the graph, each fan shape represents one step in the process of research planning and execution. The red ones are steps of research planning and the green ones are steps of research execution. The size of the fan shapes shows the relative amount of time these experienced practitioners cumulatively spent on talking about each step during the interview. The arrows represent the information flow. The thick grey arrow around the middle indicates that the information comes out from one step and then informs the next step. The thinner grey arrows represent the information flows among discrete steps. Specifically, the thinner grey arrows going clockwise outside the circle show how information coming out from the previous steps guides the later steps. The thinner grey arrows going counterclockwise inside the circle show how information collected from the latter steps
informs the understanding gained from the previous steps. All the arrows together form feedback loops throughout the whole process.

Figure 6.1 *The Cumulative Summary of the Three Representative Experienced Design Researchers’ Processes of Research Planning and Execution*
In the three experienced design research practitioners’ processes of research planning and execution, there are seven steps — “conduct internal discovery”, “plan the overall research”, “collect data, consolidate information and modify or concretize the research plan”, “plan the analysis, analyze, check-in with stakeholders and modify analysis plan”, “plan the bridging”, ”bridge the research to the next step”, “follow up with stakeholders” and “initiate a new study”. These steps follow each other in sequence.

1) CONDUCT INTERNAL DISCOVERY
First, before the three experienced practitioners even started drafting their research plan, they conducted internal discovery with stakeholders (see Figure 6.2). This was a critical step for all three experienced design research practitioners to plan and execute the rest of their research, because it laid the foundation for their projects to be successful. One experienced practitioner who works at a research consultancy said “we increasingly spend more and more time to research our clients and get to learn our clients because it will have such a big impact on what we do.” Also, one in-house practitioner told the researcher that a lot of departments in her company worked in silos and even though they were providing a connected service for their customers, they were not aware of what each other was doing. In order to conduct impactful research for the organization, she had to identify all the key stakeholders and meet with them to understand what they knew about the research space and what problems they had.

During the internal discovery step, the three experienced design research practitioners spent a lot of effort to gather information from stakeholders, such as what is the goal the stakeholders want to achieve at the end? what are the criteria for success? and how much do stakeholders already know about the research space? From this process, the three experienced practitioners tried to understand stakeholders, define the research goals
and questions and get a basic understanding of participants through the stakeholders’ perspectives. This information was then synthesized by the experienced practitioners to inform their research plan.

Figure 6.2 *The Step of Conducting Internal Discovery in the Cumulative Summary of the Three Experienced Design Research Practitioners’ Processes*
2) PLAN THE OVERALL RESEARCH

In this step, the three experienced design research practitioners used the information gathered from the internal discovery to drive the important decisions on their overall research planning process (see Figure 6.3), such as how to design the research.

Figure 6.3 The Step from Conducting Internal Discovery to Planning the Overall Research in the Cumulative Summary of the Three Experienced Design Research Practitioners’ Processes
activities so the stakeholders could be engaged in the process, the research questions could be answered effectively, the participants could better express themselves, how long each activity should take and who would execute each research activity. During the interviews, the researcher found that it was hard to gather in-depth information about how the three experienced design research practitioners apply specific methods to different questions. Part of the reason may be that there are so many factors that influence their decisions on methods. There is no standard formula that can be applied to all projects. Another reason may be that after so many years of practice, this way of knowing becomes tacit knowledge and is difficult for them to verbalize.

3) COLLECT DATA, CONSOLIDATE INFORMATION, THEN REFLECT ON IT AND MODIFY OR CONCRETIZE THE RESEARCH PLAN

In this step, the three experienced practitioners collected data to answer the research questions (see Figure 6.4). Also, they tried to engage stakeholders in this process as much as possible. During this step, the experienced practitioners periodically consolidated the new information they gathered along the way, reflected on it and modified or concretized their research plan accordingly. The new information included the new data collected about participants as well as the new understanding they gained about stakeholders. As the counterclockwise arrows show in Figure 6.4, the experienced practitioners compared the data they collected about participants with the research plan they created at the beginning of the research to see if they answered the research questions effectively and if the hypotheses they had before were correct. Also, the experienced practitioners compared the understanding they gained about stakeholders through the data collection step with their understanding of stakeholders gained from the internal discovery step to see if it supported or contradicted their previous understanding and why. Based on the comparison, the experienced practitioners reflected on what they
could do better to achieve the research goal, to help participants express themselves and
to engage stakeholders in the process. If necessary, the experienced practitioners would
modify their plans or concretize their plans accordingly. Depending on the relationship
the experienced practitioners had with their stakeholders or whether they worked

Figure 6.4 The Steps from Conducting Internal Discovery to Data Collection in the
Cumulative Summary of the Three Experienced Design Research Practitioners’ Processes
outside or inside the company, practitioners had different levels of flexibility to change
their plans. Overall, the three experienced practitioners always kept an eye on the data
they gathered from the research to see what they could do better. The three sub-steps
— “collect data”, “consolidate the new information, then reflect on it” and “modify or
concretize the research plan” — were repeated until all the necessary data were collected
and the research questions were answered. As the counterclockwise and clockwise
arrows show, feedback loops start forming and the planning appears to be an iterative
process in the data collection step.

4) PLAN THE ANALYSIS, ANALYZE, CHECK-IN WITH STAKEHOLDERS AND MODIFY THE
ANALYSIS PLAN

In this step, the three experienced research practitioners created their analysis plan and
conducted their analysis. As the arrows pointing to “plan the analysis” show in Figure
6.5, the experienced practitioners’ analysis plan was created based on the collected
data, the research goal and the understanding of stakeholders. During the process of
analysis, the experienced practitioners checked in with their stakeholders to see if they
were going in the right direction with their analysis. Depending on the stakeholders and
the project contexts, the “check in” step could take different forms. For example, one
practitioner said “typically, we have what we called top-line documentation which is a
first draft of the research documents. It is usually intended as a document that has pretty
much the main things we learned but not intended to be made as our final findings we
want to communicate. That document is a chance for us to review our findings with our
clients and review our analysis with our clients.” Also, sometimes, instead of reporting
to stakeholders what has been done in the analysis process, experienced practitioners
involved stakeholders in the analysis process and got their input directly. After the
step of “check in”, based on stakeholders’ feedback, the experienced practitioners
then modified their analysis plan accordingly. Also, through the “check in” step, the experienced practitioners gained more understanding about their stakeholders and the organizational context the stakeholders were in. This new understanding, together with the understanding of stakeholders gained from the previous steps, informed the...
modification of the analysis plan. As the Figure 6.5 shows above, while the research steps proceed, more and more feedback loops emerge in the process and the planning process is tied in with the execution process. The plan guides the execution and the execution informs a new plan. Together, they form an iterative integrated process.

5) PLAN THE “BRIDGING” STEP AND BRIDGE THE RESEARCH TO THE NEXT STEP

This is a step called bridging. In “bridging”, the researcher fills the gap between research (the analyzed data) and stakeholders’ next steps (e.g., design, business strategy, engineering work, etc.). This is another step that the three experienced design research practitioners talked a lot about. For example, one experienced practitioner emphasized that “we have to rely on them (stakeholders) understanding that (the research findings as well as implications) and taking that and owning that, because they are going to be the people who make the decisions and drive the project to move forward.” This bridging step eventually determines whether stakeholders will be able to take actions on the research.

In this step, the experienced practitioners first planned what they could do to bridge the gap between research and the stakeholders’ next steps. As the arrows show in Figure 6.6, the plan was informed by the analyzed data, the research goal and the understanding of stakeholders gained along the entire research process. After that, the experienced practitioners executed their “bridging” plan and made their final research deliverables. The deliverables took various forms such as large posters, short video clips, concise presentations, detailed reports and workshops. The design of the deliverables was focused on helping stakeholders empathize with the research participants, enabling them to take actions on the research and implement these actions in their organizations.
6) FOLLOW UP WITH STAKEHOLDERS

Typically, design research projects end at the previous step. However, two of the three experienced design research practitioners mentioned that they sometimes followed up with the team who took the research deliverables to see if they had any questions about applying the research to their work or if they had some other questions that were
not resolved from the last research project (see Figure 6.7). This happened more often when the research team and the team who took actions on the research were in the same company.

Figure 6.7 The Steps from Conducting Internal Discovery to Following Up with Stakeholders in the Cumulative Summary of the Three Experienced Design Research Practitioners’ Processes
7) INITIATE A NEW STUDY

Also, sometimes, the experienced practitioners proposed a new research study. One practitioner mentioned that over the past several months she had been creating a big end-to-end customer journey of crossing different touch points and it had gained a lot of traction inside the company. By having the big customer journey laid out, her team was able to identify knowledge gaps and they proposed the research to the different business owners rather than waiting for the business owners to come to them. Then the process loop closed and the whole research process started again.

As the length of the large color blocks in the graph show in Figure 6.1, during the interviews, the three experienced design research practitioners primarily focused their talk on “conduct internal discovery”, “consolidate collected information then reflect on it and modify or concretize the research plan” and “plan the ‘bridging’ and bridge the research to the next step”. The secondary focus was on “plan the overall research” and “check-in with stakeholders during the analysis process and modify analysis plan accordingly”. All the steps are connected with each other. Together, they form a closed loop. Also, in the experienced practitioners’ entire research process, research planning is not just one stand-alone step, but an iterative process integrated in the entire research process. The plan guides the execution whereas the understanding gained from the execution process informs a new plan. There are many on-going feedback loops constantly forming in the process.
Correspondingly, three representative beginning practitioners were selected and their cumulative processes were visualized to compare with the cumulative processes of the three experienced design research practitioners’ processes.

**6.1.3 THE CUMULATIVE SUMMARY OF THE THREE REPRESENTATIVE BEGINNING PRACTITIONERS’ PROCESSES OF RESEARCH PLANNING AND EXECUTION**

Correspondingly, three representative beginning practitioners were selected and their cumulative processes were visualized to compare with the cumulative processes of the
representative experienced practitioners’.

The three representative beginning design research practitioners all had less than three years of experience in design research and their current job was their first full time design research job. One practitioner had just graduated from graduate school two years ago where she majored in design research and since then she has been working at a Fortune 500 company in the customer innovation team focused on design research. The company just formed their customer innovation team three years ago. There were people with all kinds of backgrounds joining this team and a lot of them were not familiar with design research before joining. Only this practitioner and one of her colleagues were trained in design research. The second beginning practitioner had more than ten years of experience working in the web industry doing interface design and five years of experience working as a project manager. She went to graduate school three years ago and discovered design research there. After graduation, she has been working at a three person research team in a design consultancy. The last practitioner had the background of interaction design. While working at a technology company as an interaction designer, she participated in several research projects and found that she really enjoy doing it, so she changed her job and joined a mid-size mobile company working as design researcher. She has been with that company for three years. There are two other full time design researchers working at her company.

Figure 6.9 is the cumulative summary of the research planning and execution processes for the three representative beginning design researchers. In this graph, each fan shape represents one step in the process of research planning and execution. The red ones are steps of research planning and the green ones are steps of research execution. The size of the fan shapes shows the relative amount of time these beginning practitioners
cumulatively spent on talking about each step during the interview. The arrows represent the information flow. The thick grey arrow around the middle indicates that the information comes out from one step and then informs the next step. The thinner grey arrows represent the information flows among discrete steps. Specifically, the thinner grey arrow going clockwise outside the circle show how information coming out from a previous step guides a later step. The thinner grey arrow going counterclockwise inside the circle show how information collected from a later step informs the understanding gained from a previous step. All the arrows together form a feedback loop throughout the whole process. The violet-red arrow refers to the perceived “unexpected factors” that had an influence on the projects.

In the process of research planning and execution, there are primarily six steps — “conduct internal discovery”, “plan the overall research”, “collect data, consolidate information then reflect and modify the research plan”, “analyze”, “bridge research to the next step”, “follow up with stakeholders” and “initiate a new study”. These steps follow each other in sequence.

1) CONDUCT INTERNAL DISCOVERY

During the interviews with the three beginning design research practitioners, the internal discovery step was briefly mentioned by two practitioners. For beginning design research practitioners, the internal discovery step was mainly about defining the research goals and the research questions. One practitioner who worked as an in-house researcher mentioned that when they got a project, they generally tried to assess what they knew, what they thought they knew and what they didn’t know. Based on that, they defined what their assumptions and questions were. Also, another practitioner said as a consultant, she usually tried to understand why the clients brought her research team
into the projects, so they knew what they were expected to achieve in the projects.

Figure 6.9 *Beginning Design Research Practitioners’ Process of Planning and Executing Research*
2) PLAN THE OVERALL RESEARCH

Based on the research goals and questions defined in the internal discovery step, the three beginning practitioners came up with their research methods, schedule and budget allocation in the next step. All three beginning practitioners said the methods they used for different projects depended on the respective research questions. However, one practitioner in the later stage of the interview contradicted herself by saying “we take our process into different projects. It is generally pretty standard. We are usually pretty good and sort of experts. It is usually the researcher who comes up with the research plan and presents it to the rest of the stakeholders and we start with execution.”

Also, another beginning practitioner said that “when we do start broad, we start with ethnographic interviews, of course.” Although it does seem that this practitioner selected methods based on the type of questions, the “of course” used at the end of the sentence indicates that when the practitioner encountered a broad question, she automatically went into her default mode — applying the method of ethnographic interview. Perhaps some beginning practitioners intended to apply their methods based on the research questions, but it was easy for them to fall in the trap of adopting the methods or process they were most familiar with.

3) COLLECT DATA, CONSOLIDATE INFORMATION, THEN REFLECT AND MODIFY THE RESEARCH PLAN

Data collection was something the three beginning practitioners spent most of their time talking about during the interviews. All three beginning practitioners gave a number of case studies where they used different methods in various projects and they all mentioned involving stakeholders in the data collection process to get their buy-in for research or help disseminate data faster. However, none of the three beginning practitioners talked about engaging stakeholders in the process in other ways or at
other points in the process. Plan changing was also mentioned by some beginning practitioners. However, only the practitioner who used to work as a project manager gave an example of proactively seeking opportunities to improve her research plan. In one project, she was not able to conduct all the interviews in the field, and she had to do half of the interviews in the lab instead. She deliberately planned to have one day of field visits followed by another day of lab interviews. After a day of field visits, she always reflected on what she learned in the field and thought about how she could modify the interview guide so her lab interviews could be more successful. That’s why there are two thin grey arrows forming the only feedback loop in the process (see Figure 6.9). Another beginning practitioner also had the experience of changing the plan during the data collection process, but her plan changing case was more reactive and she was not prepared for the changes. It was a project she conducted in the restaurant context. Before conducting the research, her team prepared a binder with structured observation guides having different blanks they thought they were going to fill in with answers. However, when they got into the field, they realized that in restaurants things were always changing and it was really hard for them to fill in the blanks. In the end, they had to put aside their binders and just grabbed their recording device to capture everything. Her lesson learned from this case was that practitioners have to be very flexible with their ways of collecting data. Still, being flexible with ways of collecting data was different from proactively consolidating knowledge and looking for opportunities to better achieve research goals.

4) ANALYZE

Data analysis was briefly mentioned by two practitioner as one step they conducted after the data collection step. One practitioner said sometimes she would involve stakeholders in other departments to participate in this step.
5) **BRIDGE RESEARCH TO THE NEXT STEP**

In this step, the three beginning practitioners communicated their research findings to their stakeholders. The practitioner who used to work as a project manager pointed out the extra effort she put into this step to help stakeholders take the ownership of the research results. She gave the example of her conducting ideation workshops with stakeholders to help them understand the research and start taking actions on the research by generating ideas based on it. She said “we get a lot of buy-in from clients. They are usually very into the solution we came out from the workshop because they helped to create it.”

6) **FOLLOW UP WITH STAKEHOLDERS**

Usually, design research projects for the beginning end at the previous step. Depending on the context, the beginning practitioners may follow up with their stakeholders after the research. One practitioner said that when her consultancy got both the research and design work, she would check-in with the design team and provide feedback for their design. Another practitioner said sometimes she would do the exploratory research first and follow up with designers to do some usability tests later.

7) **INITIATE A NEW STUDY**

Sometimes, the beginning practitioners tried to initiate a new study. One practitioner gave the example that she once did a project where she found a new opportunity her client could dig more into, so she proposed another more in-depth research study into that particular opportunity and ended up getting more work from the client.

As the graph shows in Figure 6.9, the interviews with the three beginning design research practitioners were primarily focused on their data collection step and the
secondary focus was given to “plan the overall research”, “conduct internal discovery” and “bridge the research to the next step”. All the steps are connected with each other and form a close loop. Beginning practitioners’ research process is relatively linear. The research planning steps usually happen at the beginning of the research process. Occasionally, beginning practitioners change their plans in the field. Even less likely, beginning practitioners actively seek out opportunities to improve their research plans. Thus, feedback loops are not very evident in their process.

6.1.4 A COMPARISON OF THE TWO CUMULATIVE SUMMARIES

Just by looking at the cumulative summaries of the three beginning and the three experienced practitioners’ processes, there are already many patterns and themes rising to the surface. Here the researcher puts both summaries in one graph (see Figure 6.10) in order to compare the similarities and differences.

In terms of the similarities, both the three beginning practitioners and the three experienced practitioners had primarily seven steps involved in their research process — “conduct internal discovery”, “plan the overall research”, “collect data, consolidate information, reflect on it and modify the research plan accordingly”, “analyze”, “bridge research to the next step”, “follow up with stakeholders” and “initiate a new study”. Also, the seven steps follow each other in the same order in both processes.

There are obviously many differences between the two processes, too. First, the relative amount of time the three beginning practitioners and the three experienced practitioners spent on talking about each step was very different. The three beginning practitioners focused their conversations on giving multiple examples of using different research methods in various projects, while the three experienced practitioners put
Figure 6.10 A Comparison of the Two Cumulative Summaries with the Three Experienced Practitioners’ Cumulative Processes on the Right and the Three Beginning Practitioners’ Cumulative Processes on the Left
more stress on how they conducted their internal discoveries, continued consolidating their knowledge and modified their plans accordingly throughout the process as well as how they bridged their research to the next step. For the experienced practitioners, the internal discovery conducted at the beginning of the process laid the foundation for their successful research projects. The constant reflection throughout the process helped the experienced practitioners make sure that they were on the right track getting the truthful deep insights and they were able to have their stakeholders engaged in the process. The bridging step was also critical for experienced practitioners, since it directly determined whether their stakeholders would be able to use the research and how much impact the research could make throughout the organizations. Second, although both the beginning practitioners and the experienced practitioners had their stakeholders involved in the data collection and analysis process, the three experienced practitioners paid more attention toward engaging their stakeholders in the process rather than just having their stakeholders be present in the filed research. The experienced practitioners looked out for their stakeholders’ reactions in the process and they modified their research activities accordingly to have the stakeholders more engaged in the research sessions. However, besides having stakeholders present in the research field, the beginning practitioners didn’t take a step further to actually get their stakeholders interested and help their stakeholders play more active roles in the research process. How to improve the stakeholders’ experiences in the research process was not the focus for the three beginning practitioners. Third, the three beginning practitioners’ research processes were more linear with fewer feedback loops and the research planning process mainly happened at the beginning of the process. Two of the beginning practitioners said they usually just executed their research plan unless something unexpected happened and they had to change their plan to keep the research project going on. On the contrary, the three experienced practitioners’ research processes were much more iterative with
many feedback loops going back and forth throughout the whole process. The three experienced practitioners constantly consolidated their knowledge and they reflected on the new information they gathered by comparing it with their previous assumptions and the information they gained from the former steps. Based on the reflection, the three experienced practitioners changed their plans accordingly.

Overall, the big structures of the three beginning and the three experienced practitioners’ research processes were similar, but their emphasis on the research steps, the engagement of their stakeholders and the linearity of their processes were quite different.

6.1.5 ONE OF THE THREE BEGINNING PRACTITIONERS STARTED TO TRANSITION FROM A BEGINNING PRACTITIONER TO A MORE EXPERIENCED PRACTITIONER

While summarizing the three representative beginning practitioners’ cumulative research processes, the researcher realized that the process of one beginning practitioner was different from the other two beginning practitioners. A few steps wouldn’t have appeared in the cumulative summary of the three representative beginning practitioners’ processes, if this practitioner hadn’t mentioned them. This is the practitioner who previously had ten years of experience working in the web design industry and five years of experience working as a project manager. For the purpose of easy reference, “practitioner J1” was given as the code name for her and it will be used in the rest of the thesis.

The researcher took a close look at practitioner J1’s individual research process (see Graph C in Figure 6.11) and compared it with the other two representative beginning practitioners’ cumulative research processes (see Graph B in Figure 6.11) as well as the
three representative beginning practitioners’ cumulative research process (see Graph A in Figure 6.11). In order to easily compare these three processes, the researcher scaled the size of the middle ring in Graph C to be one third of the size of the middle ring in Graph A and the size of the middle ring in Graph B to be two thirds of the size of the middle ring in Graph A. Thus, the proportional differences among various steps

Figure 6.11 *A Breakdown of the Three Beginning Practitioners’ Cumulative Research Processes (Top) into the Practitioner J1’s Research Process (Right) and the Other Two Beginning Practitioners’ Cumulative Research Process (Left)*
in Graphs B and C could remain the same as the proportional differences in Graph A. Also, to increase the readability, the researcher provided a close shot of the practitioner J1’s process in Figure 6.12 and a close shot of the other two representative beginning practitioners’ cumulative process in Figure 6.13.

Figure 6.12 The Summary of Practitioner J1’s Process of Research Planning and Execution
However, as the Graphs B and C show in Figure 6.11, only practitioner J1 talked about consolidating new information learned in the field, reflecting on it and modifying the plan accordingly. The other two beginning practitioners usually just executed their initial research plan unless there was something disruptive (e.g., the pink arrow in Graph B) happening in the process and they had to change their plans to continue the study. That’s
why only Graph C has a feedback loop on it. Another difference shown on Graphs B and C was that practitioner J1 spent relatively more time talking about “conducting internal discovery” and “bridging the research to the next step” than the other two practitioners did. Practitioner J1 mentioned that as a consultant, before starting the project, it was important for her to understand why the clients hire them and what was the expectation her clients had on her team. Also, she gave an example of her conducting workshops with various stakeholders to help them act on the research findings during the “bridging” step. Lastly, practitioner J1 also had the experience of initiating a new study rather than waiting for the clients coming to her. This was a step that the other two beginning practitioners didn’t mention in the interviews.

Based on the differences and similarities shown among the three graphs in Figure 6.11, it seems that practitioner J1 was transitioning to become a more experienced practitioner. Compared with the other two beginning practitioners, practitioner J1 paid more attention to understanding her stakeholders at the beginning of the research process and put more efforts on helping the stakeholders act on the research findings at the end of the research process. Also, she incorporated iterative learning in her data collection process, which was one step towards more integrated iterative learning throughout the entire process.

Connecting the differences between the practitioner J1’s process and the other two beginning practitioners’ cumulative processes with their respective backgrounds, the researcher realized that the transitioning that practitioner J1 was experiencing may be related to her past experiences in general. Compared to the other two beginning practitioners, practitioner J1 had been in the user experience field for ten years working as a user interface designer and she also worked as a product manager for five years. These are the rich and relevant experiences the other two beginning practitioners didn’t
have. Therefore, apart from the experiences practitioners had with design research, there could be many other factors that had an influence on practitioners’ processes of research planning and execution.

6.2 AN OVERVIEW OF THE FOURTEEN PRACTITIONERS’ RESEARCH PROCESSES

Now that the researcher found the similarities and differences between the two extreme cases — the three very experienced practitioners’ and the three very beginning practitioners’ processes, she took a step back and looked at the rest of the eight practitioners’ research processes to see how and why their processes were similar or different from the six representative practitioners’ processes.

It turned out that the processes described by the three very experienced practitioners were very similar to the cumulative summary of the three representative experienced practitioners’ processes in Figure 6.1. The processes described by the remaining five practitioners with various levels of design research experiences were shaped somewhat differently from each other but they all seem to fit in between the cumulative summaries of the three representative beginning practitioners’ processes and the three representative experienced practitioners’ processes.

In Figure 6.14, the researcher created a visual summary for all fourteen practitioners’ research processes. The two cumulative summaries were used to represent the three representative beginning practitioners’ and the six experienced practitioners’ individual processes respectively. Also, the researcher visualized two of the five remaining practitioners’ processes as examples to show how these five processes varied in between the two representative processes.
It appears that all fourteen practitioners’ processes graph fall into three groups. The three beginning practitioners were in one group with the processes that were relatively linear and had a focus on collecting data. They all had less than three years of design research experience. They had only been working at one company focused on doing design research. The companies they worked at just started doing design research not too long ago. The teams they worked with were relatively small with two or three full time design researchers. The five practitioners with various levels of experiences were in another group with processes that fit in between the two visual summaries. These five practitioners had different numbers of years of design research experience ranging from a little over one year to six years. Some of them had been working at the same company since their first day being a design researcher. The other practitioners had worked at several different places over the years. All of the five practitioners worked at companies that had been conducting design research for a relatively long time and they worked in the teams that had practitioners who were very experienced in design research. The six experienced practitioners were in the last group with iterative research processes that focused on conducting internal discovery, consolidating the information in the process and bridging the research to the next step. All these six practitioners had over eight years of experiences conducting design research. They had worked at different companies in their career lives. Some companies they had worked at had a very long history of doing design research but others had just started doing design research when they joined. Over the years, they had worked with various types of stakeholders in different industries and faced many different challenges.

So why were these practitioners’ process graphs shaped differently? Why were some beginning practitioners’ process graphs different from the cumulative summary of the three representative beginning practitioners’ process graphs? In order to understand
Figure 6.14 *A Visual Representation of These Fourteen Practitioners’ Research Process*
these questions, the researcher looked into what the practitioners in each group talked about in their individual interviews.

The reason why the three beginning practitioners’ processes were shaped the way they were was mentioned in the previous chapter. More detailed information can be found in section 6.1.3.

6.2.1 WHY THE SIX EXPERIENCED PRACTITIONERS’ PROCESSES WERE SHAPED THE WAY THEY WERE

In comparison, in the six experienced practitioners’ processes, their goal was not just to provide stakeholders with the information they needed but also to make sure that their research was able to make organizational impact in the stakeholders’ organizations. In the conversations with six experienced practitioners, they focused more on the steps of “conduct internal discovery”, “consolidate new information, reflect on it and modify the plan accordingly” and “bridge the research to the next step” which were all very critical for them to make organizational impact.

During the step “conduct internal discovery”, the six experienced practitioners first defined their research goals and questions with the relevant stakeholders to make sure that their research fit into the bigger project context and it supported the relevant stakeholders to achieve their shared business goals by filling their knowledge gaps. Second, in this step, the six experienced practitioners built mutual understanding with their stakeholders in the internal discovery step. This allowed the research team to understand their stakeholders so they could design the research activities that engaged their stakeholders and it enabled stakeholders to understand the researchers as well, so stakeholders were more likely to buy into the research results later. Third, by communicating with stakeholders during the internal discovery process, the six
experienced practitioners gathered the information about the research contexts and the participants as well. This information helped them better design the research activities that fit in the research contexts and fit with their research participants.

Then in the step “plan the overall research”, the experienced practitioners applied the information they gathered from the internal discovery to design their research plan. They made sure that the research questions were able to be answered in effective ways, their stakeholders were able to be engaged in the process and their participants had the ability to express themselves truthfully, deeply and relevantly.

In the data collection step, the six experienced practitioners periodically consolidated their knowledge, reflected on it and modified their research plan accordingly to get their stakeholders more engaged in the process and allow their participants to better express themselves. Also, they compared the data they collected with their research questions and hypothesis they defined at the beginning of the project to make sure they were able to provide the answers effectively and to see if the hypothesis they had the beginning was correct.

In the analysis step, the six experienced practitioners tried to get their stakeholders’ input in the process to help them better direct their analysis effort and made sure they were going towards the right direction and providing actionable results. Lastly in the bridging step, the six experienced practitioners applied all the knowledge they gained about their stakeholders to design the deliverables so their stakeholders would be able to empathize with their research participants, take actions on the research and implement their plans in the organizations. After the bridging step, sometimes, the six experienced practitioners also followed up with the stakeholders to help them
incorporate the research into their next steps.

As you can see, with every step the six experienced practitioners went through, they tried to set the groundwork for their research to make organizational impact. They were being problems-driven, stakeholders-centered and participants-centered in their entire research process. Also, the six experienced practitioners achieved their goal through an iterative learning process by constantly consolidating their knowledge, reflecting on it and modifying their research plans accordingly. The six experienced practitioners planned their research at the beginning of the process and as they gained more and more understanding about their stakeholders and participants in the research process, they continued their planning process throughout the entire research process. That was why there were many feedback loops in the six experienced practitioners’ process graphs and the fan shapes with red colors were in different parts through the entire process loop.

6.2.2 WHY THE OTHER FIVE PRACTITIONERS’ PROCESSES WERE SHAPED THE WAY THEY WERE

The other five practitioners’ process graphs all seemed to fit in between the three beginning practitioners’ and the six experienced practitioners’ process graphs, but the shapes of their individual process graphs were different from each other. Here the researcher selected two of the five design research practitioners as examples to discuss how and why their processes were similar and different from the three beginning practitioners’ processes and the six experienced practitioners’ processes. For the purpose of easily referring to these two practitioners, “practitioner J2” and “practitioner S1” were given as the code names for these two practitioners and they will be used in the rest of the thesis.
Practitioner J2 only started doing design research less than two years ago. Before that, he did statistical and qualitative research across different industries. More importantly, he had four years of experience starting up his own company. He obtained his MBA degree three years ago and he never had the educational training for design research. He is now working at a company that has been doing design research for a while. He works with designers and another researcher in his team as well as different product owners outside of his team in various departments.

The graph in Figure 6.15 is a visualization of practitioner J2’s process of research planning and execution. It was obvious that practitioner J2’s process graph was quite different from the typical beginning practitioners’ research process graph (see the graph in the left of the Figure 6.14). The step “consolidate new information in the process, reflect on it and modify his plan accordingly” took up the most space among all the steps. Also, compared to the three representative beginning practitioners, practitioner J2 talked more about conducting internal discovery with stakeholders. What’s more, there were many more feedback loops in practitioner J2’s process graph than in the three representative beginning practitioners’.

Similar to the six experienced practitioners, practitioner J2 valued iterative learning throughout the research process. That was why there were many feedback loops in his process graph and the red fan shapes were not just centralized at the beginning of the process. Also, practitioner J2 was aware of the importance to collaborate with other stakeholders. He didn’t explicitly mention making organizational impact with his research, but before he started every research project, he always made sure that stakeholders understood how research could help them achieve their goals and he
explored with stakeholders to see how they could be better engaged in the process. This resulted in the step “conduct internal discovery” taking up more of the space in his process map than it did for the three representative beginning practitioners.

Figure 6.15 Practitioner J2’s Process of Planning and Executing Research
Similar to the six experienced practitioners, practitioner J2 valued iterative learning throughout the research process. That was why there were many feedback loops in his process graph and the red fan shapes were not just centralized at the beginning of the process. Also, practitioner J2 was aware of the importance to collaborate with other stakeholders. He didn’t explicitly mention making organizational impact with his research, but before he started every research project, he always made sure that stakeholders understood how research could help them achieve their goals and he explored with stakeholders to see how they could be better engaged in the process. This resulted in the step “conduct internal discovery” taking up more of the space in his process map than it did for the three representative beginning practitioners.

Connecting practitioner J2’s research process with his background, the researcher found that his process was an exact reflection of his years of experience as an entrepreneur. In the interview, practitioner J2 said, as an entrepreneur, he paid close attention to the new information coming out of his learning process and iteratively changed his ideas accordingly. He said “a research plan is equivalent to a business plan. Nowadays business plan only means intention. It doesn’t mean that things listed on the business plan will literally happen, because it won’t and it never does…It doesn’t make sense for me to blindly stick to the plan because what’s most important is to follow up what’s coming up at the moment across the different activities that have been conducted.” Therefore, when practitioner J2 conducted his research, he applied the same principles. He reflected on what he learned from the previous research activities, gauged where he was in the process and redesigned his next research activity to help to better achieve the research goal. Also, with the experiences of starting up his own company, he knew that in order to achieve the business goal, it was important for people from different disciplines to understand each other and collaborate with each other. Although he
specialized in conducting research now, he made sure that his stakeholders understood the value of research and were able to apply the research to their work.

In conclusion, practitioner J2’s past experiences in general had an influence on his attitudes towards design research and his attitudes towards design research had an influence on the way he planned and executed the research. That was why although practitioner J2 didn’t even have as much experience as the three representative beginning practitioners did, the summary of his research process looked closer to the summary of the six experienced practitioners’ processes.

2) WHY PRACTITIONER S1’ PROCESS WAS SHAPED THE WAY IT WAS

Practitioner S1 had the experience of doing design research for over four years. Before going into the research field, she had been to graduate school to learn about design research and user experience design. During the past four to five years, she worked at various companies in different industries such as entertainment, consumer goods and technology industries. The company she is working at now is a Fortune 500 technology company and it has a long history of conducting design research. Practitioner S1 worked in a product team with a consistent group of designers, engineers and product managers. She said design research has been well integrated in the company. The people she worked with all valued design research and they worked very closely with each other very well.

The graph in Figure 6.16 is a visualization of practitioner S1’s process of research planning and execution. Similar to the six experienced practitioners’ processes, practitioner S1’s process had an emphasis on “bridging the research to the next step”. However, unlike the six experienced practitioners’ processes, practitioner S1’s process
didn’t contain any feedback loops. Also, in practitioner S1’s process, the step “conduct internal discovery” and “plan the overall research” merged into one holistic step. And practitioner S1 put a lot of emphasis on this step.

With four years of experience working at different companies in the design research field, practitioner S1 understood the importance of making the research impactful for
the organizations. She valued stakeholders’ input and tried to involve them from the very beginning of the research process. Before she started creating the research plan, she first gathered questions from different stakeholders. Then during the research planning process, she gathered feedback from stakeholders and revised her research plan with them. Also, practitioner S1 said, since the main goal for her was to have an impact on the product development process, everything she did after she conducted the research session was central to making the research results clear to her team and helped designers feel how the participants feel. Therefore, in the “bridging” step, she spent a lot of effort using different forms such as videos and posters to connect the research to design. That was why in practitioner S1’s process graph, the two parts that show up largest on the graph were the planning steps happening at the beginning of the process and the bridging steps happening at the end of the process. However, similar to the three representative beginning practitioners, practitioner S1 didn’t mention about consolidating the information in the field or modifying her research plan accordingly. She said most of the time, she just executed the research plan without changing much, unless she was doing the research with kids that were really hard to predict or conducting international research which involved a lot of unstable factors such as travel and language issues. Therefore, there weren’t any feedback loops in practitioner S1’s process.

Connecting practitioner S1’s research process with her background, the researcher found that practitioner S1’s process was influenced by her professional design research experiences as well as the team she worked at. Practitioner S1 had the design research experience which was more than the three representative beginning practitioners had but less than the six experienced practitioners had. Her experiences allowed her to understand the importance of making the research impactful for the organization, but
she didn’t realize the importance of iterative learning through the research process, yet. Also, practitioner S1 worked on a product team inside a company which had a great integration of design research. Different from many other practitioners who needed to spend time to understand their stakeholders and get their stakeholders’ buy-in for the research, practitioner S1 worked with a group of designers, engineers and product managers who valued design research and had been collaborating closely with design researchers. Under this fairly ideal situation, she was able to create the research plan with her stakeholders. Therefore, in her research process, there was no separation of “conduct internal discovery” and “plan the overall research”. These two steps merged into one integrated and continuous step where practitioner S1 constantly gathered input from her stakeholders to co-create the research plan together.

To conclude, it made sense that practitioner S1, as a mid-level design research practitioner, had the research process that was in between the three representative beginning practitioners’ process and the three representative experienced practitioners’ process. Also, since the company she worked at integrated design research better than the companies the other practitioners worked at, the overall structure of her process also turned out slightly different from the others.

As the two examples showed here, although the two practitioners’ processes both seemed to fit in between the three beginning practitioners’ and the six experienced practitioners’ processes, they were also different from each other. Their processes were the reflection of their goals and attitudes towards the design research process. And their goals and attitudes were influenced by a combination of factors such as the experiences practitioners had with design research and the practitioners’ past experiences in general. Also, sometimes, depending on the context of their work, their processes of research
planning and execution may be different as well.

6.3 CONCLUSION

All in all, the beginning practitioners who didn’t have much experiences in design research tended to focus their research on collecting the information to answer the research questions. Their processes were often very linear. They planned the research at the beginning of the process and executed the plan as it was created in the first place. They tried to be problem-driven, but sometimes they adopted a standard process that they were most familiar with. Also, beginning practitioners were aware of the importance of involving stakeholders in the process but they thought just involving stakeholders in the process was sufficient and didn’t see the need to engage stakeholders in the process. The experienced practitioners with lots of experience in design research tended to focus their research on making organizational impact. Their processes were very iterative. They planned the research at the beginning but they constantly consolidated knowledge in the process, reflected on their plans and improved their research plans throughout the process. In the experienced practitioners’ entire research process, they were always being problem-driven, participant-centered and stakeholder-centered. To evolve from beginning practitioners to very experienced practitioners, different practitioners took different paths. As it was revealed through practitioner J2s’ and practitioner S1s’ examples, the evolution paths were influenced by a combination of factors such as the increasing years of design research experience, the practitioners’ past experiences, the companies that the practitioners worked at and the people who the practitioners work with. The practitioners with more related past experiences and working with people who were experienced at design research tended to make the transition faster than others.
CHAPTER 7: UNDERGRADUATE DESIGN STUDENTS’ PROCESSES OF RESEARCH PLANNING AND EXECUTION

In parallel with chapter 6, chapter 7 reveals undergraduate design research students’ processes of research planning and execution. Section 7.1 establishes the context of these research projects and reminds the reader again of the background of the course and the students. In section 7.2, these students’ processes of research planning and execution are visualized as a whole. Based on the visualization, what student groups did in each step is explained in detail. Since these projects are all course projects and students’ research processes were influenced by the course structure and the instructor, the researcher thought it was important to understand what students really thought of their guided research processes. Thus, in section 7.3, the researcher reviews the responses to students’ final journal question and synthesizes students’ reflections of their research projects into main themes. What students learned from these research projects and what they didn’t learn is uncovered.

7.1 THE INTRODUCTION OF STUDENTS’ RESEARCH PROJECTS

All the students who participated in this thesis research were junior design students in the Design Research II course at The Ohio State University. In this course, the students’ primary learning objectives were to learn how to plan, conduct and analyze experiential and generative design research. The class met twice a week for about ninety minutes. The major course components involved the class lectures, guest lectures, the journal
questions, the textbook and the team projects.

At the beginning of the semester, the instructor introduced basic concepts about planning, conducting and analyzing experiential and generative design research through lectures. During the second half of the semester, guest speakers were invited to the class to share their real world experiences with students. Also, there were two journal questions assigned to students for the purpose of reflection. One was the interim journal question which was given after the interim presentation and another one was the final journal question (see Appendix A) which was given after the final presentation. (More detailed information about the journal question can be found in Chapter 4, Section 4.3.3) Also, “Convivial Toolbox” (Sanders and Stappers, 2012) was assigned as a required textbook to supplement the class lectures. However, according to students’ responses from the final journal question, most students were not able to keep up with the reading.

During much of the semester, students were focused on conducting research projects with their respective community groups in the Franklinton area, a neighborhood in Columbus, OH. (More detailed information about the projects can be found in Chapter 4, Section 4.3.1 and Figure 4.13) In the first half of the semester, students planned and conducted experiential research to understand the participants’ current experiences. In the second half of the semester, students planned and conducted generative research with the participants to explore their dreams for future experiences. The instructor and the researcher met with each team once a week to answer the questions each team had and help them to move forward. Half way through the semester, the students gave interim presentations where they showed their experiential research processes and described what they found out through the experiential research. They also presented their initial generative research plan. The instructor provided each team with oral and written
feedback, including things they could have done better for their experiential research and suggestions for their next steps in the generative design research phase.

It is important to keep in mind that all the projects relied on people to volunteer their time, i.e., the people who provided the project opportunities and the participants who participated in the projects were all volunteers. To some extent, this increased the risk factors involved in the projects. Each student group worked directly with a representative from their community group. The representatives were the people who provided the project opportunities for students and they acted as contact people to connect student groups with more people in their communities. Certainly, different representatives had different expectations for the projects. Some of them had specific things they wanted to get out of the projects and some were more open. Therefore some student groups had more of a challenge to balance between satisfying this representative’s needs and exploring the real unmet needs with the participants. Also, different representatives, depending on their levels of interest and involvement, had different influences on students’ projects. For example, one representative was really engaged in the process. He gave presentations about his organization in class, invited students to the organization’s community events, helped students distribute surveys and coordinate research activities. His support definitely had an extra positive impact for the project that he was involved with. Another representative was less active and had less involvement in students’ projects. She really cared about the privacy of the people in her community and mainly acted a gate keeper for that community. At the beginning of the project, she helped connect students with a group of community members who volunteered to participate in the research, but after that, she refused to give students any access to more community members. Comparatively, students who worked with this representative got less support than some other groups. Although not every student
group had the experience of working with a very active and supportive representative, that’s just like the nature of the real world projects — there are always stakeholders who support and want to get involved in the research process and stakeholders who have less interest in the research projects. By having class time to discuss progress and issues with the projects, the students were able to learn from these experiences and learn from each others’ success and failures.

7.2 UNDERGRADUATE DESIGN STUDENTS’ PROCESS OF RESEARCH PLANNING AND EXECUTION

The researcher summarized the undergraduate design students’ research process in a graph (see Figure 7.1). It is important to note that the process visualized in Figure 7.1 was based on what the undergraduate design students actually did in their class projects. It is different from the visualization of practitioners’ process which was based on what practitioners said they did in their projects. Also, the students’ process was under the influence of the instructor and the structure of the course which was different from the practitioners’ situations.

In Figure 7.1, each fan shape represents one step in the student teams’ processes of research planning and execution. The brown ones are steps of research planning and the blue ones are steps of research execution. The size of the fan shapes represent the relative amount of time student teams spent on each step during their class projects. The arrows represent the information flow. The thick yellow arrow around the middle indicates that overall the information coming out from one step always informs the next step. The thinner yellow arrows represent the information flows among discrete steps. Specifically, the thinner yellow arrow going clockwise outside the circle show how information coming out from the previous steps guides the later steps. The thinner
yellow arrow going counterclockwise inside the circle show how information collected from the later steps informs the understanding gained from the previous steps. All the arrows together form feedback loops throughout the whole process. It is important to keep in mind that, different from the information flow in practitioners’ processes, the way the information flows in student teams’ processes was influenced by the instructor

Figure 7.1 Undergraduate Design Student Teams’ Process of Planning and Executing Research
and the course structure. This information flow didn’t always happen naturally. Lastly, the deep pink arrows represent the perceived unexpected factors that had an influence on the research process.

In the Design Research II course, undergraduate design students’ process of research planning and execution involved primarily four steps — “plan the research”, “collect data, consolidate new information then reflect and modify the research plan”, “plan the analysis and analyze data” and “bridge research to the next step”. These steps follow each other in sequence.

1) PLAN THE RESEARCH
The students’ research process started with their planning the research. As it was mentioned in the Chapter 4 “Research and Analysis”, all the student teams used the planning tool (see Figure 4.14) to create their initial research plans (see samples of students’ initial research plans in Appendix B) for their experiential research. The research planning tool was developed based on the table — “components involved in making the plan” — in Sanders and Stappers’ book “Convivial Toolbox”. The tool was created to get students started on their research planning and helped students keep track of their plan changing process along the way. It primarily consisted of four parts — the project name, the research goal, the methods and the timeline for execution. In the section of research goal, students were required to spell out their goal and the subgoals. The word “goal” refers to the expected result(s) of the research effort and the word “subgoals” refers to the mini goals that must be addressed along the way to meeting the end goal (Sanders and Stappers, 127). Also, in the section of timeline, students were asked to map out a timeline that involves all the parties — future users, contact person, research team and instructors.
All the student teams set their own research goals, sub-goals and planned a series of corresponding activities to achieve these sub-goals. This initial planning didn’t take long, since the students had already learned about experiential research in their sophomore year. However, due to the schedule conflicts, some student teams had a slow start. In those cases, the student teams had to change their research plan in order to work with the new schedule. There was a lot of anxiety going on in the process for these teams. The instructor provided guidance for each of the teams to restructure their research plan and helped them better prepare themselves while they were waiting for the project to start. For example, one community representative went on a trip with his community members at the beginning of the project and he was not able to start the project until two weeks later. When the student team first heard this news, they were totally thrown off the track and didn’t know what to do. The instructor encouraged them to come up with three detailed research plans, so when the representative came back, students could present all three plans to him, pick one that made the most sense to him and get the project started immediately. Later on, it turned out that this strategy worked pretty well and the student team worked fairly efficiently with a more detailed plan.

2) COLLECT DATA, CONSOLIDATE NEW INFORMATION THEN REFLECT AND MODIFY THE RESEARCH PLAN

A) CONDUCT EXPERIENTIAL RESEARCH

First, students conducted their experiential research. Some representatives participated in the experiential research process and some didn’t. Also, the form of participation varied. Sometimes students initiated the interview with their representatives to explore the research opportunities together. Sometimes the representatives initiated a tour to their community space or an observation of their community events to help students get familiar with their community.
While collecting data for the experiential research, many student teams had the experiences of modifying their research plans. Most of the student teams were forced to modify their research plan due to their perceived “unexpected factors”. One of the major “unexpected factors” was the scheduling issue. It was obvious that many of the teams were not used to dealing with meeting cancellations or reschedulings that happen naturally in practice. For example, one student team wrote on their final documentation that “unfortunately, our original plan was hardly applicable once we got into the thick of things. Many setbacks interfered with our schedule. Most involved cancellations for meetings and interviews or problems stemming from lack of reciprocated communication from our artist base…This was frustrating, as our group was unable to progress nearly as quickly as planned”.

However, there were a few student teams that were able to proactively consolidate the new information they collected in the field and modify their plans accordingly. One student team who worked with the Dinin’ Hall, one of the community groups, had set their original objective as “learn about their customers’ unmet needs in the casual dining experience and collaborate with them to provide ideas for future experience”. Yet after their observations in the Dinin’ Hall and their interview with the owner of the Dinin’ Hall, they realized that most of the customers were fairly satisfied with their experience in the Dinin’ Hall. Also, it turned out that the biggest problem the representative (also the owner of the Dinin’ Hall) struggled with was to get Dinin’ Hall’s name out in order to attract more customers. Based on the insights collected from these two research activities, the Dinin’ Hall team reframed their research focus as “to gain more insights into how the Dinin’ Hall functions to reach a larger audience”. Later on, they also redirected the focus of their survey questions on understanding who the existing customers were and how new customers could get to know the Dinin’ Hall. Since the
new focus was really targeted at the representative’s need, the representative offered to help distribute the surveys. Therefore, the knowledge consolidation process not only allowed the student team to find a better research opportunity but also strengthened students’ relationship with their representative.

B) CONSOLIDATE INFORMATION COLLECTED FROM THE EXPERIENTIAL RESEARCH AND PLAN THE GENERATIVE RESEARCH

After the experiential research, students had their interim presentations in which each team was asked to present the processes and findings of the experiential research and their initial plans for the generative research. This interim presentation provided the opportunity for every student team to consolidate what they learned from the experiential research and create their generative research plan based on that. By summarizing the research findings through the experiential research, many student teams narrowed down their research topic and had a more defined focus for their generative research. Also, many student teams were able to apply what they learned about their participants’ characteristics in general to the design of their generative research activities. The students attempted to ensure that the participants would have a good experience in the research process and the activities would maximize the participants’ ability to express their aspirational future experiences. For example, one student team who worked with Columbus Idea Foundry, a maker community, found that their participants were all very hands-on and they loved building things. So instead of making a toolkit that mainly consisted of 2D materials, the student team incorporated building blocks in their toolkits to allow their participants to express their dreamed experiences in a three dimensional way and the activity turned out to be very successful.

However, since it was most of the students’ first time conducting generative research,
a lot of the teams had a hard time finalizing their generative research plan and getting started on creating their generative research toolkits. In this planning step, the instructor provided a lot of support to inspire students and help students think through what they could do to get the results they wanted. Also, before the students conducted the generative research activities with their participants, the instructor organized a pilot test day for each team to test their toolkit with other student teams and gather feedback from each other to make the final adjustments to their toolkits.

C) CONDUCT GENERATIVE RESEARCH

Then each team executed their generative research plan. The researcher observed several teams’ generative research sessions. Some of them were more successful than the others. The successful teams tended to have a schedule outlined, a moderator script prepared and had divided responsibilities before coming to the field, while the other teams were less prepared for these things. In general, it was obvious that many teams lacked experience in conducting participatory workshops in the field. Out of the six teams’ generative sessions the researcher attended, three student teams forgot to record when their participants were presenting their dreamed future experiences. Also, one team lost control of their research activities. This team didn’t decide roles and responsibilities of each team members before their research. Then during the research, there were many times that several team members were interacting with one participant while other participants were waiting to present. In the end, this team ran out of time and some participants left without even explaining their dreams of future experiences. Clearly, one round of pilot testing was not enough for this team.

However, it was not surprising to see these things happening, since this was the first time these students had attempted to conduct generative research. This showed that there
was a lot more to learn and practice before these students could be good at it.

3) ANALYZE

After students finished their experiential and generative research, there was not much time left. Most of the student teams only had about two weeks to analyze their data and prepare their final presentations. The instructor met with each team to provide suggestions and answer students’ questions during the analysis process.

4) BRIDGE THE RESEARCH TO THE NEXT STEP

In order to keep the course assessment consistent and make sure certain learning objectives were covered, the instructor created a presentation outline (see Appendix C) for the student teams. (More detailed information about the final presentation can be found in Chapter 4, Section 3.3 in the “final presentation” section). The outline provided the key points students needed to cover but students still had a lot of freedom to structure their own content.

During the presentations, every team showed their process of planning, executing and analyzing the research. Only one team had a visual summary of participants’ ideal experiences. The other student teams reported with bullet points. Out of the nine student teams, six teams had actionable suggestions for improving their respective community teams’ current situations. The other three teams summarized their research results but didn’t come up with the implications. Also, two teams took the initiative and showed video clips along with their presentations and one team brought the work their participants created in the generative sessions. Clearly, the extra efforts these three teams took helped the instructor and other student teams better empathize with their research and findings.
Overall, things that happened in this step indicated that these students still had a lot to learn about data analysis and bridging the research to the next step.

As the graph shows in Figure 7.1, student teams spent most of their efforts on the first two major steps — “plan the research” and “collect data, consolidate new information then reflect and modify the research plan” which were the main focuses of the students’ learning experiences. The fact that other steps of the research processes were not given as much emphasis as these two steps was not because they were less important, but within the limited time frame in the class, there was only a certain amount of the content could be covered in-depth. Also, as the discrete brown fan shapes and green arrows indicated, students’ research planning process seemed to be very iterative with constant knowledge consolidation and plan modification happening throughout the research process. However, it is important to keep in mind that students’ research processes were under the influence of the instructor and the course structure. In the middle of the research project, every student team was required to summarize what they learned about their participants’ current experiences and plan their generative research sessions based on that. The weekly meeting students had with the instructor also provided them with the opportunity to consolidate what they learned through the past week and gather instructor’s feedback on what they could do better in the next steps. The interim presentations and the weekly meetings made sure that every student team had to consolidate their knowledge in the middle of their research processes. Moreover, oftentimes, the plan modifications happened because students had to do so. During the initial planning process, most of the students didn’t anticipate the real world challenges involved in working with community representatives and voluntary participants. These students thought once they planned out their research, they could just execute it as it was planned. However, soon after these students started their field research, they were totally
thrown off the track and they had to modify their ideal research plan to coordinate with the real world constraints before continuing their research projects.

7.3 STUDENTS’ REFLECTION ON THE RESEARCH PROCESS

At the end of the Design Research II course, all the students answered the final journal question (see Appendix A) and reflected on their learning experiences throughout the course of the semester. The key points of students’ reflection for the research projects are summarized below.

7.3.1 STUDENTS BELIEVED IT WAS BEST TO LEARN DESIGN RESEARCH THROUGH HANDS-ON PROJECT EXPERIENCES

Many students said in the final journal questions that the research projects they conducted in class really helped them to put things they learned in lectures into practice. They all seemed to reach the consensus that learning through doing was the most effective way for them to learn design research. Students said that the lectures were helpful but they couldn’t understand everything until they tried it out in their projects. The book was also a good resource but most of the students found it was hard to keep up reading. Also, it was pointed out by a few students that what they learned most through the research projects was how to apply different research methods.

7.3.2 STUDENTS APPRECIATED THE SUPPORT THEY GOT FROM THE INSTRUCTOR AND THE RESEARCHER THROUGH THEIR RESEARCH PROCESSES

During the research processes, the part students needed most support on was to create the generative research plan and modify their research plan along the research processes. Many students expressed their appreciation for the in-class meetings they had with their instructor and the researcher. One student said “we were lost more than a few times in
our group and having these in-class meetings set us back to work and made us feel that we had something we need to do rather than wander aimlessly.” And another student said “feedback was essential for our project to become successful. It helped us change the plan and kept us on the right direction.” Overall, the in-class meetings addressed students’ questions and kept their projects moving forward in the right direction.

7.3.3 MOST OF THE STUDENTS WERE FRUSTRATED BY THE REAL WORLD CONSTRAINTS

In the final journal question, many students expressed their frustration with their participants and community representatives. Several students thought that they should have easier access to participants and it was unfair for their groups to have to deal with the recruiting issues. One student said “since participants are one of the major parts of the research, and because they maintain the biggest uncertainty factor in a semester-long project, we should have an alternative plan before it starts.” Similarly, another student felt that they didn’t get to use their time fairly because of the recruiting issue they encountered. It was obvious that these students didn’t realize the importance of learning how to recruit participants. Even in practice, practitioners with incentives still have challenges to recruit participants. In order to conduct successful research, students need to accept these recruiting challenges and learn to overcome them.

Also, some students thought that their community representatives should have been more “reliable”. For example, one student said “I felt the whole project was a little unorganized and uncoordinated. Whoever made the commitment to be part of the project should not use ‘busy’ as an excuse and return calls as soon as possible.” Another student said “a solid set of stakeholders should be sought for next years’ course. Although it was great to see the difficulties and success of working with different stakeholders, it
seemed to create much more work down the stretch for teams while making the projects take more time and efforts than they should have.” However, most of the community groups were not for profit organizations and the representatives were already working many hours a day. The student project was not their top priority. Also, in practice stakeholders were never as enthusiastic as the students would want. It is the research team’s responsibility to engage stakeholders in the research process and help them see the value of research. These students need to understand the situation and be aware of the importance in collaborating with stakeholders and try to embrace these real world challenges rather than consider them as unnecessary distractions.

There were a few students who wrote in the journal question that they appreciated the opportunity to work in the real world context and they learned to build a relationship with their stakeholders. For example, one student reflected “team project brought us new questions — how do we deal with the relationship with our contact person, our interviewees and how to schedule the events according to our participants’ time. These are issues that seemed unimportant but would affect the final results.”

7.3.4 A FEW STUDENTS MENTIONED THEY WANTED TO LEARN MORE ABOUT DATA ANALYSIS

After the data collection, there wasn’t much time left for students to learn and explore different data analysis methods. A few students mentioned in the journal question that they would have liked to learn more about data analysis. For example, one student said “it may be helpful to learn more about data analysis and ‘coming to conclusions’. I find it hard for me to break away from my immediate reactions to the research field research.” Also, another student pointed out that analysis was a critical step to generate actionable insights that designers could use to produce valuable results. It was good to
see these students were able to see the value of rigorous analysis and the importance of creating actionable insights.

Based on the responses from the journal questions, it seemed that after the two design research courses, students learned how to plan and execute some basic design research methods. However, even with the experiences of working in the real world context and all the other learning experiences from the past two research courses, many of the students were still not able to embrace the real world challenges involved with recruiting and working with stakeholders. They saw these challenges as unnecessary outside forces which resulted in needless obstacles in their projects. Also, there were many other aspects of the research such as data analysis that were not able to be covered in-depth within the timeframe of two semesters. Therefore, before these students can be good at design research, they still have a lot of things to learn and a long way to go.

7.4 CONCLUSION
To conclude, first of all, within the current course structure and timeframe, only certain aspects of design research can be covered in class. Based on the research process visualized in Figure 7.7.1, in the Design Research II course, students’ learning was focused on “plan the research” and “collect data, consolidate new information then reflect and modify the research plan”. However, not every student understands the importance of going through such an iterative design research process. Even at the end of the course, some students still persisted that they could have just executed their original plan if their contact persons and participants were more responsive and responsible. In another word, these students were not able to embrace the real world challenges such as recruiting and keeping participants and stakeholders engaged in the research projects. Also, there are many other aspects of the design research, such as
data analysis and bridging research to the next step, that were not able to be practiced and discussed in-depth in class, considering the limited timeframe. Only a few of the students were aware of that and mentioned that they would like to learn more about the data analysis. It is evident that within the limited timeframe, students were not able to grasp everything that is essential to become a design researcher and they need more time to learn, digest, practice and reflect.
CHAPTER 8: CONCLUSIONS, FUTURE WORK AND REFLECTION

This research project has been a exciting learning journey. In this chapter, the entire research project is reflected on as a whole. First, conclusions are drawn in section 8.1. Based on the conclusions, section 8.2 reveals what educators and practitioners can do next to keep the design research field growing. Two directions for future research are proposed. In the last section, the researcher concludes with her reflection towards the entire research process which resonates with the research findings.

8.1 CONCLUSION

Based on the understanding of what undergraduate design students learned about design research in school and design research practitioners’ practice in industry, the researcher realized that before these design students can plan and conduct good design research on their own, there are still a lot of things for them to learn and a long way for them to go. What students learned at school equips them with a basic understanding of various design research methods and it also exposes students to some real world challenges that practitioners face in their everyday jobs. This knowledge and experience serves as a good foundation for students who intend to go into the design research field. It allows these students to be able to empathize and collaborate with other design researchers. However, the knowledge and experience gained in class is not enough to prepare a student who plans to enter the design research field to plan and conduct successful design research projects on his/her own.
As you can see from students’ reflections on their research processes, even after the two semesters’ design research courses, most of the students were not able to cope with real world challenges. Instead, they considered these challenges (such as getting stakeholders on board and keeping participants interested in the research project) as unnecessary outside forces. In their opinion, once they created a research plan, they should be able to just execute it without being disturbed by these “unnecessary outside forces”. Yet in the design research industry, there are always unexpected things happening in the research process and getting stakeholders as well as participants engaged in the research process is the key to the success of a research project. To work with the uncertainty, experienced practitioners continually consolidate their knowledge, reflect on it and modify their research plan accordingly. Compared to the research process that the students expected, experienced practitioners’ research process is much more iterative with many feedback loops going back and forth. Also, instead of considering the challenges coming from stakeholders and participants as burdens, experienced practitioners make sure that their entire research process is problems-driven, stakeholders-centered and participants-centered. They design every research activity to get both stakeholders and participants engaged in the process, so their research can make organizational impact and inform/inspire their stakeholders’ decision making in the next steps.

In conclusion, there is a gap between what current undergraduate education enables design students to do in terms of design research and what design research practitioners are expected to achieve in industry. Based on the analysis of beginning and experienced practitioners’ research processes, you can see that the transitioning from a beginning practitioner to an experienced practitioner doesn’t just happen naturally. It requires many years of hands-on experience and great mentorship along the way. Depending on various factors such as the environment that practitioners work in and the people that
the practitioners work with, some beginning practitioners make the transitioning sooner than the others. Sometimes, beginning practitioners may end up working at a company that doesn’t have any experienced practitioners. Then it becomes really easy for these beginning practitioners to fall into the trap of producing commoditized research that is not going to make much organizational impact.

**8.2 IMPLICATIONS AND TOPICS FOR FUTURE WORK**

In order to prevent design research from becoming a commodity and promote continued growth of the design research field, it is important to join efforts from different parties to better prepare students for going into the design research field and help beginning practitioners to better transition to experienced practitioners.

In fact, several different strategies have already been taken to help students and beginning practitioners better transition to experienced practitioners who are able to make organizational impact with their research. As shown in Chapter 3, various research planning frameworks and worksheets have been created by companies and individuals for both educational and practical purposes. These frameworks and worksheets mainly focus on helping students and practitioners create research plans that help answer the research questions. There are still many other strategies that can be and need to be developed and implemented. Here the researcher suggests two directions for future work.

**8.2.1 CHANGES IN THE EDUCATIONAL SYSTEM**

With more and more undergraduate design students going into the design research field after their graduation, the need for more robust design research education is evident. The two semesters of design research at The Ohio State University are just enough to get
students exposed to the basics of various types of research (i.e., experiential, generative and evaluative research). In order for students to understand and even conduct research that can make organizational impact, more dedicated class time and resources for design research are needed.

8.2.2 MORE GUIDANCE ON PLANNING AND CONDUCTING IMPACTFUL RESEARCH

Currently, most of the existing information focuses on helping students and beginning practitioners create a research plan that answers the research questions. There is a lack of information on guiding students and junior practitioners to conduct internal discovery and understand stakeholders. However, being able to build mutual empathy with stakeholders is critical when it comes to produce research that makes organizational impact. Therefore, the researcher decided to take this opportunity and design a tool that helps students and junior design research practitioners to start a conversation with their stakeholders. Right now, this tool is still in the preliminary development stage. Much more research and refinement is needed to make the tool more useful and usable. Figure 8.1 shows a prototype of the tool.

This planning tool is used at the beginning of this workshop with various stakeholders in the form of a workshop. Stakeholders are the people in your organization (or your client’s organization, if you are an outside consultant) who have direct or indirect stake in the project. As you can see in Figure 8.1, there are four major components included in this tool. They are the round board, big hexagon post-it notes, paper characters and other shapes. On the round board, there are three layers which represent the relationships between the teams. They are “core team”, “lead team” and “bigger team”. Stakeholders and the research team can use the hexagon post-it notes to map out how much they want to be involved. The paper characters are used to represent different stakeholders. During
Figure 8.1 *A Prototype of the Research Planning Tool Designed by Lingyue Hu*
the workshop, stakeholders are encouraged to write down their needs, expertise/skills and other characteristics (e.g., extravert) on the post small post-it notes and stick them on their paper characters. The other shapes including arrows and explosion shapes serve as supporting materials to help stakeholders and the research team to better express themselves. They can interpret the meaning of the shapes on their own and choose how they want to use them.

This tool helps to set the groundwork for an impactful design research by providing the opportunity for both the research team and the stakeholders to flesh out their thinking about how to approach the problem and how much they want (or are asked) to be involved in the project. There could be a lot of debates at the beginning of the workshop. However, by fleshing everything out, both the research team and the stakeholders will build much more empathy towards each other. Therefore, stakeholders will be much more engaged in the research process and the research team can better craft their research plan to support stakeholders’ needs.

The researcher believes that more guidance such as the development of this tool can be really beneficial for beginning practitioners. Even if some practitioners may end up being in a company that doesn’t have any experienced practitioners to be their mentors, at least with the guidance of resources, such as the tool, they will be able to continue to grow and improve themselves.

8.3 REFLECTION ON THE RESEARCH PROCESS

This entire thesis research process has been a great learning experience for me. At the end of this thesis, I would like to share what I have learned throughout the research process with everyone.
I started this project with a perspective that is similar to most of the undergraduate design students who participated in this research. I thought my research process was going to be step by step, very linear and like what is shown in Figure 8.2. As you can see from the graph, I only expected to plan my research at the beginning of the research process and execute the plan in that way.

However, once I started my research project, I realized I was completely wrong.
Figure 8.3 *The Research Process I Actually Went Through*

Figure 8.3, I visualized my actual process of research planning and execution. As you can see from the graph, the entire research process is very iterative with many feedback loops going back and forth. It is nothing like the waterfall style visualized in Figure 8.2 in which one step starts after another step completes. In the actual research process, many steps happened multiple times in different stages of the research process. For example, “research planning” wasn’t an isolated step that happened only at the
beginning of the project. In fact, it was an iterative process that is integrated to the entire research process. First, I modified the research plan based on what I learned from the pilot tests. Then during the data collection process, after each research session, I always reflected on what I learned and what I could do better next time. Small tweaks of the research plan were made along the way. Also, the analysis didn’t all happen after the data collection completed. An interim analysis was conducted after the first nine interviews to better consolidate the information and make sure the research project was on the right track. In addition, within the analysis step, many small iterations were conducted to make sure all the underlying meaning was understood and all the patterns were sought out.

In summary, this research project has changed a lot of my perceptions towards design research and even my own process of planning and conducting research. Admittedly, this change didn’t just happen naturally. During this entire thesis research process, I had weekly meetings with my advisor and her guidance provided along the way was essential. Meetings with other committee members provided with me with many critical insights, as well. Now that I understand the gap between experienced practitioners and me, I have a better direction to heading forward and continuing my iterative learning journey.


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APPENDIX A: THE LAST JOURNAL QUESTION IN THE DESIGN RESEARCH II COURSE

THE FINAL JOURNAL QUESTION

This is the first year that a course focusing on participatory design in the front end of the design process has been taught in undergraduate level Design at OSU. In fact, this is the only place it is being taught at the undergraduate level in the US. The purpose of the final journal question is to give you the opportunity to participate in the next iteration of the course by providing feedback that will be used to improve it for next year.

A. For each course component listed below, rate its usefulness on a scale from 0 to 3 (0=not useful, 1=a little useful, 2=useful, 3=very useful).

___ class lectures
___ guest lectures
___ the textbook
___ the practice activities in the beginning of the semester
___ the team project
___ the design research portfolio pages
___ the journal questions
___ feedback during class meetings
___ written feedback (about the portfolio pages, the project, etc.)
___ the peer evaluations
B. Now choose three of the course components listed above and discuss why you rated them as you did.

1.

2.

3.

C. What components should be added next year? Why?
APPENDIX B: EXAMPLES OF STUDENT GROUPS USING THE PLANNING TOOL IN THE DESIGN RESEARCH II COURSE

<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>IDEA FOUNDERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOAL</td>
<td>Understand the co-existence of equipment and human behavior, and how it can be utilised for public engagement.</td>
</tr>
<tr>
<td>SUB- GOALS</td>
<td>Minimum, maximum, and average values of the data collected during the research.</td>
</tr>
<tr>
<td>METHODS</td>
<td>Conduct surveys, focus groups, and interviews.</td>
</tr>
<tr>
<td>FUTURE USERS</td>
<td>Identify potential users and their needs.</td>
</tr>
<tr>
<td>CONTACT PERSON</td>
<td>Researcher X, Y, Z</td>
</tr>
<tr>
<td>RESEARCH TEAM</td>
<td>Team A, B, C</td>
</tr>
<tr>
<td>INSTRUCTORS</td>
<td>Prof. A, B</td>
</tr>
<tr>
<td>TIME AND EVENTS</td>
<td>Week 1-8, Activity 1-5</td>
</tr>
</tbody>
</table>

Figure B.1 Research planning tool from the team “Idea Founders”

Figure B.2 Research planning tool from the team “The Wolf Pack”
Figure B.3 Research planning tool from the team “Artist Ink”
Figure B.4 Research planning tool from the team “House Stark”
APPENDIX C: OUTLINE FOR STUDENTS’ FINAL PRESENTATION

OUTLINE FOR THE FINAL PRESENTATION

• Background about your topic (assume audience members know nothing about your topic)
• Objective(s) of your research
• Participants and your recruiting process
• Methods (say, do and make)
• Analysis (show your work)
• Findings
• Visual model or framework of the experience that you researched
• Reflections on doing experiential design research
• Team members and roles/contributions
Figure D.5 The picture of tallies of students’ ratings of different course components in the section of the last journal question
APPENDIX E: A MATRIX THAT SUMMARIZES WHAT STUDENTS ACTUALLY DID IN THEIR TEAM PROJECTS IN THE DESIGN RESEARCH II COURSE

<table>
<thead>
<tr>
<th>CF COMMUNICATION</th>
<th>WOLF PACK</th>
<th>IDEA FOUNDERS</th>
<th>ARTIST DOMINICLO</th>
<th>ARTIST INK</th>
<th>DORH VALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand people who are involved Define research goal They identified goals with stakeholders. Meetings with stakeholders are motivated talk. They identified goals with stakeholders. Meetings with stakeholders are motivated talk. They identified goals with stakeholders. Meetings with stakeholders are motivated talk. They identified goals with stakeholders. Meetings with stakeholders are motivated talk. They identified goals with stakeholders. Meetings with stakeholders are motivated talk.</td>
<td>Plan research (the what, when, how, where) They didn’t fully grasp the “made-it” The research questions they have on are fairly specific. Interviews may be more difficult to answer. They considered it the best they could. They considered it the best they could. They considered it the best they could. They considered it the best they could. They considered it the best they could.</td>
<td>Collect data at the place they connect with participants (with participants) They didn’t test why but get answers directly from participants. They didn’t test why but get answers directly from participants. They didn’t test why but get answers directly from participants. They didn’t test why but get answers directly from participants. They didn’t test why but get answers directly from participants.</td>
<td>Analyze and synthesize the data You considered the feedback, but not very thorough. You considered the feedback, but not very thorough. You considered the feedback, but not very thorough. You considered the feedback, but not very thorough. You considered the feedback, but not very thorough.</td>
<td>Communicate research findings &amp; help stakeholders embody the findings. They considered stakeholder’s implementation weaknesses. They considered stakeholder’s implementation weaknesses. They considered stakeholder’s implementation weaknesses. They considered stakeholder’s implementation weaknesses. They considered stakeholder’s implementation weaknesses.</td>
<td>(Dorh Vall’s feedback is not clear.) There is no design criteria provided in the feedback. The feedback is not clear.) There is no design criteria provided in the feedback. The feedback is not clear.) There is no design criteria provided in the feedback. The feedback is not clear.) There is no design criteria provided in the feedback.</td>
</tr>
</tbody>
</table>

In the interview, the participants are asked to reflect on what they actually did. The findings are based on the reflections of the participants. The feedback is not clear.) There is no design criteria provided in the feedback. The feedback is not clear.) There is no design criteria provided in the feedback. The feedback is not clear.) There is no design criteria provided in the feedback. The feedback is not clear.) There is no design criteria provided in the feedback. |

Figure E.6 A matrix that summarizes what students actually did in their team projects