

Learning the Theory of Emotional Design by Application to Pandemic Face Masks

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Dedication

To my wise and witty mother Marilyn for instilling in me a passion for lifelong learning,
supporting my insatiable curiosity for life and always encouraging me to
“Go for it” no matter what “it” was.

Abstract

Emotional design is a threshold concept in design education. A concept-based assessment exercise called a DESIGN C.U.E. (Conceptual Understanding Evaluation) was used to teach the Three Levels of Emotional Design framework in an introductory undergraduate course, with the purpose of answering the following research questions: Can students apply the theory of emotional design to the design of pandemic face masks? How do students incorporate emotional design into the design of pandemic face masks?

Participants in the study were 128 students at a large Midwestern University in the College of Design. A review of the literature included background on pandemic face masks, pandemic face masks in the context of emotional design, design theory, design thinking and pedagogy. The study used a mixed methods approach with multiple data sources. The study was conducted asynchronously online during the Covid-19 pandemic when masks were recommended as a protective device.

Before completing the DESIGN C.U.E. exercise, students took part in a pandemic face mask experience survey, they were assigned a reading, a video and a lecture based on the 3 levels of emotional design. The exercise was designed to foster transfer learning through bridging that required students to demonstrate understanding of the emotional design theoretical framework. This included first an application to an existing pandemic face mask, followed by designing their own face masks through sketching rough prototypes and finally selecting one of their prototype designs to apply their conceptual understanding of emotional design. The Design C.U.E. was graded by

course instructors and analyzed to determine learning outcomes using Bloom's taxonomy as the assessment measurement tool.

Of the 128 students given the assignment, 126 of them were able to understand and apply the 3 levels of emotional design to pandemic face masks using the DESIGN C.U.E. Such a concept-based assessment exercise was found to be useful in teaching design theory to undergraduate students. Findings of the study suggest that the learning outcomes of the DESIGN C.U.E. may be attributed to students' knowledge, experience and interest in pandemic face masks which aided in learning emotional design. Additionally, the learning took place during the Covid-19 pandemic which offers further insights into the value of situated learning.

This research advanced the understanding of the use of concept-based assessments in teaching design theory. How undergraduate students effectively learn about emotional design has been a neglected area of scholarly research.

Keywords: Design education, design theory, three levels of emotional design, concept-based exercise, threshold concept, Pandemic Face masks

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GLOSSARY OF TERMS

Design – the word originates from the Latin word *designare*, which means to mark out. Design is said to come from the deliberate choices a person makes within a project or scheme that meet the requirements of solving a problem, need or objective to produce functional or aesthetic forms through 2D compositions (drawings, illustrations, photographs, commercial art) or 3D objects, structures or built environments in order to satisfy a human need (Dorst & Cross, 2001). Design is also defined design as a process, “Design is a conscious decision-making process by which information (an idea) is transformed into an outcome, be it tangible (product) or intangible (service)” (von Stamm, 2003, p. 17). Simon broadly defines the act of designing as “Everyone designs who devises a course of action aimed at changing existing situations into preferred ones” (Simon, 1988, p.67). Charles Owen a leading design scholar at the Chicago Institute of Design views design as “a profession that is concerned with the creation of products, systems, communications and services that satisfy human needs, improve peoples’ lives and do all of this with respect for the welfare of the natural environment” (Owen, 2004 p.3). Design has also been viewed as reflection in action, Schon, (1983).

Design education – teaching of theory and application in the design of products, services and environments, design education encompasses various disciplines of design, such as graphic design, user interface/experience design, web design, packaging design, industrial design, fashion design, information design, interior design, sustainable design, trans-generational design, service and universal design (Archer, 1979; Dorst & Cross, 2001; Vande Zande, 2011)

Design process –described as the working process or method a designer follows in the act of designing, the design process has three major components: the concept or idea, the form and/or product’s process, and the content or meaning (Dorst & Cross, 2001). Moreover, design as a process also occurs in “variously documented in letters, sketches and notes, plans, briefs, company records and writings by designers in the creation of tangible and intangible artifacts that result from this process” (Lees-Maffei & Houze, 2010 p. 3).

Design thinking – Design thinking is an inventive process through which problems are identified, solutions are proposed and produced, and results are evaluated. Design thinking includes “role-oriented activities to learn and teach through life-related experiences.” Design thinking has been described as a complement to science thinking, whereas science thinking is done by “Finders” who exercise their creativity through discovery and are oriented towards analysis, Design Thinking is done by “Makers” who demonstrate their creativity through invention and are oriented towards synthesis. (Owen, 2007, p. 5). Design Thinking revolves around a deep interest in developing an understanding of the people for whom we’re designing the products or services (Dam and Siang, 2020). Tim Brown defines design thinking as a “discipline that uses the designer’s sensitivity and methods to match people’s needs with what is technologically feasible and a viable business strategy that can convert into customer value and market opportunity.” (Brown, 2008, p. 86) Design Thinking can also have a positive influence across educational disciplines because it involves creative thinking in generating solutions for problems (Razzouk and Shute 2012).

Material culture – is the physical evidence of a culture in the objects and architecture they make or have made. This means all material evidence which can be attributed to culture, past or present. Material culture is interdisciplinary and examines the relationship between people and their things, the making, history, preservation, and interpretation of objects. It draws on theory and practice from such disciplines as art history, archaeology, anthropology, history, historic preservation, folklore, and museum studies, among others. Anything from buildings and architectural elements to books, jewelry, toothbrushes, or bubbles can be considered material culture (Miller, 2010).

Threshold Concept – A 'threshold concept' is a concept that, once understood, changes the way that a person thinks about a topic. Jan Meyer and Ray Land explain: “A threshold concept can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something.” (Meyer and Land, 2003, p. 1)

COVID-19 – On February 11, 2020, the World Health Organization announced an official name for the disease: coronavirus disease 2019, abbreviated COVID-19. ‘CO’ stands for ‘corona,’ ‘VI’ for ‘virus,’ and ‘D’ for disease. The virus that causes COVID-19, SARS-CoV-2, is a coronavirus. The word corona means crown and refers to the appearance that coronaviruses get from the spike proteins sticking out of them. COVID-19 spreads when an infected person breathes out droplets and very small particles that contain the virus. These droplets and particles can be breathed in by other people or land on their eyes, noses, or mouth. In some circumstances, they may contaminate surfaces they touch. People who are closer than 6 feet from the infected person are most likely to get infected (Center for Disease Control, 2021).

Pandemic Face Mask – COVID-19 is spread from person to person by respiratory droplets, which are largely projected when a person coughs, sneezes, talks and sings. For general use, cloth and disposable face masks act as barriers, preventing others from inhaling these droplets. Masks are used as part of a comprehensive strategy of measures to suppress transmission and save lives (World Health Organization, 2021).

Chapter I

INTRODUCTION

The purpose of this qualitative study is to investigate the ways undergraduate students in an Introduction to Design Thinking course understand and apply emotional design using the Three Levels of Emotional Design conceptual framework created by cognitive psychologist and design researcher Dr. Donald Norman (2004). Emotion is fundamental to all human behavior and Norman urges it to be infused into every aspect of the design process. Therefore, in educational terms emotional design can be considered an essential threshold concept to be introduced in beginning design coursework.

Design education can be greatly enhanced by introducing students to developmentally appropriate conceptualization tools as a teaching strategy. To grow as scholars, students must be able to match theory to real-world situations on their own (Ricke, 2018). To many students, the “theoretical” is a space in their thinking that doesn’t come automatically in practice. Many consider design theory to be the antithesis of “actual” design. (Taura & Nagei, 2013) However, studying and applying conceptual frameworks and process models as well as design theory, most often produces more thoughtful students and in doing so more impactful designs (Roudbari, 2012). Such educational viewpoints influenced the decision to use pandemic face masks as the designed artifact to teach emotional design in an introductory design course.

Reasons for the use of the face mask include the following: Face masks encompass diverse design disciplines including apparel, textile, product, human factors, and even graphic design as well as being public health safety devices. The experience of wearing a face mask is widespread and masks have been in use for several months prior to the course. As a designed artifact they are simple to understand, and students do not need complicated skills to enter the arena of product designer. The pandemic face mask has come to have social, political, psychological, and symbolic significance in the USA making pandemic face masks a purposeful way to teach participants the Three Levels of Emotional Design (Norman, 2004).

The focus of this study is how students taking this introductory design course can apply the theory of Donald Norman to a specific product—the pandemic mask. Participants in the study are students in an Introduction to Design Thinking Course, (Hemmis, 2021)—a large lecture with multiple and separate discussion sections. The class is a popular elective, as well as required for students in a variety of design disciplines, i.e., graphic, interior, apparel design and retail management. Research Questions are as follows:

- Q1. Can student/participants apply the theory of emotional design to the design of pandemic face masks?
- Q2. How do student/participants incorporate emotional design into the design of pandemic face masks?

Chapter II

LITERATURE REVIEW

This chapter addresses the literature related to design education and covers the following topics: background on Covid-19 pandemic and face masks, Face masks and the 3 Levels of Emotional Design, Design Thinking, Approaches to Design Education, Conceptual Knowledge, Concept-Based Exercises, Evaluating Learning Outcomes, Design Education Research Methods and Rationale and Significance of study and methods.

Background on Covid-19 pandemic and face masks

Never has a small piece of fabric had such significance to so many American people, the pandemic face mask entered American lives and changed their behaviors in a matter of months. At first there was confusion about their effectiveness for other than health care workers. Initially the World Health Organization took a position against the wearing of face masks by the general public stating there wasn't enough medical evidence to support members of the public wearing masks unless they themselves were sick or around other people with Covid-19 (Ellis, 2020). Consequently, disposable face masks (Strauser & Schlich, 2020) took front and center on the faces of those concerned about their health. The shortage of N95 (Reyes, 2020) face masks used by frontline health care workers, further encouraged the public to use the disposable masks until reports began to surface that fabric masks (CDC, 2020) could be effective in preventing contracting COVID-19.

The shortage of medical masks resulted in the “Pandemic Pivot” when corporations and institutions retrofitted operations to design and produce suitable masks for the healthcare arm of the fight against COVID-19. Meanwhile civic leaders enlisted the public to sew fabric masks for the general population. A new wave of civic duty brought sewing machines (Wetli, 2020) to the frontlines across America with people making fabric masks for anyone who wanted one, often giving them away. The opportunity to generate income during record unemployment caused by the pandemic created overnight ETSY Shops (Kastrenakes, 2020) and Pinterest pages, websites, magazines, and newspapers were filled with patterns for making face masks.

As the Pandemic continued to surge, face masks could be found for sale everywhere from gas stations to pet food stores. The homespun masks were soon eclipsed by the presence of fabric masks at major retailers and online shopping venues not long after fashion masks were seen on runways and in fashion editorials. Politicians and celebrities were photographed wearing masks and appearing in public service announcements telling others to “Mask Up” (Truitt, 2020).

Most notably the United States 45th President and the 48th Vice President were not just photographed without masks but spoke against them (Pazzanesse, 2020) until the raging pandemic’s refusal to abate convinced both resistors to mask up. However, up to that point, the mixed messaging created a cross country divide between pro-mask and anti-mask factions. Public health and personal liberty made the face mask a signal of both boundary and bond. As social unrest coincided with the pandemic the face mask became a symbol of both medical and social disease. Like its predecessor the

Slogan T-Shirt, the pandemic face mask (Devaney, 2020) became an in-your-face protest sign serving double duty for protection and protest.

In just a few months mask designers grew their trade and innovation regarding the mask flourished. Therefore, face masks have gone from polarized polemics to aesthetic abundance; the tiny piece of cloth had even entered the embodied aesthetics of contemporary fashion. (Smelik & Kaiser, 2020)

Emotional Design

In 2004, Dr. Donald Norman wrote about emotional design as a concept for making products that would give their intended users a positive emotional experience (Norman, 2004). By 2006, both designers and researchers became interested in the subject of emotional design (Denton and McDonagh 2006 as cited by Yu & Nagai, 2020). Emotion-focused design as a term, was first used at a conference of design and emotion (Cupchik, 1999 as cited by Desmet and Hekkert 2009). The topic of “design and emotion consist of various concepts and terms. Emotional design topics covered in research have been pleasure, fun, enjoyment, wow factor, and attachment (Jordan, 2000; Desmet, 2002, 2006; Blythe & Hassenzahl, 2003; Norman, 2004; Chapman, 2005; Schifferstein & Zwartkruis-Pelgrim, 2008 as cited by Lo, 2010). Emotional design focuses on providing intended users with a positive emotional experience. Van Gorp and Adams (2012) suggest that emotions can deeply influence the overall user experience. Sáenz et al. (2019) added that understanding the users’ feelings and emotions is essential to the design process and (Violante et al. 2019) found emotional design to be a crucial component of product design.

Face masks and emotional design

In the human mind there are numerous areas responsible for what we refer to as emotion; collectively, these regions comprise the emotional system. Cognitive Psychologist and Design Researcher Dr. Donald Norman proposes the emotional system consists of three different, yet interconnected levels, each of which influences our experience of the world in a particular way. Norman's three levels of emotional design are visceral, behavioral, and reflective (Norman, 2004).

Emotional Design: Visceral

The visceral level of design refers to an individual's first impression of an object or experience, both in terms of perception and feelings. Visceral design concerns itself with appearances (Norman, 2004). Historically, face masks (outside of costumes and rituals (Alexandre, 2020) have been associated with disease and danger (Leone, 2020). An individual's declaration against wearing face masks may have less to do with personal freedom and more to do with a subconscious fear of them and the pandemic they represent.

Problems stemming from a visceral reaction to the site of face masks may confound the reasons for an anti-mask stance, but other factors are at play as well. A visceral reaction to seeing half of a face covered has been generally unexpected in America (outside of religious or cultural wear (Alexandre, 2020) which are relatively new to many Americans), the inability to judge facial reactions in a country that values a smiling face (Solomon, 2020) and the look of the masks themselves all contribute to an individual's visceral response. As face masks move into the final phase of adoption

and are accepted as a necessary accessory, the visceral response may change from repulsion and fear to humor and delight (Norman, 2004) and the response to their aesthetics may even become a “Wow” (DeLong, 2020).

Emotional Design: Behavioral

The second level of Norman’s Emotional Design is Behavioral. This level has to do with the pleasure and effectiveness of use, understandability and physical feel (Norman, 2004). For the pro-mask populace, wearing masks poses its own set of problems arising from functional or use properties such as fit and physical feel. “Maskne” (Cleveland Clinic, 2020) skin problems caused by masks, entered the 2020 American vocabulary as did “Mask Gap” (Pawlowski, 2020) a serious concern as the virus could be transmitted out of the sides of a loose mask. Proper wear became the subject of posters and public service announcements, editorial commentary and cartoons carrying the message that not only should you wear a mask you must wear it properly. These design problems could also have contributed further to the anti-mask rationale. Masks that are uncomfortable, ill-fitting, hot and create skin problems won’t be worn consistently, at least not voluntarily.

As with other apparel one size face mask does not fit all. These drawbacks add to the resistance of wearing masks. Masks must also be cleaned properly. The cleanliness of fabric masks also poses a design problem as they are to be washed, preferably in a bleach solution after each wearing (National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases 2020). A mask should be folded with the outside in if taken off between wearing, for example to eat, and put

into a plastic sealed bag, until it is worn again the same day. This all makes the habit of proper cleaning difficult to instill and bleach and plastic bags add to environmental waste. Because of the hassle of washing, some people wear disposable masks which in turn create landfill. It is difficult to go through a day without seeing face mask litter in streets and parking lots (Sangal, 2020).

Other problems with the behavioral design of face masks include the inability for the hearing impaired to read lips or decipher muffled voices and those with sensory integration issues to use them effectively (Martin, 2020). Mask induced “Face Blindness” (Fetters, 2021) causes anxiety and agitation in those unable to identify people and mask induced “Fog” which according to the American Academy of Ophthalmology occurs, when warm breath escapes from the top of your mask and lands on the cooler surface of your lens, (Hazunchuck, 2021).

Mask exemption has become another behavioral issue, while some people experience real problems posed by mask designs such as asthma and COPD, Albert Rizzo, chief medical officer for the American Lung Association as cited by (Doheny, 2020) stated, “It’s very rare for someone to need an exemption.” However, public policy professor Mical Raz M.D., finds that figuring out if a patient’s request to opt out of wearing a mask is a legitimate new frontier for doctors in dealing with those seeking doctors’ notes. Fake face mask exemption permit cards have also been used as a tactic to get around the face mask requirement (Gaydos & Tyler, 2020) prompting the United States Department of Justice to issue an alert regarding fraudulent face mask flyers (Department of Justice, 2020).

Emotional Design: Reflective

The third level of Norman's Emotional Design is Reflective. This level considers the rationalization and intellectualization of a designed artifact. This is the highest level of emotional design; representing the conscious thought layer; weighing up a design's pros and cons, judging it according to our more nuanced and rational side. Reflective thinking allows us to rationalize environmental information to influence the behavioral level.

This level includes the object's cultural symbolism influencing what an individual believes about an object or experience, its meaning and what it says about the individual (Norman, 2004). The image projected by, and the messages conveyed by pandemic face masks reflect this level. As Americans began to accept that face masks would be part of daily life for the time being, they started to shop for new designs and sources of fashion masks (Carter, 2020). Fashion magazines and YouTube channels featured "how-to" mask wardrobing. Artists, celebrities, and sports figures collaborate with apparel makers on face mask designs for charitable fundraising and once the fashion stigma was gone, even luxury fashion brands were offering masks to coordinate with ensembles. Both enjoyment and self-expressiveness are influenced by the visceral level ("Does the mask look beautiful?") but also very much by the reflective level ("What will my friends think when they see me wearing this mask?"). The reflective level mediates the effects of the behavioral level – people may well put up with difficulties and shortcomings of wearing masks because they believe they will gain other, non-functional benefits from it (Norman, 2004) such as status from wearing

luxury brands and limited-edition masks and social approval by “virtue signaling” (Tilley, 2020).

Design Thinking

Design thinking is a combination of cognitive processes, mindset, practices, and action (Cross, 2006). Design thinking as a process considers data; generates ideas; eliminates doubt; tests, evaluates, and refines ideas in order to create meaningful solutions to achieve desired outcomes. On the IDEO website, Tim Brown states “Design thinking is a human-centered approach to innovation that draws from the designer’s toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success” (Brown, 2021).

Design thinking has been defined in multiple ways, but what researchers agree upon is that design thinking is a combination of thinking and acting in solving ill-formed problems (Hassi & Laakso, 2011).

Approaches to design education

In the world of wicked problems and globalization, there is a continued demand for educational methods training students to face real life challenges (Ulrich & Eppinger, 1995). Ideally, design education should extend into everyday life where producers and consumers become vital participants in a process that allows them to fully engage in the world around them (Dewey, 1934; Tillander, 2011). This calls for a better connection between knowledge and the context of its application along with the development of the skills required to tackle the ill-defined, complex design problems (Laakso & Calvert, 2014). Approaches to instruction that further connect knowledge to

the context of its application (Barron et al 1998) and that develop the necessary skills to successfully handle the ill-defined, complex design problems of the twenty-first century (Adams et al., 2003) are needed.

Providing students with design experiences is essential for the development of design thinking skills (Laasko & Claver, 2014). Learning by doing or practice-based learning, is a key approach that is essential in design thinking (Hassi and Laakso, 2011). “Enhancing students’ design thinking skills may be achieved through incorporating authentic and intriguing tasks into the classroom and providing opportunities to apply design processes” (Razzouk and Shute, 2012, p.344).

Designers are concerned with the quality of people's experiences and devise whole solutions derived from multidisciplinary insights (Margolin, 1997). Since experiences are personal and context-dependent, designers who adopt the experience driven design approach are designing elements for optimal user experiences. Emotional design is a design approach that emphasizes the importance of eliciting users' pleasant emotional responses. McGarry states, “Design education has always been about context but today its agenda identifies one that is increasingly more oriented towards people” (McGarry, p. 81, 2005). With this approach, design education, research and practice are extended beyond function, form, and usability, to emotional dimensions that enrich user experience. (Lo & Piu, 2010).

Conceptual Knowledge

Design thinking involves a conceptual plan followed by the creation of forms. The conceptualization process is an activity that has visual and verbal dimensions,

which involves the coordinated use of drawing and language as the representation systems (Taura & Nagai, 2013). Conceptual knowledge, the ideational basis of design, constitutes one of the most significant forms of knowledge in design and is fundamental to design thinking methodologies. According to Taura & Nagai there are two types of methodological support techniques that have been developed for concept generation, the visual method and linguistic method. Prototyping can provide a way for a dialogue to take place using the visual and linguistic methods. The visual method is thought to be effective in assisting a designer's image aspect of concepts (Taura & Nagai, 2013). A conceptual process that includes sketching is important in aiding students' creative exploration and innovative thinking (Zak, 2011). Innovating thinking can be aided by the linguistic method. The linguistic method contributes more towards activating concept generation at the abstract level, such as the meanings or social values of a product (as in the reflective level of the Norman framework). Both types are considered useful for accelerating or efficiently driving concept generation. (Chiu & Shu, 2007).

From a conceptual and psychological point of view, design concept generation requires a designer to find balance by moving from world to mind (imagination) and mind to world (evaluation) engaging in a "Process of fit" (Searle, 2005, as cited in Heylighen, et. al., 2009).

Concept based course exercises

When bringing concept and process together concept-based exercises are a means to invite students to explain the relationship of factual or situational examples

and performances through a conceptual lens (synergistic thinking) so that students' thinking is made visible to both the student and instructor. Concept-based curriculum design advocates limiting the amount of information to be studied and applied to ensure students have ample time to deeply process ideas.

Short, structured concept-based exercises like the one in this study which is referred to as a DESIGN C.U.E (Conceptual Understanding Evaluation) requires students to span multiple areas; task commitment, synergistic thinking, depth of understanding, conceptual thinking (critical, creative, and reflective) and conceptual visualization (Erickson and Lanning, 2013).

Evaluating learning outcomes

Educational institutions today rely on variations of Bloom's taxonomies for laying out teaching strategies and learning outcomes, (Figure 1. Anderson and Krathwohl, 2001).

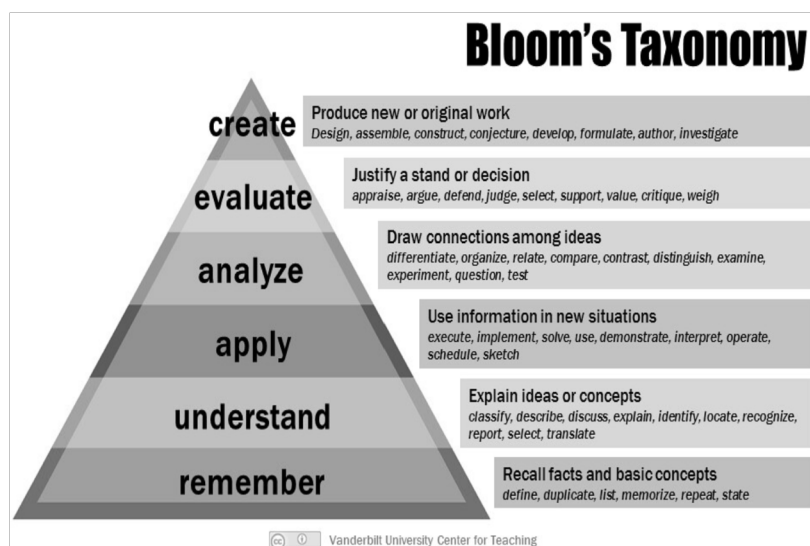


Figure 1: Version 2 of Bloom's Taxonomy (Anderson and Krathwohl, 2001)

In his research, Bloom focused heavily on the Cognitive domain, proposing a taxonomy with six hierarchical structural categories of educational objectives (from less to more complex). It is important to note that, during the learning process, several levels from this taxonomy can coexist on different levels of knowledge complexity (Bloom et al. 1956).

Along with the Cognitive domain in learning there is also the Affective domain which represents the emotional (subjective) aspect of behavior in learning. According to Bloom and colleagues there are five main categories within the Affective domain (Krathwohl et al. 1973): Receiving phenomena, Responding to phenomena, Valuing, Organizing, and Internalizing/personalizing value system. Affective domain refers to a category of behavioral and operational learning including motivation theories that examine students' motivation during the learning process. These theories recognize two kinds of motivation: Intrinsic (internal) motivation, which occurs when a person is internally motivated to do something, because it will provide pleasure, or because a person thinks it is important or morally significant; and Extrinsic (external) motivation that represents imposition to do something or behave in a certain manner under the influence of external factors e.g., money, grades (Huitt 2011, Kashef & Savic, 2013).

In revising Bloom's Cognitive domain taxonomy (Figure 1), Anderson and Krathwohl (2001) modified the idea of 'synthesizing' to 'creating', introducing a new dimension in the cognitive domain, which primarily depends on critical (in evaluating) and creative thinking skills. The definition of critical thinking is "reasonable, reflective thinking that is focused on deciding what to believe or do" (Ennis 1985, p. 10). Ennis introduces 'reflection' or personal values (as affective category) in the

evaluation category of cognitive domain. On the other hand, if “creativity takes place in conjunction with desire and preparations” (Marzano et al. 1988, p.24), affective dimension plays an important role in educational processes.

Relevant to the Norman Exercise 2 DESIGN C.U.E., (Fink 2003) presents a taxonomy (Figure 2) that is not hierarchical, but rather relational and interactive.

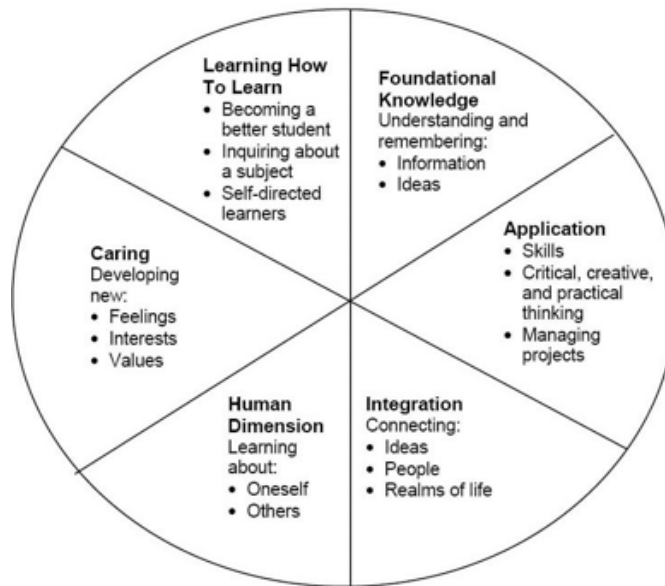


Figure 2: Fink's taxonomy

Here each kind of learning is related to the other kinds of learning and achieving any one kind of learning simultaneously enhances the possibility of achieving the other kinds of learning as well (Kashef et. al., 2013). This learning corresponds to the educational objectives of bridging and transfer discussed further in the educational rationale of the study.

Design education research methods

No matter how a researcher defines education or decides to approach the educational phenomenon, the field of education is complex and elusive (Johanningmeier and Richardson, 2008; Condliffe, 2000). Design education may have additional challenges when it comes to research because “no one seems to be really sure what design research means.” Buchanan further questioned whether design research should follow the model of traditional academic disciplines, or should it seek a new model-based theory, practice and production, (Buchanan, 1998- pp. 63-66 as cited by Mangiarotti, 2010, p, 109) while (Roth, 1999) suggested that design seems particularly well-suited to the employment of qualitative research methods applied within a constructivist paradigm and that human centered qualitative research methods are key to understanding issues surrounding design. Considering matters of education to be phenomenon, the use of qualitative research methods has also been the dominant approach to understand the student’s learning experiences. However, mixed methods research is discussed in educational research literature recognizing that quantitative and qualitative research methods are important in educational research to capture the complexity of the field (Ponce, Pagan-Maldonado, 2015).

Rationale and Significance

In empowering students with techniques, skills, and wisdom to design and build this world (Fry 2003) successful design education also provides “situated learning developed through purposeful authentic activities in a social context” (Brown et al., 1989, p.34) (Fry 2003) (Taboula, et al, 2013). Successful learners will create

connections between theory and practice to develop the required ability to handle complex challenges of real-life situations (Hung, 2013).

In a Core 777 interview Norman suggests that designers need to know more about the sciences including the social sciences (Norman, 2018). This view supports introducing beginning design students to Norman's framework during a global health crisis using the pandemic face mask which many of them have personally used since the Center for Disease Control first recommended on April 3, 2020 (Center for Disease Control, 2020).

Artifacts of the design process affect those who interact with them every day of their lives (McGinley, 2012). How effectively these artifacts integrate within the daily activities of individuals can vary immensely according to whether their needs have been proficiently considered, understood, and acted upon by designers during the design process (Norman, 1990). The ability to empathize with end users is hypothesized as being key to designing people-centered products beyond purely functional considerations (McGinley, 2012). Dan Formosa of Smart Design believes design should focus on people not things (2021). Designers need to shift their focus to understanding people (Formosa, 2018). It is important for designers to appreciate and assess a wide variety of human capabilities and wants (McGinley & Dong, 2011). One way to understand people is by understanding how design relates to their emotions. For a novice designer a good place to start is Norman's 3 levels of Emotional Design, whereby in understanding people's emotional responses to designed artifacts, students can take the first steps to empathizing with them.

A 2019, study conducted by the American Institute of Graphic Arts (AIGA) surveyed designers in the field and found “empathy to be one of the topmost critical design skills of the future” (AIGA, p. 56). So, it makes sense to introduce students to Norman’s 3 Levels of Emotional Design as a threshold concept (Meyer and Land, 2010) in beginning design classes where it may serve as a bridge to developing empathy in understanding the visceral, behavioral, and reflective cognitive processes of the users for whom they will design. Consequently, emotions influence and affect aspects of everyday activities and interactions between people, the environment, and products and services that surround them (Bucolo. S & Wrigley, C, 2012). It is also important that designers come to understand that designed artifacts have “deep impressions” (Nagai, Y. & Georgiev, G. & Zhou, F., 2011) that may underlie the “surface impressions” that users ordinarily receive when viewing designs and that these deep impressions touch the emotions of users.

Design educators should be preparing students for a changing world--one that meets the needs and expectations of the human beings whom we ultimately must serve (Buchanan (1998). Today, designing for human beings encompasses attributes of artifacts that go beyond their intended functions, imbuing them with new meanings. Those meanings are deeply related to the emotions perceived by the users (Alfatony et al., 2017). One way for novice design students to understand user emotions is by learning the conceptual framework of Dr. Donald Norman’s 3 levels of Emotional Design, by first understanding their own emotions as users of designed artifacts, in this case pandemic face masks.

For over a year now, face masks have been part of the study participants daily lives and daily emotions. Russel (2003) considers emotions to occupy all aspects of daily life including moods, cognition, behavior, attention perception and memory. Understanding the emotional experiences of others fosters empathy. However, all empathy starts with self-empathy. If individuals don't notice, recognize, and work on understanding their own emotions, they are likely to confuse their observations of others with their own biases and assumptions (Niezink and Train, 2021).

In teaching design students, it is not always obvious to them that what they are being taught constitutes more than just parts of class projects and that what they are learning can be applied to different scenarios in and out of classes (Barbour, 2016). As a teaching assistant in an Introduction to Design Thinking course (Appendix A) for the past two years at a large midwestern University, I can attest to the fact that students may approach class projects as a series of check off boxes. In this scenario, if left unmitigated, educators may fail if they do not guide students in connecting everyday knowledge and interests to subjects taught in class (Barbour, 2016). Conversely, educators may succeed when they make use of students' everyday knowledge by relating it to course content. In his handbook on design teaching strategies, design educator John Bowers states that "If you are able to integrate students' existing experiences, interests, and knowledge into the coursework, they will feel more of a connection to the course" (Bowers, p. 23, 2020). This was the intended consequence when selecting pandemic face masks as a means to teach students the conceptual framework of Dr. Donald Norman's 3 levels of Emotional Design. It should be noted that the idea to use pandemic face masks as the subject of this study came from

reading comments written on Student Rating of Teaching (SRT) forms from the same Introduction to Design course the previous semester (Theall and Franklin, 1991).

Rationale for Teaching Strategy: Transfer learning through bridging

Design is a field that asks for a different outcome than one previously created, however in user-centered design students need to transfer case information (Barbour, 2016). In the exercise assessed in this study, transferring information required that something was known about a situation i.e., pandemic, and face masks and that knowledge was then applied to a new situation of becoming pandemic face mask designers tasked with designing masks based on a newly learned conceptual framework.

Teaching participants a subject and then later having them put that knowledge into a new context or having them use what they learned on another project is a way of “fostering transfer learning through bridging” (Perkins & Salomon, 1992, p.10). Transfer is an active, dynamic process (Hajian, 2019). The Norman Exercise 2 DESIGN C.U.E. (Appendix B) designed for this study, intends to foster transfer learning through bridging in an active dynamic process of transferring knowledge of the 3 levels of emotional design. In Norman Exercise 2, Part 1, students are required to apply the conceptual framework to an existing face mask design, followed by applying it to their own face mask design in Norman Exercise 2, Part 2. The exercise was structured this way to readily see if students associated concepts in the first part of the exercise to the second part using what they learned while working on the first part of the assignment with an artifact they were already familiar with. In other words,

designing their own face mask design helps them in synthesizing multiple abstract concepts (visceral, behavioral, and reflective cognitive processes). Concept association is assumed to be a key notion in design thinking during concept synthesis (Yamamoto et al., 2009). When students complete tasks that require them to think in new ways, they are training their brains to make unique connections for future scenarios in life (Dee, 2015). Moreover, successful learners will create connections between theory and practice to develop the required ability to handle complex challenges of real-life situations (Hung, 2013).

The Covid 19 pandemic provided a real-life scenario in which to help learners make connections between theory and practice. The Norman Exercise 2 DESIGN C.U.E. (Appendix B) was designed to help students train their brains by conceptually organizing the 3 levels of emotional design as three distinct yet interacting levels present in one artifact, the pandemic face mask. Completing the exercise requires an understanding of the extent and degree to which each level is present in the existing face mask as well as their own selected design, all of which is determined solely by the participants with the purpose of getting them to think beyond the mere presence of the levels or definition of each level.

The idea to be tested is that students will be able to perceive design situations and issues better if they understand a theory, framework, or principles in this case, understanding and applying Norman's 3 Levels of Emotional Design in ways that require their critical thinking abilities. For students to get better at transfer, we must help them organize knowledge. "This means helping students build conceptual frameworks in their brains" (Shank, 2004, p. 1).

Six weeks after completing the Norman Exercise 1: Experience Survey, the participants viewed a class lecture on emotional design, watched Norman's TedTalk® “Why good design makes you happy” (2009) and read chapter 3 from Norman’s book, *Emotional design: Why we love (or hate) everyday things* (2004). In chapter three Norman describes a case study involving emotional design in the context of NFL football coach headsets.

In design disciplines, the method of contrasting cases can be used when students need to learn both the general and special characteristics of a subject (Perkins & Salomon, 1992). After reading the assigned chapter discussing the case study regarding NFL Coaches’ headsets, students can transfer a single case (NFL Headsets) to a contrasting case that is well known to students (face masks) enabling them to both recognize and apply the 3 levels of emotional design in the contrasting case in ways they did not see possible beforehand. The students would be able to recognize that they already have some knowledge of emotional design, as they apply it to the new case, and as they develop as designers, they either work with that knowledge or build upon it using other frameworks such as Kensei (Lockman, 2010) Affective Design (Halimahtun, 2006) and Positive Design (Casais, et al 2016) among others.

Researchers Perkins and Salomon (1988) authored the term “low-road transfer” meaning knowledge or skills are transferred from one task to another very similar task. When students are just starting out, low-road transfer tasks such as the tasks required in completing the Norman Exercise 2 DESIGN C.U.E. (Appendix B) can help them gain independence and confidence working with new conceptual frameworks. In

education, when a transfer is made, then it could be said that learning has occurred (Brandsford et al., 2000).

Rationale for the Norman Exercise 2 DESIGN C.U.E. pedagogical design

The results from the 2013 National Institutes for Learning Outcomes (NILOA) national survey indicate that provosts believe that some of the most valuable and useful classroom-based assessments take the form of well-designed assignments (Kuh, et al., 2014). Before analyzing the empirical material, it is necessary to discuss the rationale for Norman Exercise 1 experience survey and Norman Exercise 2 DESIGN C.U.E. (Conceptual Understanding Evaluation) (Appendix B) used in the study.

The Norman Exercise 1 Experience survey served as a stimulus to get students thinking about their experiences with pandemic face masks. The Norman Exercise 2 DESIGN C.U.E. asks students to draw upon those experiences in designing their own face masks by sketching prototypes. Several studies attest to a relationship between drawing and experience and assert that the iterative act of drawing involves seeing and thinking. According to Kosslyn and Thompson (2003) visual mental imagery is related to human experience where memory not only comprises an image or an event; seeing a face mask, but also information about its sensorial context; wearing a face mask during a pandemic. Therefore, it can be said that knowledge in visual thinking is associated with contextualized individual human experience and a product's context of use is revealed in particular areas of human experience that trigger people's understandings of them (Chamorro-Koc et al., 2009) Covid-19 pandemic face masks notwithstanding.

Sketching

Extensive literature exists in the field of design on the topic of sketching.

Sketching is a concept development technique used to visually communicate ideas. The iterative practice of sketching is a vehicle by which design students learn about visual thinking; that is, the process by which visual elements—codes, symbols, and other representational forms—are integrated into the tangible forms such as designing rough prototypes. Therefore, sketching is a fundamental skill essential to design practice.

Menezes and Lawson (2006) state that conceptual sketches are at the core of emergence and reinterpretation during the design process. As new ideas emerge and are drawn (emergence), drawings become visual clues that trigger, and help develop and transform new images during sketching. In earlier design studies, drawings have been both a communication aid and part of a cognitive process of thinking and reasoning. Artistic activity such as sketching rough prototypes is a form of reasoning, in which perceiving and thinking are indivisibly intertwined (Arnheim, 1956). According to Do (1996) design reasoning is embedded in the act of drawing, as it supports rapid exploration, and incremental definition of ideas (Chamorro, Scott, Coombs, 2015).

Chamorro-Koc, et. al. (2009) found that while conventional longer-duration design projects are essential for allowing students to engage with the full depth and complexity of the design process, short and intensive design activities introduce variety to the learning experience and enhance student engagement. The study also emphasized the benefits that sketching provides in short design activities in that they

constitute a natural thinking process in design; the designer's dialogue with their ideas (Cross, 1999).

While speaking at the Creative Innovation 2010- "Re-thinking the Future" conference, Dr. Edward de Bono, a leading authority in the field of creative thinking and direct teaching of thinking as a skill, stated that "We need to teach students to be thinking for creating value, looking at what is and then looking at what can be... we need to add the ability to design...every week a student should have a design project, using drawings always (DeBono, 2010). Particularly for generating new ideas and perspectives, sketching, rapidly executed freehand drawing, is considered essential to making ideas tangible and understandable. Simple drawings can be a powerful tool to explain, clarify and discuss ideas. Visual thinking, as in transforming ideas and information into images, plays a special role in Design Thinking and visualization tools have been referred to as "the mother of all design tools," because they are used in every stage of a design thinking process (Liedtka & Ogilvie, 2011p. 49). For study participants' the process of sketching face masks serves as a thinking tool (Suwa et al, 2001) (Ferguson, 1992) termed this type of sketching, a "Thinking Sketch."

The importance of the type of design thinking activity like the Norman Exercise 2 DESIGN C.U.E. (Appendix B) used in this study, is succinctly described by Cross "Without writing, it can be difficult to explore and resolve our own thoughts'; without drawing it is difficult for designers to explore and resolve their thoughts. Like writing, drawing is more than simply an external memory aid; it enables and promotes the kinds of thinking that are relevant to the particular cognitive tasks of design thinking" (Cross, 1999, p.36).

Combining designing and writing

Verbal and visual thinking are cognitive modes that are interconnected (Brumberger, 2007). Orr and Blythman, in a chapter entitled “Design is Almost like Writing an Essay” suggest that writing is design, and they challenge an oppositional model of design and writing that sets writing on one side and design on the other instead of seeing them as processes on a continuum with many similarities. The authors state that “designing and writing are both constrained processes” (Orr and Blythman, 2002, p.41).

The Introduction to Design Thinking 1101 course syllabus (Appendix A) states that “designers must be able to communicate effectively. Writing is often a catalyst for creative problem solving. Written communication is crucial to design thinking. Because designers work collaboratively, within a system of constraints, the ability to communicate effectively with clients, manufacturers, and users is critical” (Hemmis, 2021). In the 2017 Design In Tech Report, Maeda lists writing as a key design skill. In a general sense, design is about communicating ideas, and writing can help clarify your thoughts (Maeda, 2017). The Norman Exercise 2 DESIGN C.U.E. was designed to aid novice designers of various disciplines in clarifying their thoughts using a content first design approach. Prior to completing the Norman Exercise 2, students in this Introduction to Design Thinking course used design process models to complete team projects. As a teaching assistant in the course, the researcher saw firsthand that structured models were extremely useful for student learning. Norman’s 3 Levels of Emotional Design (Norman, 2004) were a very useful conceptual framework that had yet not been used in application of students’ designs. This prompted the design of

Norman Exercise 2, DESIGN C.U.E. (Conceptual Understanding Evaluation). This short concept-based exercise using a W-D-W (writing-designing-writing) model was created to provide a simple framework which students use to apply the levels of emotional design. The exercise help students communicate their thoughts (Maeda, 2017) and makes learning stick (Brown et. al, 2014) by using design thinking in a “picture-word cycle” where students can “put ideas into words to help clarify and elaborate on ideas” (Razzouk and Shute, 2012, p.342).

Rationale for Concept-based Assessments

Short concept-based exercises like the Norman Exercise 2 DESIGN C.U.E. promote a reflective design process and offer consideration for future development as design pedagogy. The exercise format both fits with the current “outcome focused” approach where students are eager to complete tasks and finish assessments with a process-based learning task that is crucial for student education and development as good designers (Taboada & Coombs, 2013) and writers (Hemmis, 2021).

Because the objectives of the exercise focus on pandemic face masks, this study is in keeping with the trend in design education toward problem seeking (rather than problem solving) with an understanding of theory and the practice of design (Keane, 2002). The DESIGN C.U.E. (Conceptual Understanding Evaluation) was purposefully designed to support student success in understanding a theoretical framework. The authors of *The Movement to Build More Effective Assignments*, believe “Focusing on more effective, intentionally designed assignments can reinforce program outcomes, contribute to meaningful assessment and most important support student success” (Hutchings, Jankowski, Baker, 2018, p.1). The design of assignments

is one of the most creative and consequential tasks that faculty undertake in their work as teachers (Hutchings, Jankowski, Schultz, 2016).

Gaps in the literature

Thus far, the concept of emotional design has primarily been restricted to the fields of research and industry not education (Yu et. al., 2020). In their study, Yu and Nagai observed that historic research on emotional design does not include teaching it to students, “There has been limited research into methods of teaching emotional design for the purpose of achieving a positive emotional experience for users” (Yu & Nagai, 2020-p.1). Most professionals using emotional design slowly acquired the required skills by experience and without direct education (Lo, 2010). In design thinking-based curricula, student understanding of emotional design is necessary but assessing these skills is usually a challenging task for design educators and researchers, and little work has been conducted to evaluate design thinking skills of students gained in such courses (Alfatoona, Wakkary, Neustaedter, 2017). Sharing this view, Yu and Nagai state that “Teaching emotional design to design students in general has been overlooked due to its difficulty” (Yu and Nagai, 2020, p.1).

Chapter III

RESEARCH METHODOLOGY

A mixed methods approach was used to study design education phenomena with the aim that the empirical material collected continues to offer indications and suggestions as a basis for discussion and reflection in teaching design theory. The research questions guided the study and determined which components of quantitative and qualitative models were used. This type of study design makes the relationship of the approaches apparent to establish relevance of and alignment to the research questions. It is considered that the more a combination or integration of quantitative and qualitative approaches can be used to capture the essence of the problem, the greater the relevance and effectiveness of the design. When this occurs, it can be argued that the researcher's decisions were correct (Ponce et al., 2015).

Study Participants

Participants in the study comprised the student population of an Introduction to Design Thinking course (Appendix A) in the College of Design at a large Midwestern University during the spring semester of 2021. The exercise assignments were listed on the course syllabus.

Objectives of the study

The overall aim of this study was to gain an understanding of the study participants' experiences in applying a newly learned concept to a product they have

experience using followed by creating their own design as a way to investigate outcomes. Many students who enroll in an Introductory Design Thinking course are unfamiliar with the frameworks, methods and theories from which designs are created nor the application of such frameworks to the design process. Therefore, the objectives to meet this aim were:

- Identify student experience using pandemic face masks
- Introduce students to the conceptual framework of Norman's 3 levels of Emotional Design
- Improve student understanding of emotional design by engaging them in an application exercise as both product designer and user
- Explore learning transfer in student application of conceptual framework to existing pandemic face mask
- Explore learning transfer through bridging by applying conceptual framework to student's own face mask designs

Procedure

I. Norman Exercise 1: Experience Survey

A survey entitled Norman Exercise 1 (Appendix C, D) was administered via secure portal on Survey Planet® to 150 students enrolled in an Introduction to Design Thinking course (Appendix A) in spring semester 2021. The range of survey questions (Appendix D) provided inquiry into the students' initial reactions to face masks, their experiences wearing them, and the meanings they associate with face masks.

The survey was created both to assess students' experiences with pandemic face masks and serve as a creative stimulus for solving design problems associated with their personal mask experiences. The survey consisted of a Likert scale questionnaire with 3 additional fill-in answer questions to total 31 questions (Appendix C). Survey Planet® independently tabulated the survey results and provided them to the researcher via their website. Student participants were required to complete the survey to receive 5 class points. The survey completion results generated by Survey Planet® were used by 6 teaching assistants to record participation scores.

Six weeks following the survey, students were introduced to Norman's 3 Levels of Emotional Design in 3 assignments including an assigned reading, assigned viewing of a TedTalk® and assigned asynchronous class lecture.

II. Assigned Reading (Appendix D)

Chapter 3 "Emotional Design: Why we love or hate everything things"

(Norman, 2004)

III. Norman TedTalk® (Appendix E)

"3 ways good design makes you happy" (Norman, 2009)

IV. Lecture (Appendix F)

Introduction to Design Thinking class lecture covering Norman's 3 Levels of Emotional Design with slides from the lecture provided to students online (Hemmis, 2021).

V. Norman Exercise 2 Design C.U.E. (Conceptual Understanding Evaluation)

Norman Exercise 2 DESIGN C.U.E. (Appendix B) was administered asynchronously online. Students were given one week to complete the assignment. No extensions were given. The exercise was created to guide students through a 3-part learning structure based on the six parts of Blooms Taxonomy (Anderson and Krathwohl, 2001) (Figure 1). The exercise involves taking newly obtained information and applying it to an existing design followed by taking iterative design steps sketching rough prototypes of their own designs followed by transferring newly acquired knowledge to the application of one of their own designs. The content of Norman Exercise 2 DESIGN C.U.E (Conceptual Understanding Evaluation) is concept-based (Erickson and Lanning, 2014). The exercise was a new addition to the course.

Evaluation of Norman Exercise 2 DESIGN C.U.E. (Appendix 2)

Each student response to the exercise was evaluated by two instructors to ensure consistency in scoring. The exercise was worth 5 points and the assignment needed to be satisfactorily completed according to specific requirements. Partially filled in sections or failure to submit the exercise received a zero. The requirements of the written portion of Norman Exercise 2, Part 1 and 2 was a clear understanding of the 3 levels of Emotional Design conceptual framework and its application to a previously designed artifact and the students own designed artifact. The written portion of the exercise must consist of 3-4 sentences in each column indicated on the exercise worksheet.

The sketching portion of the exercise must include rough prototypes of students' own face mask designs. The purpose of the sketching portion is to show visual thinking therefore students were not graded on the artistic or rendering quality of sketches nor the creativity of the designs, but rough prototype sketches needed to be understandable as face mask designs. The directions state "prototypes" plural, however after a student inquired asking how many prototypes they should provide, the teaching assistants were asked to email students instructing students to provide 2-3 rough prototypes.

Data Analysis

The Norman Exercise 1 survey data was analyzed to understand student respondents' prior experiences with face masks. Two Likert scale questions Q11 and Q31 were used for further analysis in the study in connecting students' prior experience with face masks to the design of their own. Written answers to three survey questions: Q7, Q18 and Q30 were read multiple times and answers were coded to compare with matched codes to Part 2 of the completed Norman Exercise 2 DESIGN C.U.E.

For consistency in grading and to avoid undue influence on the part of the researcher, the Norman Exercise 2 was graded twice by two instructors working as teaching assistants in one of six individual classroom sections in the same Introduction to Design Thinking course. After scores were recorded in the gradebook, each exercise was coded to protect the identity of the study participants.

Each sketch page of the exercise was coded and reviewed multiple times. Each face mask design that was selected by the student for further exploration in Part 2 was categorized and sketch pages were grouped according to the most prominent level of emotional design.

The designing portion of the exercise called for rough sketches of mask designs, the majority of students' hand-drew their sketches, others used Adobe Illustrator or other programs to draw their face masks, and some used a basic tablet marker tool to draw their designs. To look for evidence in support of the exercise design and student's intrinsic motivation (Bloom, 1954), exercises with sketches of 3 or more face mask prototypes were coded and recorded.

Each written portion of the Norman Exercise 2, Part 2 was read multiple times to validate what was written corresponded with the students selected face mask design. Each written portion was also coded by word frequency to categorize specific features of student mask designs relating to survey questions Q11 and Q31.

To look for further evidence of intrinsic motivation (Bloom, 1954), the written portions of the exercise were counted to determine the number of sentences written in each column. The written instruction on the exercise asks for 3-4 sentences for the written portions of both Part 1 and Part 2. For the purposes of the study a sentence consisted of 7 or more words. Sentences were determined by student's use of a period indicating the end of the sentence. Exercises with 5 or more sentences per three or more columns were coded and recorded.

Bracketing Bias

A statement of philosophical assumptions that underpin the research has been required for rigorous qualitative research (Creswell, 2012). The researcher assumed: students in general had a negative attitude regarding face masks or had pandemic fatigue and would not want to complete the survey; most students would be able to sketch with pencil using even basic lines in order to visually communicate basic ideas; all students using tablets to draw had experience using them and show competence in their work; design majors from any design discipline would perform better on the designing portion of Norman Exercise 2 DESIGN C.U.E. than students in other colleges at the University; apparel design majors choose to complete the exercise; graphic design students would create more surface designs for their face masks than other majors; the overall level of output of the design students would be greater than other majors; most of the design students would focus prominently on the visceral level of emotional design in creating their face mask designs; color, surface design and alternatives shapes would play a prominent role in the visceral level of students face mask designs.

IRB Approval

Signed consent was not required, per the IRB as the study took place within the curriculum of an established design course. IRB approval was granted with exemption from human subject research.

Limitations of the Procedure

There were several limitations that affected the outcomes of this study. Due to Covid 19, the entire study was conducted asynchronously online. All aspects of the study were accommodated to take place within an existing Introduction to Design Thinking course syllabus, so it was necessary to design a study within the existing lesson and course structure.

A pilot study that focused on the aesthetics of face masks was conducted fall semester 2020. The pilot served as inspiration for this study as well as being useful in the creation of the survey questions that provided the background context on Covid face masks for study participants. The instructions for the Norman Exercise 2 DESIGN C.U.E. could have been clarified with one more pilot. Mostly, the instructions were not verbally explained to students in class and relied on student interpretation of written instructions on the exercise. The written instructions regarding rough prototypes indicated that students would not be graded on the quality of rough sketches, however, it would have been useful to give a short refresher on the ways designers use rough sketch to visualize thinking and to communicate their ideas.

The instructions stated “rough sketches” but did not indicate an actual number of sketches. Performance motivated and extrinsically motivated students (Dweck and Leggett, 1988) prefer explicit directions such as the number of sentences and number of drawings required, while learning motivated and intrinsically motivated students (Elliot and Dweck, 1988) prefer being given options to enhance learning. The lack of a specific requirement on the number of sketches was attempted to be remedied when

teaching assistants were asked to email students instructing them to design 2-3 prototypes, however it is not known if students read their emails.

Both the scoring of the sketching and written portions of the exercise could have been calculated using a rubric, to better evaluate the depth and quality of work based on the taxonomy (Bloom et al. 1956). Participants were given 7 days to complete the Norman Exercise 2 DESIGN C.U.E. (Conceptual Understanding Evaluation). In the future, it may be beneficial to record the time students spend completing the exercises, for example, to learn how much time they spent on the writing portion of the exercise and the drawing portion respectively.

Chapter IV

RESULTS & ANALYSIS

PART I: Study Participants

Participants in the study comprised the student population of an Introduction to Design Thinking course at a large Midwestern University during spring semester of 2021.

The class population represented students from 8 colleges (Figure 3), 7 design majors and 5 design minors (Figure 4).

18 students were non-design majors representing 7 colleges. All names were removed to protect identity of the participants. Each student was assigned a code according to college, major, minor and year in college.

CDES	GD*	APD*	R*	ID	XD*	ARC	LD
MAJORS	Graphic Design Major	Apparel Design Major	Retail Merch Major	Interior Design Major	Inter disciplinary Design Major	Archi tecture Major	Landscape Design Major
CDES	gdm*	iem	xdm*	fsm	pdm*		
MINORS	Graphic Design Minor	Interior Environments Minor	Inter disciplinary Design Minor	Fashion Studies minor	Product Design minor		

Figure 3: Design majors and minors in the study, * indicates required course

CDES	CLA	CCPS	CEHD	CSE	SPH	CSOM	CFANS
College of Design	College of Liberal Arts	College of Continuing and Professional Studies	College of Education and human development	College of Science and Engineering	School of Public Health	School of Mgmt.	Food and Nutrition Science

Figure 4: Colleges represented in the study

PART II. Identifying student experiences with pandemic face masks

Norman Exercise 1: Experience Survey

The essential first step in the study was to determine a relationship between study participants and pandemic face masks by conducting a survey (Norman Exercise 1) (Appendix C and D). The survey was administered to 152 students and completed surveys totaled 147. Eliminations included the following: one survey had no name; 2 surveys were completed twice and the second submissions were eliminated. Table 1 shows that 147 (96.7%) of the study participants satisfactorily completed the survey.

Total class participants	Surveys submitted	Surveys without names	Completed surveys	Surveys completed twice	Total Survey participant data
152	150	1	149	4(-2)	147
100%	98.7%	.66%	98%		96.7%

Table 1: Survey participation

Part III. Understanding students' prior experiences with face masks

All 147(100%) survey respondents had experience wearing pandemic face masks (Figure 5) ranging from negative to positive. Of the respondents 86 (58.5%) had an above neutral experience, 48 (32.7%) had a neutral experience and 13 (8.8%) had a below neutral experience with pandemic face masks.

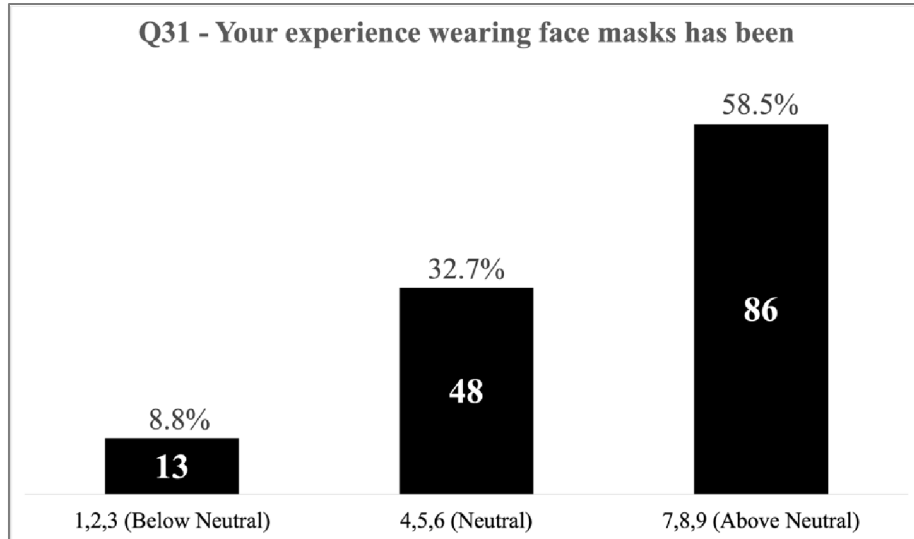


Figure 5: Norman Exercise 1-number of survey respondents with face mask experience

The next purpose of the survey was to discover the types of experiences respondents had with wearing face masks. Figure 6 is a survey question (Q11) with student responses regarding issues they experienced with the fit and function of face masks.

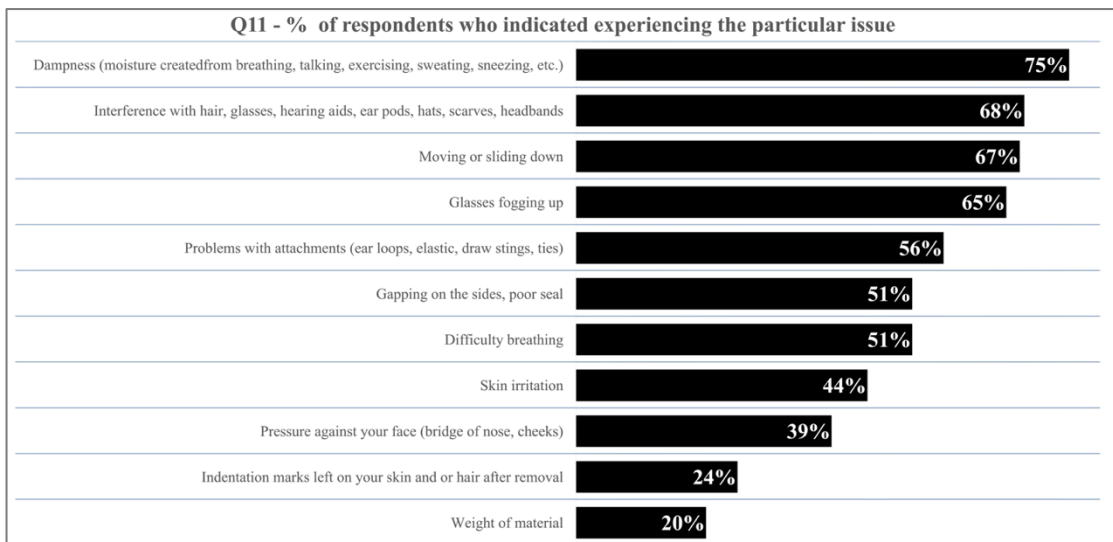


Figure 6: Student responses to survey question Q11

The survey also contained 3 questions that required written answers (Table 2 and Table 3).

Online Face Mask Survey Write-In Questions	Took the Survey	Number who answered	Percent of total
If you answered NO to the previous question (Q6 - As the pandemic continued did your reaction to wearing face masks change?), please skip this question. Q7 - If your reaction to wearing face masks changed, please describe how it changed	147	84	57%
Q18 - Please list any additional observations on face masks you have bought, made or received as a gift	147	76	52%
Q30 - What do you think the purpose for face masks will be in the future?	147	119	81%

Table 2: Number of total survey respondents that wrote answers to Q7, Q18, Q30.

Online Face Mask Survey Write-In Questions	Students who successfully completed the Norman Exercise and took the survey	Number who answered	Percent of total
If you answered NO to the previous question (Q6 - As the pandemic continued did your reaction to wearing face masks change?), please skip this question. Q7 - If your reaction to wearing face masks changed, please describe how it changed	126	84	67%
Q18 - Please list any additional observations on face masks you have bought, made or received as a gift	126	76	60%
Q30 - What do you think the purpose for face masks will be in the future?	126	119	94%

Table 3: Survey respondents that answered Q7, Q18, Q30 and completed Norman 2.

Discussion

If understanding is based on knowledge and experience acquired through life (Arnheim, 1954) it makes sense to teach design students a threshold concept (Meyer and Land, 2010) based on their existing knowledge and experience. Therefore, before teaching students, the conceptual framework of Dr. Donald Norman's 3 levels of Emotional Design it was important to learn not only about their knowledge and experience of pandemic face masks but also their interest in them as those factors may influence their learning of a threshold concept as well as the outcomes of the study.

The survey was useful in determining the number of respondents who had any experiences wearing face masks (Table 1). All 147 (100%) survey respondents had experience wearing face masks during the pandemic; 86 (58.5%) students had above neutral experiences, 48 (32.7%) had neutral experiences and 13 (8.8%) had below neutral experiences with pandemic face masks (Figure 4).

It should be noted that many of the issues listed in survey question 11 (Q11) (Figure 5) were addressed by students (unprompted) in the written portions of Norman Exercise 2 DESIGN C.U.E. when they completed the exercise six weeks after the survey was completed. Table 2 shows the number of written responses to survey questions Q7, Q18 and Q30 out of 147 survey respondents. The answers provided detailed descriptions of students' experiences with face masks, some of which will be further discussed in Part IV using some examples from the 126 survey participants that also completed the Norman Exercise 2 (Table 3). The higher number of combined above neutral and neutral experiences (Figure 4) may have contributed to the receptivity of students in opting to participate in the study for the full duration.

PART IV: Participation Data Norman Exercise 2 Design C.U.E.

During the semester, 8 students dropped the course, changing the number of study participants to 139 (94.6) (Table 4). Furthermore, eleven students opted out of participating in the Norman Exercise 2 portion of the study changing the number of study participants to 128. Figure 6 shows the majors and minors of 128 students that completed Norman Exercise 2 DESIGN C.U.E. by code, the code key is shown in part I (Figure 2). In Figure 7 110 students are coded by design majors/minors and year and

18 students outside of design are coded “other” by year. Table 4 shows that students, 126 (98.4%) satisfactorily completed the Norman 2 Exercise each earning 5 points and 2 (1.4 %) students unsatisfactorily completed the exercise receiving zero points.

The 126 Norman Exercise 2 DESIGN C.U.E.s will be the focus of the data analysis.

Survey Participants	147	100%
Dropped class Prior to Norman 2	8	5.4%
Remaining Study Participants	139	94.6%
Opted out of exercise 2	11	7.5%
Completed Norman Exercise 2	128	87.1%
Scored 5 in Exercise 2	126	85.7%
Scored zero in Exercise 2	2	1.4%
Successfully completed Exercise 2 out of 128	126	98.4%

Table 4: Norman exercise 2 participants

Survey Participants	DES un	GD	APD	ID	R	R pdm	LD	XD	ARC	ARC xdm	ARC iem	xdm	gdm	iem	GD fsm	Other	Total
Freshman	1	26	4	1	3	0	0	0	0	0	0	0	1	0	1	2	39
Sophomore	0	17	4	3	6	1	1	0	0	0	1	1	1	0	0	7	42
Junior	0	3	2	0	11	0	1	0	1	1	1	6	0	0	0	3	28
Senior	0	3	0	0	5	0	0	1	0	1	0	1	0	1	0	6	19
Total	1	49	10	4	25	1	2	1	1	2	2	8	2	1	1	18	128

Figure 7: Majors, minors of students that completed Norman Exercise 2 Design C.U.E.

Discussion

Of the 139 (94.6%) students that were given the Norman Exercise 2 DESIGN

C.U.E. assignment, 128 (87.1%) of survey participants completed it and 11 (7.5 %) opted out including two majors outside the College of Design. Design majors included one landscape design, one interior design major, one apparel design major and six graphic design majors. With the first level of Norman's Emotional Design being Visceral design and face masks being essentially a blank canvas, this was a somewhat surprising outcome. This also suggests a missed opportunity for graphic design students to practice design using the levels of emotional design considering empathy was deemed the number one design skill (AIGA, 2019). One apparel design student also chose not to design face masks, which was also unexpected and suggests a missed opportunity, given that functional face masks were featured on couture and high-end streetwear runways as early as 2014, six years prior to the pandemic (Lubitz, 2015).

PART V. Identifying the 3 levels of Emotional Design in the blue pandemic face mask

Teaching participants a subject and then later having them put that knowledge into a new context is a way of fostering transfer learning through bridging. After reading chapter 3 of Norman's book (Norman, 2004) (Appendix F), watching Norman's TedTalk® (Norman, 2009) (Appendix G), and viewing an asynchronous lecture (Hemmis, 2021) (Appendix H) with accompanying slides provided for later reference, students were assigned Norman Exercise 2 DESIGN C.U.E. (Conceptual Understanding Evaluation) (Appendix B).


In Norman Exercise 2 DESIGN C.U.E. Part 1 (Figure 8) students were required to know the definition of the 3 levels of emotional design and demonstrate their

understanding of the levels by applying them to the disposable blue pandemic face mask pictured in the exercise.

STUDENT NAME: _____ T.A. or Section #: _____
 (PAGE 1 of 3)
 Introduction to Design Thinking 1101
Special Assignment 2: Applying Norman's 3 Levels of Emotional Design to face masks
 DUE: 11:59pm on Sunday March 14, 2021

Recently, you participated in a survey regarding your experiences with pandemic face masks. You watched an asynchronous online class lecture and read a case study which introduced you to Don Norman's 3 levels of Emotional Design. The exercise below will assess your understanding and application of Emotional Design present in a pandemic facemask. **Satisfactory completion of both Part 1 and Part 2 of this exercise is required to receive 5 points.**

Assignment Part 1: Identifying and Applying
 (Figures 1-3) show different views of the same pandemic face mask. **WRITE** in at least 3 to 4 sentences, explaining: How the design of the face mask **does or does not** reflect each of Norman's 3 levels of Emotional Design (Figure 4) and **which level is the most prominent** in the face mask and why.



Level:	Level:	Level:	Most prominent

Figure 8: Norman Exercise 2, Part 1

The first column of the written section of the exercise (Figure 8) involves transferring the conceptual knowledge of the Visceral level of emotional design to the blue disposable face mask. Table 5: Shows the number of student participants who wrote that the positive visceral level, was NOT present in the Blue Pandemic Face Mask (Norman Exercise 2, Part 1) those who wrote that the blue face mask's visceral response was negative, those that wrote the visceral level was positive, those that objectively described the visceral level and the number of students that chose to address the Visceral level in their own mask designs.

No Visceral level present in blue face mask	31	25%
Negative Visceral level	28	22%
Positive Visceral level	6	.05%
Visceral Level is present	54	43%
Students that designed face masks to address the visceral level in Norman Exercise 2-Part 2	72	57%

Table 5: Identifying the visceral level in blue face mask

Following are examples of students’ Norman Exercise 2, Part 1, writing about the Visceral level of emotional design in the context of the blue disposable face mask:

GD3o:

“The design of the common face mask does not reflect the visceral level of design. This statement can be made due to the physical appearance of the face mask – since it is and looks disposable, the eye is not attracted to it. There is a lack of personality when it comes to this face mask, and it does not incite a reaction of “wow, I want that!”

GD2b:

“The Visceral Level doesn’t apply to the face mask because Visceral design is about the “initial reaction” and the emotional reaction it invokes. I would argue that many years ago, before the pandemic, seeing a face mask in public and the design of the mask was pretty uncommon and may have applied on the Visceral Level. However, today the mask is a normal object that every day people interact with, and it doesn’t invoke emotion based on the look or feel it provides.”

xdm3b:

” Face masks are made of thick polypropylene, and the cloth backing often can become itchy if used more than once. This makes them unattractive on the visceral level. The look of the mask may be symmetrical, but the material and color feel clinical, which can also be viscerally unattractive. Overall, the sterile look of medical face masks is not desirable.”

The second column of the written section of Norman Exercise 2 Part 1, (Figure 8) involves transferring the conceptual knowledge of the Behavioral level of emotional design to the blue disposable face mask.

Table 6: Shows the number of students who wrote that the blue Pandemic face mask represented the Behavioral level of Norman’s 3 levels of emotional design. It also shows the number of students that chose Behavioral level as the most prominent in the blue face mask and the number of students who chose to address the Behavioral level in their **own** mask design.

Students stating the Behavioral level was represented in the blue pandemic face mask	126	100%
Students stating the Behavioral level was <i>most</i> prominent in the blue pandemic face mask	106	84%
Students that designed face masks to address the Behavioral level as written in Norman Exercise 2-Part 2	122	97%

Table 6: Identifying the behavioral level in blue face mask

The following are examples of students' writing on the Behavioral level of the blue disposable face mask.

XD4a:

“To me, a face mask certainly represents behavioral emotional design and how that is important. When it comes to face masks, people's primary concern lies in its function. Does it do its job, and does it do it well? Especially considering the context of the pandemic and how scary it can be, the behavior and the function of the product is important and its important the design furthers the products intended function. People want to know if it will protect them.”

R3d:

“The design of the face mask is behavioral because their performance is the focus. Face masks have a basic function to be able to protect yourself and others, so the usability of the item as well as how it performs outweighs other attributes. Additionally, face masks meet consumers' need for a facial covering that reduces the chance of spreading or contracting COVID-19, so the design is behavioral in the sense that it must be functional to fulfill people's needs”.

CLA4b:

“I would definitely say that this type of face mask reflects Norman's ideas about behavioral design because, for starters, the mask has a strong sense of functionality. It functions to protect ourselves and others from viruses and illnesses just by wearing it on our faces and wrapped over our ears.

Also, it's quite easy to understand. From Figure 2, it's quite intuitive if you know off the bat that it's supposed to go on your face then it's fairly easy to

figure out from there. The only thing that isn't inherently understandable is which side faces in and which side faces out.

In terms of feedback, the mask will inform you sometimes when it can't be used anymore. For example, when it's visibly dirty or smells. Although most people throw their mask away after one day or wash them after a wear. You'll also know if you're not wearing it right sometimes, like if there are gaps between your face and the mask.

As far as usability goes, sometimes masks aren't always extremely user friendly. For example, if you wear it too long, the pressure on your ears causes your head to hurt. Also, depending on the size of one's face, it isn't user-friendly for everyone. I myself have to wear children sized masks to avoid gaps and to feel secure.

And as for physical feel or tangibility, which is the element of behavioral design that is most connected to visceral design, it's soft and lightweight, which feels comfortable on the face.”

The third column of the written section of Norman Exercise 2, Part 1 (Figure 8), involves transferring the conceptual knowledge of the Reflective level of emotional design to the blue disposable face mask.

Table 7: Shows the number of student participants who wrote that the Blue Pandemic Face Mask represented the Reflective level of emotional design, the number of students that wrote it did not represent the reflective level and the number of students that chose to address the Reflective Level in their **own** designs.

Students stating the blue face mask represented the reflective level	118	94%
Students stating the blue face mask did NOT represent the reflective level	8	6%
Students that designed face masks to address the Reflective level as written in Norman Exercise 2, Part 2	33	26%

Table 7: Identifying the reflective level in blue face mask

The following are examples of students' Norman Exercise 2, Part 1 (Figure 8) writing about the Reflective level in the blue disposable face mask:

APD2c:

“A face mask holds strong reflective values amidst a global pandemic. The mask indicates a great period of change that was experienced across cultures, where the social aspect of life was largely compromised. Likewise, the use of a mask is often a connotation for having a respect for others' lives; wearing a mask during a pandemic is indicative of the intentions to minimize dangerous interactions while upholding values of daily life.” xdm3c:

“The design of this does reflect the reflective level. Although it is a polarizing issue to many in our country, the use of a face mask sends the message that one cares about others and wants to keep them healthy. One's self-image is reflected positively when one feels they have tried to protect those around them.”

CLA3a:

“I think that this medical mask has one of the most clear reflective designs of this decade. People are going to have personal memories using this product

because of the pandemic, and it has a very clear message that it is necessary to use this product to live a safe life. People have different opinions on masks; however, I think everyone can agree that the meaning of the product is to try to keep others safe and to be a good, nice citizen.

The following are examples of student's writing on the absence of the Reflective level in the blue disposable face mask:

GD2c:

“This mask design is not particularly reflective. There is no prestige, rarity, or exclusiveness attached to it; they are inexpensive and easy to buy (outside of a pandemic). The masks are only made to serve a simple, straightforward purpose, and then to be disposed of, so there is no point in attaching extra meaning. There is the association with hospitals that can give it certain connotations and make it seem like a better mask than other kinds. Someone buying this plain utilitarian mask instead of other masks during the pandemic does create some sort of impression. There is also a cultural aspect to the mask in that it is expected to be (and should be) worn in certain settings.”

ID2b:

“Reflective design is about the message a product senses and its meaning. The meaning of these face masks is to keep us safe during the corona virus pandemic. This mask in particular does not send a message about who you are as a person because it is so bland to look at.

After writing about all three levels of emotional design applied to the blue disposable face mask, the final column asked students to select and write about which level was the most prominent.

Table 8: Shows students' selection of most prominent level of emotional design represented in the blue disposable face mask:

Most prominent level	Students	%
Visceral	8	6%
Behavioral	102	81%
Reflective	14	11%

Table 8: Identifying the most prominent level

The following are examples are student's written justifications for selecting the most prominent level of emotional design in the blue disposable face mask.

1. Participant GD2e written justification for choosing visceral as the prominent level of the blue disposable mask:

GD2e:

“The most prominent level in the face mask is the Visceral level. In other words, the standard pandemic face mask is most successful with its physical features, particularly the comfortable material and the form of the mask; The soft cloth does not irritate the skin, and the stretch of the mask gives room to breathe without a feeling of tightness. The design is clean, though it lacks desirability in the aesthetic sense. The pandemic face mask needs most help at the behavioral level.”

2. Participant GD2k written justification for choosing Behavioral level as the prominent level of the blue disposable mask:

GD2k:

“The most prominent level in the face mask is Behavioral. This is because the main purpose of the face mask is to effectively protect people from catching the virus, which would be considered human-centered. Although some masks focus more on appearance, the overall function of every mask is to block air and saliva containing viruses from someone’s nose and mouth. Since it is a worldwide pandemic, the face mask is designed to be able to be used by any human. And since it is used by so many people, the design of the face mask has to be sure it satisfies a vast majority of users”.

3. Participant APD3a written justification for choosing Reflective level as the prominent level of the blue disposable mask:

APD3a:

“Overall, I think the most prominent level of emotional design in the standard face mask is the reflective level. Over the last year, wearing a face mask has meant that you take the health of yourself and others very seriously, showing that you are a responsible citizen. Since wearing a mask has been a mandate in indoor spaces for the last 10-11 months, the mask has become a norm in society. People who actively choose not to wear a mask due to the small inconveniences they can cause send the message of being ignorant and a danger to the health of others. The mask in general has been a symbol that goes hand in hand with the pandemic, so I suspect that even after the pandemic is

over, face masks will forever remind people of the COVID era. understandings, Reflective Design is the most prominent.”

Discussion:

In applying the 3 levels of emotional design to the blue disposable pandemic face masks, students wrote about the visceral level of emotional design and gave rationale for whether it was present in the blue pandemic face mask or not: 31 (25%) students wrote that the blue face mask had no visceral level of emotional design, and 28 (22%) students wrote the blue mask had a negative visceral level with reasons being about the look of the mask or as one student wrote, the visceral reaction was the result of negativity they associated with the mask.

Norman discusses how the reflective level and visceral levels can modify each other. Although visceral responses can be positive and negative, when Norman speaks of the Visceral level, he is describing a positive visceral level. Thereby, the students that indicated there was no level at all were most likely referring to no positive level. 6 (5%) students wrote that the blue disposable face mask had a positive visceral level, and 54 (43%) students wrote about the presence of the visceral level in the blue face mask in neutral terms.

All 126 (100%) of the students wrote that the blue pandemic face mask had a behavioral level of emotional design and 102 (81%) stated the behavioral level was the most prominent. The blue disposable pandemic face mask pictured in Part 1, is used in the practice of medicine, and is well known as being useful for preventing the transmission of Covid-19 (CDC, 2021), notably 122 (97 %) students designed their

face masks with features to improve one or more of the four components of the behavioral level: function, understandability, usability, and physical feel.

117 (93%) students wrote that the blue disposable face mask had a reflective level of emotional design and 33 (26%) discussed improvements to the level in their own mask designs. 9 (7%) students wrote that the blue disposable mask did not have a reflective level. Norman (2004) discusses one aspect of the reflective level is that it can be modified by the visceral level.

PART VI. Identifying the 3 levels of Emotional Design in students' face mask designs

Short and intensive design activities (Figure 9) introduce variety to the learning experience and enhance student engagement (Chamorr-Koc, 2009). The Chamorr-Koc, study also emphasized the benefits that sketching provides in short design activities in that they constitute a natural thinking process in design, the designer's dialogue with their ideas.

In the Norman 2, Part 2 designing portion of the exercise students draw from their own experiences armed with the conceptual framework of the 3 levels of emotional design.

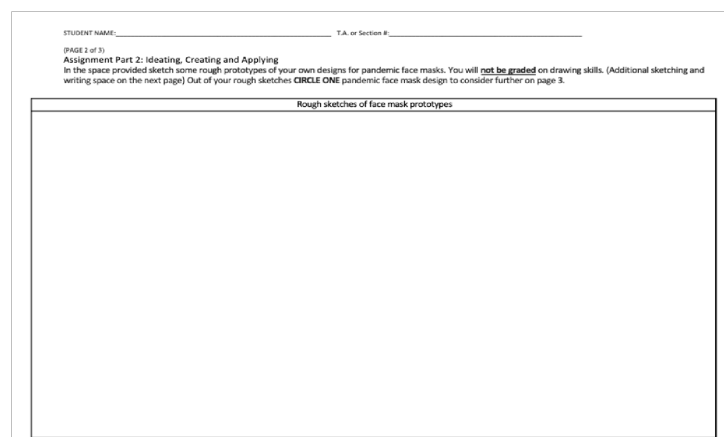


Figure 9: Norman Exercise 2, Part 2, sketching page

In the Norman Exercise 2, Part 2 the students first sketch rough prototypes of face mask designs, then select one to further analyze on exercise page 3. Figure 9 shows the number of face mask prototypes students designed.

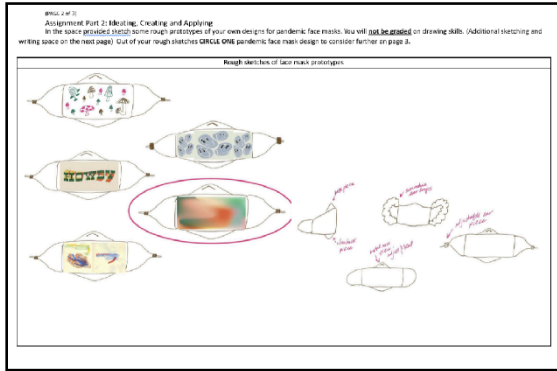
Student(s)	# of masks	Total
1	0	0
16	1	15
11	2	22
60	3	180
17	4	69
6	5	30
6	6	36
5	7	35
2	8	16
2	9	18
126	Total	438

Table 9: Student face mask design output

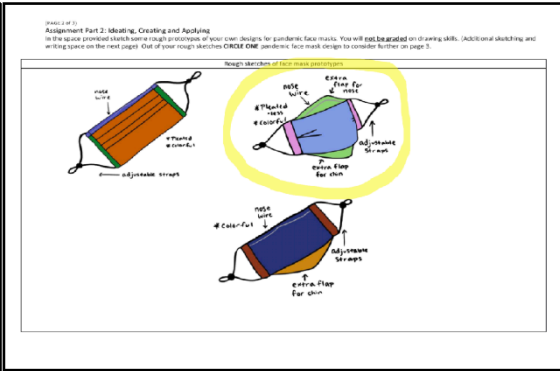
Together students' prototypes totaled 438. Individually student output ranged from 0 (no access to a scanner) to 9 mask designs.

Each student was instructed to circle or otherwise indicate which face mask prototype they would discuss in the written portion of Part 2. Figures 10, 11, 12 are examples of student face mask sketches displayed according to one of the 3 levels emotional the students chose to make most prominent.

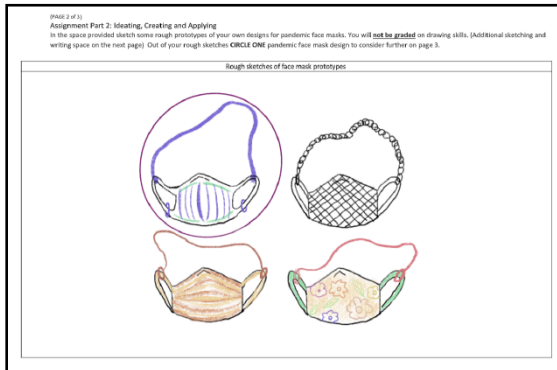
Figure 10: Examples of student designs with a prominent Visceral Level of Emotional Design



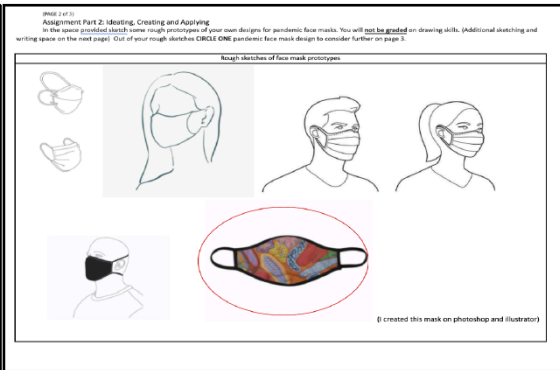
Participant: R3a



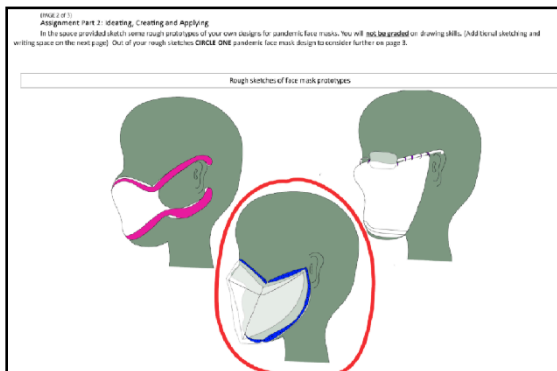
Participant: GD1b



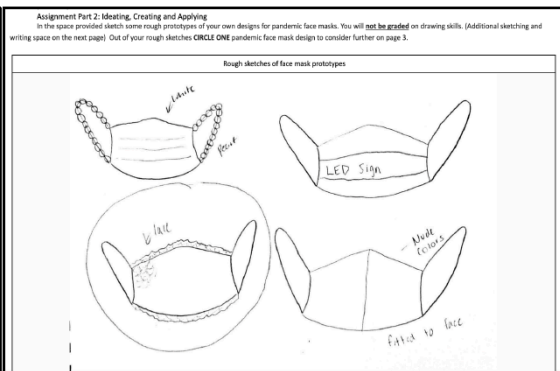
Participant: ARCIDm1a



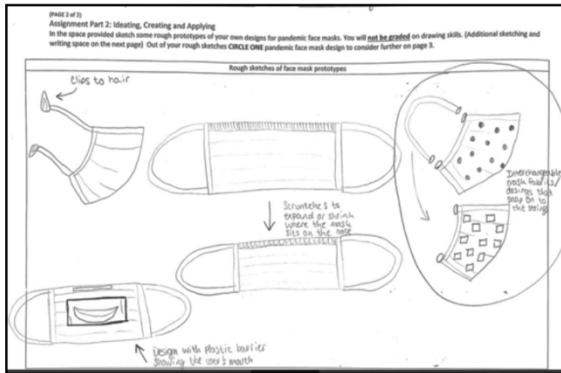
Participant: R4a



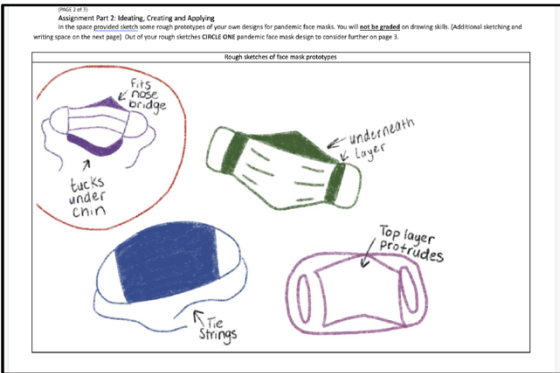
Participant: GD2d



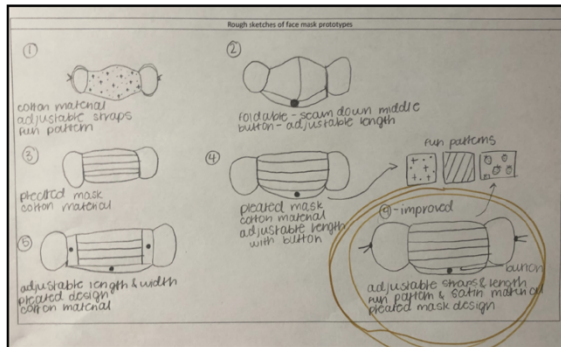
Participant: APD1b



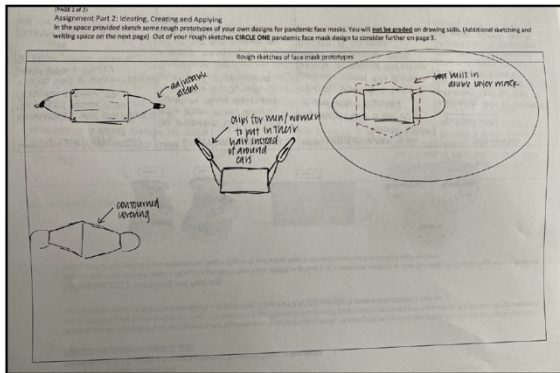
Participant: R3c



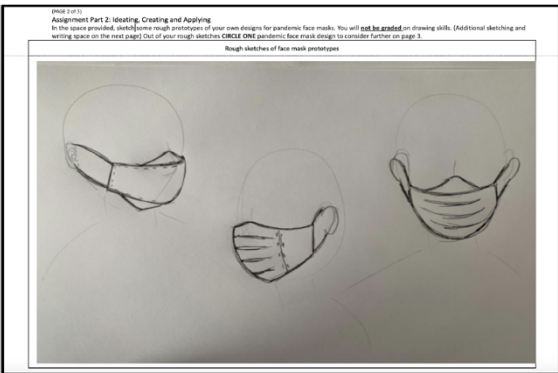
Participant: GD2c



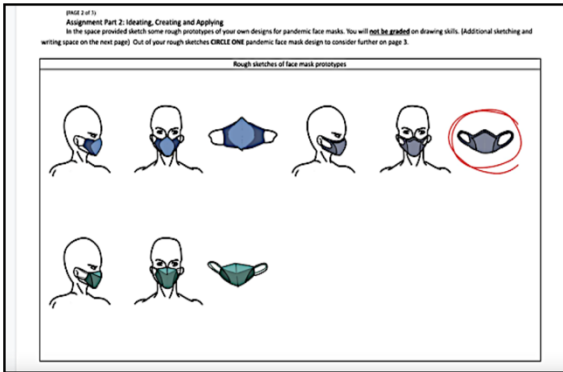
Participant: GD1u



Participant: iem4

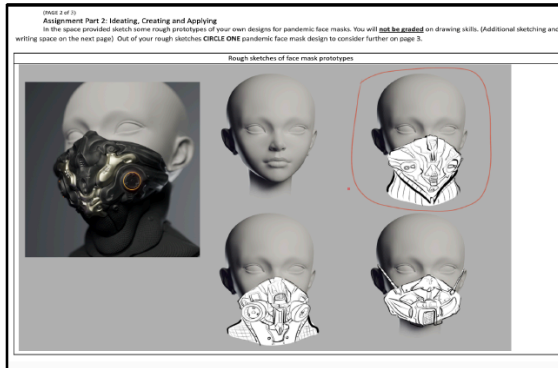


Participant: xdm3a

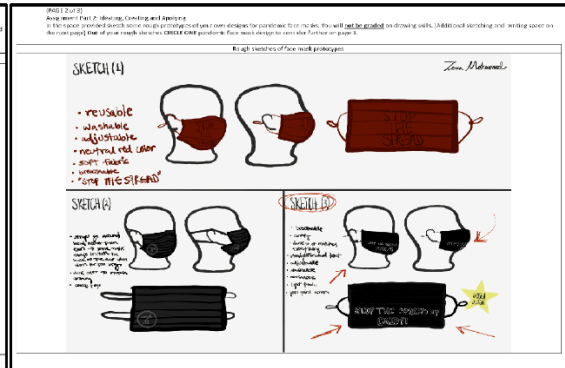


Participant: CLA3c

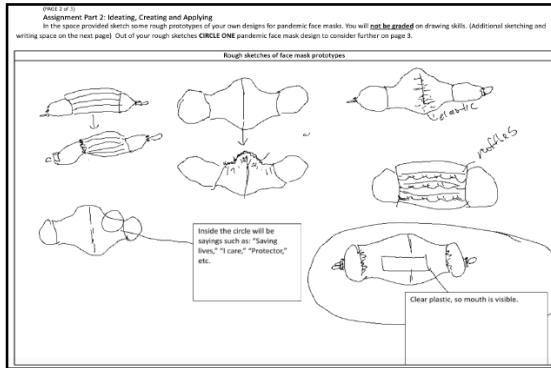
Figure 11: Examples of student designs with a prominent Reflective Level of Emotional Design



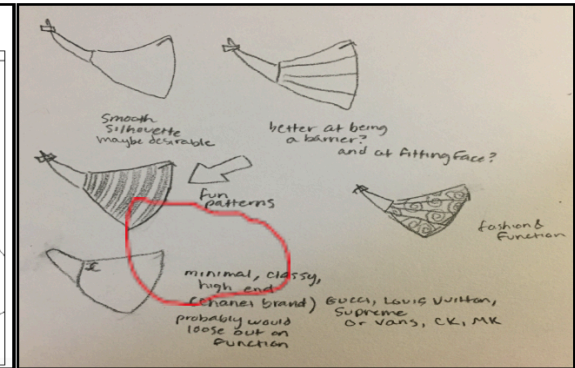
Participant GD1f



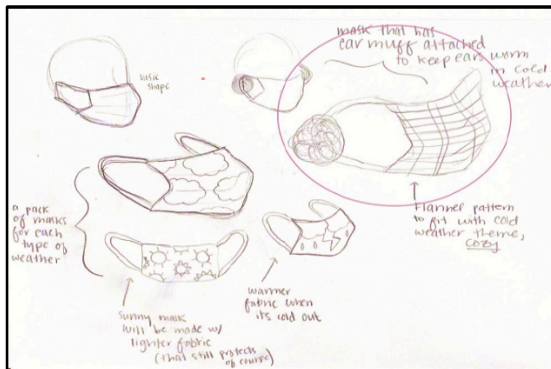
Participant GD1p



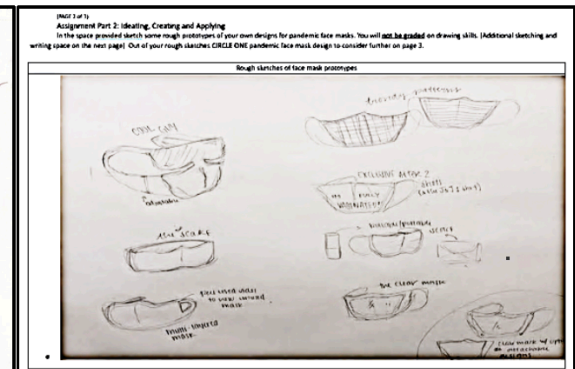
Participant: APD3b



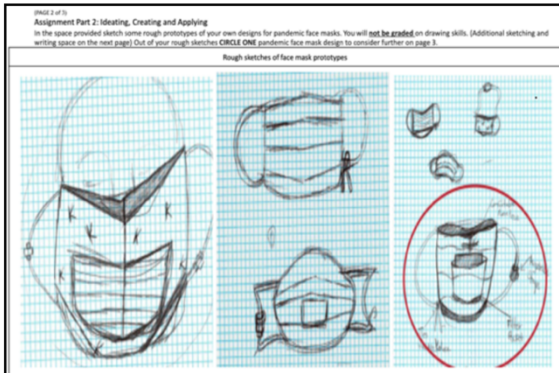
Participant: GD2c



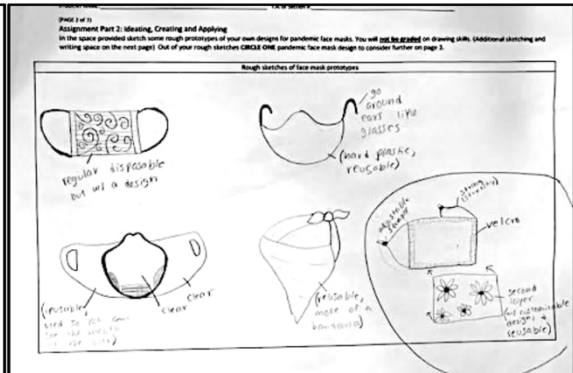
Participant: GD3d



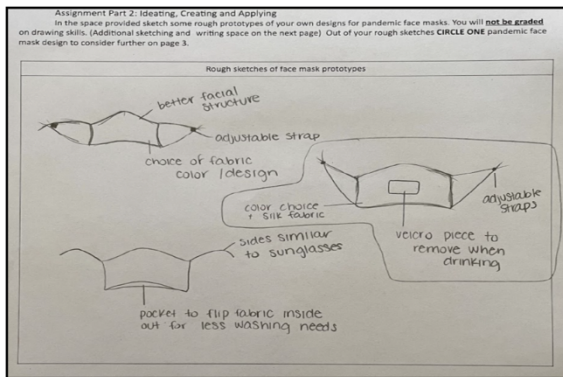
Participant: GD1g



Participant: GD2g



Participant: CLA2b



Participant: GD2a

Discussion:

In reviewing the drawing portions of Norman Exercise 2, Part 2, not every student sketched their rough prototypes with pencil (Liedtka & Ogilvie, 2011); some used a drawing application or a basic tablet tool. One student had no access to a scanner or another way to upload their sketches, so they used words to describe the features of their mask design in the form of bullet points. Two students chose to use photographs from sales literature of already existing manufactured pandemic face

mask designs stating they would design their masks like those pictured. Additionally, 4 students designed face masks that the CDC would deem unusable for preventing Covid-19 such as visors and balaclavas (CDC, 2021).

Although sketching is important and aids in creative exploration and innovative thinking (Zak, 2011), after evaluating these 7 exercises, the students were still given 5 points because they demonstrated conceptual understanding of the 3 levels of emotional design and applied them in writing to both the blue pandemic mask and their selected designs which was the primary purpose of the exercise.

PART VII: Norman Exercise 2, Part 2 Bridging through transfer

After sketching rough prototypes, the participants evaluate their designs according to the 3 levels of emotional design in writing on page three of the exercise (Figure 13). If used electronically the writing space could be increased.

STUDENT NAME: _____ T.A. or Section No. _____

(PAGE 3 of 3)
Assignment Part 2: Ideating, Creating and Applying
Below **WRITE** in at least 3 to 4 sentences an explanation of how your **selected design** represents each level of emotional design.

Level:	Level:	Level:

Use the extra space here for sketching or writing

Figure 13: Page three of the exercise

In the first column of the written section of Norman 2-Part 2, students transfer learning through bridging by using their knowledge of visceral design in the context of

the blue pandemic face mask and bridge it to designing their own face mask. The following are examples from students' writing about the Visceral level in their own mask designs:

APD1d:

“I believe my design solves the Visceral Function due to the high aesthetics of the mask. The mask would be catered towards women, but men could also wear it. The mask would have beautiful lace cover over the mask so it's attractive to the eye, and people look good wearing it”

ID2b:

“I chose the first sketched design of my face masks. I think something that really stands out about this mask is that you can change the design on the front without having to spend a lot of money on multiple face masks. The customer can pick multiple designs of their choosing so they can have a fun face mask every day.”

GD2e:

“This design is visually appealing due to the bright, saturated color. The physical features dominate with the unique shape of the bottom layer combined with the top layer. The tie string looks good and feels good in comparison to the original constricting ear band. The tie can also function as a hair accessory, further adding to its beauty and aesthetic sense. The texture of the materials is soft and comfortable.”

In the second column of the written section of Norman 2, Part 2, students bridge the knowledge of behavioral design from the context of the blue pandemic face

mask to designing their own face mask. The following are examples from students' writing about the Behavioral level in their own mask designs:

GD2k:

“(My) selected design represents the behavioral level because its function is fairly easy to understand. The securing portion of the mask is a peel and stick so it is easy to use. This helps accomplish the needs of people who complain about how the strings on masks pull on their ears. This would eliminate strings and the possibility of strings breaking when trying to use the mask.”

APD2c:

“The mask meets the expectations of the behavioral level because the design of the insets and implementation of toggles enhances the user experience. The inset design allows for better performance, as the user will not have to readjust the placement of their mask because the insets are curved to match the map of the human face. The toggles on the straps enhance the user's ability to have a form-fitting mask, and in turn, this increases the mask's ability to perform the basic function of protection better. Overall, my 3rd design gives the user control over both the functionality and personality of the product.”

CDES1u:

“This mask works for behavioral because the straps secure the mask tightly against the face and enables the consumer to comfortably move around. It is protective, there is a nose piece that is able to be bent like all blue single-use masks and the ear straps are sticky which means they can be taped to each

other at the desired length. The strongest point of this design was to be focused on the behavior and functionality because it's important for the mask to be protective but also breathable, moveable, and comfortable on the face."

In the third column of the written section of Norman 2, Part 2, students bridge the knowledge of Reflective design from the context of the blue pandemic face mask to designing their own face mask. The following are examples from students' writing about the Reflective level in their own mask designs:

APD1b:

"This is a futurist take on the mask. The mask has an organic, alien look not currently seen in normal masks. This type of mask is fashionable and can be worn by people who are inspired by the future. The design of this mask is mostly reflective. Some wearers of the mask may use it as a fashion statement."

R4b:

"The reflective design of my mask is that it holds the meaning of caring for others health other than oneself. While doing your best in protecting others, you can do it in a fashionable way! The message my mask sends is to wear a mask during a pandemic, it's not a political statement, it is simply an act of kindness."

GD1f:

"A mask like this would be priced very high as a sign of luxury and wealth. It can also be reflective of the user's interests of science fiction and high-tech. The

mask could also be paired up with various clothing or match a certain futuristic aesthetic.”

In Figure 14 a student takes the reader through their process of analyzing mask designs by level before selecting a face mask design for further analysis.

GDI:

(PAGE 2 of 3)
Assignment Part 2: Ideating, Creating and Applying
 In the space provided sketch some rough prototypes of your own designs for pandemic face masks. You will **not be graded** on drawing skills. (Additional sketching and writing space on the next page) Out of your rough sketches **CIRCLE ONE** pandemic face mask design to consider further on page 3.

Double Layer
Wire
Cotton

Bandana Pattern

Double Layer
Wire
Cotton

This mask shows durability in that it is double layered, made from effective material and has a wire going along the nose. It fulfills the behavioral needs but lacks a visual appeal and emotional meaning.

This mask has a pretty design fulfilling the visceral needs, but it shows no effort for functionality and durability. It does not meet the behavioral or reflective needs.

This mask (bandana) is visceral because it has a pretty design, it is also reflective as the bandana has meaning in different groups and cultures. The mask lacks behavioral level as it is typically thin and only secured with a knot.

This mask is visceral as it has a pretty design. It shows durability in that it is double layered, made from effective material and has a wire going along the nose.

Double Layer
Wire
Cotton

Stop the Spread with our new mask!
Clear Sealed Bag

This mask is visceral because it has a pretty, appealing design, it is behavioral because it is double layered, made from an effective fabric (cotton), and has a nose wire. It is reflective because it has meaning, as the packaging targets stopping the spread of the disease by using the mask. People may take this statement personally because their life has been changed in some way due to the virus and they want the spread to stop.
THIS IS MY PROTOTYPE THAT I WILL FURTHER CONSIDER.

Figure 14. Student level analysis in selecting a prototype

In the previous examples, students discussed their own designs whereby they demonstrated understanding in the ways designers' choices relate to each level of emotional design. In the following examples students wrote that they added features to masks to impact a particular level of emotional design, the Reflective level:

SPH4a:

"I decided to include the reflective level in my design since I didn't see it in the example. By adding "prevent the spread" on the front of the mask, people will know that the purpose of the mask is to prevent the spread of covid, or germs in general! It also shows that the meaning of the mask is to show the importance of wearing one."

CCPSa:

"I have noticed that when women wear masks in public, many have stopped wearing drop earrings because the earrings get caught in the elastic ear loops. The circled mask provides hanging baubles that would clip on and off the elastic as a substitute for earrings. The baubles could be colorful, long, or short and made of different beads or materials, just like earrings. They would clearly identify the user as someone who likes jewelry and/or who likes to dress up a bit, reflecting more about the wearer."

GD2j:

"The design I chose represents this (reflective) level of emotional design by presenting itself as an item of fashion in addition to being functional. Different scarf designs offer a wearer choice in how they wish to be perceived. They could choose a darker color to go with a dark outfit, or simply choose a

design because they think it reflects them well. Even whether or not they keep the scarf attached to the mask portion can give others a message as to what type of person they want to be seen as.”

Students also showed an understanding of the way one level of emotional design can modify another, in the following example a student writes about how changing the Behavioral level can alter the Reflective level:

APD2b:

“This mask would lose a bit of the reflective aspect of emotional design, simply because the loops go around the back of your head instead of being hidden behind your ears. The loops are more visible, and they limit some daily hairstyles because they have to be positioned over the hair. At the same time, it could be a benefit as people might decide they like seeing a more secure mask, and decide to use one, in spite of the loop visibility and hairstyle limitations.”

The structure of Norman Exercise 2, also walked students through a process by level of emotional design, the following is an example of a student working between the levels in a “Process of Fit” (Searle, 2005, Heylighen et al., 2009):

R3g:

Within the ideate stage of my design, I knew I wanted to increase the behavioral design portion of the face mask. I wanted to add an additional layer of protective fabric within the inside of the mask that has both the breathability

and sticks tighter to the face to avoid side air from coming through the mask as pictured in figure. Additionally, I wanted to improve the visceral design aspect of this face mask through adding a variety of prints and colors other than blue. This way customers can choose the face mask color or pattern that can best match their outfit for the day.

Within the creating stage of my design, I chose to sketch out numerous designs that went along with my improvement goals within the behavioral and visceral design levels of the face mask. I drew various designs for both the inside and outside of the mask. Adding different colors and patterns, showing the additional layers of fabrics, and even testing out the shape of the mask itself so it can better fit our faces.

From both the ideate and creating stages of the process, I selected a final design that met the improvement criteria of both the visceral and behavioral design levels of the face mask. The mask itself is more triangular-shaped, meant to specifically cup the nose and mouth better. As well, on the inside adding an additional layer of polyester-based cloth that can be used as an additional barrier to airborne germs. Lastly, by adding a striped pattern to the face mask from the original blue color, I added an additional incentive for a consumer when choosing to purchase a face mask.

Discussion:

“Processes of learning and transfer of learning are central to understanding how people develop important competencies,” (Brandsford, et. al., P. 51, 2000).

Transferring knowledge or skills from one task to another very similar task is known as low-road transfer (Perkins and Salomon, 1988). When students are just starting out, low-road transfer tasks such as the tasks required in completing Norman Exercise 2 can help students gain independence and confidence working with new conceptual frameworks. Furthermore, the Norman 2 Exercise required students to not only make a low road transfer of a conceptual framework, but it also required them to move between imagination and evaluation within the framework. For example, in sketching rough prototypes students conceptually moved from world to mind (imagination) and mind to world (evaluation) engaging in what is known as a “Process of fit” (Searle, 2005, Heylighen et al., 2009).

In the context of the 3 levels of emotional design, the visceral and reflective levels move students from world to mind using their imaginations in designing face masks and the behavioral level moves students from mind to world in evaluating their face mask designs. In this way the low road transfer also required a “Process of Fit”. The written portion of Norman Exercise, Part 2 required students to further transfer knowledge of the Norman conceptual framework to their mask designs in writing. The examples of students writing indicated transfer occurred between Part 1 and Part 2 of the exercise. When a transfer of skills learned in education is made, then it could be said that learning has occurred (Brandsford et. al, 2001).

PART VIII. Influence of prior face mask experiences on students’ mask designs

The previous figures and written examples show that students understood the conceptual framework of Norman’s 3 levels of Emotional Design in application to the

blue disposable face mask and their own mask designs. 147 (100 %) students responded to survey Q11 (Figure 5) and of the 126 who completed Norman Exercise 2, 102 (81%) addressed improving aspects of the behavioral level of face masks with their own designs. In the examples following (Table 10), students write about specific issues their designs solved which relate back to the issues they experienced with masks as indicated in responses to the Norman Exercise 1 Survey Question 11 (Figure 5).

Table 10 shows the number of students that designed face masks with features to specifically address the Q11 Behavioral level issues. This may suggest that prior experience with face masks based on their survey responses, contributed to students choosing to improve face masks as demonstrated in their writing about the behavioral level of emotional design in their own face mask sketches.

Students that designed face masks to address issues with attaching face masks: straps/loops	43	34%
Students that designed face masks to address issues in conjunction with wearing eyeglasses	14	11%
Students that designed face masks to address the issues with a proper seal in conjunction with mask shape	56	44%
Students that designed face masks to address issues related to communication: lip reading and facial expression	19	15%

Table 10: Face mask features addressed in students designs

The following examples are from the Norman Exercise 2, Part 2 in which students wrote about ways their own mask designs will solve issues that were included in the survey:

APD2b: writes about a design solution to mask slippage

“This mask is designed to go all the way over your nose, not just the bridge of it. Going all the way over your nose (as in up to under the eyes) would fix the frequent slipping, because the smaller width at the top of the mask would get stuck as it travels down your nose and stop slipping.

GD1c: writes about a prominent behavioral level solution to fogging glasses

“The main feature I wanted to incorporate with the mask I designed was to make a large piece that protrudes upward to cover the nose better. This would be really useful for people who wear glasses since most masks leave slips of air that allow the glasses to fog up really easily. Not only would this help people control the amount their glasses fog up, but it would also help prevent the spread of the virus due to the mask’s surface area. Overall, it would have a lot of utility that I don’t think you get in the standard mask.”

GD3b: writes about a prominent visceral level solution to fogging glasses

“Many glasses wearers struggle with wearing masks as it fogs up their glasses. People will see this mask design on the street and think to themselves “Wow, I need that. My glasses keep fogging up, this is great!” The mask and mask tape will be in the same exact print, that users can purchase from a list of colors/prints or upload/create their own design. This way the design is appealing and can be made into a fashion statement. “

GD1j: writes about enabling communication

“This design represents the Behavioral level of design because the mask is functional beyond the traditional use. Not only is it beneficial for the

user in terms of preventing germs from escaping, but it provides the ability to read lips for hard of hearing (HOH) or deaf members of the community to adhere to safety guidelines and not have as difficult of a time communicating. Masks that cover mouths can be ableist towards HOH or deaf people because if they do not have any type of hearing aid, eliminating the ability to see someone mouthing words takes away an element of their lives, making it harder for them to carry on normally, which is already hard enough for everyone as we have new standards for safety in place.”

GDly: writes about alleviating ear pain

“The padding makes it more comfortable to wear the mask for longer hours without having to adjust the ear loops as it won’t cause pain behind the ears. Three layers along with the face-fitting shape also makes the mask more functional as it can offer the required protection while also making it so the user doesn’t have to constantly move the mask to make sure it’s sitting correctly. The seam along the bridge of the nose makes sure the mask fits snugly across the nose and cheeks.”

Each of the Figures 15, 16, 17 corresponds to a level of emotional design; Q7 visceral, Q18 behavioral and Q30 reflective. Each example shows a survey respondent’s written answer to one of the 3 survey questions, an image of their face mask prototype sketches and written rationale based on Norman’s 3 Levels of Emotional Design.

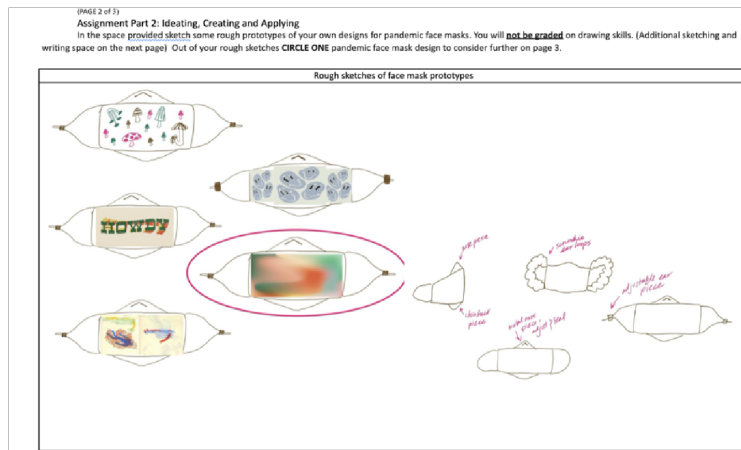
Figure 15 shows the survey questions and student R3d's survey response to Q7, and their completed Norman Exercise 2, Part 2.

6) As the pandemic continued did your reaction to wearing face masks change?

Yes
No

7) *If you answered NO to the previous question, please skip this question.*
If your reaction to wearing face masks changed, please describe how it changed

R3d: Survey Written Response
"I am comfortable wearing a face mask no matter what and I think they can be attractive because people can express themselves through designs/styles"



(PAGE 3 of 3)
 Assignment Part 2: Ideating, Creating and Applying
 Below **WRITE** in at least 3 to 4 sentences an explanation of how **your selected design** represents each level of emotional design.

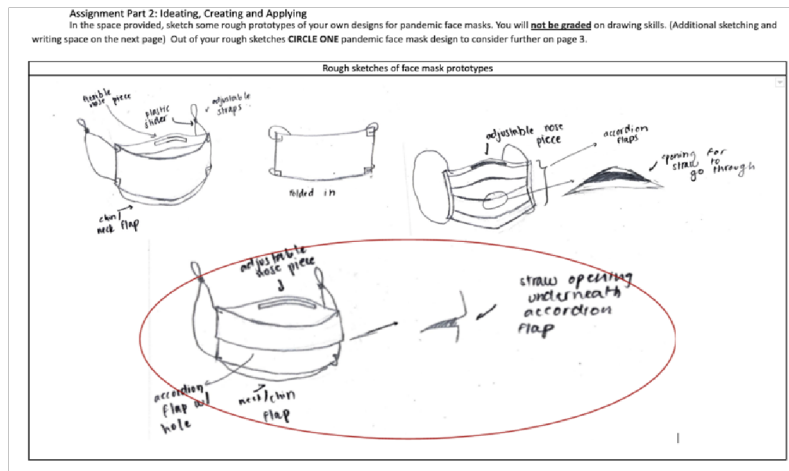
Level: Visceral	Level: Behavioral	Level: Reflective
<p>My mask design represents visceral design for multiple reasons. First, it can be used across the world since COVID-19 is relevant everywhere right now. Similarly, I chose the pattern that did not have any words or faces on it because I want the mask to relate to anyone. Additionally, my design provides an initial emotional response based on looking at it because the pattern on the facemask is aesthetically pleasing. Finally, the mask design also would touch on the topic of feeling because it would be comfortable since there is a dedicated nose piece and chin piece to comfortably cover your nose and mouth.</p>	<p>My mask design represents behavioral design in multiple ways. To start, the design focuses on performance by having a dedicated chin piece and a nose piece that also has an adjustable wire to sculpt to your nose. Having these dedicated pieces makes sure that the mask seals around your nose and mouth so your breath/germs stay within the mask and do not leak out. Finally, the mask is also functional because the ear loops are adjustable so as a user, you can adjust the mask to your desired fit and comfort.</p>	<p>My mask design represents reflective design because of its message in multiple perspectives. First, the mask itself sends a message because of its top tier performance, so a user is sending the message that they care about their own health as well as the wellbeing of others. Additionally, the mask allows you to send a message that you care about your self-image because the fun pattern can be used to spice up an outfit or show your personality.</p>

Figure 15. student response to Q7 and Norman Exercise 2, part 2

Figure 16 shows student gdm2's survey response and their completed Norman Exercise 2, Part 2.

SURVEY Q18- Please list any additional observation on face masks you have brought, made, or received as a gift.

gdm2: Survey Written Response
"I make sure that it fits my face shape well since I have a smaller face."



Assignment Part 2: Ideating, Creating and Applying
 Below **WRITE** in at least 3 to 4 sentences an explanation of how **your selected design** represents each level of emotional design.

Level: Visceral	Level: Behavioral	Level: Reflective
One feature of my mask that demonstrates this level of emotional design is the adjustable ear straps. When a mask doesn't fit around one's face, it causes the mask to look visually unappealing when worn. The straps solve this problem by allowing for a fitted look when the mask is worn. Additionally, the flap with the flexible nose piece being separated from the section of the mask with the accordion opening allows the mask to hug the shape of the user's face while allowing air in between the face and the mask. These features contribute to the overall look and aesthetic of the mask when worn.	How my design represents this level of emotional design is through the features in the mask that make it ergonomic and functional. For example, the adjustable ear straps allow the mask to be versatile for users with different head shapes and sizes. The opening underneath the accordion flap on the mask makes it easier for people to sip on drinks through a straw without having to pull down/remove the mask. These features on my design allow for the mask to be worn with ease as well as performing other tasks with ease.	My mask represents this level of emotional design since it addresses the culture of to-go drinking that we have. In many countries (except for Japan since people there tend to stand and drink rather than walk), people tend to carry their drink and sip on it while they are on the go. The straw hole in my mask allows people to sip through a straw with ease instead of having to pull down or take off their mask when they need to take a drink. Overall, my design was created with this behavioral and cultural pattern in mind.

Figure 16: student response to Q18 and Norman Exercise 2, part 2

Discussion

The examples of survey responses along with examples of students' work, suggest a relationship between students' prior face mask experiences and their application of the 3 levels of emotional design in the Norman Exercise 2 DESIGN C.U.E. The survey may also have served as a creative stimulus for the 126 students that designed face masks based on the 3 levels of emotional design. These students specifically addressed how their designs would solve the problems they experienced with other face masks. The desire to solve these problems, may have to do with the fact that 119 (96%) of students that designed their own mask wrote in survey Q31, that face masks will be part of the future, which as undergraduates is in their purview. In his handbook on teaching strategies, design educator John Bowers states that "If you are able to integrate students' existing experiences, interests, and knowledge into the coursework, they will feel more of a connection to the course," (Bowers, p. 23, 2020). This was the intended consequence when selecting pandemic face masks as a subject in which to teach students the conceptual framework of Dr. Donald Norman's 3 levels of Emotional Design.

Summary of learning outcomes

The purpose of this study was to explore how students taking this introductory design course can apply the conceptual framework of Dr. Donald Norman to a specific product—the pandemic face mask. To answer the research questions, the second version of Bloom's Taxonomy (Anderson and Krathwohl, 2001, pp.67-68) will be used in a relational (Fink 2003) rather than hierarchical framework along with the

previously discussed learning for transfer methods (Bransford et al, 2001). Each cognitive domain of Bloom's Taxonomy will be in shown in parentheses in bold lettering.

Research Questions:

Q1. Can student/participants apply the concept of emotional design to the design of pandemic face masks?

As suggested by the study results of evaluated student work and as shown in the examples provided, it can be said that students were able to apply the concept of emotional design through the following process (Figure 18). **(Remember)** Students were able to remember the definition of the 3 levels of emotional design.

(Understand) Students showed understanding when they identified the levels.

(Analyze) Students analyzed in writing whether 3 levels were present or not present in the blue disposable pandemic face mask. **(Apply)** Students showed they understood the levels when they applied them to the blue pandemic face mask and justified their choices. **(Evaluate)** Students evaluated all the levels in the blue pandemic face mask and selected which level was most prominent.

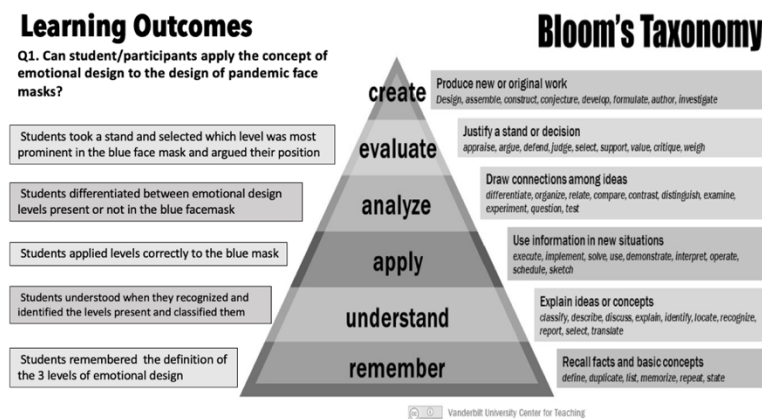


Figure 18: Q1 Learning outcomes applied to Version 2 of Bloom's Taxonomy (Anderson and Krathwohl, 2001)

Q2. How do student/participants incorporate emotional design theory into the design of pandemic face masks?

As suggested by the study results of evaluated student work and as shown in the examples provided, it can be considered that students were able to incorporate the concept of emotional design into their own face mask designs through the following processes of the cognitive domains of learning (Anderson and Krathwohl, 2001) (Figure 19). **(Evaluate)** In considering their own designs, students evaluated what was lacking in the blue pandemic face mask pertaining to the 3 levels of emotional design. **(Apply)** students demonstrated that they were able to apply what they knew in both writing and sketching. **(Create)** students created their own face mask designs by sketching rough prototypes. **(Remember)** In doing so they demonstrated that they remembered and understood the 3 levels of emotional design **(Understand)** and they analyzed their own designs **(Analyze)** in order to choose one mask design to **(Evaluate)** further in writing. Students also demonstrated conceptual understanding of Norman's 3 levels of Emotional Design by choosing to **(Create)** face masks with specific features to improve one or more of the 3 levels they deemed **(Evaluate)** as lacking in the disposable blue pandemic face mask.

Learning Outcomes

Q2. How do student/participants apply the concept of emotional design to the design of pandemic face masks?

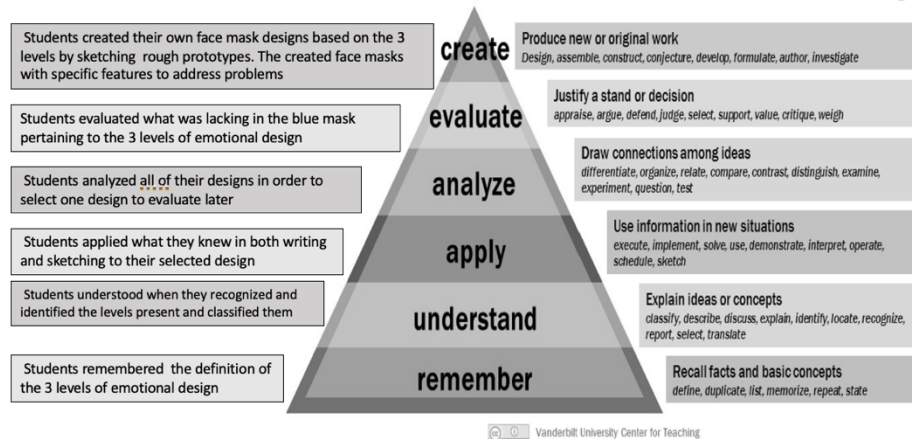


Figure 19: Q2 Learning outcomes applied to Version 2 of Bloom's Taxonomy (Anderson and Krathwohl, 2001)

The Norman Exercise 2 DESIGN C.U.E. enabled interaction between the Cognitive and Affective learning domains. The Affective domain refers to a category of behavioral and operational learning including motivation theories that examine students' motivation during the learning process (Bransford et al., 2001).

In terms of study participation, student motivation can be said to be above average intrinsically and extrinsically (Affective domain). Out of 150 class participants, 147 completed Norman Exercise 1, N=147 (100%) were extrinsically motivated to complete the survey. Accounting for the 8 (5.4%) that dropped the course, 139 (94.6) study participants remained that were available to complete the exercise of which 11 (7.5%) opted out. It can be suggested that of the remaining study participants, 128 (85.7%) were extrinsically motivated to complete the Norman Exercise 2 DESIGN C.U.E. to earn 5 class points of which 126 (98.4%) did.

From the efforts of 126 students, 405 face mask prototype images were the outcome. As mentioned previously, the exercise did not specify a required number of prototypes and it is not known if students received an email instructing them to sketch 2-3 rough prototypes. Table 9 shows 98 (77 %) students produced 3 or more face mask prototype designs and 38 (30%) produced 4 or more, which may suggest there was intrinsic motivation to complete the exercise. Norman Exercise 2 required reading a book chapter, viewing a TedTalk® and a class lecture in addition to completing the exercise which involved significantly more time and effort from students for the same number of class points as the Norman Exercise 1 (31) question survey, which further suggests students were intrinsically motivated to complete Exercise 2.

In counting sentences, it was found that 48 (38%) participants exceeded the writing requirements of 3-4 sentences, by writing 5 or more sentences in all columns of the exercise, which may suggest participants were intrinsically motivated. The intrinsic and extrinsic motivation data may also suggest student interest in the subject matter (Bowers, 2020). Students may have also believed in the importance of pandemic face masks as a research subject and therefore may have been intrinsically motivated to take part in the study (Huitt 2011, Kashef & Savic, 2013).

Two evaluators graded each of the Norman Exercise 2 submitted by students. Based on the number of students earning 5 points for completing Norman Exercise 2, data suggests the following:

- 126 (98.4%) of 128 Students/participants satisfactorily applied new material (Norman's 3 levels of emotional design) to an existing form; the pandemic face mask (Cognitive, Relational).

- Applying Norman's 3 levels of emotional design, 126 (98.4%) of the students synthesized information to create new forms (Cognitive, Relational).
- 126 (98.4%) participants demonstrated reflective (metacognitive) thinking, while writing on the meaning of face masks in the context of the reflective level of Norman's framework (Affective Domain).

The students integrated visceral, behavioral, and reflective levels of emotional design into their face mask designs in creating rough sketch prototypes (Cognitive and Affective).

It may also be considered that the Affective domain in student learning motivation may have been impacted overall since learning the 3 levels of emotional design in the context of pandemic face masks took place during an active Covid-19 pandemic.

Chapter V

CONCLUSION

The results from the 2013 National Institutes for Learning Outcomes (NILOA) national survey indicate that provosts believe that some of the most valuable and useful classroom-based assessments take the form of well-designed assignments (Kuh, et al., 2014). In an article for *Change: The Magazine of Higher Learning*, entitled “Designing effective classroom assignments,” the authors Hutchings, Jankowski and Schultz, believe that:

The design of assignments is one of the most creative and consequential tasks that faculty undertake in their work as teachers, calling on their knowledge of the field, their understanding of how students learn and the kinds of tasks that help strengthen that learning while providing evidence of it. But such work is often invisible and insufficiently supported.

(Hutchings, et al, 2016, p.1).

The teaching strategy used in this study along with the Norman Exercise 2 DESIGN C.U.E. was made visible as well as its assessment to be of service to design education.

The study was undertaken in keeping with the work of educators (Dewey, 1934; Tillander, 2011) and instructional designers (Bowers, 2020) that suggest successful teaching strategies use students’ prior experiences, knowledge, and interests. Based on the findings presented, the study was constructive in the use of

pandemic face masks to teach students Norman's 3 Levels of Emotional Design. In analyzing the data in terms of learning outcomes and assessment design, the data suggests learning occurred when evaluating the effectiveness of the Norman Exercise 2 Design C.U.E. against Blooms Taxonomy (Bloom, 1954, Anderson and Krathwohl, 2001) Based on the assessment of the six class instructors, students understood Norman's conceptual framework, they were able to transfer learning from the NFL headset case study to the blue disposable pandemic face mask design and subsequently transfer learning through bridging to their own face mask designs. This lends support to the idea that the Norman 2 DESIGN C.U.E. was a useful exercise in teaching Norman's 3 Levels of Emotional Design to novice design students, and that it also may have contributed to the development of successful learners who will create connections between theory and practice to develop the required ability to handle complex challenges of real-life situations (Hung, 2013).

Implications for Future Studies

Future studies could include interviewing students regarding the emotional levels of their own design to gain additional insights. In an essay on jnd.org, Norman writes that people can also be classified along the 3 levels of emotional design, "visceral people will be strongly biased toward appearance, behavioral people towards function, usability, and how much they feel in control during use. Reflective level people are heavily biased by brand name, by prestige, and by the value a product brings to their self-image" Norman 2018, p.1) an assignment could be created to help students understand what level they align with which in turn may help them to

understand their own biases in designs which may lead to better user-centered designs. A post assignment exercise conducted as a follow-up assessment would be useful in evaluating retention of the conceptual framework. The assignment could also involve a transfer for learning through bridging in a third context. Teams of three collaborators each assigned with one of the 3 levels of Emotional Design could co-design face masks or another artifact answering the question: How could this design make someone happy? Using the DESIGN C.U.E and a user Persona each team member designs for a different level and in 3 rounds designers rotate through the levels to learn how individual choices can change each level as they design for a different user each round. In the case of face masks, questions could be proposed such as how might this face mask be designed to make people happy so they will keep them and use them for another purpose, such as cold and flu prevention or face warmth in cold weather. Could a pandemic facemask be so amazing that the owner would not want to part with even after the pandemic subsided? Could face masks or other functional health care artifacts be designed based on the 3 levels of emotional design to influence mask wearing or device use compliance?

This study did not measure creativity in participants face mask designs; however, the data provided by the mask designs participants submitted could lead to further research using the Taxonomy of Creative Design (Nilsson, 2011) in conjunction with Norman's 3-levels of design as the design requirements criteria model. The data obtained from the survey results could also contribute to consumer-focused research in relation to pandemic face mask use among college students.

Personal Reflection

The Covid 19 pandemic is still a part of daily life in June 2021. Pandemic face masks have made deep impressions on the college students in this study as evidenced in their writing and in sharing their experiences with face masks in their survey responses. At the beginning of the study, survey question 31 asked 147 students, “*What do you think the purpose for face masks will be in the future?*” 133 (90%) of the students wrote that face masks will still be used for other purposes after Covid-19 is no longer a threat. The following example is one student’s response to the question:

What do you think the purpose for face masks will be in the future?

GDIw:

I've thought about this a lot, and this is something I've also talked with my friends about quite a bit. In the beginning of this pandemic, I thought that everybody would toss their face masks once coronavirus was gone, but now my opinion has changed drastically. I think that people will wear face masks when they have a cold/mild illness but still have to go in public/work/etc, especially when it's flu season. I would definitely do that. It's weird to think that I used to go to school when I had a cold and that I sat next to people in class who coughed the whole time. Since we live in a country that doesn't offer much financial support or sick days to the people who need it, employees will have to go to work even if they don't feel well so they can pay for themselves and their families. Face masks are great for this reason because even if someone still has to go to work when they're sick, they can wear a mask as a preventative measure. I think face masks will stick around for quite a long time,

and they'll still be normal after a majority of the world's population is vaccinated.

As for me, I do think I will wear a face mask at times for similar reasons as this student, but whatever face mask I wear, all 3 levels of its emotional design will be spectacular.

K. E. Rajcic

June 2021

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APPENDIX

Appendix A: Syllabus Introduction to Design Thinking



Abridged Syllabus

DES 1101w: Introduction to Design Thinking (4 credits)

Spring Semester 2021

Meets University of Minnesota CLE requirements for the Arts/Humanities Core in
Humanistic Studies & Writing Intensive

University of Minnesota Department of Design, Housing and Apparel
(240 McNeal Hall, St. Paul Campus; 612/624-9700)

Instructor Information

Pat Hemmis Senior Lecturer
phemmis@umn.edu

Online Spring 2021

Office Hours:

I have 10 openings each week for 30-minute Office Hour appointments
Weekly Office Hour List is posted on our course Canvas site with sign-up instructions
and by appointment

Class Information

Lectures are Online and Asynchronous

Lectures, Assignments, etc. will be posted each week

Discussion Sections are Online and Synchronous

Discussion Sections: Days, locations, and times vary by section
Attendance is mandatory

There is no final exam in DES 1101w

Design thinking is a humanistic endeavor:

Design is a profoundly human endeavor. At its best, design thinking and practice allows humans to, in the words of Herbert Simon: “Change existing situations to preferred ones.” Designers work within the need for action, yet operate in a world of constraints. In the words of Tim Brown, author and president of IDEO, a renowned product design firm, “designers strive to achieve a harmonious balance between human desire, technological feasibility and economic viability.”

Design has become a powerful force in the 21st century. On the one hand, design methods

and processes are seen as an important means of tackling complex social and cultural problems. On the other hand, designers stimulate desire and need through their manipulation of the form and function of places and objects. Designers are asked to re-think and re-shape processes as well as products. In fact, the scope of design production has expanded to include the design of interactions, services, and experiences. More than ever, designers are called upon to place human needs at the center of their design engagement. As a result, design thinking has become a powerful tool to address issues such as sustainability and social justice, at both a macro and micro level.

Design solutions invariably lead to new design problems. Design thinking includes tools for critical assessments of design failures as well as successes. Too often in the past, design expertise has been focused upon the needs and desires of a small, elite portion of the population. Problems, where design intervention could be of enormous value, have been ignored. In some cases, design outcomes have had unexamined consequences. More recently, design practitioners, theorists, historians and critics are raising provocative questions and providing a more rigorous, critical examination of the ethical implications of design production, methods and processes.

Understanding the scope and depth of current design thinking can provide unique and sometimes profound insight into the current relationship between humans and their built environment.

Course Description:

This course is an introduction to the processes, theories and methods that underpin design thinking and practice. DES 1101w is divided into three segments: The design process, design theories, and the socio-cultural implications of design. Students investigate the interactions between humans and their natural, social, and designed environments where purposeful design helps determine the quality of those interactions. Students will learn how design outcomes, whether successes or failures, shape and are shaped by socio/cultural and historical factors. Students of design thinking will learn to critically assess the processes, and outcomes of design engagement. During the course, students will have opportunities to test

and explore the concepts of design thinking through small-group, hands-on participation in design projects, specifically created to reinforce course content.

Throughout the course, students will:

- Engage in detailed analysis of and critical thinking about current design production across many design disciplines.
- Engage the “big ideas” that are shaping design thinking today through critical assessment and hands-on discovery.
- Develop the ability to observe, describe, analyze and interpret visual and spatial design production.
- Examine the role that design production and design thinking plays in shaping the larger society and culture of which it is part.
- Develop understanding of the ways in which design solutions are reflective of socio/culture values.

Audience:

This course is intended for undergraduate students interested in learning how design thinking and design processes can be used as catalysts for exploration, innovation and research.

Rationale:

This course exposes students to many facets of design thinking and provides them with an interdisciplinary perspective about design and human behavior. DES 1101w offers the opportunity to raise awareness about the value and the power of design thinking in our culture.

Course Objectives:

By the end of the semester, students will be able to:

- Develop an understanding of the interactions and interdependencies between humans and the designed environment.
- Understand that design provides a communication through forms in which cultural meanings are made manifest.
- Understand that, in addition to the creation of innovative objects and places, design thinking can be applied to the development of new processes, services, interactions, and collaborations.
- Discuss the formal constructs of design across the discipline and among specializations using the verbal and visual vocabulary of design.
- Explain design theories and processes that guide and direct design thinking.
- Recognize the interdisciplinary practice of various design professions and the value of design thinking as a means of innovative problem solving across disciplines.
- Achieve a lifetime awareness of the ethical and social responsibilities in the practice of design.

Student Learning Outcomes:

1. *Students will learn how designers identify, define and solve problems.*

This course has a cohort of lectures that explain the concept of design thinking, and analyzes multiple design process models. In the first segment of the course, students watch a video of a product design firm engaged in utilizing a design process to re-design an everyday object.

Students are then asked to analyze a designed object that they consider to be flawed. In this assignment, they must focus on identifying and analyzing the design problems, and propose a design solution. In addition, students in DES 1101w engage in two small-group, collaborative, design integration projects, where they identify, define and solve design problems. Both collaborative projects require the students to place humans at the center of their design solutions through their research as well as their solutions. In the first project, students are required to design a disposable coffee cup using one of the design process models analyzed in the course. In addition to proposing solutions, students must demonstrate an understanding of the design process itself. In the second small-group design integration project, students are required to propose the redesign of a space using the lenses of two design-related theories to develop their solution

2. *Learning Outcome: Students can identify, define, and solve design-related problems.*

- Method of assessment: The first Student Learning Outcome is assessed through completion of two design integration team projects, the first written assignment, and one exam.

How DES 1101w fulfills the Arts and Humanities Core requirements in Humanistic Studies:

A liberal education prepares students to think critically and ethically about the world from a variety of perspectives and approaches. These understandings will enrich student life, prepare students for roles beyond college, and help students become more thoughtful and perceptive members of their communities. DES 1101w: Introduction to Design Thinking fulfills the University of Minnesota's Arts and Humanities Core requirements in Humanistic Studies. These core requirements reflect upon the human condition. Students taking DES 1101w will discover and learn from our distinctive human capacities and achievements, as well as our human limitations and failures. Through reflection and analysis of the processes and products of design, students will develop an understanding of design thinking as a profound example of humanistic enterprises.

Students taking DES 1101w will investigate the interactions between humans and their natural, social, and designed environments where purposeful design helps determine the quality of those interactions. Listed below are the criteria for fulfillment of the Arts and Humanities Core in Humanistic Studies. Each criterion is met by the assignments and course content of DES 1101w: Introduction to Design

Thinking.

1. Students engage in detailed analysis of and reflection on some humanistic literature or creative product – for example, a philosophical essay, a religious treatise, a work of cultural commentary, or a documentary film.
 - In DES 1101w, Introduction to Design Thinking, students will engage in detailed analysis of and critical thinking about design production across many design disciplines.
 - Methods of Assessment: Students analyze designed objects and places through lectures that include class discussion. In addition, students analyze designed objects and places in three written assignments, each from a different perspective.

In lecture, students are introduced to several case studies of design solutions: one example is an exploration of innovative design solution for housing across the globe. Students critically engage and analyze several readings, talks by designers, and films on the topic of design thinking from a variety of viewpoints. In addition, students analyze examples of design production in the context of designer responsibility and ethics. For example, during lecture, students are given a selection of real-world problems that young designers may encounter as they begin their professional careers and are asked to propose solutions.

2. Students develop their understanding of the works or cultural practices they consider. Where appropriate (for example, in considering a philosophical work) they engage in critical evaluation of the work.
 - In DES 1101w: Introduction to Design Thinking, students will develop the ability to observe, describe, analyze and interpret visual and spatial design production. In addition, students will engage the “big ideas” that are shaping design thinking today through critical assessment and hands-on discovery.
 - Methods of Assessment: Students prepare their second written assignment by visiting the

McNamara Alumni Center and conducting a visual analysis of the lobby area. In this assignment, students must analyze the relation between the aesthetic, symbolic and utilitarian function of the Alumni Center. Students will then critically analyze how these functions convey meanings and reinforce agendas.

3. Students examine how the work under consideration arose out of its cultural or historical context.
 - In DES 1101w: Introduction to Design Thinking, students will examine how designed solutions and practices arose out of cultural or

historical contexts.

- **Methods of Assessment:** Students examine the cultural and historical context of designed objects and places through lectures that include class discussion. In addition, students engage this material in the first paper when they analyze the ways their “flawed object” reflects the society and culture that produced it. These issues are also addressed on the third exam.

Students will learn how design outcomes, whether successes or failures, shape and are shaped by socio/cultural and historical factors. These criteria will be explored throughout the course, through lectures, talks, guest speakers and readings. For example, students will listen to a talk by Cameron Sinclair, founder of Architecture for Humanity, where he shows how design solutions created to respond to catastrophic events must first respect the culture of the victims and the results when they don't.

4. The course explores the role that the work plays in the larger society of which it is a part.
 - Students in DES 1101w: Introduction to Design Thinking will develop understanding of the ways in which design solutions are reflective of socio/culture values.
 - **Methods of Assessment:** Students examine the ways in which design solutions are reflective of socio/culture values through lectures that include class discussion. In addition, students engage this material in a hands-on manner, through the two design integration projects of the course. These issues are also addressed on the third exam of the course.

Throughout the course, students develop an understanding of the ways in which design solutions are reflective of socio/cultural values. Several examples from the course address the way that changing socio/cultural values towards sustainability are shaping design solutions and processes, and vice versa. Students are presented with a case study of Interface Carpet, where president, Ray Anderson recounts his company's reorganization to close the loops on wasteful, ecologically unsound practices. He points out that, by becoming sustainable, his company has grown, become more financially solid, and has survived economic downturns. Students also listen to a talk by Janine Benyus, on the topic of “biomimicry.” Biomimicry is a means of looking to the natural world for innovative design solutions based in the behaviors of animals and plants.

Students are encouraged to look for sustainable solutions for their two design integration projects. These projects are small-team, collaborative, and hands-on design problem solving projects. Students are able to engage and test out the ideas from the course by creating their own design solutions.

DES 1101w is a Writing-Intensive (WI) course:

Designers must be able to communicate effectively. Writing is often a catalyst for creative problem solving. Written communication is crucial to design thinking. Because designers work collaboratively, within a system of constraints, the ability to communicate effectively with clients, manufacturers, and users is critical. In DES 1101w: Introduction to Design Thinking, students must demonstrate their ability to describe, analyze and interpret the designed environment through three written assignments. The first assignment includes a mandatory draft. Students are encouraged to submit drafts of subsequent papers.

The theme of the first paper is an analysis of an object, that the student considers to be flawed. In addition to providing a rich description of the object, and proposing a solution to the flaw, students examine how the object reflects the society/culture that produced it. In the second paper, students articulate their personal response to a place they consider to be memorable. This place is then analyzed through the lens of two design-related theories. Each theory focuses on some aspect of the relationship between humans and their designed environment.

In addition to the two papers, students create two presentations relating to their collaborative design assignments. Papers written for DES 1101w use the style guidelines of the American Psychological Association or APA style. The nuances of the style are learned incrementally over the semester.

Readings, Lecture Notes, Assignments, and Handouts:

All course materials will be posted to the DES 1101w course Canvas site. Typically, two lectures, readings and videos will be posted to Canvas every week. This portion of the course is online and asynchronous, so you can study each week's materials anytime during the week.

Abridged Here

Assignments and Point Distribution, 175 total points

Written Assignments:	45 points total
Design Evaluation Paper	20 points
Memorable Place Paper	25 points
Small Exercises	10 points total
Norman Exercise 1	5 points
Norman Exercise 2	5 points
Exams:	60 points total
Exam 1- Segment 1: The Design Process	20 points
Exam 2- Segment 2: Design Theories	20 points
Exam 3- Segment 3: Socio-Cultural Aspects of Design	20 points

Design Integration Team Projects:

Project 1: "Make it Better"
 Project 2: "Design and Theory"

60 points total

30 points

30 points

Grading Scale:

At the end of the term, points for each assignment will be added together and a letter grade will be assigned based on a percentage of the whole as shown on the scale below. Please be reminded that a grade of "C" designates average work. Only if your work is above average can a grade better than a "C" be earned. The general criteria for grading is posted on the course Canvas site. Every paper and project has a rubric that explains the grading criteria. Your TA will give comments on your work.

Students are sometimes concerned about equity among sections. As a teaching team, we want you to know that we review each assignment and compare grades across the sections, checking for consistency. At the end of the course, we again compare and adjust slightly if needed.

Total Points	Percentage	Grade	U of M Description of Letter Grade
185 - 200	93-100	A	Represents achievement that is outstanding relative to the level necessary to meet course requirements
179 - 184	90-92	A-	
173 - 178	87-89	B+	Represents achievement that is significantly above the level necessary to meet course requirements
165 - 172	83-86	B	
159 - 164	80-82	B-	
153 - 158	77-79	C+	Represents achievement that meets course requirements in every respect
145 - 152	73-76	C	
140 - 144	70-72	C-	
133 - 139	67-69	D+	Represents achievement that is worthy of credit even though it fails to meet fully the course requirements
119 - 132	60-66	D	
0 - 118	0-59	F	Represents failure and signifies that the work was completed but at a level not worthy of credit

Abridged Here

Required Readings

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- Martin, R. (2009). *The design of business: Why design thinking is the next competitive advantage* (pp. 57-78). Boston, MA: Harvard Business Press.

- McArthur, J. (2016). *Digital proxemics: How technology shapes the ways we move* (pp. 1-31; 171-174). New York: Peter Lang Media and Communications, Inc.
- McDonough, W., & Braungart, M. (2002). *Cradle to cradle: Remaking the way we make things* (pp. 3-16; 92-117). New York, NY: North Point Press.
- Morgan, J., & Welton, P. (1986). *Process of communication. See what I mean?* (pp. 1-11). New York, NY: Hodder & Stoughton.
- Norman, D. (2004). *Emotional design: Why we love (or hate) everyday things* (pp. 62-95). New York, NY: Basic Books.
- Richmond, W. (2014, July/August). Physical, digital or ephemeral: Your choice. *Communication Arts*. Retrieved from <http://www.commarts.com/columns/Design-Culture/your-choice.html>
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- Shirky, C. (2010). *Cognitive surplus: How technology makes consumers into collaborators* (pp. 1-34). New York, NY: The Penguin Press.
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Talks, Films and Video Presentations

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- Bai, Z. (Posted 12/09). TEDTalks. Zubaida Bai: A simple birth kit for mothers in the developing world. Retrieve from https://www.ted.com/talks/zubaida_bai_a_simple_birth_kit_for_mothers_in_the_developing_world
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- Shirky, C. (Posted 6/2009). TEDTalks. How social media can make history. Retrieved from <http://www.ted.com/talks>



DES 1101w Overall Course Schedule for Spring 21, Subject to Change

A detailed week by week schedule with assigned readings and videos is posted on the Canvas website.

Note: All Assignments and Exams must be submitted by 11:59 pm on their due dates

Course Segment	Week	Date	Lecture	Recitation
Segment I: The Design Process	1	Jan 18-22	<i>Flawed Object Assign Introduced</i> Introduction	Presentation of "Flawed Object" special assignment
	2	Jan 25-29	<i>Written Assignment #1 introduced</i> <i>Make It Better Team Project Introduced</i> Design Thinking Lecture	Introduction to Team Project I: "Make it Better" Team Project work time
			Design Process Models Lecture	
	3	Feb 1-5	DUE: Required Draft of Written Assignment #1 Draft must be posted by Friday, 2/5 by 11:59pm Design Process Lecture	Team Project work time
			Design Truths Lecture Design Tools: Associative Maps, Category Maps, Personas, and Interviewing	
	4	Feb 8-12	<i>Exam I Review posted</i> Personas and Visual Briefs Lecture Creativity and Design Innovation (Barry Kudrowitz lecture)	Team Project work time
			Prototyping	
	5	Feb 15-19	EXAM I opens on Wed pm. 2/17 <i>Drafts of Assignment #1 returned</i> No lectures due to Exam I	Team Project work time
	6	Feb 22-26	DUE: EXAM I Exam must be posted by 11:59pm on Monday, 2/22 DUE: Written Assign I Written Assignment I must be posted by 11:59pm on Friday, 2/26 <i>Drafts of Assignment #1 returned</i> Norman's Three Levels of Design Lecture	Team Presentations, Teams 1 & 2
			Masks Lecture by Kara Rajcic Norman Exercise 2	

Segment 2: Design Theories and Frameworks	7	March 1-5	<i>Written Assignment #2 introduced</i> Proxemics Theory Lecture	Team Presentations, Teams 3 & 4
			Cultural Symbolism and Place Attachment Theory Lecture	
	8	March 8-12	Place Attachment Theory Lecture	Team Presentations Team 5 & 6
			Communications Theories Lecture	
	9	March 15-19	<i>Exam 2 Review posted</i> Biomimicry Theory Lecture	Team Project 2: Design and Theory Introduced Team Project work time
			Biophilic Design Lecture	
10	March 22-26	EXAM 2 opens Wednesday, 3/24 <i>No lectures due to exam.</i>	Team Project work time	
11	March 29 - April 2	DUE: EXAM 2 Exam due by 11:59pm on Monday, 3/29 Extra team project work time, no lectures.	Team Project work time	
Segment 3: Socio- Cultural Issues of Design	12	April 5-9	SPRING BREAK	SPRING BREAK
	13	April 12-16	DUE Written Assignment 2 Assignment due by Wednesday, 4/14 by 11:59pm Sustainability Lecture	Team Project work time
			Public Interest Design Lecture	
	14	April 19-23	Assistive Design, Designing for Special Needs Lecture	Team Presentations Teams 1, 2, & 3
			Universal Design Lecture	
15	April 26-30	EXAM 3 opens Wednesday, 4/28 Design in Minnesota-Final Lecture	Team Presentations Teams 4, 5, & 6	
	May 3	DUE: EXAM 3 Exam due by Monday, 5/3 by 11:59pm		

Appendix B: Norman Exercise 2 DESIGN C.U.E. (Conceptual Understanding Evaluation)

STUDENT NAME: _____ T.A. or Section #: _____

PAGE 1 of 3
Introduction to Design Thinking 1101
Special Assignment 2: Applying Norman's 3 Levels of Emotional Design to face masks
DUE: 11:59pm on Sunday, March 14, 2021

Recently, you participated in a survey regarding your experiences with pandemic face masks. You watched an asynchronous online class lecture and read a case study which introduced you to Don Norman's 3 levels of Emotional Design. The exercise below will assess your understanding and application of Emotional Design present in a pandemic facemask. Satisfactory completion of both Part 1 and Part 2 of this exercise is required to receive 5 points.

Assignment Part 1: Identifying and Applying
Figures 1-3) show different views of the same pandemic face mask. WRITE in at least 3 to 4 sentences, explaining: How the design of the face mask **does** or **does not** reflect each of Norman's 3 levels of Emotional Design (Figure 4) and **which level is the most prominent** in the face mask and why.

Level:	Level:	Level:	Most prominent

STUDENT NAME: _____ T.A. or Section #: _____

PAGE 2 of 3
Assignment Part 2: Ideating, Creating and Applying
In the space provided sketch some rough prototypes of your own designs for pandemic face masks. You will **not** be graded on drawing skills. (Additional sketching and writing space on the next page) Out of your rough sketches **CIRCLE ONE** pandemic face mask design to consider further on page 3.

Rough sketches of face mask prototypes


PAGE 3 of 3
Assignment Part 2: Ideating, Creating and Applying
Below WRITE in at least 3 to 4 sentences an explanation of how **your selected design** represents each level of emotional design.

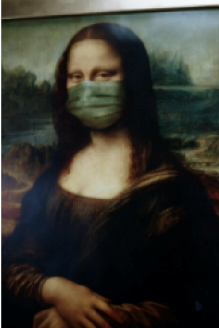
Level:	Level:	Level:

Use the extra space here for sketching or writing

Appendix C: Norman Exercise 1: Face Mask Experience Survey

Norman Exercise 1: Survey Questions

Covid-19 Pandemic Face Mask Survey




This survey is part of your Design Thinking 1101 class assignment.

Please complete the survey and include your name and section number to receive course credit for this assignment. The name is used only to ensure you receive course credit for having taken the survey.

INTRODUCTION
The focus of this survey is your personal experience with face masks. Your individual responses and any personal information will be kept strictly confidential.

Begin

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1) Full Name & Section Number

2) What was your initial reaction when you first saw people wearing face masks at the very beginning of the pandemic?

	Discomfort								Comfort
Reaction:	1	2	3	4	5	6	7	8	9

3) At the beginning of the pandemic, what is closest to your initial reaction to seeing people wearing face masks?

	Unattractive				Attractive				
Reaction:	1	2	3	4	5	6	7	8	9

4) Please indicate your initial level of comfort when you first *saw yourself* wearing a face mask at the beginning of the pandemic

	Discomfort								Comfort
Reaction:	1	2	3	4	5	6	7	8	9

5) At the beginning of the pandemic, what was closest to your initial reaction to *seeing yourself* in a face mask?

	Unattractive								Attractive
Reaction:	1	2	3	4	5	6	7	8	9

6) As the pandemic continued did your reaction to wearing face masks change? Yes No

7) *If you answered NO to the previous question, please skip this question.* If your reaction to wearing face masks changed, please describe how it changed

8) When do you wear a face mask?

	Not A : All								All the time
	1	2	3	4	5	6	7	8	9
In public situations									
When you're closer than 6 feet to another person									
Only when mandated by the state inside public buildings									
When outside in public spaces									
With family members you see frequently									
With family members older than you									
With friends you see often									
When exercising outside									
You wear a face mask as little as possible									

9) How often do you wear disposable or washable fabric face masks?

- 100% disposable
- 100% washable fabric masks
- Some of both

10) How important are the following reasons for selecting face masks to wear?

	Not Important								Important
	1	2	3	4	5	6	7	8	9
Environmental concerns									
How the face mask looks on you									
How the face mask feels when worn									

How the face mask fits your face									
The way the face protects you									
How well you can breathe when wearing the face mask									

11) What issues have you experienced with the fit and function of face masks?

(Select all that apply)

- Difficulty breathing
- Weight of material
- Skin irritation
- Dampness (moisture created from breathing, talking, exercising, sweating, sneezing,
- Problems with attachments (ear loops, elastic, draw stings, ties)
- Pressure against your face (bridge of nose, cheeks)
- Glasses fogging up
- Interference with hair, glasses, hearing aids, ear pods, hats, scarves, headbands
- Indentation marks left on your skin and or hair after removal
- Gapping on the sides, poor seal
- Moving or sliding down

12) Indicate what issues you have experienced when caring for your fabric face masks?

(Select all that apply)

- Keeping your face mask clean throughout the day (example while at work, doing errands, with friends)
- Not knowing how to or how often to wash your face mask
- Your mask shrunk with washing
- Your face masks frayed
- You found holes in your face mask
- You have had no issues with taking care of your face mask
- Other

13) When planning to wear a face mask, what do you consider?

(Select all that apply)

- The situation in which you will be wearing the face mask
- The people who will see you wearing the face mask
- How the face mask looks with what else you are wearing

14) Please describe the shape of face masks you have worn

- Flat rectangle-no middle seam
- Cone
- Pleated
- Middle vertical seam
- Other

15) How important is it to you that your face mask reflects who you are?

	Not At All								Very Much
Importance	1	2	3	4	5	6	7	8	9

16) Where do you get face mask ideas?

(Select all that apply)

- Social media or other media to see the kind of face masks influencers, celebrities and athletes wear
- Face masks on designer websites
- The kind of face masks your friends, classmates or coworkers are wearing
- Face masks on online shopping sites
- Face masks you see in your environment (school, work, grocery store, mall)

17) Which of the following elements of a face mask have grabbed your attention?

(Select all that apply)

- Funny images (cartoon character, etc.)
- Cute images (animal faces, etc.)
- Bright colors
- Brand Logos
- Designer brands
- Surprising details (Chains, zippers, studs, sequins, etc.)
- Team logos, icons, mascots, etc.
- Slogans or words
- Interesting patterns
- The shape of the face mask
- Embedded technology
- Disposable versions

18) Please list any additional observations on face masks you have bought, made or received as a gift

19) How do you feel when people make a positive comment on your face mask?

(Select all that apply)

- That you have good taste
- That you're doing your part for community health safety
- Flattered
- That you made a connection

20) When you notice another person's face mask that you admire, which of the following describes your reaction.

(Select all that apply)

- You compliment the person
- You ask them where they purchased the face mask so you can buy one like it
- You think WOW, that's an amazing face mask

21) Are you bothered when you see face masks worn improperly (e.g., off nose, on chin, gaps)?

	Never									Always
Frequency	1	2	3	4	5	6	7	8	9	

22) Have you made your own face masks?
 Yes
 No

23) Please answer the following question only if you selected YES for “made your own mask.”

When selecting fabric to make a face mask, which of the following have you selected?

(Select all that apply)

- Fabrics you have left over from other projects and/or repurposed apparel
- Fabrics you think your customers will like and purchase (for Etsy sellers etc.) New
- Fabrics
- Fabrics you think family and friends will like

24) Please answer the following question only if you selected YES for “made your own mask.”

When making a face mask, what type of head attachment do you use ? Elastic ear loops

- Elastic ear loops with attached adjusters
- Tie on Masks
- Non-elastic fabric ear loops extension of mask
- Toggle style adjustable ties
- Other

25) Have you forgotten to bring a face mask with you somewhere it was needed or mandated?

	Often									Never
Frequency	1	2	3	4	5	6	7	8	9	

26) Have you accidentally lost or misplaced a face mask?

	Often									Never
Frequency	1	2	3	4	5	6	7	8	9	

27) Have you seen face masks left on the ground (in parking lots, on the street, in public buildings, etc.)

- Yes
- No

28) If you answered NO to the previous question please skip this question

If you answered YES to the previous question, what type of face masks have you seen left on the ground?

- Disposable
- Fabric
- Both

29) If face masks become a regular part of life how much will their appearance matter to you?

	Not At All									Very Much
The appearance when you wear them	1	2	3	4	5	6	7	8	9	
The appearance when someone else wears them										

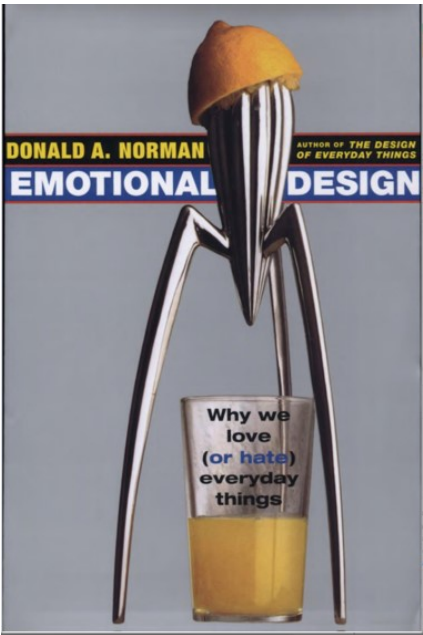
30) What do you think the purpose for face masks will be in the future? (Type answer in box below)

31) Your experience wearing face masks has been

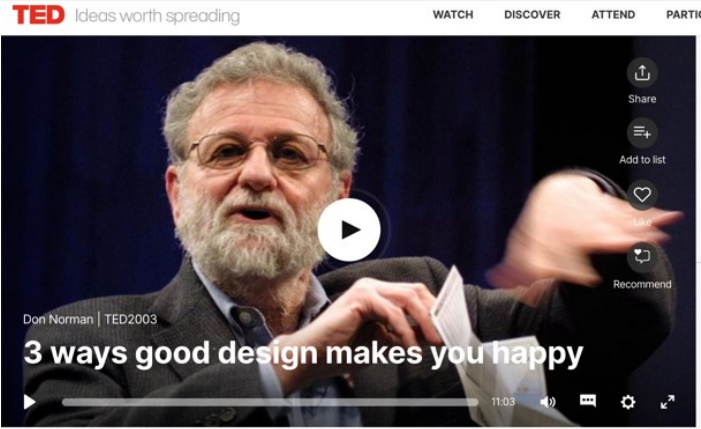
	Negative								Positive
Experience	1	2	3	4	5	6	7	8	9

32) Please enter your full name and section number below:

Appendix D: Emotional Design Why we love or hate everyday things



Appendix E: Screen shot of Norman TedTalk® (2009)



Appendix F: Slides from Introduction to Design Thinking lecture on 3 levels of emotional design

