Design Method to Enhance Empathy for User-Centered Design: Improving the Imagination of the User Experience

by

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Abstract

There is consensus around the importance of empathy in user-centered design and gaining empathy for users. Many empathic methods were developed to aid designers in understanding users they design for but lack a scientific foundation of the notions of empathy. This study aims to develop a tool that facilitates the use of the pause-predict-ponder method (PPP) by Ogan et al. (2008) in design, challenging current approaches to user research methods. Applying this method allows design students to step into and out of the user's life without having direct contact with the users.

It is argued that empathy in design is misguided in terms of understanding how empathy operates. This research examines the construct and mechanisms underlying empathy and how it functions in design based on a review of the cognitive science literature. Furthermore, this study employs qualitative research methods to develop four steps for improving design students' empathy and interpersonal skills; (1) Recognize False Assumptions, (2) Identifying Contextual Differences, (3) Building Connections, and (4) Suggesting Ideas.

Keywords: Empathic Design, User-Centered Design, Empathic Design Methods, Cognitive Empathy, Perspective Taking, Affective Empathy.

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TO MY FAMILY & SIBLINGS

Who supported and encouraged me throughout the process.

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Prof. Jim Davies

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Preface

I've always been interested in pursuing a career in the design industry. Given that my father is an Interior Architect, that was an additional motive for joining the field. After joining the school of Interior Design, one day an instructor from a technical design course, asked us students about how humane designers are? And how humane is the design profession? A doctor and a paramedic save lives, but how do designers contribute to the cycle? Since then I've always wondered about the answers to these questions. To gain more in-depth knowledge of the field I joined the Masters of Design program at Carleton University and pursued research within the field of design. Initially, I was interested in looking into the healthcare and design fields, but after a long journey of learning and discovering different fields, I choose to study empathy in user-centric design. In order to understand any field, one must dig deep into the foundation, to understand how things work. This was the advice my supervisor WonJoon Chung gave me, and I thank him for his patience and guidance throughout this process. My future interest lies within discovering more about how to implement user-centric design approaches to the field of interior design as it is still a relatively new emerging field.

Chapter 1: Introduction

1.1. Background & Scope

Understanding users' needs and experiences is an important aspect of user-centered design. Empathy is the first step in the Design Thinking[1] Process by the Stanford design thinking institute, hence emphasizing its importance (see figure 1 below). In a fast-paced environment where designers and design researchers are constantly faced with the challenges to develop new and innovative products, empathy is considered one of the paths to drive innovative products (Leonard & Rayport, 1997). Empathy allows designers to attune to users' needs and desires by experiencing others' perspectives on a product. In addition, empathic design may allow designers to touch on some hidden problems and latent concerns that users may not recognize as issues.

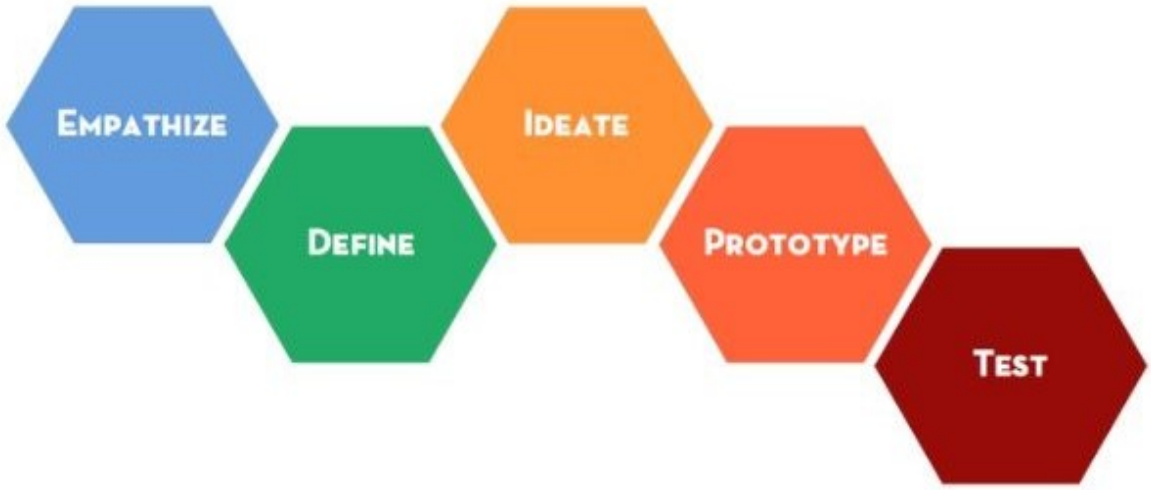


Figure 1. Image of Design Thinking Process by the Stanford D.School

The term 'empathic design' was first introduced into the design field in the late 1990s by Leonard & Rayport (1997) when quantitative methods of gathering data for businesses were no longer sufficient for maintaining a close relationship with customers and adequately meeting their

[1] Design Thinking: is a methodology for creative problem solving and innovation that combines creative and analytical approaches and requires collaboration across disciplines (Hasso Plattner Institute of Design, n.d).

needs (Battarbee & Koskinen 2005; Kouprie & Visser, 2009). For example, Fulton Suri (2003), highlighted the importance of qualitative data gathering methods that motivate and inform designers about users to develop emotionally beneficial and pleasurable products for innovation. As the qualitative information allowed designers to consider not only the functional aspects of a product but also its personal value, the interest in studying empathic design, and developing effective methods has increased (Mattelmäki & Battarbee, 2002; Kouprie & Visser, 2009). In order to understand the notion of empathy in design, we examine the notion of empathy in both design thinking and design research fields. In this thesis, design research is referred to as research into the process of design and development of design methods used in the design process. Design thinking is referred to as the cognitive process of designing concepts and products (Cross, 1982).

1.1.1 Empathy in Design Thinking

The executive design director of IDEO[2], Jane Fulton Suri, breaks down design thinking into three main pillars: Empathy, a human-centered approach to understand users' needs and desires; Ideation: applying divergent thinking to find creative and new solutions; and Experimentation: exploring possible ideas through using prototyping as a way to test out solutions adopted (Battarbee et al., 2015). In order to understand empathy in design thinking, a brief explanation of the evolvement of empathy in design thinking process is highlighted.

The design thinking approach traces back to the 1950s. It is defined as the practice of observing and studying the natural behavior of designers during the design process (Cross, 1982). It was not until the last two decades that design thinking captured attention from the field of business management to cultivate creativity, drive innovation and complex problem solving (Buchanan,

[2] IDEO: Innovation Design Engineering Organization. An international design and consulting firm founded in Palo Alto, California, in 1991. The company uses the design thinking approach to design products, services, environments, and digital experiences (Definitions net, n.d).

1992). The main reason behind business's interest in design thinking is that it brings together the desirability (how a user feels), the viability (the economic value and profitability) and the feasibility (the practical and technical aspects) of a product or service (Gaspirni, 2015). This challenges companies to address ill-defined problems (Brown & Wyatt, 2010), which increases access to new areas and expands their understanding of more complicated problems (Martin & Christensen, 2013).

When design thinking first emerged, designers focused on both usability and functionality aspects of the design, which were vital for the success of the product but were not sufficient to assure user satisfaction (Battarbee & Koskinen, 2005). This allowed designers to introduce and apply concepts of 'pleasure' and 'joy' as expressions to refer to 'users experiences,' a term coined by Don Norman (1993). The term 'user experience' was initially used to refer to a user's emotions and function of a product (Rhea, 1992). Designers then shifted the term 'user experience' to 'human experience,' emphasizing the importance of empathy and connecting with users on a deeper level (Hess & Fila, 2015). The shift to the term 'human experience' deviated the notion from 'designing with empathy' to 'designing for an empathic experience' (Devecchi & Guerrini, 2017).

1.1.2 Empathy in Design Research

As previously mentioned, design thinking interested researchers from other fields, such as business management for understanding consumer behavior and experiences. This resulted in developing different design methods to create innovative products and services (Kumar, 2012) and placed design researchers in a spot to expand and further explore the notion of design thinking for future development. This captivated the interest of researchers from other fields, such as cognitive science and cognitive psychology, to understand and theorize the notion of design thinking to

sustain for future use by other fields such as business (Goldschmidt, 2017). Design researchers and scholars argue about what parts of the design thinking methodology must be highlighted and which ought to be discarded (Johansson-Sköldberg et al., 2013).

Design researchers such as Mattelmäki et al. (2014) explain that empathic design is the ability of a designer to concentrate on day-to-day activities and interactions of a user; impersonate their character and environment, wants, needs, and feelings. These lived experiences and emotional states become the designer's insights. Although designers try to imitate how users think and feel, it is important to understand that designers would never entirely feel how the user feels. Hess and Fila (2015) discussed the relationship between empathic methods and respective design phases, while other researchers such as Kwok-leung Ho et al. (2011) and Zingoni (2019) examined 'how empathic methods played a role in the development of detailed design results. Different methods to step into the user's life were developed by design scholars including, Fulton Suri (2003) and Mattelmaki (2005). Several frameworks were developed by design scholars such as Kouprie and Visser (2009) to gain empathy when designing products but lack the scientific mechanism of how empathy works and operates. Further expansion of design literature is discussed in section (2.2).

1.2 Purpose of the Study

Current empathic methods such as personas and roleplaying techniques are sometimes argued to be less effective to gain empathy for users (Smeenk et al., 2018). Research about developing empathic methods is gaining interest in the design community through the work of design scholars such as Smeenk et al. (2018), where understanding the underlying mechanisms behind empathy would be necessary to develop more effective empathic methods that aid designers in creating a

product that meet user's needs. The primary objective of this thesis is to provide information on how empathy operates from a cognitive science perspective and adopt the Pause Predict Ponder (PPP) by Ogan et al. (2008) (more information is provided in section 2.6 about the origin of the PPP method) into design for improving design students understanding of empathy.

The PPP method was initially developed for a Linguistic course by Liddicoat & Crozet (2001) to assist students in acquiring and understanding cultural differences. They also considered how students begin with adding their 'authentic input' which is representing the initial impression as a preunderstanding of the context-based on analyzing the context and background knowledge and then comparing their input with the actual scenario provided. This allows the students to recognize differences and reflect upon them. Understanding these differences and how others feel and behave, is known as perspective-taking, which is referred to as cognitive empathy. This thesis will test if the PPP method works for aiding design students in understanding the notion of empathy. In-depth interviews were conducted to observe the efficacy of the proposed PPP method.

1.3 Research Questions

The following are the research questions.

Main question:

Is the proposed PPP method effective to develop design students' empathy? If so, what improvements and modifications are necessary?

Sub-questions:

- *What are the important steps to use the PPP method effectively for design students?*
- *What attributes of the proposed PPP method might facilitate empathy?*

1.4 Research Process

This thesis begins with a literature review of current research about empathy in design. The literature review focuses on empathic methods with an interdisciplinary perspective, examining the construct of empathy in cognitive science. The literature review covers existing literature about empathic methods used by designers as well as two examples of how empathy is used in design projects. A tool was developed as well as a 4-step process was suggested to facilitate the use of the PPP method in design. Figure (2) below represents a summary of the structure followed for this Master thesis.

Step 1: Literature Review

Develop an Interdisciplinary understanding of the existing literature about empathic methods within design literature as well as the scientific mechanisims from cognitive science literature

Step 2: Pre Ethics Measures

1. Complete Tri Council Police statement on the Ethical Conduct for Research Involving Humans (TCPS 2) training for ethical conduct in research
2. Develop three videos (individual with epilepsy, superintendent, and cashier)
3. Develop Template for PPP (Pause Predict Ponder) Method
4. Filling and submitting of Ethics Form CUREB-B to Carleton University Research ethics Board

Step 3: Conducting Qualitative Methods for Collecting Data

1. Conduct PPP Session
2. Conduct Follow Up Interview and Questionnaire

Step 4: Results

Analyze data to find insights for PPP method and if it improves design students understanding of empathy

Step 5: Suggest New Tool for PPP Method in Design Education

Develop tool and 4 step process for facilitating use of the PPP Method for design students

Figure 2. Research Process

Chapter 2: Literature Review

2.1. Definition of Empathy

Empathy is an essential human skill set that must be present through our interactions with others in any professional field, particularly in user-centered design. Before discussing empathy in design, this section attempts to investigate its etymological origin and history, along with different types, and the biological processes that form empathy in detail. To do that, relevant fields of knowledge such as cognitive science, social neuroscience, cognitive neuroscience, philosophy, and psychology, where both neural processes and behavioral processes were examined and explained.

2.1.1. Evolution of Empathy: Sympathy to Empathy

Often the terms 'sympathy' and 'empathy' are used interchangeably. This section provides a brief explanation of how the terms evolved over time. Existing records of the terms sympathy and empathy trace back to the Greeks in the late 13th century. The term sympathy was initially documented in ancient Greek as "sympatheias", (syn "together" and pathos "feeling"), meaning "having a fellow feeling, affected by like feelings" (Free Dictionary, 2010). The primary interpretation of sympathy was the capability to sense both the positive and negative emotions of others (Gerdes, 2011). Philosopher David Hume (1739) was the first to introduce the term and defined sympathy as the tendency to "pick up the feelings of others whether it's instinctive or not". Economist Adam Smith (1759) described sympathy as a simple inclination to expressing compassion for others, similar to caring about someone's joy or grief (Gerdes, 2011). Similarly, the term empathy derived from the ancient Greek "empatheia," meaning (en, "in" and pathos, "feeling"). At that time, empathy was defined as a form of considering other people's feelings, both negative and positive (i.e., pity or care) (Gerdes, 2011). The term initially implied "tenderness" for a person who is suffering and less fortunate, with an intent to provide comfort

and compassion (Wilmer, 1968, & Gerdes, 2011). Figure (3) below represents the timeline for the evolution of the term empathy.

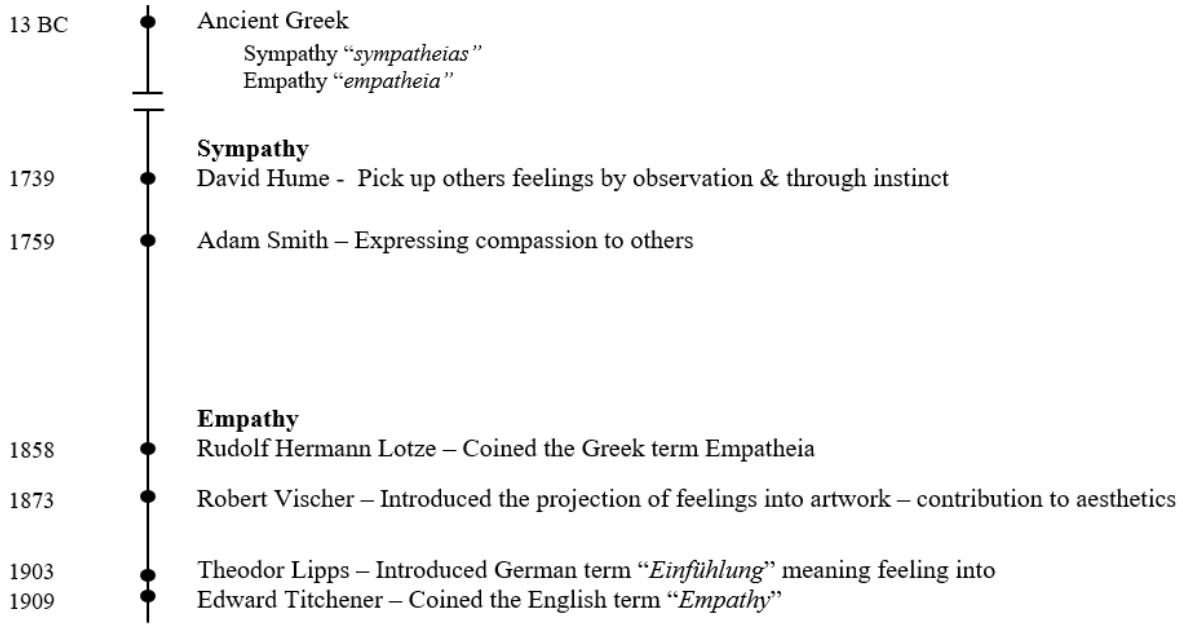


Figure 3. Timeline of Evolution of Sympathy and Empathy Overtime

Some sources cite the origin of the concept of empathy to the German medical doctor and philosopher Rudolf Hermann Lotze in 1858, but it was not coined until the German Philosopher and aesthetician Theodor Lipps (1903) introduced it in the 20th Century using the German term "Einfühlung" meaning "feeling into" represented as the acknowledgment of the other individual's experience (Curtis & Elliot, 2014). The notion of empathy was further examined by Lipps (1903) to elucidate the process of "how we understand the mental states of others" through the forecasting of inner thoughts and feelings. He further expanded the explanation for it being an involuntary progression of our "natural instinct" and imitation (Baird, Scheffer, & Wilson, 2011). Later on, Edward Titchener (1909), a psychologist, was the first to introduce the English term empathy which led to a significant shift in research about empathy in the social sciences (Stueber, 2019). Titchener introduced how the term empathy contrasted and was a continuation of the existing term

sympathy; although both sympathy and empathy are somewhat different, they historically share mutual qualities, empathy should be viewed as a development of the understanding of sympathy over time. Figure (4) below is a reports of the use of both terms sympathy and empathy in English books over time using Google Ngram viewer.

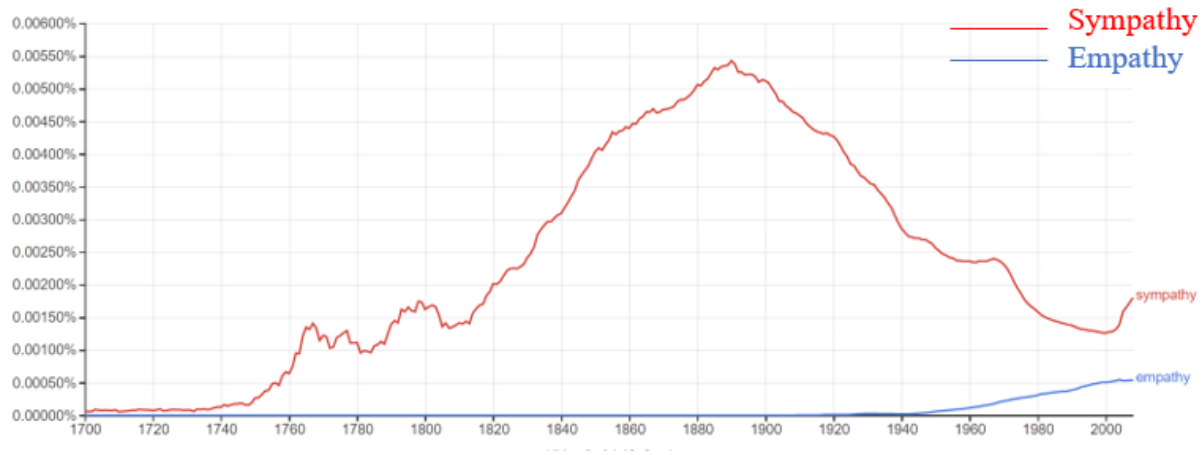


Figure 4. Google Ngram Viewer for the use of Term Empathy and Sympathy in English Books (Google, 2019)

Also, Stein (1917) explained the process of empathy as an intended interpersonal effort translated through understanding unfamiliar encounters. He expanded on the notions of Edmund Husserl to divide empathy construct into three phases: (1) relating personal experiences with another individuals situation; (2) merging personal experience and others experience through simulation; and (3) detaching from the experience with a deeper level of understanding (Stein, 1917).

2.2. Empathy in Design

Empathy in design allows designers to obtain a deep pertinent and personal interpretation of user's wants, needs, and desires to develop relevant designs that meet user's requirements (Smeenk, 2018). Hypothetically, empathy in design functions based on two notions; First, the designer's ability to grasp the user's emotions instinctively; and second, the designer's ability to project and

imagine other's perspectives. These two notions require cognitive processes, which are further discussed in section (2.4).

In this study, the existing literature about the notion of empathic in design is examined. Design researchers have introduced multiple frameworks to apply empathy throughout the design process. A study conducted by Leonard and Rayport (1997) proposed five phases for designers when interacting with stakeholders or users, "(1) observation, (2) capturing data, (3) reflection and analysis, (4) brainstorming solutions, and (5) prototyping". Figure (5) is a timeline summarizing research about empathic methods in the design literature.

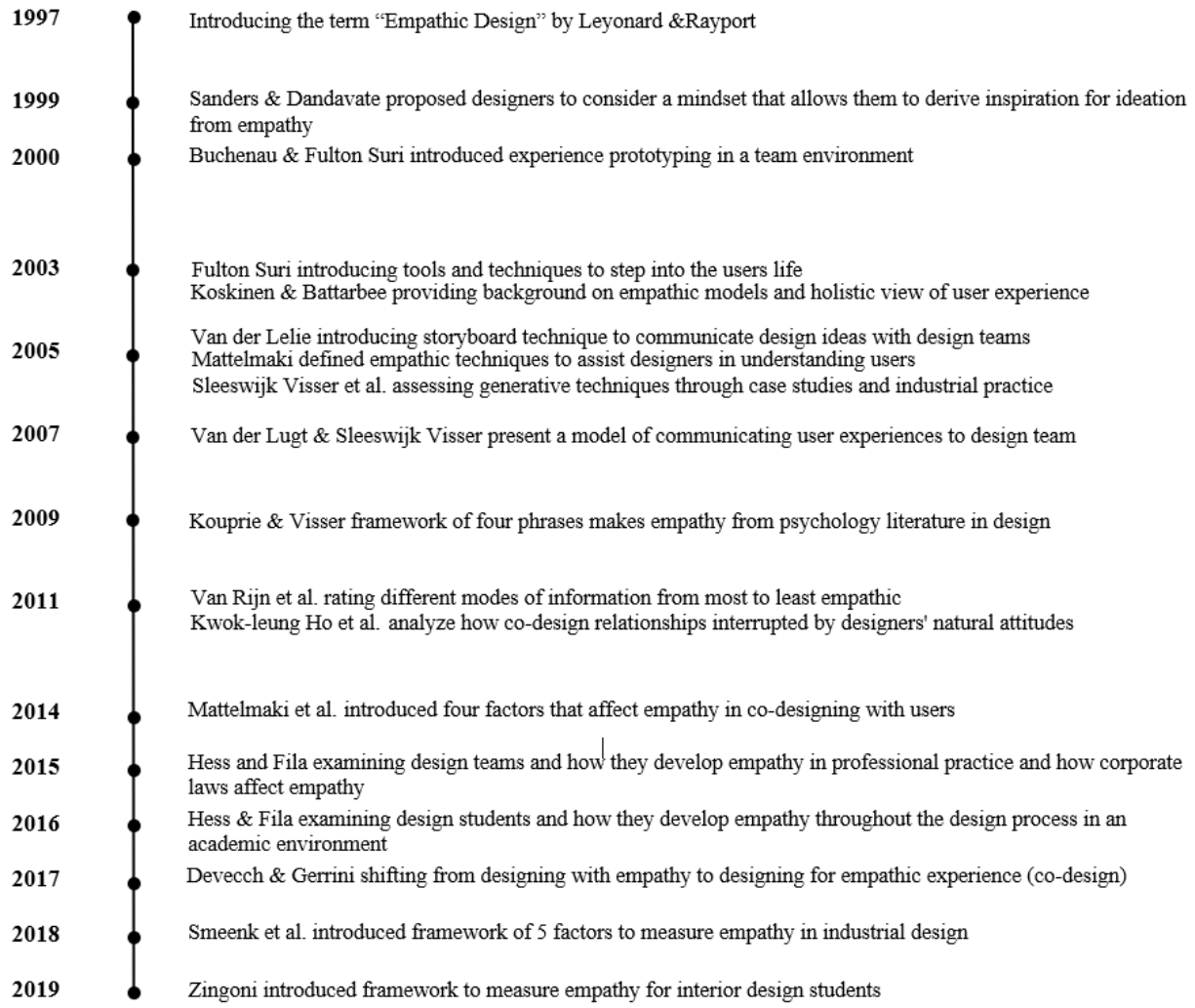


Figure 5. Timeline Summarizing Research of Empathic Methods in Design Literature

Kouprie & Visser (2009) also introduced the 4-phase framework for empathic design based on the construct of empathy from psychologists like Stein (1917), Rogers (1975) and Reik (1949). The framework is composed of four phases, Discovery, Immersion, Connection, and Detachment as a method that designers step into the user's life to understand their situation and detach to take action. Figure (6) below shows the phases of this framework and how they allow for designers to step into the life of their users.

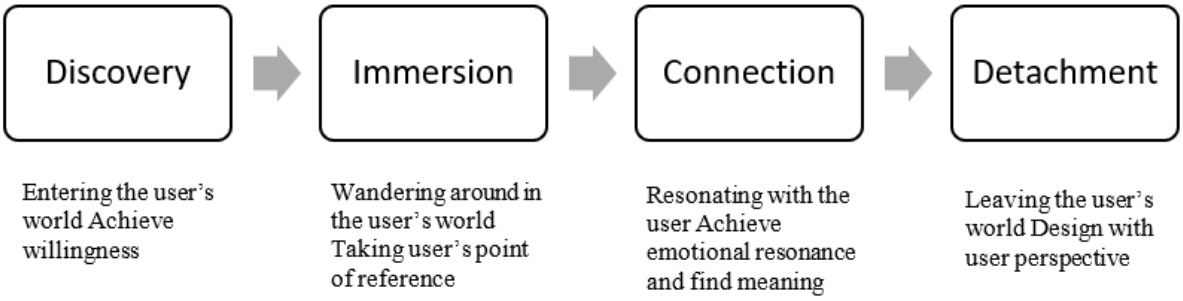
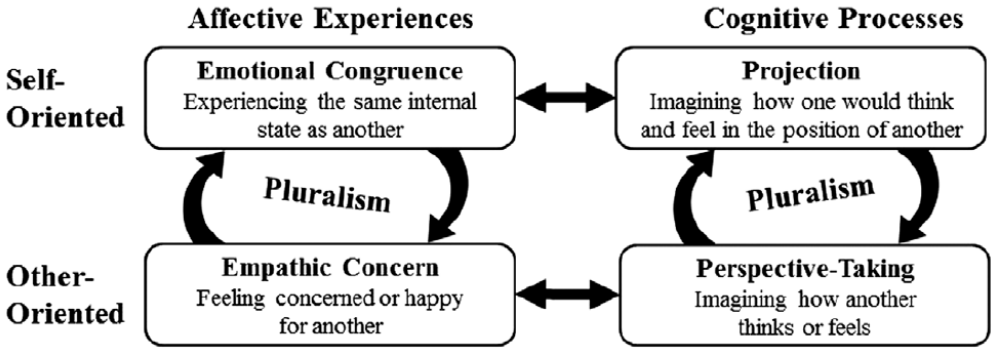


Figure 6. 4-Step Framework Introduced by Kouprie & Visser (2009)

In addition, Mattelmäki et al. (2014) introduced four factors that affect empathy in co-designing with users: (1) capability to balance off feelings and logic when attuning with users 'experiences' (asses what is necessary to consider and what is not), (2) connecting with users and suggesting considerations that suit their paths, (3) engaging users in the development of the products, (4) integrating designers with team members and users. Furthermore, Hess & Fila (2016) have introduced some of the psychological mechanisms of empathy into design research, such as the relation between affective and cognitive processes, and the interpersonal (other) and intrapersonal (self) orientation described in figure (7) below.



Pluralism: a condition or system in which two or more states, principles, sources of authority, coexist

Figure 7. Construct of Empathy Types (Hess & Fila, 2016b)

Hess & Fila conducted two different case studies, where the researchers examined video snippets in design practice and in academia (design studio). The first case (2015) was to examine a team of design practitioners to see how empathy is generated throughout the design process, and how corporate decisions affect the process of empathy and the design direction. The second case (2016) was to observe how design students develop empathy and when empathic methods are utilized throughout the design process in the assigned project. In the first case, there were 5 phases for reaching an empathic design: (1) creating an understanding of the environment you are aiming to design for; (2) applying empathic techniques to seek empathic accuracy; (3) personification, which is gathering all user research to form a story that meets both the users and corporations needs; (4) transforming the personified data into the company and representing it to other teams in the company, and; (5) finally applying these user representations into the decision making process and emphasizing their necessity.

In the second case, 4 phases for the empathic process were presented: (1) developing empathic understanding through utilizing empathic techniques such as direct observations, empathy through proxy, interaction with users, projection, and simulation of users experiences; (2) identifying user-centered criteria such as empathic concern for users' wellbeing and synthesizing the gathered data;

(3) generating design concepts such as designing for users, implementing design considerations, and then refining them, and; (4) evaluating design concepts through testing usability and feedback from users. Table (1) represents the different design process steps and the corresponding empathic approaches used by the students in each step.

Design Processes	**Empathic Patterns**
Developing Empathic Understanding	1. Direct Observation 2. Interaction 3. Projection 4. Simulation 5. Empathy by proxy
Identifying User-Centered Criteria	1. Empathic Concern 2. Synthesize Empathic Knowledge
Generating Design Concepts	1. Design for User-Centered Criteria 2. Integration 3. Refine User Suggestion
Evaluating Design concepts	1. Check with User 2. Imagined Use

Table 1. Empathic Methods Used by Design Students Throughout the Design Process (Hess & Fila, 2016b)

In Hess & Fila's (2016) study, empathy is referred to as a two-way concept formed of empathic understanding of the user's situation and empathic concern, which is the willingness to act upon that understanding and help the user (Davis, 1996). Empathy by proxy refers to the designer's responsibility to change the user's situation from current to a better situation. In these two studies run by Hess and Fila (2015; 2016), they documented the work process of both design students and design professionals and how they develop empathy throughout the project phases, and what empathic methods are used the most. To measure design students' empathy, feedback was gathered from users and project partners to re-evaluate the understanding of users' needs. It is important to point out that Hess and Fila reported that all empathic methods used in design form empathic understanding of the user but not empathic concern. Therefore, current empathic methods used by designers develop an understanding of the user, meaning that empathy in design operates in the

form of cognitive empathy (see section 2.4 for types of empathy). Further research must be conducted to measure what type of empathy do designers develop throughout the design process and what type of empathy do current empathic methods trigger.

Furthermore, Smeenk et al. (2018), were the first to introduce a framework consisting of five factors to measure empathy in design. The first factor, "emotional interest," indicates designers' inclination to show awareness of others' emotions. The second factor, "sensitivity" implied as being alert to social encounters. The third factor (3), "perceiving others awareness", represents a designer's ability to pick up other's emotions through having a keen eye on analyzing their actions. The fourth factor, "personal distress," represents designer distress when engaging in empathy and the final factor, "perspective-taking," is to project others' thoughts and feelings and placing ourselves in their situations. Figure (8) below is a representation of the factors proposed to measure designers' empathy.

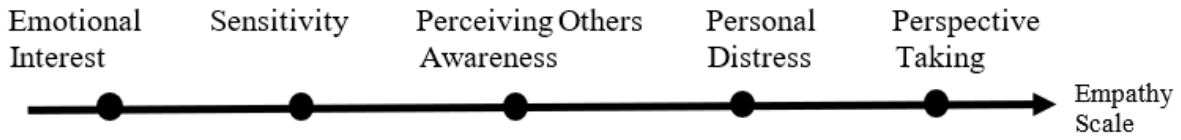


Figure 8. Scale to Measure Empathy in Design Process (Smeenk et al., 2018)

Design researchers including Battarbee (2004), Kouprie & Visser (2009), and Van Rijn et al. (2011) emphasized the importance of designers' willingness and responsibility in building empathy that is designers interpersonal skillset and ability to invest time and effort for implementing empathy throughout every step of the design process.

Within the field of design, many methods and techniques have been developed to help designers empathize with users. Mattelmaki (2005) was one of the design researchers who define empathic techniques as tools designers use to establish a deeper sense of understanding of the users. These techniques consist of "field observations, mapping, etc." Empathic methods have ranged from

“direct contact” (such as interviews, focus groups), “communication” tools (raw data from ethnographic research, such as photos of users, diaries) to “stimulating ideation through imagination” (such as personas, storyboards, experience prototyping) (Kouprie & Visser, 2009). Some researchers, such as Smeenk et al. (2018), argue that simulating users’ situations through imagination is problematic as that allows a designer to speculate and make assumptions rather than actually understanding how the user feels which limits designers’ empathy. In section (2.3), a clear distinction of how and when to use “simulating ideation through imagination” tools results in improving designer's empathy.

2.3. Empathic Design Methods

Establishing an “understanding of the user and their experience” is the fundamental idea of user-centered design (Sanders & Dandavate, 1999; Koskinen & Battarbee, 2003; Sleeswijk Visser et al., 2005; Kouprie & Visser, 2009) and direct contact with users is important especially when it comes to empathic design and human-centered approaches. Design researchers such as Leonard and Rayport (1997) and van Rijn et al. (2011) emphasize the importance of direct contact with users through conducting interviews, focus groups, etc.

Also, the series of different storytelling methods have been established and used to support designers to understand user groups (Buchenau & Fulton Suri, 2000; Van der Lelie, 2005; Van der Lugt & Sleeswijk Visser, 2007; Kouprie & Visser, 2009) such as “personas, scenarios, storyboards, and role-playing”. Such methods require the process of ‘immersing and internalizing’ in the user’s life which requires designers to let go of their perspective, so that they promote needs from a user’s perspective (Kouprie & Visser, 2009). Furthermore, Koskinen and Battarbee (2003) described empathy in design as “an imaginative projection into another users situation” while Fulton Suri (2003) explained empathy as a “unique type of imagination.” Fictitious tools that

require imaginative projection aids designers in imagining the perspective of the other. Among several empathic design methods, some of the most prominent ones used in both academic and professional practice such as metaphors, personas, roleplay, experience prototyping are examined.

2.3.1. Metaphors

Metaphors have been used to increase empathy in the design process (Gibbs, 2008). The core concept of a metaphor is the mimicking of the user's environment, aspirations, beliefs, and stories (Lakoff & Johnson, 1980; Battarbee, 2004). Metaphors in design commonly aid designers with producing a genuine representation of a problem through taking a nonphysical concept and transforming it into a visual representation with physical features. In this context, the designer is the explorer (Jones, 1992; Cross, 2011; Gulari, 2015) who understands and experiences one thing in terms of another (Lakoff & Johnson, 1980). This notion implies that metaphors in a design process would lie under the category of imaginative and fictitious techniques used by designers. In this thesis, metaphors are defined as the expression in which attribution of the interaction between the user and the product is by explaining the unknown by the known. Figure (9) shows using a sunflower as a metaphor to represent the next generation for iMac proposed by Steve Jobs and Jony I've.

Figure 9. Using a Metaphor of a Sunflower Makes an iMac Feel more Human (UX Planet, 2017)

Interestingly, there is a study to investigate the relationship between metaphors and mirror neurons[3], which behave similarly when the agent or someone observed engages in behaviors (Jeffers, 2009). Jeffers asked art students to choose a painting that serves as a metaphor and combines it with an experiential story that represents the student's life story. One of the students chose a Rococo painting as a metaphor to represent her struggle with her mom. The student imagined her two sisters (one is a nun, the other a doctor) as the "lofty mythological figures in the painting which appear luminous, representing virtue and nobility," whereas she was represented by the black figure of ignorance for choosing to go against the mothers will. This triggered her colleagues to show similar responses of rejection by their mothers and deepened their sense of empathy for their colleagues. The metaphor, in this case, was an efficacious way to describe feelings and meaning through communication. Therefore, metaphors are an effective method to communicate ideas and understanding which is a form of cognitive empathy.

2.3.2. Personas

As a metaphor, a persona is a well-known method used in a 'user-centered design process.' It was believed to be first introduced by Alan Cooper (1999) who defined personas as fictional characters resembling the original group of users that are formed to present a certain group's needs. Although personas have a general set of standards they are developed upon, they still differ in terms of the intention they were developed for (e.g., designers create personas to represent their findings, other times personas are used as a medium to transfer information for stakeholders or markets).

[3] Mirror Neurons; Mirror Neuron system (MNS): Is a group of specialized neurons that "mirrors" the actions and behavior of others. The involvement of mirror neuron system (MNS) is implicated in neurocognitive functions (social cognition, language, empathy, theory of mind) and neuropsychiatric disorders (Rajmohan & Mohandas, 2007)

Developing personas requires a series of research and data collection through a process of conducting interviews, using focus groups, thinking aloud protocols, and developing ethnographic and demographic observations. Within the scope of the past 10 years, some research evolved criticizing and questioning the importance of personas (Anvari, 2016). These critical assumptions were based on the idea that personas are becoming generalized and stereotypical approaches based on a paraphrased quote, which is biased by designers' misinterpretation of users.

However, in the studies conducted by Hess and Fila (2015, 2016b) results proved that personas tend to distance designers from the actual users and thus become less empathic. Personas are generalized representations of sample groups conducted by designers and researchers to transfer data to team members about potential users of a product or service. Generalization is the opposite of empathic design; personas portray a united picture of users which makes it hard for designers to empathize. All design methods that portray fictional characters such as (personas, metaphors, storyboards, mood boards, empathy maps) are considered “stories” that are used by designers to communicate research information to company members and represent “market niches” and a specific demographic (Hess & Fila, 2015). Therefore, these communication methods allow designers to convey a story to the public to induce an empathic response which is a process that demands going beyond superficial experience, thus connecting with the user. Figure (10) below shows an example of a persona.

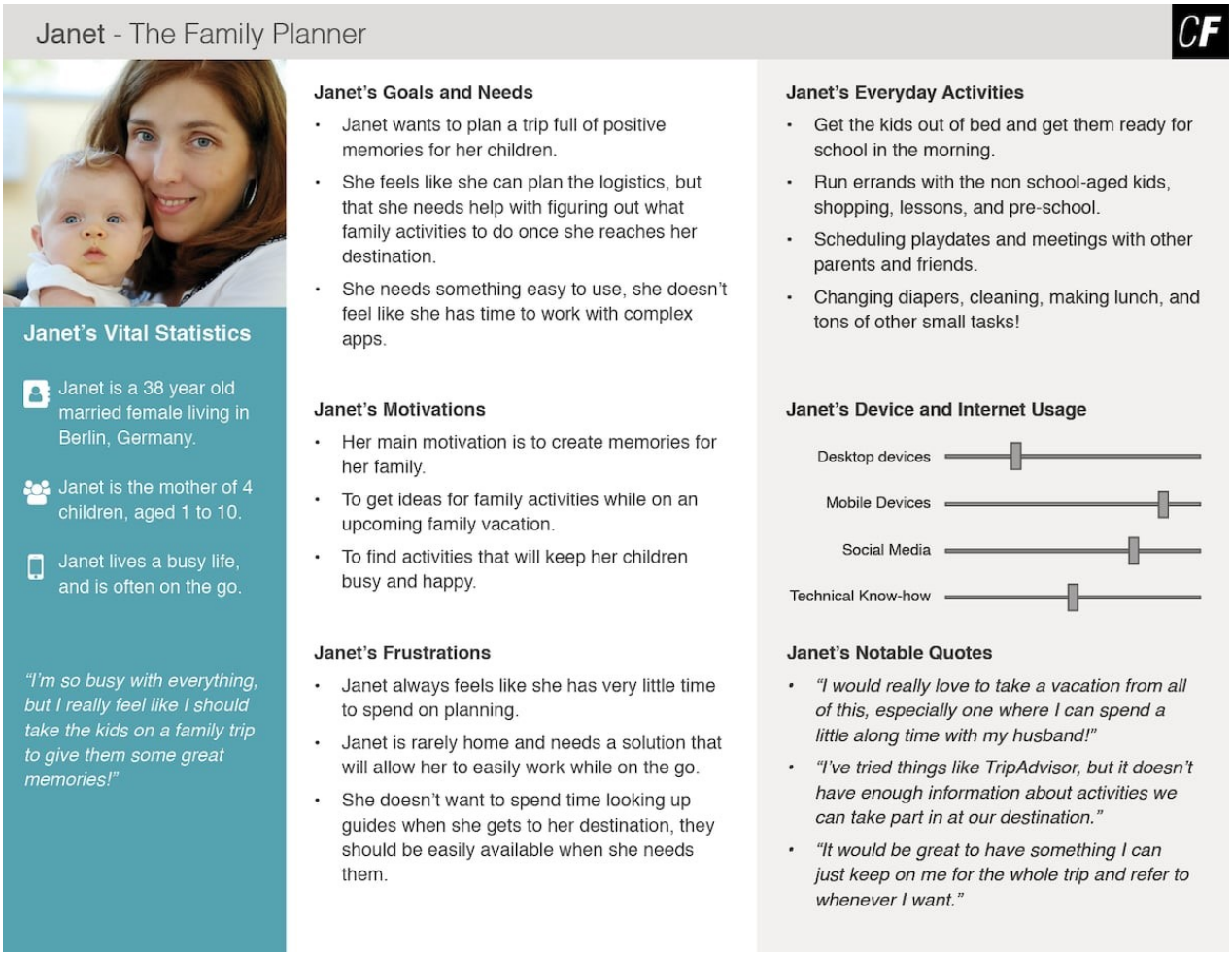


Figure 10. Example of a Persona (CareerFoundry, 2019)

2.3.3. Experience Prototyping

Empathic design methods that are based on role-playing techniques can allow the designer to simulate the user's experience and "be in their shoes", instead designers using role-playing techniques form a deeper connection with the user which allows them to communicate concerns and how to solve them in a friendly manner. The term 'Experience Prototyping' was first represented by Buchenau and Fulton Suri (2000) to clarify designers experimenting with the "new products or systems designed through interacting with the simulations." Stickdorn and Schneider (2010) define experience prototyping as a bodily way of performing design cases and prototypes

by designers, representing the physical aspects of the usability of a product. Figure (11) represents an example of experience prototyping.

Figure 11. Cliff Kuang Wearing Devices to Simulate Loss of Flexibility for Elderly When Driving for Fast-Codesign (Medium, 2016)

Prototypes allow designers to create an in-depth relationship with the users through experiencing what they feel using the designed product or system, and what improvements could be made from a user's perspective. Experience prototypes symbolize any mode created to help designers perceive an image of how it would feel like to immerse with products, spaces or systems designed (Kouprie & Visser, 2009). Modes of expression could be as simple as, for example, applying oil to a doorknob to vision how it would be like to open a door for someone with Parkinson's disease. In addition, Burns et al. (1994) explained the adoption of the roleplay tool into the design to make the change from "what is" to "what might be" and to surpass existing stereotypes of users and contexts that take place in the storyboarding technique, which is a tool used for presenting design ideas (Boess, 2006). Although experience prototyping is a method that aims to eliminate generalization and stereotypes, it is important to acknowledge that in some cases

designers mimicking disabilities is unsuccessful and results in negative responses and distress towards the disabled users, which results in failing of improving or understanding disabled users and empathizing with them (Nario-Redmond, 2017). It is important to acknowledge that experience prototyping method is not accurate in simulating user's experience for the designer; incorporating users throughout the process is necessary for constantly re-evaluating the problem and removing stereotypes through user's feedback.

2.3.4. Roleplaying

Role-playing has always been a crucial tool used for practicing "empathy and perspective-taking" (Carkhuff, 1969; Rogers, 1957; Poorman, 2002). Stickdorn and Schneider (2010) define role-playing as the psychological aspects such as replicating users in a context that resembling theater rehearsal. One of the first creative design companies to adopt the role-playing method was IDEO[1], where designers would partake in acts to create ideas for design problems and understand users' experiences (Gamman et al., 2012). In the literature around roleplay method in design, some design researchers suggested a set of improvisational props and techniques to help in interaction design ideas (Simsarian, 2003; Waterhouse, 2005; Gamman et al., 2012) using tools like the fantasy personas (which are the process of turning personas into profiles presenting a character like in theater instead of a mood board profile) (Light et al., 2009; Kaario et al., 2009; Gamman et al., 2012), role-playing with toys through simulation, or physical conditions to help both users and designers foresee the upcoming scenarios (Kuutti et al., 2002). Role-playing is also known for lessening stereotyping and assumption making of different groups of people (O'Sullivan, 1993; Pulos, 1993; Poorman, 2002). Some role-playing tools require simulating the user's situation to help designers experience the user's state. They are known as "product handling," "experience prototyping," "bodystorming" and "informants" (Buchenau & Fulton Suri, 2000; Kouprie &

Visser, 2009). Figure (12) below, is an example of design students from the Service Design Lab course using roleplaying method to experience challenges faced by elderly residents in nursing homes.

Figure 12. Example of Design Students Performing Roleplaying Method in a Service Design Course (Service Design Lab, n.d)

Table (2) sums up the pros and cons of using each of the empathic design methods above and in what situations they are considered the most effective.

Empathic Methods	Pros	Cons
Metaphors	1. Metaphors are a good empathic method for team members when paired with storytelling, they activate the mirror neurons, the underlying mechanism behind empathy. 2. Metaphors are a good communication tool to explain the unfamiliar through the familiar, thus a connecting	1. Metaphors cannot be considered an empathic method in all cases for designers, and they are combined with other empathic methods to increase a designer's empathy.

	language between the user and the designer.	
Personas	1. Personas may increase team member's understanding of others if the design researcher focuses on allowing an open discussion and focusing on the storytelling aspect.	1. Personas do not increase designer's empathy and they are a method that generalizes profiles of user groups resulting in stereotyping.
Experience Prototyping	1. Experience prototyping can help designers understand user's experience through simulating their physical experience.	1. Experience prototyping may create stereotyping and designers distress in cases simulating disabled user's experiences.
Roleplaying	1. Roleplaying in co-designing with users allows designers to generate design ideas and creates an exchange of information between designers and users, focusing on psychological experiences.	1. Roleplaying is effective in service design but is not effective in all design situations. 2. Roleplaying, in some cases, is formed on stereotyping.

Table 2. Pros and Cons of Empathic Methods

2.4. Types of Empathy

The notion of empathy has been studied in the scientific fields such as social neuroscience and cognitive science to investigate its biological constructs and mechanisms. In the cognitive science field, empathy is a complex concept, involving both affective and cognitive mechanisms (Davis, 1996; Decety & Jackson, 2004; Mattan et al., 2016). Some researchers believe the existence of three different categories of empathy in "motor, cognitive, and affective", while others indicate both affective and cognitive as the two main types of empathy and the mirror neuron system[2] (MNS) the biological correlation that triggers both types of empathy.

Motor empathy is associated with the sensory-motor neurons[4], part of the mirror neuron system (MNS). Cognitive empathy is linked to the ventromedial prefrontal cortex[5] and affective empathy, the part mainly responsible for developing emotions, takes place in the inferior frontal gyrus[6] (Chartland & Bargh, 1999; Sonnby-Borgström, 2002; Baron-Cohen & Wheelwright, 2004; Iacoboni, 2009; Bien et al. 2009). While some theorists believe that motor empathy (MNS) is considered a third underlying mechanism for empathy, others believe it is an instinctive and biological process which triggers both cognitive and affective processes (Hoffman, 1984; Van der Graaff et al., 2016). Since there has been very limited research within this area, further evidence (including brain imaging) is required to validate the argument. In this research, we are considering both affective and cognitive as the two types of empathy and the MNS as the underlying mechanism that triggers the two response types.

In design, both affective and cognitive empathy are required to work simultaneously (Devecchi & Guerrini, 2017) to enhance the full empathic experience of the designer by understanding the user and being physically involved in the user's situation.

2.4.1. Cognitive Empathy

Cognitive empathy is often referred to as perspective-taking or how well one person can perceive and understand another (Mazza et al., 2014). It is defined as grasping others' feelings

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[4] Sensory-motor integration takes the view that in many aspects of behavior, motor actions and sensory processing are inextricably linked (NACS, 2015).

[5] The ventromedial prefrontal cortex (vmPFC): is a part of the prefrontal cortex in the brain. The ventral medial prefrontal is located in the frontal lobe at the bottom of the cerebral hemispheres and is implicated in the processing of risk and fear. It also plays a role in the inhibition of emotional responses, and in the process of decision making (Science Beta, 2010).

[6] The inferior frontal gyrus: most of the three major longitudinal gyri of the lateral surface of the frontal lobe each cerebral hemisphere; it is part of the prefrontal cortex. In the dominant hemisphere, the posterior two thirds of the inferior frontal gyrus are Broca speech area, which is involved in activating the muscle groups used when speaking (Medical Dictionary, n.d).

with no need for sharing their emotional states (Mead, 1934; Bons et al., 2013). It is also known as stepping into one's situation, discovering, merging, connecting and then detaching from the situation in order to take-action (Kouprie & Visser, 2009). The cognitive process of empathy takes place in the prefrontal[7] and temporal brain regions[8] which are responsible for recognizing and capturing other's feelings and emotional states objectively (Dadds et al., 2008; Decety & Lamm, 2011). Cognitive empathy is associated with the ability to adapt to different mental states (Apperly, 2010) and the flexibility to shift between different perspectives. Intrapersonal[9] perspective-taking is thinking about your own opinions and feelings when placed in another person's situation. Interpersonal[10] perspective taking, is thinking about other people's opinions and feelings, and how they would react (Eisenberg, 2000; Decety & Jackson, 2004; Decety & Lamm, 2006; Mattan et al., 2016). Similarly, Dectey and Lamm (2011) refer to cognitive empathy as "empathic accuracy" which involves precise insights about others, a procedure that requires perspective-taking also known as Theory of Mind (TOM).

Perspective-taking is the individual's potential to comprehend another's state of mind through observing and predicting their behaviors and actions (Miller, 1994). This notion was first introduced in the 1970's period by Premack and Woodruff (1978) who defined TOM as "the ability to impute mental states to oneself and others". In the 1990's, a number of theoretical models of TOM related to visual perspective-taking were developed (Piaget & Inhelder, 1948) false beliefs, knowledge, reasoning, intentions of others, and understanding and identifying others' emotions

[7] Prefrontal Brain Region: The part of the human brain associated with aggressiveness and impulse control (Medical Dictionary, n.d).

[8] Temporal Brain Region: The temporal lobe is the region where sound is processed and, not surprisingly, it is also a region where auditory language and speech comprehension systems are located (Baars & Gage, 2010).

[9] Intrapersonal: Existing or occurring within the individual self or mind (Medical Dictionary, n.d).

[10] Interpersonal: Of or relating to the interactions between individuals (Medical Dictionary, n.d).

and what they think and believe (Premack & Woodruff, 1978; Baron-Cohen et al., 1985; Watt, 2007; Westby & Robinson, 2014). In the last 15 years, the number of studies in both neurophysiology and neuroanatomy has identified a link between cognitive and affective forms of empathy with Theory of Mind (Dectey & Lamm, 2011).

Some researchers including Chisholm and Strayer (1995) as well as Eisenberg et al. (1989, 1994) and Zhou et al. (2002) have provided proof of the presence of a link between motor response and affective empathy, though a weak one. Chartrand and Bargh (1999) initially associated the unconscious motor imitation as a solely cognitive process of no apparent link with emotional empathy. They identified the underlying cause as a "perception/behavior link" in which they introduced the term "chameleon effect" to represent this state of unconscious action perceived by an individual observing another individual. For evidence to assist their association, the result of the study showed high levels of motor imitation such as "foot shaking, face rubbing, smiling" were present in people with a high level of "cognitive empathy", and no link between motor imitation and affective empathy (IRI, Davis, 1983).

2.4.2. Affective Empathy

Affective empathy is identified as "emotional empathy". It is the capability of sharing other's emotional states and feelings (Mehrabian & Epstein, 1972). Affective empathy involves being sensitive and showing spontaneous responses towards another person's effective situation. This type of empathy replicates an individual's capability to experience an "emotional response" similar to "observed experiences of others" (Davis et al., 1995). The imitation of other's actions requires the involvement of regions in the brain which activate an individual's emotional responses like the

amygdala[11] and insula[12], which in turn create a physical response similar to that of other individuals (Dectey, 2011).

As mentioned previously, the two types of empathy work interchangeably. Preston and De Waal (2002) introduced the action and "perception model of empathy", they believe that examination of other's feelings triggers motor imitation, which in turn affects the affective and then cognitive reaction. Van der Graff et al. (2016) propose that the facial responses present in an individual proclaim that facial muscle movement resulted as an unconscious action from others emotive expressions and creates a cycle of connection between the observer and receiver.

In 2002, Sonny-Borgström denied the latter association of motor imitation and cognitive empathy by performing a study using electromyography(EMG) to measure both motor and facial imitation of emotions, including "anger, happiness., etc.". People with high levels of affective empathy revealed greater points of facial imitation than people with lower points of affective empathy. This allowed the researcher to deduce unconscious mimicry is a primary component for activating affective empathy (Barid et al., 2011). Additional research is required to set bases on whether imitation activates cognitive empathy or affective empathy first, but we can conclude that no matter which process it is, imitation is an unconscious form of action that is important in triggering both affective and cognitive forms of empathy.

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[11] Amygdala: An almond-shaped brain nucleus at the front of the temporal lobe. The amygdala is concerned with memory registration (Collins Dictionary of Medicine, n.d).

[12] Insula: An oval region found in each hemisphere of the cerebral cortex, lateral to the lentiform nucleus and situated within the sylvian fissure, involved in sensation, emotion, and autonomic function (Medical Dictionary, n.d).

2.4.3. Mirror Neuron System

The general concept of empathy which revolves around "putting oneself in another's shoes" by mimicking how others feel or think was associated with the mirror neurons (Iacoboni & Mazziotta, 2007). Psychological representations of imitation adopt an overlay or strong association between "perception and action" and that they are reinforced by neural mirroring. Mirror neurons were first discovered by Psychobiologist, Vittorio Gallese, who observed monkeys' behavior in response to watching other monkeys eating a banana and performing similar actions of imitation. (Gallese et al., 1996). Since then it has been identified in humans as well, but it is a subject of much speculation based on limited empirical evidence (Decety, 2010); although some researchers have proved its existence in humans through fMRI imaging were similar results were found (Baird et al., 2011). Surprisingly, however, there has been very limited empirical evidence around whether mirror neurons trigger empathy (Barid et al., 2011).

2.5. Understanding Empathy in Design

After examining the history and biological construct of empathy, we explain how designers practice empathy in design through examples of two case studies. The problem of designing something with sympathy (i.e., feeling concern, compassion, or feeling sorry for others' suffering) is that designers have positioned themselves in an inappropriate way from which to design. Often, bad decisions are made when designers design for people they feel sorry for. Designers would pay attention to the suffering aspect and would often suggest what they would want instead of what the user needs. Empathy is "putting yourself in someone else's shoes" and viewing their perspective, how they feel, and what they do. See figure (13) below for a visual representation.

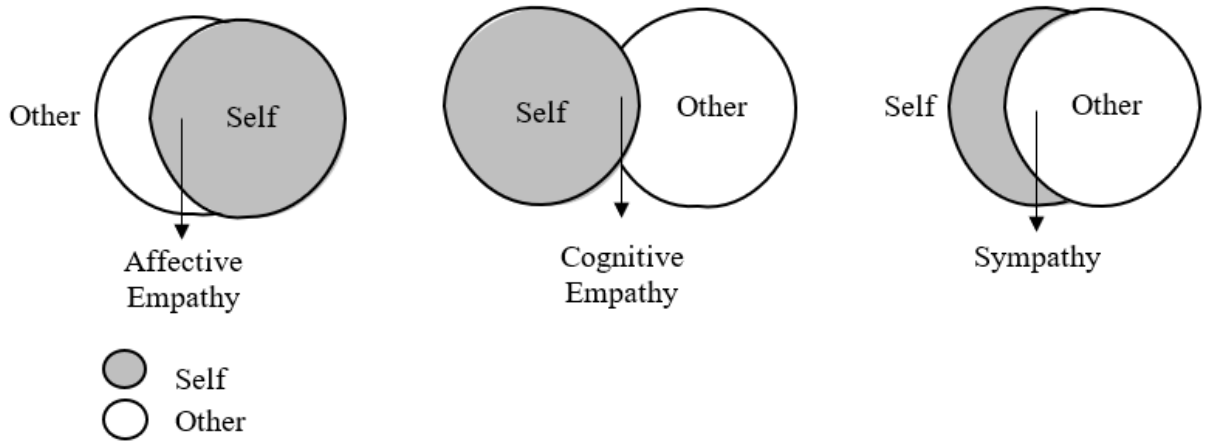

Figure 13. Differences between Sympathy, Cognitive Empathy, and Affective Empathy (The circle in the foreground represents what gets the most attention in the mind of the empathizer)

Designers should aware that using an experience prototype does help them to understand the users on a certain level. While it is also important to acknowledge that the experience prototype cannot make us fully experience how the other feels in some cases, it increases our level of understanding and awareness, thus improving understanding experiences when designing a product. As a spectrum, it begins with understanding the user's situation. The more we share similar experiences, the more we connect with the user.

The empathic Horizon, introduced by McDonagh-Philip and Denton (1999), refers to the way designers to expand the boundaries of the knowledge they have to include factors such as social, cultural, educational and emotional models. It is essential to recognize that emotional sensitivity is different from empathy. It could manifest as sensitivity to one's own emotions but not to the users. Thus, designers must set limits on how much to get emotionally involved. That can transform over time with increased experience and training. Figure (14) below represents the empathic spectrum. The more the experience the designer has, the closer they get to on the range to the user. Complete empathy is impossible, we must understand that our experiences are different

than others, and no matter how much we try to mimic them, we can never fully become morph into the other. The deeper we understand, the more answers we receive for the design problem.

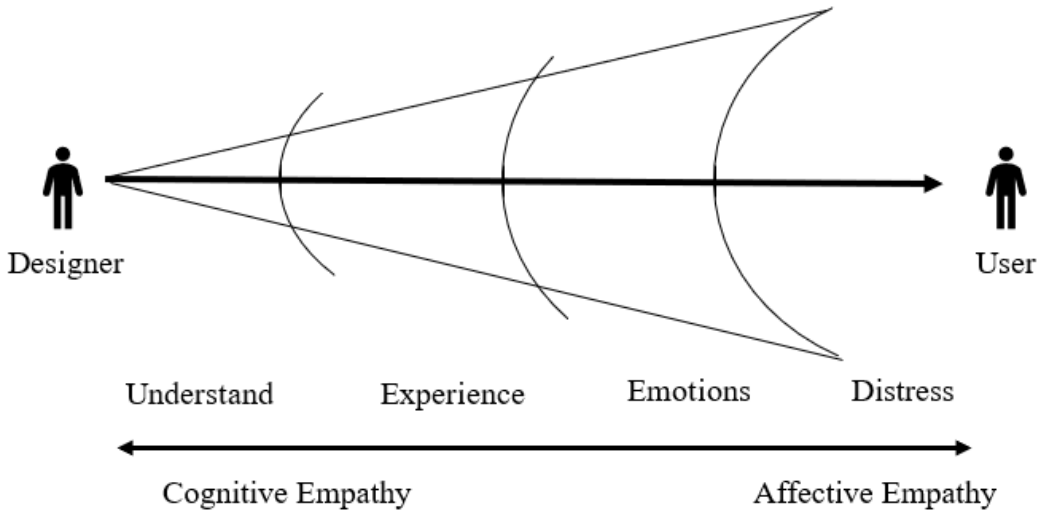

Figure 14. Empathy Spectrum

2.5.1. Design Example 1: Google Empathy Labs

The case study done by Danielle Krettek at Google's Empathy Lab is presented (Krettek, 2018). The researchers from the Google Empathy Lab wanted to understand how users interact and user's emotions when using Google's Pixel smartphone. The team of researchers went on and gathered over 10,000 data points from all states across the US by tracking everything the google user would do on their phone for an entire week, from every tap to text message, to swipe and touch. Results showed that people on average would open their phones about 150 times a day. For a super-light user, they open their phone 72 times a day, which is 2600 touches, for a heavy user, it is 10,000 times a day and what that adds up to over a year is 1 to 2 million touches depending on how heavy the use is. This triggered the researchers to understand user emotions when interacting on their phone screen (e.g., working, with friends) and how they felt at that moment (e.g., stressed, happy,

angry), as well as the density and sensitivity of the interaction. Participants were asked to record their emotional travel throughout the day and how they felt throughout the day.

Most of the time in user experience (UX) design, the focus of the researchers and engineers is on the density, reliability, speed, and accuracy of the interactions, but how the user is feeling in every interaction is not highlighted (Krettek, 2018). The team of researchers in the Google Empathy Lab identified the sensitivity aspect as the key insight, understanding how their users' interactions change throughout the day. This allowed these researchers to expand their understanding of how the users feel with each interaction with the interface. This form of understanding is known as cognitive empathy, the capacity of attuning with the users and understanding their emotions.

2.5.2. Design Example 2: GE Healthcare

Another case study is the project completed by GE Healthcare, The Adventure Series, for Pittsburg Children's Hospital designed by Lead Industrial Designer Doug Dietz, was to make neuroimaging machines more user-friendly for children patients (Dietz, 2012; Ruiz Costilla, 2015). Children usually face anxiety and fear when entering a neuroimaging room, usually in response to the big warning signs and the sound caused by the machine. It is a scary experience for young patients, and therefore 80% of pediatric patients are sedated for technicians to be able to generate more detailed image scanning. Through Dietz's observation, he noticed the difficulty of having to undergo neuroimaging for the patient, family, and technicians as well, reassessing the meaning of what good design is. Therefore, instead of looking into improving the neuroimaging machines given the complexity of such changes, the focus was on making the experience more user-friendly. In order to solve that design problem, Dietz, along with a team of 30 designers, collected data through observing the children, gathering data from nurses, technicians, and

specialists working with the families as well as psychologists. The combination of designers from different age groups and genders helped collect different forms of data from the children. The design of the rooms was collected by asking the patients and daycare children to make drawings of different themes they like.

In every room, there is music that leads children patients to a colored room containing elements that addressed all the anxiety points the young patients and their families experienced. There were different themes for each room, and the young patient would get to choose what character to play in this journey. The devices were camouflaged to imitate the actual sensory experiences within this space. Figure (15) below shows the bed shaped like a ship, so the young patient would feel like they were getting onto the ship to begin their adventure in the sea. This form of attunement to the young patients, understanding how both the child and parent feel (recognizing the user's emotions), and being able to identify them is cognitive empathy. In this design example, Doug Dietz got emotionally involved through sharing how he felt about observing these children terrified, given he is a father himself.

Figure 15. GE Adventure Series - The Pirate Room

In both design examples examined, some similar patterns and attributes allow designers to understand user's behaviors, feelings, and desires. In both examples, designers let go of leadership and adopt humility in order to attune and understand users. Listening and attuning is another attribute, in both examples designers keen observations allowed the designers to understand how users felt and their behavior. There are multiple empathic approaches, each of which are designed for a specific case and scenario. Various empathic methods are usually used together in a design project. After looking at two different examples of how empathy is used in the design, the conclusion that empathy in design follows a model in which the designer identifies how and why the user is feeling a certain way. Then designers are capable of solving potential user problems.

2.6. Pause-Predict-Ponder (PPP) Method

The Pause-Predict-Ponder (PPP) method was introduced by Ogan et al. (2008) as a model to assist students in acquiring cultural skills in a French language online course in Linguistics field through watching videos and analyzing individuals behaviors from different cultures. The PPP method was originally built on the Liddicoat model for developing intercultural competence (Liddicoat & Crozet, 2001) which is composed of a four-step process (authentic input, noticing, reflection, output) allowing students to understand the given information, noticing significant actions, reflecting on those actions and drawing conclusions. Liddicoat model is an 'attention focusing technique' that aims to help students understand and pay keen attention to key components of language, cultural differences, and gestures. Later, Ogan et al. (2008) expanded the notion of Liddicoat's model to naming it the Pause Predict Ponder (PPP) method. Ogan et al. (2008) developed a digital tool for the PPP method to create a more interacting environment for the students. The PPP method is divided into three phases, (1) Pause, (2) Predict, (3) Ponder as seen below in figure (16).

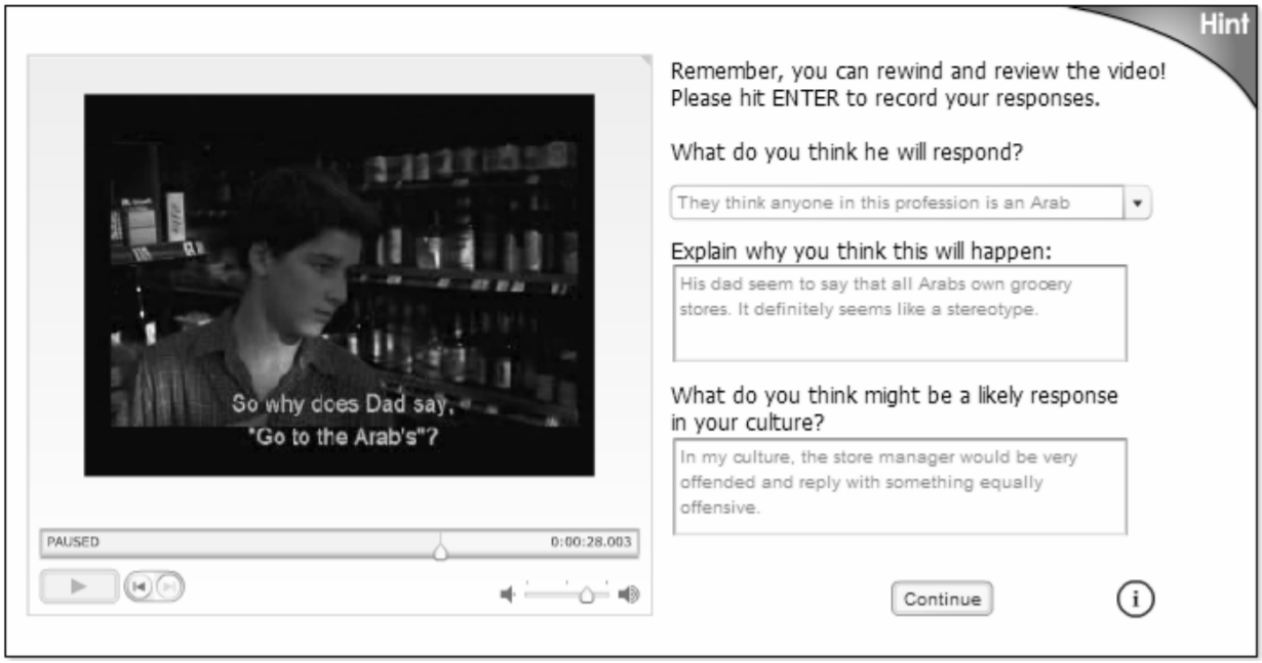

Figure 16. Representation of the Digital Tool for PPP Method Used by Ogan et al. (2018)

In order to understand the development of the PPP method overtime, Table 3 below shows the original model by Liddicoat and Crozet (2001) and the changes done by Ogan et al. (2008).

Specifications	Liddicoat Model (2001)	Ogan et al. (2008)
Time for Video Recordings	Watch an entire film to understand key components of languages.	Watch short video clips from authentic films that target culture. (1 – 2 / minute clips)
Steps	1. authentic input: observe video with a keen eye on details 2. noticing: notice unique elements 3. reflection: reflect on these elements 4. output: create verbal output to be evaluated	1. pause: Select moments from the film that are interesting and unexpected cultural interest 2. predict: viewing/reflecting 3. ponder: resume clip then compare if the answer was correct or not
Type of Questions Asked	Open-ended questions related to the video clips that require cultural analysis supported with knowledge.	Multiple-choice questions related to the video clips that required cultural analysis supported by declarative knowledge.
Medium	Digital (multimedia technology)	Digital (multimedia technology)
Evaluation	Not evaluated by the instructor, informal evaluation by peers	Input by students evaluated by instructor and peers

Table 3. Comparing and Contrasting Original PPP Method

Direct contact with users is essential for designers to understand users' latent needs. Unfortunately, in professional practice in some cases, it is not feasible due to limited time and budgetary restrictions (Kouprie & Visser, 2009). A study done by van Rijn et al. (2011) revealed the effects of different sources of information (i.e., interviews, videotapes, audio recordings, autobiographies, etc.) on designers' empathy; results indicated that interviews are the most effective source of information and videos come in next. This implies that videos hold immense potential in allowing the designer to empathize with the user. Although direct contact involves designers to be strongly immersed with the users, if the designer possesses the 'willingness' to adopt an empathic mindset, videos may take on a more 'active role' (van Rijn et al., 2011). The results showed that when design researchers were targeting precise information from the videos related to the task at hand, this allowed the designers to show enthusiasm and exchange talks among team members if used in a co-design environment. When watching videos, designers might lose attention after a certain time and miss important snippets of information.

In this study, we propose adopting the pause-predict-ponder (PPP) method into the design. Empathy is a necessary skill that design students must possess, but it takes years of experience to understand, therefore adopting the PPP method allows design students to keep a keen eye on understanding different key components of user's behaviors. This 'attention focusing technique' is important as design students to notice gaps and compare current information with the desired information allowing design students to reflect on their suggestions and evaluate them as a learning process to understand users, thus understand the notion of empathy.

Chapter 3: Methodology

3.1. Approach to Methods

Since it is believed that empathy is an important concept in user-centered design that helps designers to set aside their personal beliefs and gain a deeper understanding of their user's perspectives, needs, and desires, this study aims to improve design students understanding of the user, enhancing both cognitive and affective forms of empathy. The aim of this thesis is to aid design students in learning how to understand users behaviors and feelings through the use of PPP (pause-predict-ponder) method as an 'attention focusing technique' which is a learning method that allows design students to reassess current understanding of the user into the desired understanding through reflection on assumptions and reality.

3.2. Development of PPP Empathic Method

Before collecting data from participants, we conducted in-depth interviews with real users as stimuli for this study. The videos represent a day in the life of a user performing a particular service or using a specific product. In the videos, the researcher would ask users questions about their experience, more like a profile of a user. The following notions are mainly considered.

- Ask users about the troubles faced in a particular environment
- How they work with this product or service (how they use it, their routine, why they use this product or service)
- Ask users what they want as an end result
- Allocate limited time to expressing frustration with a user's experience with a product, service or even a task (how they feel about it).

In this study, different videos of three different cases were developed to ensure credibility. The cases were:

- Individual with epilepsy (22 years old, Canadian, Female, Technology Consultant, Works at Technology implementation companies)
- Superintendent (50 years old, Canadian, Male, Married, Father of two girls, Superintendent)
- Cashier (26 years old, Canadian, Female, Master of Law student, Works as a part-time cashier)

The reason for this selection of these three individuals was to provide a range of individuals that participants are relatable with and others that they are less familiar with. In these videos, the individuals explained more about their environments, their work, and activities. The videos represented a day-in-the-life interview with each individual. The interview was 15 minutes per each individual. The individual with epilepsy was filmed at university, the cashier was filmed at student housing, the superintendent was filmed in his work environment while doing his daily tasks. The videos were played in the following order for all participants, (1) individual with epilepsy, (2) superintendent, and (3) cashier.

The author must keep in mind that this would be a semi-structured interview and one answer might lead to other questions. The interview is a combination of a day-in-the-life type of video with a series of questions asked, while the user is in their natural environment, (e.g., the scope of the project is for designing a digital system for superintendents that connects them with tenants in a building to know about any shutdowns and to keep them up to date). In that case, the design researcher would videotape the superintendent while performing his tasks in his environment while asking a series of questions.

3.3. Data Collection

Participants were recruited through email invitations sent to the school of Industrial design at Carleton University (both undergraduate and graduate students) as well as social media platforms (including Facebook (Carleton Master of Design group), Messenger, WhatsApp) and through verbal communication among young professional designers in Ottawa, Canada area (see Appendix B). An expected range of participants for interviews for qualitative research is ideally from 5 to 25 based on Creswell (1998) or at least six by Morse (1994).

In order to gather data for this study, a PPP session was held to test the PPP (pause-predict-ponder) method during which the researcher observed participants' connections with the three cases. A follow-up interview and questionnaire were used as qualitative methods to gather data. Design students from the school of Industrial design, school of Architecture, and school of Information technology at Carleton University (undergraduate and graduate students) in Ottawa, Canada area were recruited (see Appendix B). The total number of interviewees was eight. Participants were from different design fields including

- 5 Master Industrial design students (2 participants had an undergraduate degree in interior design, 2 participants had an undergraduate degree in graphic design, 1 participant had an undergraduate degree in industrial design)
- 1 Master Human-computer Interaction (had an undergraduate degree in architecture)
- 1 Undergraduate Architecture

Each PPP session with an interview lasted for an average of 70 minutes. The period for gathering data for this study was a month (from May to June 2019).

The participants were informed of video recording the interview and were given the option of being audio recorded if they desired. The participants were assured that they could withdraw from the study at any time during the session, or not answer questions they wish not to. All participants

were provided with detailed instructions about the process of this study and the ethical protocol 'Consent Form' before the sessions were conducted.

3.3.1. PPP Method Session

Before conducting the concept scenario session, a brief introduction of the process was given to each participant. The first method was watching the three videos separately (one by one) prepared for this study. At a certain point, the video is paused, and participants are asked to suggest what they anticipate would happen next (see section 3.2 for more details). Then, 10 minutes are allocated for participants to answer the question asked: such as "If you were the person in the video, what would you do next?" Each participant was expected to write down on a paper with a template what the individual in the video would do, feel, and think, daily routine (what the user would do), struggles (potential triggers for user's frustration). Table (4) shows a summary of the suggested PPP method for design context and figure (17) shows the template provided for writing and drawing scenarios suggested.

Specifications	Liddicoat Model (2001)	Ogan et al. (2008)	Adjusted PPP Method for Design
Time for Video Recordings	Watch an entire film to understand key components of languages.	Watch short video clips from authentic films that target culture. (1 – 2 / minute clips)	Watch short video clips filmed by design researcher or design educator about users of a product. Video is paused after decent amount of information is provided (Average 2 to 3 minutes)
Steps	1. authentic input: observe video with keen eye on details 2. noticing: notice unique elements 3. reflection: reflect on these elements	1. pause: Select moments from film that are interesting and unexpected cultural interest 2. predict: viewing/reflecting	1. pause: Select moments from film that are interesting and unexpected cultural interest 2. predict: viewing/reflecting

	4. output: create verbal output to be evaluated	3. ponder: resume clip then compare if answer was correct or not	3. ponder: resume clip then compare if answer was correct or not
Type of Questions Asked	Open ended questions related to the video clips that require cultural analysis supported with knowledge.	multiple-choice questions related to the video clips that required cultural analysis supported by declarative knowledge.	Open ended questions related to the video clips aiming to improve design students analysis of users perspectives and reflecting upon them.
Medium	Digital (multimedia technology)	Digital (multimedia technology)	Template provided for writing and drawing for scenarios suggested
Evaluation	Not evaluated by instructor, informal evaluation by peers	Input by students evaluated by instructor and peers	Input by students evaluated by instructor and peers

Table 4. Adjusted PPP Method for Design Explained

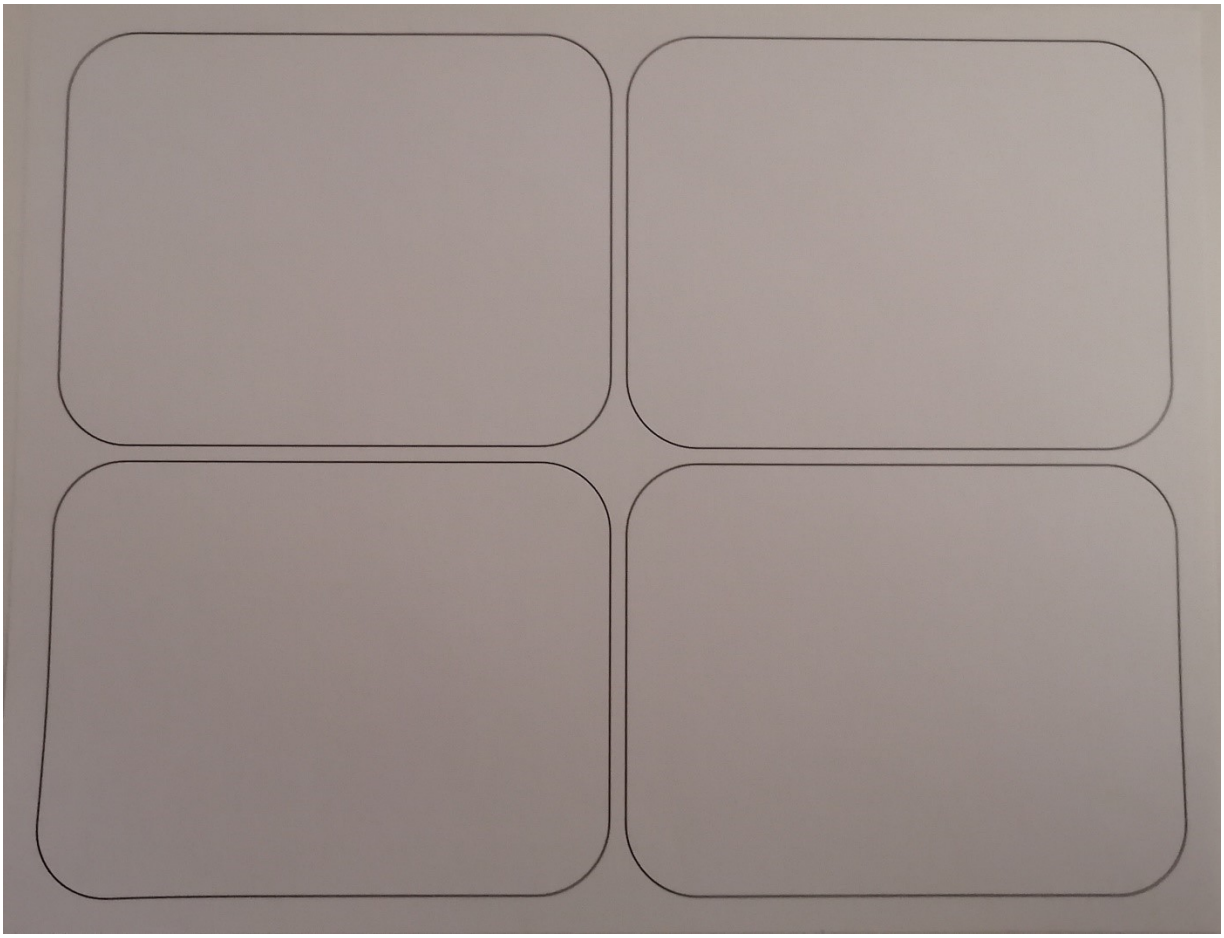

Figure 17. Template Used to Write Down Scenarios Suggested for PPP Method Session

After that, the video is resumed, and the participants are asked to compare their suggestions with reality in each case. After giving an overview of the case, each video is paused at an allocated time, where participants have enough information to suggest a forecast of the individual's activities and when an interesting and unexpected moment occurs. In case 1 (student with epilepsy), the video was paused at 4 min 15 seconds where participants had a decent amount of information about the individual with epilepsy. As for case 2 (superintendent) and 3 (cashier), the video was paused at 1 minute 7 seconds when a decent amount of information was provided about each individual's case. Figure (18) below represents the steps for gathering the data during the PPP session and figure (19) showcases the setting and props used during the PPP method session.

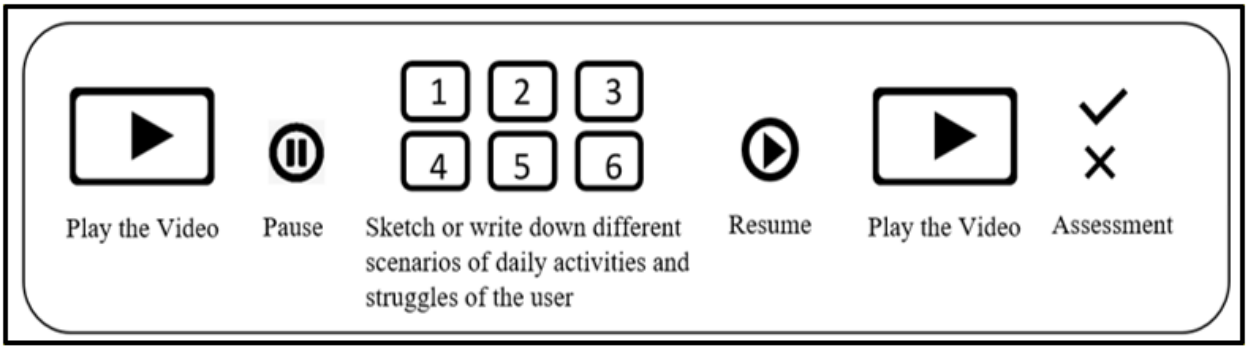

Figure 18. Pause Predict Ponder (PPP) Method Demonstration

Figure 19. Setting for PPP Method Session with Participants

3.3.2. Follow Up Interview & Questionnaire

The second method to gather data was a follow-up interview and questionnaire which was handed out to the participants to assess their experience with using empathic methods in both academia and professional practice if they had the chance to work, as well as give feedback on the PPP method (Ogan et al., 2008) and the tool proposed. During the follow-up interview participants were asked the following questions:

- What individual did you empathize with the most, why?
- Was it hard to imagine yourself in someone else's shoes?
- Why was it easier to generate more activities/struggles for a particular user group more than another?

These questions were asked to understand the process of how participants understood the user's perspective, to develop a guideline for improving the efficacy of the tool developed for the PPP (Ogan et al., 2008) method in this study.

3.4. Data Analysis

After conducting the eight interviews with the participants, content analysis methods have been employed to analyze audio and video recorded data of the PPP session along with the follow-up interview and questionnaire. The collected data were analyzed by both the researcher and supervisor to reduce bias and speculation in the findings. The excel coding sheet for both the interview and questionnaire was used to identify the primary and the secondary keywords which were grouped into categories resulting in the 4-step process revealed in the findings section in chapter 4, see figure (20) below.

Coding for Interview							
				Researcher Analysis			
Date	Question No:	Activity Number	Transcription	Interpretation/Implications	Primary keyword	Secondary keyword	Comments

Figure 20. Template of Analysis Sheet for Interview

The table below (Table 5) represents the before and after answers of participants when they predicted scenarios of the user's perspectives and then reflect differences for case 3 (See Appendix D for all 3 cases). This allowed participants to suggest outcomes to improve the user's situation. Themes such as physical health, mental health, emotional aspects, safety concerns, technology implementation, social life, communication skills, and privacy emerged.

Case # 3 - Cashier			
Participant #	Before Pausing	After Pausing	Outcomes/ Themes
P1	1. knowledgeable of everyday sales and prices 2. check supplies needed on the counter 3. dealing with difficult customers 4. patient to deal with peak hour 5. standing for long hours 6. know how to enter data manually in case system breaks	1. broader perspective of the general picture of what the job entails 2. standing for long hours, back pain, bad posture 3. very small breaks, companies go against labor laws 4. how to treat customers 5. didn.t expect the way cashiers are treated 6. didn't expect the hunger aspect shared	1.communication skills 2. healthy, physical & mental
P2	1. working night shifts 2. Prepare cashier before work shift 3. stressful because repetitive movements 4. standing up the whole time 5. something can spill on the belt during scanning she needs to clean	1. pretty similar predictions, familiar with working as a cashier in retail store 2. standing even when there are no customers 3. Scanning all shift 4. doesn't mention encountering fake currency	1. health concerns 2. stress encountered from job

	6. managers are not very friendly 7. she's a student, temporary job to make money 8. dealing with robbery. Or laundry washed money 9. responsible for money balance 10. buying food for lunch	5. never imagined she hunger aspect from scanning food whole day 6. expected to pack items 7. I can understand managers situations 8. trouble having bathroom breaks 9. short 15-minute lunch break for 5 hr. shift	
P3	1. change shifts between cash and customer service 2. miscalculating customers items 3. complaints from customers 4. remain focused the whole time, tiring 5. make sure cash in and out are correct 6. I don't know how long breaks are, but every 2 hrs. maybe 7. possible robbery	1. didn't think of the mental problems rather than physical ones 2. 15-minute break in 5 hr. shift is not enough 3. how to treat customers is a big part of the job	1. mental health 2. physical health
P4	1. it's often portrayed that cashiers try to scam employer when signing in early, although they have the right to be compensated for that 2. dealing with patsy customers 3. stressful job 4. accuracy in counting cash or else paid from cashier account 5. very tiring, repetitive movements 6. hygiene, touching food all day 7. dealing with money	1. highlighting emotional aspects and dealing with customer service 2. tired from listening 3. importance of communication skills	1. physical health 2. hygiene 3. responsibility 4.communication skills
P5	1. tiring standing all the time 2. pay price of your mistakes 3. fussy customers	1. 10-minute break is illegal, but employers still get away with it	1. physical health 2. mental health 3.communication skills

	4. strict manager laws 5. illegal small breaks 6. responsible for check in and out 7. maintain store cleanliness 8. educate yourself about offers	2. how to handle customers communication skills 3. I predicted possible cases since I have worked a s a cashier, her job is on a larger scale	
P6	1. Cash totals 2. Discounts 3. Upset customers 4. ID's legal age 5. standing for long time 6. Body related fatigue 7. injuries repetitive movements 8. Robbery 9. Emergency procedures 10. System knits-obstacles 11. Fake currency 12. Updated price list	1. missed the emotional aspect 2. the upset customers 3. the unmatched price lists 4. I did think about the tiring aspect the repetitive movements and injuries 5. I thought about discounts or legal age or cash totals, but it doesn't seem to be addressed 6. I thought of her emotional aspect and social interaction with the customers	1. emotional and mental health 2.communication aspects 3. physical health 4. responsibility 5. emergency
P7	1.Punch in/out Grocery cashier night shift lives close to work 2. must be energetic 3. how long is breaktime, shifts 5pm-9pm 4. responsibilities 5. technical errors 6. handling complaints? 7. prioritizing work	1. I'm a cashier but in different environment in retail store 2. I can't relate to her case, I take 30 mins breaks 3. I like my team and manager 4. handling complaints and customers 5. energy to interact with customers 6.motivatedenvironment	1. health 2.communication skills 3. opposing experience
P8	1. dealing with. belligerent people 2. inaccessible during work hours 3. dealing with peak hours 4. dealing with cash 5. fast pace in case machine disrupts 6. stand up the whole time	1. I did not anticipate emotional aspects 2. communication skills 3. dealing with manager 4. exhausting and repetitive movements 5. no aspiration to be a cashier, just for the money	1. emotional and mental health 2.communication skills 3. physical health

Table 5. Analysis of Case 3 (cashier) Interview - Participants Responses

Chapter 4: Results

4.1. Findings

For clarification, the PPP method session refers to the exercise composed of watching/pausing the videos and suggesting the user's perspective through sketching, writing, and verbal forms of communication. Following Sanders (2002) approach for analyzing qualitative research in design (see figure 21 below), we assume that what people do is what they use, what people say is what they think, and what people desire is what they make, and this will allow us to understand participant responses and frame them as insights.

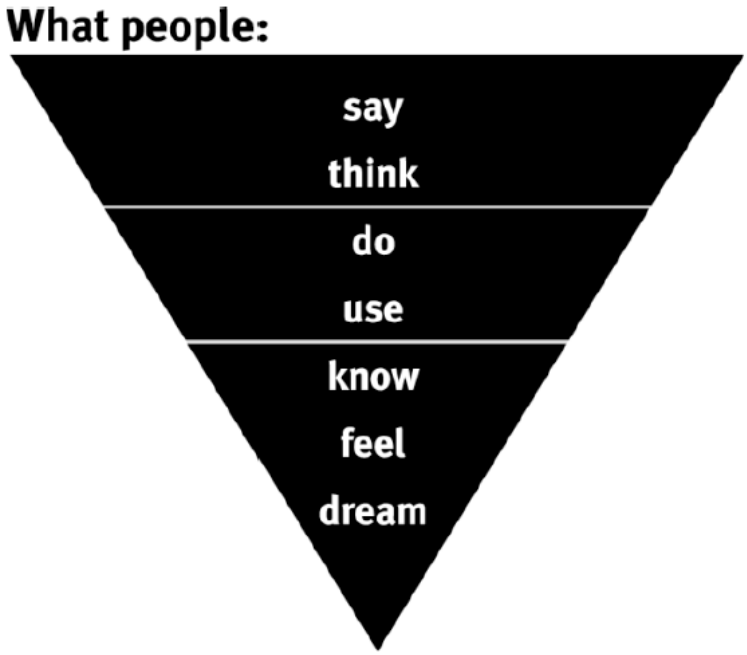

Figure 21. Approach for Analyzing Qualitative Data in Design (Sanders, 2002).

4.1.1. Results for the PPP Method Session

Pausing the video after showing a general overview of each individual's situation seems to allow the participants to gain a general synopsis of the users' situation. After analyzing the collected data and observations, results showed how beliefs and assumptions affected participants

understanding of the three cases. Participants' comparisons of their suggestions with the actual results allowed them to acknowledge the differences and provide them with a deeper understanding of their own perspective and why they responded as they did. The following are examples from the case (1) and the terminologies participants used were to express surprise and recognize the element of how assumptions and beliefs affected their perception of the other individual in each case.

- *"Wow, **very different** like I **did not expect** that …. the horse story was **very interesting**, it is a **very emotional aspect**, I didn't expect that."*
- *"what **I appreciated** about them was **sharing** the lifestyle aspect they go into detail that they have a level of independence."*
- *"This is **very informative** like I just know about the spoon in the tongue thing very informative."*

Participants who were familiar with a case were able to generate more insights for someone they are knowledgeable, unlike the participant who is not as familiar and has minimal knowledge about. When participants were knowledgeable of a case, using this method allowed them to reconsider similar encounters they faced in similar situations and share their experiences with the researcher. Participants clearly identified the emotional states, and feelings of the individuals in each of the three cases and considered it an eye-opening experience. For example, some participants shared stories that reminded them of the cashier's case 3:

- "*I've never worked as a cashier, but in traveling most complaint is on the airlines waiting in the transit sitting watching people complain … it's all about the customer service business, so I know what they have to deal with every day … like having a big delay which was messed up … we had customers yelling and even banging the counter getting mad at*

the attendant it doesn't help actually it only makes them nervous at one point the lady went into the room and started crying."

On the other hand, some participants mentioned fatigue from listening and how that affected and changed their mood from positive before listening, to negative after listening for case 3 (cashier).

- *"I've noticed that at one point I felt that I'm really tired of listening to her and it was very ranting and yes people are allowed to express themselves and let their emotions but … also I feel when listening to that stuff you become aware of your own emotional fatigue. I can understand why people may be apprehensive to listening … it got really hard listening to someone you already understood to a point I don't actually care.*"

When pausing the video and predicting different scenarios, some clarification was requested by participants about what aspects to focus on for the user and their situation in the three cases. Some of the participants focus shifted to health and safety aspects for the case in first (student with epilepsy) and second video (the custodian). As for the third video (the cashier) the focus shifted towards emotional and mental states.

While observing the participants and their responses in each case, all 8 participants shared similar encounters, of them or their family and friends that were either the same or similar experiences to the three cases specifically the cashier. These experiences created deeper understanding connection with the cashier, thus choosing the cashier as the individual that participants empathized with the most. This triggered the participants emotions and sharing them with the researcher. Participant 5 for case 3 (cashier), said:

- " *I hate being a cashier but like I'm glad it's a smaller store and everything costs the same so they can't argue about it … when it comes to promotions you get all these old ladies trying to fight you for the price … like she mentioned the back pain after standing … the*

breaks at work, I do not get a 15 minute break they give a 10 minute break and although that's illegal they still get away with it … if you only get 10 minute break within 5 hour. shift than maybe you have health problems and you have to go to the bathroom … pay price of mistake … satisfying management while satisfying the customer."

Participant 7 for case three (cashier) said:

- "*I'm a cashier as well but in different setting so the tasks and responsibilities are very similar like having an interesting customer or complains that are not reasonable, I could relate almost like 100 % however I guess like job setting environment is much different and I think we have like more stronger team and like general … break is not enough to heat food and have a meal I'm totally on that with her … it's too much stress so it's been similar with me, but I don't agree with manager complaints, I think it depends on type of team, colleagues, managers, she has.*"

Finally, three participants asked questions rather than suggesting different scenarios of how the user would feel or behave in each of the three cases. Participant 8 asked:

- "…*What is she raising the service dog to?... Also, I'm wondering if she's living alone or is the service dog at home and he's helping her like how does she like how intense does the seizure and how does she recover from that like does she need anyone? I guess I just have questions rather than predictions.*"

4.1.2. Results of the Follow Up Interview & Questionnaire

After completing the concept scenario sessions, a follow-up interview and questionnaire were conducted. The results of the interview showed that three participants for different cases expressed their understanding of the user without feeling the need for interfering and suggesting ways to actually help the user. Participant 2 for case 1 (individual with epilepsy) said:

- "*I understand what she's going through… I connect with her emotionally but for me as a designer I don't really look at the health products and those types of groups of people with disabilities … I don't find my personal satisfaction for designing for them.*"

When answering the question revolving around what group the participant empathized with the most, participant 2 chose case 1 (student with epilepsy). What was interesting about the response was that the participant understood the individual's feelings, but preferred self-interest over being accountable and responsible for suggesting design solutions to assist that individual. This is considered cognitive empathy-based on definitions provided in section (2.4) previously.

Participant 4 for case 3 (cashier) said:

- "*Sometimes I just say well then leave your job if you're not happy but that's not polite so this one thing about exhaustion and getting tired I've noticed that at one point I felt that I'm really tired of listening to her and it was very ranty and yeah people are allowed to express themselves and let the emotions, there's a lot of frustration, that's fair like given the level of intensity of interactions, also I feel when listening to that stuff you have to become aware of your own emotional fatigue like you can only consume too much of someone's negative energy.*"

Another question asked to participants was what individual they empathized with the most. Table (6) represents the responses of the participants, and figure (22) is an infographic of this data.

Participant	The case they Empathized with	Reason
P1	Cashier	Visual interaction – a family member
P2	Individual with epilepsy	Sensitive individual – emotional level
P3	Cashier	Visual interaction – observation
P4	Cashier	Last interaction – last video exposed to
P5	Cashier	Similar experience – work as a cashier
P6	Cashier	Similar experience – retail cashier
P7	Superintendent	Similar experience – self interest
P8	Cashier	Visual interaction – a family member

Table 6. Analysis of Participants Responses for which Case they Empathized with Most

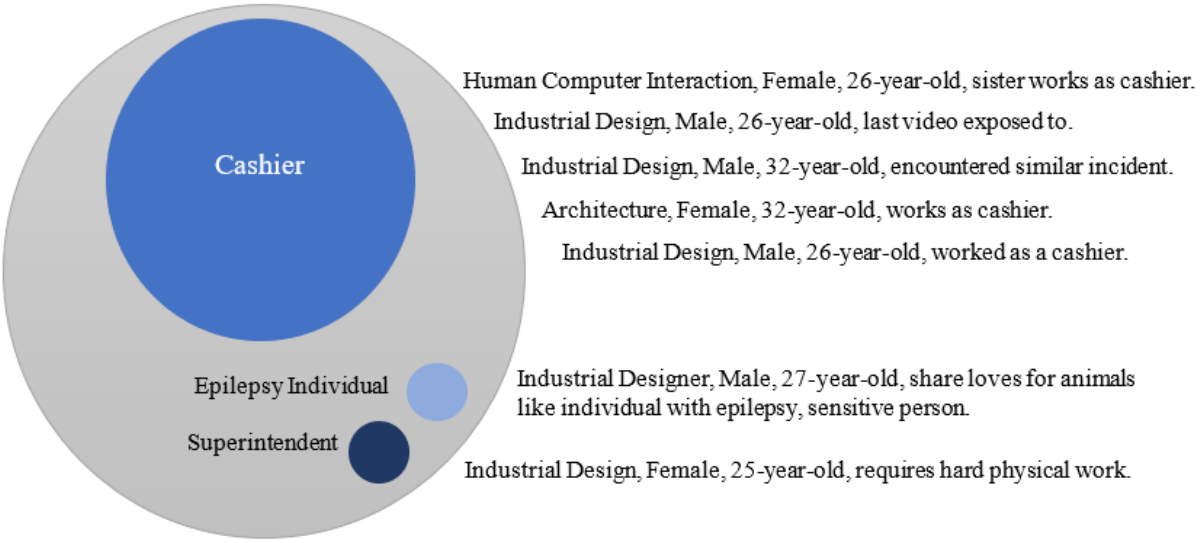

Figure 22. Infographic Representation of Tables 6's Data

As for the questionnaire, the main purpose was to cover the following three issues; (1) the types of empathic methods used by the participants in academia and professional environment, (2) how effective the proposed PPP (pause-predict-ponder) method was in assisting participants in understanding users, and (3) what environment this method would be most effective, in design practice or academia.

In the first part of the questionnaire, answers varied across participants from different design majors and their familiarity with empathic methods. It is interesting to note that participant P5 from architecture and participant P3 from graphic design was not familiar with user-centered design approaches, whereas participants with an undergraduate degree in industrial design and human-computer interaction field were more familiar with empathic methods. All eight participants listed the empathic methods they use the most. They were asked to rank the empathic methods they consider most effective to least effective. The responses are below in the table (7).

Participants	Answers
P1	Interviews, scenario creation, Story mapping, brainstorming.
P2	Interviews, user observation, workshop, persona.
P3	Interviews methods, questionnaire.
P4	Discourse analysis, personas.
P5	--- "no answer"
P6	Mood boards, day in the life, personas.
P7	Interviews, qualitative methods, scenarios, personas, surveys.
P8	Contextual interviews, co-design, observations, user testing.

Table 7. Participants Answers about most to least Empathic Methods

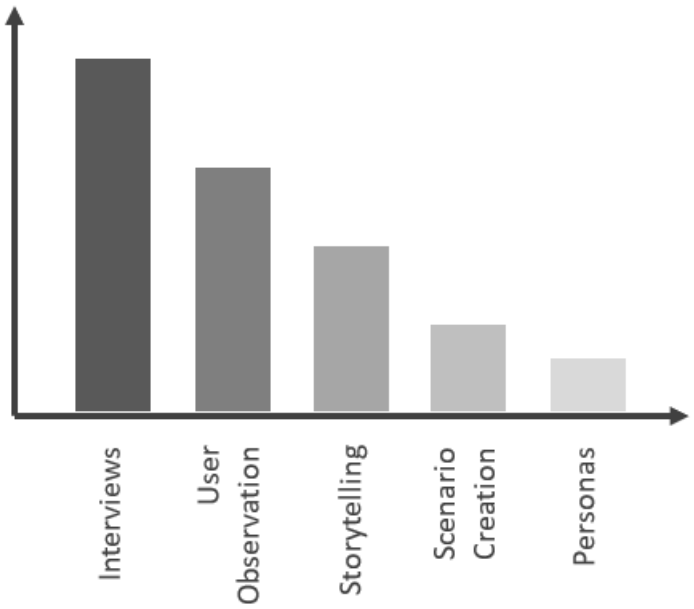

Figure 23. Representation of Table 7 Results

Participants considered interviews to be the most effective method that aids designers in understanding their users and grasp their emotional states. Direct contact, such as (interviews, focus groups) was proven to be the most effective source of information that aids designers in understanding their users. Below are some of the answers of the participants regarding considering "direct contact techniques" as the most effective.

- "*…interviews because it unfolds tiny little details.*"
- "*…the best methods are you talking with people, you can ask more details.*"
- "*normally in interviews, people are more open, it's their time to vent.*"

- " *the videos (interviews from the video recordings) simulated the experience of having an actual conversation with the individuals.*"
- "*Yes, the participants talked about their experiences in the context, so it enabled me to think of this context and struggles as one story.*"

In addition, the two tables below Tables 8 & 9 reveal the participant's positive Table (8) and negative Table (9) responses of using the PPP (pause-predict-ponder) method.

Participant no#	Positive Outcomes
P1	" Direct Interaction (1.To evaluate my ideas / 2.To check what's right and wrong)"
P2	" It made me think about how I would feel if I was that person you become emotional after the first video / it helped me understand that we cannot judge everyone with the same eyes / I learned many new things."
P3	" It's good to realize that the reality may not be what we expected so it can open our eyes / this method also can develop brainstorming ideas with just a little bit of hint at the beginning."
P5	" Pausing the video to guess what happens next creates assumptions first as you continue watching you learn the truths and compare to what you guessed it's a great method to learn (making a mistake then correcting)"
P6	" Interviews help bring the real struggles of the users."
P7	" Narrative: it was not difficult to imagine their life as if they were someone had just met or a neighbor."
P8	" Making you aware that you can't anticipate the struggles without sufficient information."

Table 8. Participant Answers about Positive Outcomes of Adopted Method

Participant no#	Negative Outcomes
P1	" Difficult to convince people to be recorded / difficulty in sourcing the right user/ethics clearance/people getting offended – emotional for the kind of questions we ask/have to be very particular about questions, and that becomes a barrier to get the right info."
P2	"The researcher should be very careful about selecting proper videos."
P3	" Because we paused at the beginning and possibly generated ideas after that our ideas may not fit with the reality at the end."
P4	" An operated as a self-reflection and self-confrontation emotions vs. logic."
P6	" Forces you to jump into conclusions beforehand having not experienced these activities (jobs) is a barrier that will inform initial assumptions."
P7	" Video only shows one of the days in their schedule or week it's somewhat challenging to imagine everyday routine at their workplace or elsewhere hard to get all the information in 1 video as it may depend on the interviewee's mood / the participants did not address any challenges about their physical setting (i.e., ergonomics, noise in the background, poor light)"
P8	" Must be difficult to generalize this experience of a person."

Table 9. Participant Answers about Negative Outcomes of Adopted Method

4.2. Four-Step Process for Facilitating Use of Suggested PPP Method

After analyzing the concept scenario sessions and follow up interviews for the eight participants, a 4-step process to improve the use of the PPP method and empathy was proposed through analysis of the interviews as seen below in figure (24).

Coding for Audio Recorded Interview

				Researcher Analysis			
Date	Interviwee	Activity Number	Transcription	Interpretation/Implications	Primary keyword	Secondary keyword	Comments
May 24th 2019	Participant 6	**Video # 1 - Pausing the video**	Discipline routine / concerns when meeting new people / driving commuting / handeling machines? / emergency contacts? / ID / not early activities / staying over? / table care of the service dog / prepare for daily commute - backpack - snacks - hydrate the day / not injuring yourself if seizures happen	Participant imagining possible scenarios the person in the video migh encounter with a keen eye on safety aspects	Responsible Design	Safety Concerns	

Figure 24. Analysis of Recorded PPP Method Session and Interview (Participant 6)

Figure (25) represents the 4- step process as a result of the analysis.

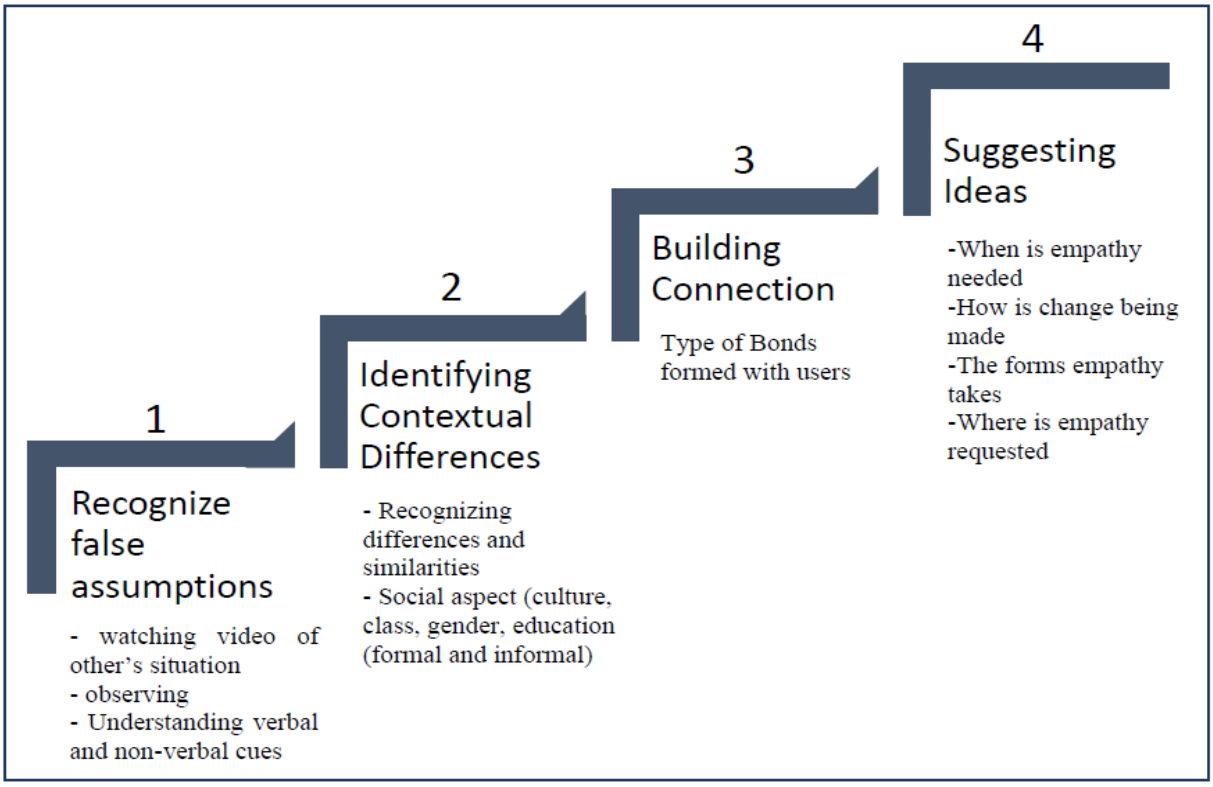

Figure 25. Four-Step Process to Empathize

4.2.1. Recognize False Assumptions

The notion of recognizing false assumptions was apparent with the participants throughout the interviews. When asked to predict what would happen next in a case after pausing the video, participants talked about their thoughts and assumptions. This represented the first step towards sensitizing participant's own biases and assumptions. While participants observed the user in the video, they tended to look for verbal and visual cues. One example of non-verbal cues was when one of the participants had a keen eye on pointing out a ring on a person's hand.

- "*oh, he has a ring probably he is married; that means he has family and children*."

This made the participant consider spending time with family was an important concern for the superintendent, yet with the busy schedule and long shifts the job entails were preventing him from having time for private life and family time. The participant suggested changing laws and regulations entailing the job as an outcome. Also, the superintendent pointed out the importance of having a schedule and showed the handwritten schedule in the video. The participants suggested a digital system that would make the superintendent's job easier in terms of schedules and assigned tasks for the day as well as directly receiving messages from tenants through system updates. This is analyzing nonverbal cues and suggesting solutions that fit and improve the user's situation.

Another aspect observed was the knowledge that participants already had represents the information that they have accumulated over the years. It mainly revolves around the set of beliefs known as individuals belonging to a certain group and culture. The process of unlearning takes place when the participants were exposed to the case after pausing the video, at that point they might let go of what they have learned. Unlearning is often harder than anticipated depending on the situation because when something contradicts your current understanding, you most likely disregard it. By unlearning, you allow new knowledge to come in, but that does not necessarily

need to replace or alter your current beliefs. Logical reasoning and assessing the information given about a domain you relatively know little of and have not experienced is enough to shift the participant's perspective and understanding of a situation. The process and effort put into unlearning represent the participant's willingness to understand and recognize the different perspectives, thus activating a form of cognitive empathy.

4.2.2. Identifying Contextual Differences

Being able to acknowledge the contextual difference such as culture, gender, education, age between the participant and the user would be the main step towards empathizing. Contextual differences include different social aspects such as upbringing, was empathy taught and focused on during early developmental stages; mental health and how it affects an individual's responses to others; practice and years of experience; exposure and time spent with users in a design project. When observing the before and after answers, the participant would be able to recognize the assumptions they made. At this stage, after listing the differences, the participant can begin to recognize the other's perspective. Recognizing and realizing that the participant's experience is different from the user is the starting point towards empathizing and finding a connection with the user. Participant 4 said:

- "*No matter how hard you try, you can say that I've had that experience but, in the end, there is that limit, and it's more of whether you can address those I guess that's what I feel empathy is about*."
- "*it's more of how I want to maintain this relationship vs. what kind of relationship I wish to have with people, my approach to it, I would like to believe I'm empathetic with people but for the most part I will acknowledge that my experience is very different than others*

and I think that's the starting point if you can recognize a difference probably that's one of the most empathetic things you can do."

4.2.3. Building Connection

Establishing a solid relationship with the user is an important step in the process of developing empathy. Identifying what type of bond, the participant shares with the user is the starting point. What type of relationship does the participant share with the user, do they share same or similar experiences, all this is important to consider. During the interview, participants were asked which case they understood the most. Responses were associated with participants that shared their same experiences both on professional and personal levels, as explained earlier. One example is the six participants connected with the cashier, given that they shared the same profession and responsibilities. Two participants highlighted on empathizing with the last user they are exposed such as:

Participant 4 for case 3 (cashier) said:

- "*I feel the most with the last one I saw it just comes back to who was my last interaction with that's how I understand empathy rather than someone's circumstance*s."

Participant 2 fore case 1 (an individual with epilepsy) said:

- "*most emotional for me probably the student with epilepsy because I'm an emotional person so like just looking at her thinking about her … and probably because I love animals and this connection with her dog, I will have more empathy with her.*"

Understanding the emotional motivators are represented through the user's behavior. To allow the participants to gain insights, understanding the context of the video and the type of message being conveyed is important. When a participant pinpoints the emotions, feelings, and motives of the user in a certain situation, this ensures that the participant resonated with and was attuned with

the user at some point. The conversations and stories shared in each case in the videos represent a certain message. For example, in case 3, the cashier shared a story about joking with a customer who only bought an orange and gave a fifty-dollar bill, but instead, the customer replied in an angry manner. The message the cashier tried to highlight through the story, was the emotional aspect required for that position; a cashier is required to smile and engage in talks with customers. But most often customers are not interested, and the cashier is stuck between what the job requires and what the customer wants. Participants were able to pick up the emotional aspects that the cashier dealt with that they usually wouldn't sense and acknowledge when interacting with the cashier. The intensity of interactions is another important aspect not only for connecting with the user but how deep the level of sharing a similar experience can affect participant's objectivity (either positive or negative reaction) depending on the case. In our data, often when a participant is familiar with the case, listening to something you are already knowledgeable of may lead participants to be apprehensive about listening. This leads back to step 1, the process of learning and unlearning and how to control the situation. Participant 4 said:

- "*one thing about exhaustion and getting tired I've noticed that at one point I felt that I'm really tired of listening to her.*"
- " *you can imagine stuff for a person you actually put yourself in a very vulnerable place and putting yourself in that very vulnerable space can bring up your emotions, whether I'm interested in going that path or not, and is it necessary for my own wellbeing.*"
- "*Sometimes you have to disconnect yourself and not feel super invested emotionally and intellectually.*"

4.2.4. Suggesting Ideas

The final step in the process of empathizing is the way the participant approaches the design problem in order to propose a solution. All the previous steps mentioned above dictate the path the participant would follow after analyzing the users' behavior, verbal and non-verbal cues, and understanding their perspective and social context. Participants in this study proposed design solutions when they sensed the need to provide a change in a certain area to improve the user's situation. For example, participants for case 1 (student with epilepsy) suggested designing a technological device to notify the individual of medicine intake time as well as another device to maintain seizures intensity and monitoring to inform the doctor. Moreover, designing furniture systems that match the individual's needs and provide safety since the user resides alone. Similarly, in case 2 (superintendent) the participants suggested changing labor laws to allow more privacy and social life for the individual as well as develop a digital system that informs the superintendent of schedules and assigned tasks for the day and directly receive messages from tenants about complaints that need to be fixed through system updates. Furthermore, in case 3 (cashier) change was requested by self-awareness of future interactions considering the cashier's mental aspects as well as suggest a solution for standing up during shifts. Refer to (Appendix D) for more information on the participant's responses.

Therefore, by proposing solutions they wish to see, participants would be contributing to improving the user's overall situation. It is important to acknowledge that some users may be self-critical and do not believe they need any suggestions, when they actually do or what they need negatively impacts others. This situation may be handled by designers with more experience, as they have a keen eye on identifying user's hidden needs, years of experience with interacting with users, and maturity through exposure and time spent on projects. Empathy is a compass that guides

designer's decisions by asking three questions: (1) What am I being requested to change in this situation? (2) What do I think needs to be changed? (3) How will this change impact an individual's life?

Chapter 5: Discussion

In this study, four important findings were established; (1) adopting the PPP (pause-predict-ponder) method as an empathic method in design along with a tool to facilitate the use of the PPP method, and (2) the 4-step process to achieve an understanding of the users while using the PPP method. (3) The understanding of the concepts of empathy and sympathy in design, (4) the fear of empathic connection discovered among participants.

After analyzing the questionnaire, results showed that participants from the industrial design discipline were more familiar with empathy design methods, whereas participants from architecture were not. This result leads to two aspects. The first is the lack of resources and time constraints. Architects have very limited time to conduct and analyze research (Goodman-Deane et al., 2010). When the eight participants were asked about the least empathic methods, personas were considered the least empathic. Similar results were depicted in studies done by Hess & Fila (2015, 2016b) where the results revealed that personas were considered to be a representation of profiles for potential users used by companies to share user data with stakeholders and team members. On the other hand, qualitative methods, such as interviews were considered the most effective (Van Rijn et al., 2011).

This study examined the construct of empathy from a cognitive science point of view. It would be interesting to revisit current empathy design methods based on these notions, introduced in the thesis from cognitive science, in order to improve the efficacy of current methods and create more empathic experiences for designers to understand their users. Besides, the PPP method would be

an effective method to facilitate a full empathic experience for design students by understanding the user's perspective and increasing both cognitive and affective empathy. That solely relies on the designer's experience and their perception of the situation. An important point of empathy is once the designer realizes the differences between the self and other's experiences. It is a self-reflection method that allows reassessing assumptions and what is perceived of the other. That's when understanding the other's perspective becomes the step towards enhancing the empathic experience. Therefore, the PPP method will help design students in improving their interpersonal ability to understanding user feelings and perspectives, without having a similar experience. It is also a time-effective method for an academic environment to help design students understand users in case direct contact is not feasible, but it is important to note that these multiple videos must be observed for credibility and reducing generalization of users. Similarly, design educators using this method will reduce the time by collecting data of multiple videos of users at once, and playing them to students, as a learning exercise for design students to understand the notion of empathy and how to employ it in the design process.

The 4-steps, recognize false assumptions, identifying contextual differences, building connections and suggesting ideas to aid design students in understanding their users and enhancing the empathic experience. This form of step improves design student's perspective-taking skills. This framework is an effective way to understand empathy and immersing in other's experiences and perspectives in a more flexible manner. Learning to empathize begins with recognizing potential stereotypes, following this framework could prove to be promising in an academic environment as results indicated. Since design students are less experienced and mature in design than professional designers, introducing the concept of empathy by the instructor might be difficult, as empathy is an intangible experience.

Another important result mentioned was the fatigue from listening that some participants expressed. This result is similar to what some scientists claim about two possible reactions of listening, positive or negative response to a situation. The first response could be a trigger to positive reaction the individual in distress to support the other person. Some researchers like Davis (1983) and Pardini & Colleagues (2003) believe that this form of feeling for another person's suffering is often what leads a person to respond with compassion to other individuals suffering. The second response could trigger a negative reaction for others suffering. Researchers like Jolliffe & Farrington (2006) imply that individuals who score low emotional responses affect the ability to respond to others' distress due to the unavailability of their own. Therefore, controlling or balancing emotional responses is a necessary skill that designers must possess. This important and interesting point uncovered is the fear of the empathic connection that the participants expressed. The following is a response from participant 4:

- "*Trying to constantly learn and unlearn is very vicious like at the same time people don't understand much of what that is and they don't appreciate it, it comes down too if they don't appreciate what they're telling me is that they don't appreciate my time, it's a mutual contract between people … it comes down to what sort of bonds I want with people and I will determine that based on our interactions rather than empathy.*"

The participants experienced understanding also known as cognitive empathy, but they still preferred to distance themselves to protect their emotions or choose their interest as a designer over suggesting improving the user's situation. This brings us back to the notion that there are limits to how much one can connect with the other. Therefore, using the term "being in someone's shoes" isn't empathy, instead, it should be: "acknowledging that your experience is different than others" is how empathy operates in design.

An important finding was observing the responsibility of the designer to solve a design problem. This is similar to the concept proposed by Kouprie & Visser (2009), Van Rijn et al. (2011) and Zingoni (2019) about proxy and the willingness and motivation to solve a problem. Design Scholars such as Kouprie & Visser (2009) and vin Rijn et al. (2011) discussed the importance of designer's willingness and motivation that aid in the process of developing empathy for users. Designers constantly enter different workspaces that are often hostile, and that relies heavily on designers' self-awareness (Smeenk et al.,2018) and how to handle these conditions. A deeper level of understanding is established when the designer had a personal experience with the situation. That could be through sharing the same culture, religion, gender, etc. Often observing the situation as an outsider creates a deeper understanding of the designer. Therefore, it is crucial to include a designer who has had a similar experience with the design problem being solved, as they view the problem from two perspectives, the designer's perspective and the user's perspective. Observing users alone is often not enough to fully understand the design problem.

The understanding of the definition of empathy and sympathy in design is confusing. The following is participant 4's answer to their understanding of what empathy is:

- "*I think a lot of empathy is misguided in terms of how it operates and how we are expected to use it, like the difference between empathy and sympathy, but also a lot of what I feel empathy is pity based.* "
- " *the definition which we say empathy is like it's almost as if it's an automatic reaction people expect to have and it's like why won't you empathize with me, or to an extent it's being more of is that being requested and I feel there's that soft set skill that language or communication, am I requested to be engaged or is empathy needed in this situation and I feel there's a lot of bias around whether designers are really empathic or how empathy is*

actually used. I feel like it's a quick monetary tool that's strategized … I feel that however whatever reveals is like a weird social dynamic that people aren't willing to care for each other it more highlights whether you were raised to take care of people around you socially and work collectively or are you individualistic."

Based on the design examples examined in the literature review, as well as participant's responses on how empathy is perceived in design, we conclude that empathy in design is more of cognitive empathy. It revolves mainly around understanding how users feel and begin with recognizing the differences between the designer and the user and is seen as the capacity to be aware of other's feelings, and the skill of analyzing what they do, and why they do what they do. This is the case with all ethnographic methods of gathering data, such as interviews and observations, the value is learning to analyze other's behaviors and feelings and reflecting on them to come up with design solutions. The downside to the PPP method suggested is it lacks social interaction, a necessary component of ethnographic research, but in proposing using this environment in a participatory environment were design students and design instructors exchange information and probe and analyzed user's behavior. A new approach of understanding different perspectives and views of how other design students analyze user's behavior is an important learning experience that can help design students acquire the skill of listening.

Empathy should be the compass that guides designer's decisions. The most effective way to apply empathy is by adopting change. What is the user requesting, and what areas are missing? Acknowledging differences and showing a willingness to Design students must have the skill set of how to navigate through a problem and how to suggest a change.

- "*I feel self-awareness more as like a working designer having to enter conditions or like working spaces that I feel are often hostile you train how you navigate those things, I say*

like empathy is more of a compass that's helping you and whether this is of genuine concern and sometimes you have to disconnect yourself and not feel super invested emotionally and intellectually."

5.1. Effective Aspects for Using the PPP Method

After conducting the interviews with eight participants who were design students in both undergraduate and graduate levels, the new template was developed to effectively utilize the PPP method (Ogan et al., 2008) in an academic environment. This method is productive in an educational setting given that it is a learning exercise that helps design students understand their perspective and biased assumptions as a step towards understanding user's behaviors and feelings. Design students are usually less professional (van Rijn et al., 2011), and the PPP method is considered an 'attention focusing technique' which assists students in projecting and reflecting upon their assumptions, hence improving understanding of the concept of empathy in an easier approach through the pausing of the video, and allocated time for reflection (Ogan et al., 2008). Also, it is a time-saving method, as it requires a design instructor to collect different user data, prepare videos, and present it to design students. Featuring multiple videos with the PPP method increases design students' empathy in the sense of understanding user's behaviors for a specific product.

5.2. A Tool to Facilitate the Pause-Predict-Ponder Method in Design

To employ the PPP method more effectively in design, the following template is proposed. This template would help the instructor and design students organize the PPP method process. Each phase of the chart is explained in detail below (see figure 26).

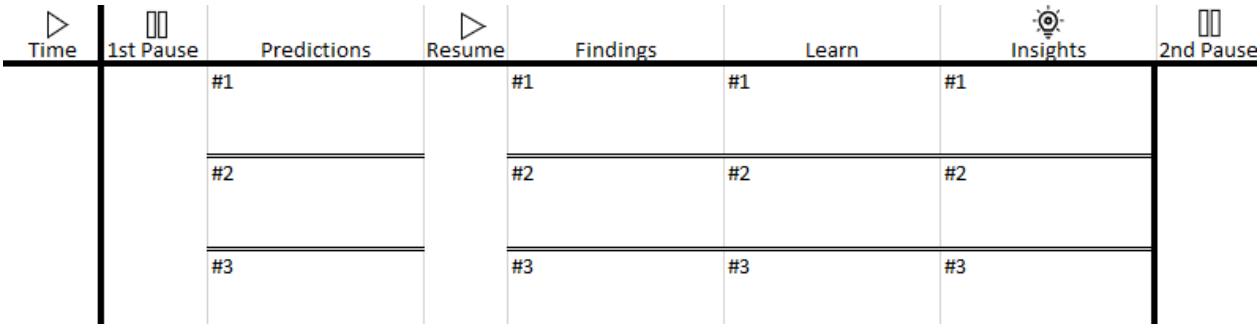

Figure 26. Tool for Facilitating the use of the Pause Predict Ponder Method

- 1st Phase: Watching a video clip of a user's situation.
- 2nd Phase: Pausing and Predicting possible scenarios that the user in each case might encounter.
- 3rd Phase: Resuming video, comparison, and reflection of the differences and similarities set by the participant.

The following are the steps necessary to ensure the effective use of the PPP method in a design environment.

- Predictions: It represents the possible activities the user in a video could encounter in a particular situation. The participant is required to predict those encounters both negative and positive.
- Findings: At this point, the participant is asked to state all the assumptions and false beliefs they predicted by comparing with what the actual scenario presented.
- Learn: After the comparison of content between what the participant thought and what was presented, the participant begins to acknowledge new information and different perspectives.
- Insights: Suggest potential ideas that might improve the user's experience.

5.3. Limitation of the Method

There were a few points highlighted by the participants which could improve and facilitate the use of the PPP method more effectively. This method can only be used to develop designs to a certain extent complemented by a number of other empathic methods in evaluating designers understanding of a design context, as it misses the physical, social interaction with users aspect, which emphasizes the need to be exposed to a number of videos to reduce stereotyping and generalization from observing one case. Another limitation is the selection of clips of what content to expose vs. eliminate and identifying what information is important vs. is not a controversial point from the limitations of this method.

5.4. Limitation of the Study

The first limitation is that there was no scale to measure/assess the level of effectiveness for the PPP method. There are several self-measuring empathy reports which design educators may use to asses design student's empathic capacity (both cognitive and affective types of empathy). Some of the most common empathy measuring reports include, “Empathy Scale” (ES; Hogan, 1969), the “Interpersonal Reactivity Index” (IRI; Davis, 1983), the “Emotional Empathic Tendency Scale” (EETS; Mehrabian & Epstein, 1972), the “Empathy Quotient” (EQ; Baron-Cohen & Wheelwright, 2004), the “Toronto Empathy Questionnaire” (TEQ; Spreng, McKinnon, Mar, & Levine, 2009). Another limitation of this study is reassessing the new proposed tool. Some of the interview questions were leading when participants were asked about what individuals they empathized with the most. It would have been more appropriate to ask about how the experience was and allow the participants to bring up the notion of empathy. Another limitation is that the videos were played in the same order for all eight participants which may have affected the results, randomly playing the videos might result in some data changes. Initially in this thesis, we aimed

to test the PPP method with both design practitioners and researchers, but all participants were design students. It would have been interesting to observe how to design a student responses would have changed if they were given definitions of cognitive, affective empathy and sympathy. Also, it is important to acknowledge that our experiences are different from others, and empathy is reachable to an extent. Finally, the number of participants was relatively low, therefore running statistics for the results was not feasible.

Chapter 6: Conclusion

Empathy plays an important role in design as it represents the first step in the design process. There is a great emphasis on the role of empathy in relation to the innovation of products and services within the last 20 years. After reviewing literature around empathy in human-centered design, we established that the current perception of empathy in design is misguided in terms of how it operates, and there is confusion around the notions of both empathy and sympathy. Although empathy is highly emphasized in design, it is often used as a monetary tool that is strategized within the design context, highly emphasized but not clearly applied and used. Design students are often not knowledgeable of the underlying construct of empathy which is a necessary skill they must understand and practice. Current empathic methods used to miss the construct of empathy and has not been examined thoroughly in the design literature. Future research should focus on refining current empathic methods and developing new ones based on the construct of empathy. Therefore, in this thesis, we examined an in-depth overview of the construct and the biological system underlying the notion of empathy.

A clear definition of the types of empathy along understanding both cognitive and affective empathy was examined. In addition, current empathic methods used by design students were discussed and two examples of design projects and how professional designers framed empathy throughout the project. This study answered the following question, *Is the proposed PPP method effective to develop design student's empathy? If so, what improvements and modifications are necessary?* The PPP method, an 'attention focusing technique' was adopted from the linguistics field for students and adjusted to fit in a design context through facilitating a tool for design students to improve their understanding of the user's perspective. In addition to that, a 4-step process was proposed to improve the use of the PPP method in design education and to enhance

the full essence, they are: (1) Recognize False Assumptions, (2) Identifying Contextual Differences, (3) Building Connections, and (4) Suggesting Ideas. Results revealed improvement in design students understanding of the user's perspective through their reflections and improvement in their understanding of the users and suggestions provided to improve the user's overall experience with a product or service. Therefore, introducing this new PPP method into the design as an empathic method.

The attributes of the proposed method are the one-to-multiple aspect, in which the design instructor may showcase multiple videos for multiple users and allow students to interpret the user's perspective and reflection upon their current knowledge. This would improve the design student's understanding of a user's behaviors and feelings; a necessary skill design students must learn. The second attribute is the open discussion and exchange of information among design students and design instructors. This cycle of sharing information may help design students in understanding different perspectives and modes of analyzing information, learning how to listen and what to listen to, which is the core concept of empathy. The third attribute is time efficiency for introducing the concept of empathy to design students more effectively. This study has suggested a new approach for looking at and assessing current empathic methods and developing new ones. In using this method, design educators will easily transfer the meaning of empathy into a tangible experience for students in minimum time.

6.1 Future Studies

The first approach would be to test the suggested PPP tool in a design course and implement the open discussion concept and sharing information among design colleagues to expand their understanding of different analysis perspectives. The second approach would be to introduce multiple pause points throughout the video to observe if such data may affect the productivity of

this method. Regarding this point, multiple pausing points were introduced in the new tool template, suggested. The third approach would be to develop videos with content catered towards a specific task, designing a product as an end result. It would be interesting to observe how the use of the PPP (pause-predict-ponder) method could affect the design student's decision making and the final design of a product.

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Appendices

Appendix A Ethics

Carleton
UNIVERSITY
Canada's Capital University

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

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

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

Ethics Protocol Clearance ID: Project # 110953

Research Team: Alaa Makki (Primary Investigator)
WonJoon Chung (Research Supervisor)

Project Title: Invitation to participate in a research project on "Developing a design method to enhance empathy for User-Centered Design: Improvement of the imaginative projection to the user's situation".

Funding Source (If applicable):

Effective: **May 16, 2019** Expires: **May 30, 2020.**

Please ensure the study clearance number is prominently placed in all recruitment and consent materials: CUREB-B Clearance # 110953.

Restrictions:

This certification is subject to the following conditions:

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

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

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

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

CLEARED BY: **Date: May 16, 2019**

[redacted]

Bernadette Campbell, PhD, Chair, CUREB-B

[redacted]

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

Carleton UNIVERSITY
Canada's Capital University

Research Consent Form

Project Title

Invitation to participate in a research project on "Developing a design method to enhance empathy for User Centered Design: Improvement of the imaginative projection to the user's situation".

Carleton University Project Clearance

Clearance #: 110953 Date of Clearance:

Invitation

I am writing to you today to invite you to participate in a study which is part of my research project. This study is being conducted by Alaa Makki of the Carleton University School of Industrial Design (alaa.makki@carleton.ca) working under the supervision of Prof. WonJoon Chung (wonjoon.chung@carleton.ca).

Objectives and Summary

The aim of this study is to develop a practical application for improving designer's interpersonal ability to understand target user's feeling and perspectives without having the same experience. The information in this form is intended to help you understand what we are asking of you so that you can decide whether you agree to participate in this study. Your participation in this study is voluntary, and a decision not to participate will not be used against you in any way. As you read this form, and decide whether to participate, please ask all the questions you might have. This study involves one 70 to 80-minute session and questionnaire that will take place at Carleton University. With your consent, interviews will be video-recorded. Once analysis has been done, the video-recording will be destroyed. If you do not wish to be video recorded, you will be only audio recorded.
During the session, you will be asked to watch three different videos with three different users, and then asked to take on their role and sketch down or brainstorm your ideas on a paper. You will be asked to evaluate the ideas you stated were close to that of the users. The second part of the study will be to fill in a questionnaire.

Eligibility

All participants will be young professional designers or design students (Expected age group: 20 and above) who currently work or study in various design fields such as: Industrial design, Architecture, Graphic design.

Risks and Inconveniences

We do not anticipate any risks to participating in this study, nor do we anticipate that you will derive any direct benefit. While this project might involve a very low possibility of emotional risk, we do not anticipate any feelings that are greater than usual from what an individual might encounter in any daily life situation.

Compensation

As a token of appreciation, I will be providing you with refreshments during the interview. No other compensation will be provided.

Withdrawing from the study

The participants may choose to withdraw from the study at any time during the data collection phase 1st of July 2019 before the data is debriefed. After the data is anonymized, it cannot be removed.

Confidentiality

We will treat your personal information as confidential, although absolute privacy cannot be guaranteed. No information that discloses your identity will be released or published without your specific consent. Research records may be accessed by the Carleton University Research Ethics Board in order to ensure continuing ethics compliance. All data that will be collected during the sessions will be stored in an encrypted and secured folder on a password protected personal laptop and only the researcher would have access to this data. The hard copies of the collected data will be kept in a locked cabinet in supervisor's office (ME 2492) at Carleton University. Access to the cabinet will be restricted to the researcher, supervisor, and Co-supervisor. All data will be destroyed after 1 year from clearance date.

Ethics review

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

Statement of consent

I voluntarily agree to participate in this study.	___Yes	___No
I agree to be (video recorded)	___Yes	___No
If not, I agree to be (audio recorded)	___Yes	___No

_____ _____

Signature of participant Date

Research team member who interacted with the subject

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

_____ _____

Signature of researcher Date

Researchers Contact Information:

Name: Alaa Makki
Department: Carleton University, School of Industrial Design
Tel.: [redacted]
Email: alaa.makki@carleton.ca

Supervisor Contact Information:

Name: WonJoon Chung
Department: Carleton University, School of Industrial Design
Tel.: 613-520-6606
Email: wonjoon.chung@carleton.ca

Appendix B Recruitment Forms

Carleton UNIVERSITY
Canada's Capital University

Email Invitation

Subject: Invitation to participate in a research project on "Developing a design method to enhance empathy for User Centered Design: Improvement of the imaginative projection to the user's situation".

Dear Sir or Madam,

My name is Alaa Makki and I am a Master's student in the School of Industrial Design, Faculty of Engineering and Design at Carleton University. I am working on a research project under the supervision of Prof. WonJoon Chung.

I am writing to you today to invite you to participate in a study which is part of my research project entitled "Developing a design method to enhance empathy for User Centered Design: Improvement of the imaginative projection to the user's situation". The aim of this study is to develop a practical application for improving designer's interpersonal ability to understand target user's feeling and perspectives without having the same experience.

This study involves one 70 to 80 minute session and questionnaire that will take place at Carleton University. With your consent, interviews will be video-recorded. Once analysis has been done, the video recording will be destroyed. If you do not wish to be video recorded, you will be only audio recorded.

During the session, each participant will watch the videos of the three different user groups, an individual with epilepsy, a custodian, and a cashier, in terms of their working environment and daily activity. At the certain point, the video will be paused, and the participants will be asked a question, "If you were the person in the video, what would you do next?". Then, the participants will express their thoughts in a drawing or a writing. The conversation during the sessions will be recorded and the drawing & the writing will be collected. After the session, several follow up questions will be asked by the researcher.

All participants will be young professional designers or design students (Expected age group: 20 and above) who currently work or study in various design fields such as: Industrial design, Architecture, Graphic design.

Your participation in this study is voluntary. While this project might involve a very low possibility of emotional risk, we do not anticipate any feelings that are greater than usual from what an individual might encounter in any daily life situation. All responses are kept anonymous.

The participants may choose to withdraw from the study at any time during the data collection phase 1st of July 2019 before the data is debriefed. After the data is anonymized, it cannot be removed.

As a token of appreciation, I will be providing you with refreshments during the interview. No other compensation will be provided.

All data that will be collected during the sessions will be stored in an encrypted and secured folder on a password protected personal laptop and only the researcher would have access to this data. The hard copies of the collected data will be kept in a locked cabinet in supervisor's office (ME 2492) at Carleton University. Access to the cabinet will be restricted to the researcher, supervisor, and Co-supervisor.

This ethics protocol for this project was reviewed by the Carleton University Research Ethics Board, which provided clearance # 110953 to carry out the research. Should you have questions or concerns related to your involvement in this research, please contact:

CUREB-B:

If you have any ethical concerns with the study, please contact Dr. Bernadette Campbell / Dr. Natasha Artemeva, Chair, Carleton University Research Ethics Board-B (by phone at 613-520-2600 ext. 4085 or via email at ethics@carleton.ca).

If you would like to participate in this research project, or have any questions, please contact me at my email: alaa.makki@carleton.ca

Sincerely,
Alaa Makki

Carleton UNIVERSITY
Canada's Capital University

Online Invitation:

To be posted on Facebook group, and sent via whats app

Design students needed for a study about User Centered Design and Empathy

I am looking for volunteers to participate in an Interview session which is part of my research project entitled "Developing a design method to enhance empathy for User Centered Design: Improvement of the imaginative projection to the user's situation". The aim of this study is to develop a practical application for improving designer's interpersonal ability to understand target user's feeling and perspectives without having the same experience.

During the session, each participant will watch the videos of the three different user groups, an individual with epilepsy, a custodian, and a cashier, in terms of their working environment and daily activity. At the certain point, the video will be paused, and the participants will be asked a question, "If you were the person in the video, what would you do next?". Then, the participants will express their thoughts in a drawing or a writing. The conversation during the sessions will be video recorded and the drawing & the writing will be collected. After the session, several follow up questions will be asked by the researcher. If you do not wish to be video recorded, you will be only audio recorded.

To be eligible, you must be a young professional designer or design student comfortable in sketching and writing, and at least 20 years of age who currently work or study in various design fields such as: Industrial design, Architecture, Graphic design.

The study will take place on campus and should not take more than approximately (70 to 80) minutes to complete.

If you are interested, please email Alaa Makki at (alaa.makki@carleton.ca) for more details on participating.

The ethics protocol for this research has been reviewed and approved by the Carleton University Research Ethics Board, which provided clearance # 110953 to carry out the research. Should you have questions or concerns related to your involvement in this research, please contact:

CUREB-B:

If you have any ethical concerns with the study, please contact Dr. Bernadette Campbell / Dr. Natasha Artemeva, Chair, Carleton University Research Ethics Board-B (by phone at 613-520-2600 ext. 4085 or via email at ethics@carleton.ca).

Appendix C Interview + Questionnaire

Procedure:

1. Design students are given three different scenarios, one is about an individual living with epilepsy, the second is a video of a custodian, and the third is a cashier. The videos are recorded by the researcher.
2. The videos are played to give the participants background information about the specific users working environment and daily activity.
3. Then the video is paused, and the participants are asked to imagine themselves and taking on the role of the user in the video. They are asked:
4. " If you were the person in the video, what would you do next?" (Activities/struggles)
5. They are asked to create concept scenarios. They may sketch or write down their ideas on paper. They are provided pencils, markers, and pens. The sessions will be video recorded.
6. They are asked to number their ideas chronologically, (what ideas came to their minds first) for analysis purposes.
7. After allocating 12 minutes for the task of imagining the user's life, the video will resume playing. The individuals in the video will explain the activities/struggles they take on in their daily lives.

The participants will compare how close the points they thought of are similar to the individual in the video.

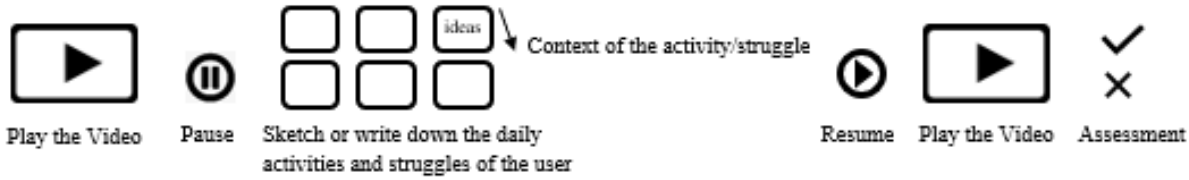
List of questions to ask after watching the three videos and drawing sketches or writing down ideas:

1. What group did you empathize with the most, why?
2. Was it hard to imagine yourself in someone else's shoes?
3. Why was it easier to generate more activities/struggles to a particular user group more than another?

The reason for this comparison is to see:

1. How good young designers are at taking the perspective of the other?
2. What are the first beliefs that come to mind about specific user groups?
3. What factors affect our interpersonal ability to fully understand the others experience?
4. How emphathical response varies across different user groups?

Info Graphical Explanation of Procedure:



Questionnaire:

1. Have you used empathy design methods while working on design projects?

   Yes No

   If so, what methods did you use?

   _____

   _____

2. Were these methods helpful for increasing your empathy? Explain.

   _____

   _____

   _____

3. Can you classify the methods you use from the most empathic to the least empathic?

   _____

   _____

   _____

4. Why did you classify the methods accordingly? Explain separately for each method.

   _____

   _____

   _____

   _____

5. In your opinion, what are the barriers to empathy?

   _____

   _____

   _____

6. In what ways was this method considered helpful for you? Please mention both Positive / Negative aspects of using this method.

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_____

7. Any comments to improve this method?

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_____

_____

8. Which context is more appropriate to use this method? In design practice or academic environment? Why?

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Appendix D Data

Interview Analysis Case 1

Case # 1 – Student with epilepsy			
Participant #	Before Pausing	After Pausing	Outcomes/ Themes
P1	1. what does the service dog do 2. people have seizures put metal keys in their hands 3. cooking 4. special exercises 5. medications 6. studying	1. Did not list any challenges 2. Didn't think of having challenging exercise like horse riding 3. Surprised to know people robbed her during seizures 4. Importance of technology 5. Surprised she has seizures during sleep 6. No need to go to hospital with every seizure	1. importance of technology
P2	1. Very straight forward schedule 2. preparing herself and service dog for school 3. have a part time job 4. walking the dog 5. difficulty to have a conversation 6. she can't drink coffee 7. going out with friends 8. timetable for medicines 9. special exercises for headaches	1. didn't expect the emotional aspect with her animals, like the horse and service dog 2. working from home to have control over her case 3. devices to help detect seizures 4. having seizures during sleep, precautions needed	1. connection with animals 2. safety 3.environment surrounding 4. importance of technology
P3	1. Problems with public speaking presentations 2. seizures come unexpectedly throughout the day 3. taking medications 4. public encountering – general public education on handling case 5. dangerous to live alone	1. didn't understand why she needed a service dog first, turned out for robbing her 2. surprised she's living alone 3. having seizures during sleep and precaution measures taken for safety 4. dangerous to shower in bathroom alone	1. safety 2. connection with animals 3. level of independence
P4	1. adherence to medication is a challenge for young adults	1. I appreciated sharing their lifestyle aspect	1. health concerns 2. social life

	2. importance of technology in individuals life 3. schedule they must follow 4. hard to focus and paying attention 5. transportation to school, taking same route 6. having extracellular activities	2. the level of independence within the context of their condition 3. awareness of Christmas lights, awareness of their environment 4. understanding the importance of animals in their lives 5. establishing a solid relation with their mother 6. addressing medical stances and appointments with doctor 7. social life with their condition	3. relations with parents 4. connection with animals 5. acceptance of sharing information 6. importance of technology
P5	1. keep track of medical health 2. exercising 3. maintain a good diet 4. maintain a sleep schedule 5. time management 6. take care of her service dog 7. maintain social life in case of emergency	1. I know about putting metal spoon in their tongue (assumption) 2. not having to go to the hospital every time a seizure happens 3. prefer to stay at home and limit commuting, at home she can control seizures 4. she feels safer knowing people she knows 5. importance of technology in life	1. Health concerns 2. mental health 3. social connections 4.environment surrounding 5. safety 6. importance of technology
P6	1. Discipline routine 2. concerns when meeting new people 3. driving & commuting 4. handling machines 5. emergency contacts 6. staying over friends 7. take care of the service dog 8.prepare for daily activities 9. not injuring yourself if seizures happen	1. I didn't think about furniture and 2. she considering minimizing commuting 3. I was concerned about dating and staying over 4. now I know why she needs a service dog, it's more useful than I thought 5. not injuring yourself during seizures when handling machines or cooking	1. Safety concerns 2. social life 3. connection with animals 4.environment surrounding
P7	1. I'm not sure why she needs a service dog, might provide comfort	1. importance of animals in providing comfort,	1. social interaction 2. health concerns

	2. I would feel anxious and stressed having to explain my situation to everyone 3. individual is young and expected to have a strict routine that is challenging 4. waking up, having breakfast, going to school, running errands 5. need to carry a schedule to remember things	emotional support ad safety 2. technology plays an important life in such case help remember things, and record and monitor seizures 3. I guessed she worked from home 4. encountering new friends, acquaintances could be difficult 5. I didn't think of her hobbies	3.emotionalconnections with animals 4.environment surrounding 5.importance of technology
P8	1. conscious choices of where to go because of a service dog 2. what does the service dog do 3. adhering to schedule for medications 4. communication difficulties 5. does she live alone 6. chores 7. cooking 8. taking care of dog 8. how does she recover from an intense seizure	1. didn't expect the frustration she needs to go through 2. didn't expect her to do high risk activities 3. in case of emergency she has information about her case 4. animals responses vs. a car or machine in case of seizure, didn't expect animals role they play 5. didn't expect sleeping and bedding situation, getting seizures during sleep	1. safety concerns 2. connection with animals 3.environment surrounding

Interview Analysis Case 2

Case # 2 - Superintendent			
Participant #	Before Pausing	After Pausing	Outcomes/ Themes
P1	1. specific tool or software to manage activities 2. wear specific uniform 3. cleaning 4. reach in emergency 5. handyman 6. contacts and management 7. shopping for building supplies 8. maintain expenses on cleaning supplies and repairs	1. didn't expect individual in the video to talk about labor laws 2. daily maintenance of the building 3. on call 24/7 4. system to manage calls	1. device to manage job 2. duties
P2	1. having to deal with people which may be angry sometimes 2. maintenance of the building 3. can't have a full lunch break 4. cleaning 5. underestimating the job, bullying 6. long hours of work (12hrs) 7. no time for personal life, he's wearing a ring and married 8. stressful job with responsibilities, physically exhausting	1. pretty close in terms of predictions made 2. he did not mention anything about health 3. surprised he's working 24 hrs. 4. surprised he mentioned the labor laws 5. surprised he has to clean even the bathrooms and kitchens of apartments before someone rents a unit 6. needs to understand everything and manage have certificates in plumbing, etc.	1. Health (physical) 2. social life 3. managing private vs. work life
P3	1. unexpected events that might happen, leaking or flooding, power down 2. prevent vandalism 3. cleaning snow 4. needs to be physically fit 5. clean apartments after a tenant move out, 6. needs organization skills to manage	1. working for long hours 2. fast response for emergencies 3. security and vandalism 4. most were predictable like I've wrote	1. physical health 2.organization skills 3. safety of tenants
P4	1. no clear mention of health 2. maintaining a routine and schedule	1. set hours of work 2. did not anticipate him to share aspects around social policy	1. solutions design a system to manage time

	3. running into sporadic people	3. people are mis-leaded to think it is easy	2. work on legislation giving more break hours
P5	1. wake up early, maintain building 2. cleanliness, vacuuming 3.responsible to notify participants in case of emergency	1. I didn't think of availability 24/7 2. suspicious activity 3. doesn't get a full lunch break 4. tiring 5. dangerous fumes smelled from cleaning products 6. large scale maintenance	1. physical health 2.communication skills 3. safety of tenants 4. responsibility
P6	1. Long shifts 2. working tired 3. difficulty to stay focused 4.checklist 5. concern about my health physical condition 6. Asbestos 7. work safety, physical injuries 8. maintenance 9. sleeping time enough	1. I think I missed a lot compared to past ones 2. didn't expect labor plans and policies 3. lunch shifts 4. stress the job entails 5. handling and managing 6. working with third parties	1. safety 2. physical health 3. social life 4.communication skills
P7	1. different break times 2. dealing with emergency situations family or medical 3. building repairs emergency 4. mobility 5. physical strains or injuries - ice removal slipping risks hazards safety risks 6. productivity, very efficient at his job 7. privacy concerns	1. I've had same experience working 24/7 on a construction sight as an interior designer 2. unexpected emergencies 3. privacy, social and personal life 4. safety and hazards 5. dealing with tenants 6. responsibilities 7. being alert	1. health concerns 2. social life 3. safety 4.communication skills
P8	1. checking everything everyday 2. prioritizing tasks 3. long work hours 4. health, stay fit 5. maintenance 6. security	1. workshop, managing tools 2. surprised about mentioning labor laws 3. no boundary between social and work life 4. vandalism	1. designing a system that updates of what to manage at a time 2. safety 3. physical labor

Interview Analysis Case 3

Case # 3 - Cashier			
Participant #	Before Pausing	After Pausing	Outcomes/ Themes
P1	1. knowledgeable of everyday sales and prices 2. check supplies needed on counter 3. dealing with difficult customers 4. patient to deal with peak hour 5. standing for long hours 6. know how to enter data manually in case system breaks	1. broader perspective of the general picture of what the job entails 2. standing for long hours, back pain, bad posture 3. very small breaks, companies go against labor laws 4. how to treat customers 5. didn.t expect the way cashiers are treated 6. didn't expect the hunger aspect shared	1.communication skills 2. healthy, physical & mental
P2	1. working night shifts 2. Prepare cashier before work shift 3. stressful because repetitive movements 4. standing up the whole time 5. something can spill on the belt during scanning she needs to clean 6. managers are not very friendly 7. she's a student, temporary job to make money 8. dealing with robbery. Or laundry washed money 9. responsible for money balance 10. buying food for lunch	1. pretty similar predictions, familiar with working as a cashier in retail store 2. standing even when there are no customers 3. Scanning all shift 4. doesn't mention encountering fake currency 5. never imagined she hunger aspect from scanning food whole day 6. expected to pack items 7. I can understand managers situations 8. trouble having bathroom breaks 9. short 15-minute lunch break for 5 hr. shift	1. health concerns 2. stress encountered from job
P3	1. change shifts between cash and customer service 2. miscalculating customers items 3. complaints from customers 4. remain focused the whole time, tiring	1. didn't think of the mental problems rather than physical ones 2. 15-minute break in 5 hr. shift is not enough 3. how to treat customers is a big part of the job	1. mental health 2. physical health

	5. make sure cash in and out are correct 6. I don't know how long breaks are, but every 2 hrs. maybe 7. possible robbery		
P4	1. it's often portrayed that cashiers try to scam employer when signing in early, although they have the right to be compensated for that 2. dealing with patsy customers 3. stressful job 4. accuracy in counting cash or else paid from cashier account 5. very tiring, repetitive movements 6. hygiene, touching food all day 7. dealing with money	1. highlighting emotional aspects and dealing with customer service 2. tired from listening 3. importance of communication skills	1. physical health 2. hygiene 3. responsibility 4.communication skills
P5	1. tiring standing all the time 2. pay price of your mistakes 3. fussy customers 4. strict manager laws 5. illegal small breaks 6. responsible for check in and out 7. maintain store cleanliness 8. educate yourself about offers	1. 10-minute break is illegal, but employers still get away with it 2. how to handle customers communication skills 3. I predicted possible cases since I have worked a s a cashier, her job is on a larger scale	1. physical health 2. mental health 3.communication skills
P6	1. Cash totals 2. Discounts 3. Upset customers 4. ID's legal age 5. standing for long time 6. Body related fatigue 7. injuries repetitive movements 8. Robbery 9. Emergency procedures 10. System knits-obstacles	1. missed the emotional aspect 2. the upset customers 3. the unmatched price lists 4. I did think about the tiring aspect the repetitive movements and injuries 5. I thought about discounts or legal age or cash totals, but it doesn't seem to be addressed	1. emotional and mental health 2.communication aspects 3. physical health 4. responsibility 5. emergency

	11. Fake currency 12. Updated price list	6. I thought of her emotional aspect and social interaction with the customers	
P7	1.Punch in/out Grocery cashier night shift lives close to work 2. must be energetic 3. how long is breaktime, shifts 5pm-9pm 4. responsibilities 5. technical errors 6. handling complaints? 7. prioritizing work	1. I'm a cashier but in different environment in retail store 2. I can't relate to her case, I take 30 mins breaks 3. I like my team and manager 4. handling complaints and customers 5. energy to interact with customers 6.motivatedenvironment	1. health 2.communication skills 3. opposing experience
P8	1. dealing with. belligerent people 2. inaccessible during work hours 3. dealing with peak hours 4. dealing with cash 5. fast pace in case machine disrupts 6. stand up the whole time	1. I did not anticipate emotional aspects 2. communication skills 3. dealing with manager 4. exhausting and repetitive movements 5. no aspiration to be a cashier, just for the money	1. emotional and mental health 2.communication skills 3. physical health