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Ecological Art Exhibition as Transformative Pedagogy

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ECOLOGICAL ART EXHIBITION AS TRANSFORMATIVE PEDAGOGY

by

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Environmental degradation is considered one of the biggest issues facing humankind. The problem is deep and global with fast fashion playing a significant, yet underrealized role. Scholars have established that developing the sustainable behaviors necessary to mitigate the effects of environmental degradation is a complex process, that knowledge of environmental degradation alone is insufficient to develop sustainable behaviors, and that both attitudinal and behavioral transformations are necessary for global environmental action and stewardship. As a result, researchers have called for new approaches to environmental education to promote transformative learning.

Art experiences can function as a powerful tool in learning and transformation, but art exhibition experiences are underutilized in environmental education. This quasi-experimental study was designed to determine whether an ecological art exhibition, *Canary Concepts and the Hidden Danger of Ubiquitous Things*, could be associated with internal factors related to sustainable behaviors in fast fashion consumption—specifically an environmental attitude consisting of knowledge, values, and intended sustainable behaviors.

This repeated measures study compared pre-exhibition and post-exhibition knowledge, values, and intended sustainable behaviors test scores of 163 University of

Nebraska-Lincoln student participants. They consisted of 148 females and 15 males ranging between 18 and 34 years-of-age. Two-tailed t-tests were used to determine whether there was a statistically significant increase in knowledge, values, and intended sustainable behaviors associated with the exhibition-intervention.

Results indicated a statistically significant increase in knowledge, values, and intended sustainable behaviors supporting the primary hypothesis that an ecological art exhibition experience can be an effective educational intervention and transformative experience. Results also demonstrated the importance of the holistic nature of the exhibition experience, as the majority of participants attributed changes in knowledge, values, and intended sustainable behaviors to the exhibition-as-a whole rather than individual labels or installations. Relationships between participants' characteristics and changes in knowledge, values, and intended sustainable behaviors were also explored.

Keywords: environmental attitude, ecological art exhibition, environmental education, environmental degradation, sustainable education, fast fashion, textile industry, environmental attitude, environmental knowledge, values, transformative learning theory, fashion footprint, chemical pollution, plastic pollution

Dedication

This dissertation is dedicated to my family.

I am especially grateful for the patience and support of my husband, Mark; my daughters, Halsten and Hathaway; my parents, John and Virginia; and my brother, Jason.

It is also dedicated to finding tools to live in *the After*…to keep our boat afloat (to paraphrase Mary Pipher, 2013) and to sail on in a world with safer chemicals, better legislation, and a whole lot more trust.

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Abbreviations Key

A-B	attitude-behavior relationship
AD	affective domain
CC	*Canary Concepts and the Hidden Danger of Ubiquitous Things*
ED	environmental degradation
EE	environmental education
FF	fast fashion
K	knowledge
SBs	sustainable behaviors
TL	transformative learning
UNL	University of Nebraska-Lincoln
V	values

Chapter 1

Introduction

Background of Study

Environmental degradation (ED) is considered one of the biggest issues facing humankind (Hanh, 2008; Kahn, 2010; Louv, 2008; Speth, 2008, as cited in Anderson & Guyas, 2012). Since the 1960s, environmental education (EE) and the environmental movement have increased knowledge of and the human role in ED, but this increase has not translated into a great enough increase in sustainable behaviors (SBs) to mitigate the impact of ED.

Theorists and researchers have analyzed this gap between awareness and action as well as the various complex barriers to SBs. In doing so, scholars ultimately established that in the consumer-based, aesthetic-driven, anthropocentric society, the reasons for the gap are complex and that awareness and knowledge of ED alone are insufficient to change behaviors and cultivate SBs. Maguire and McCloat (2017) have argued that "fundamental transformations" in learning and new modes of thinking and doing are required for global citizens to cultivate sustainable behavior patterns in everyday life in the Anthropocene—an epoch in which human beings are changing the Earth in profound and potentially irreversible ways (p. 165).

Expanding upon traditional, information-based EE, various educational paradigms and frameworks have developed focusing on the complex root causes of ED. While consensus upon one specific educational framework does not exist, new paradigms include transformative learning (TL) theory and an ecological educational framework.

This study focused on the TL potential of an ecological art exhibition, *Canary Concepts and the Hidden Danger of Ubiquitous Things* (CC). CC integrated TL and an ecological framework with environmental and human costs of FF pollution— an underrecognized yet significant contributor to ED. CC art installations addressed external factors relating to the gap between awareness and action including the complexity and invisibility of ED. In doing so, the study examined whether CC could affect internal factors relating to the awareness-action gap—specifically an environmental attitude. Environmental attitude is considered a consistent base in developing SBs (Kaiser, Wölfing, et al., 1999) and a predictor of SBs (Marcinkowski & Reid, 2019) and, in this context, is measured by changes in levels of knowledge (K), values (V), and intended SBs (Kaiser, Wölfing, et al., 1999). The study also addressed to what aspects of CC participants attributed changes in K, V, and SBs, determined whether CC elicited emotional responses and/or shifts in perspective, and explored potential relationships between the participants' characteristics and changes in K, V, and intended SBs.

Purpose of the Study

Ecological Art Exhibition as Transformative Pedagogy was inspired by the need to address the ecological crisis. It was a response to the call for new, holistic approaches to instill SBs (Saylan & Blumstein, 2011) and to the underrecognized role of FF in the ecological crisis. In doing so, *Ecological Art Exhibition as Transformative Pedagogy* sought to determine the educational and transformative potential of an ecological art exhibition addressing FF in developing an environmental attitude (Kaiser, Wölfing, et al., 1999). An enhanced understanding of the role an ecological art exhibition can play in an

environmental attitude in terms of knowledge, values, and intended SB would address the lack of systemic studies in this area, enhance the understanding of the complex process of developing SBs, and enable educators to improve and expand upon their teaching approach and curriculum.

Research Questions, Objectives, and Hypotheses

There are primary and secondary research questions and objectives with corresponding hypotheses.

Primary

The Primary Research Question. Is there a difference between the K, V, and intended SBs pre-exhibition and post-exhibition survey scores of University of Nebraska-Lincoln (UNL) student-visitor participants to an ecological art exhibition, CC, at the UNL Robert Hillestad Textiles Gallery from April 11-22, 2016?

The Primary Research Objective. Determine whether CC can stimulate/is associated with an environmental attitude consisting of K, V, and/or SB intentions by comparing pre-exhibition and post-exhibition survey results of UNL student visitor-participants to CC.

Primary Hypotheses.

H1a: Participants' K scores will be greater after CC compared to before.

H1b: Participants' V scores will be greater after CC compared to before.

H1c: Participants' SB intentions scores will be greater after CC compared to before.

Secondary

Secondary Research Question. Do UNL student-visitor participants to CC at the UNL Robert Hillestad Textiles Gallery report emotions and/or new knowledge, perspectives, or SB intentions associated with their experience visiting the CC exhibition? If so, which emotions and which exhibition component(s) are identified?

Secondary Objective. Examine student responses regarding exhibition components in terms of emotions and new knowledge, perspectives, and SB intentions to explore possible relationships between emotions and any new knowledge, perspectives, and SB intentions acquired by participants and potential differences between pre-exhibition and post-exhibition survey scores for K, V, and/or SB intentions.

Secondary Hypotheses.

H2a: Participants will attribute an increase in knowledge to didactics and interactive components.

H2b: Participants will attribute critically examining assumptions and beliefs to Chris Jordan's *Midway: Message from the Gyre* installation (a movie trailer).

H2c: Participants will attribute an increase in intended SBs to CC as-a-whole.

Chapter 2

Research and Literature Review:

Fast Fashion and Environmental Degradation

Introduction

In this chapter, FF and ED—the content of the *Canary Concepts and the Hidden Danger of Ubiquitous Things* exhibition—will be addressed. This research and literature review includes definitions, descriptions, and historical summaries of FF and ED. The chapter will end with a focus on the FF footprint including environmental and human costs.

Fast Fashion Development

While most people are aware of the relationship between travel and oil industries and ED, the relationship between the FF industry and ED is underrecognized (McFall-Johnsen, 2019). The role of FF in ED is best understood in the context of the development of FF, the socio-cultural conditions surrounding FF, and the FF system. All of these components are connected by textiles, which can be considered as psychologically basic to human life as food (Dichter, 2000). According to Dichter (2000):

> All creatures need a barrier which enables them to resist the changes in the environment to which they cannot adjust. But, alone among the animals, the human species has no such adequate natural barrier between itself and the world. Only in the context of this basic situation of humankind can the psychology of textiles be understood. Cloth—a synonym for textile—has the same meaning as clothe—to cover. Naked things like naked people demand to be covered. In covering nakedness, whether of people or of things, we accomplish these five basic purposes: we protect and insulate; we facilitate contact with the world; we hide defects and weaknesses; we give the appearance we wish to give; and we decorate. (p. 228)

Textiles are one of the first ways humans overcame biological limitations and modified the planet to sustain themselves (Fagan, 2016). Today, textiles touch almost every aspect of human life. They form the basis of clothing, accessories, and furniture as well as carpets and bedding in a variety of settings ranging from homes and offices to vehicles.

Prior to the Industrial Revolution, the lifecycle of textiles was slow and localized. This changed with the development of factories and numerous inventions including roller printing, cotton gins, power looms, sewing machines, and factories and the production of dress patterns, which made fashionable clothes increasingly accessible and faster to make (Kaiser, 1985). The first luxury fashion house, the House of Worth in Paris, founded in 1858, developed the model for the modern fashion industry by designing clothing and accessories with its own labels creating a division between high fashion and factory-made ready-to-wear clothing ("Fashion," 2020). Luxury fashion houses in the twentieth century served as models for ready-to-wear fashions, which were standardized and did not need alteration (Black, 2010; Cline 2013). Ready-to-wear fashion was considered to be the democratization of fashion, as fashionable clothes became increasingly accessible and economical—available to people outside of the wealthy class (Black, 2010; Cline, 2013).

In the 1960s, the development of big-brand department stores and mail order catalogs (beginning with Sears) offered clothing even faster and at a cheaper price (Black, 2010; Cline, 2013). Ready-to-wear fashion became increasingly accessible to the

masses with desire and self-expression playing more prominent roles in consumption (Black, 2010; Cline, 2013).

The fashion industry evolved further in the 1980s when corporations began buying international luxury fashion houses (Cline, 2013; Eagan, 2014). In doing so, many corporate-owned luxury brands outsourced production to overseas factories that employed cheaper labor and materials to increase production and profits (Eagan, 2014). This change resulted in drastic changes. United States exports dropped from 95% to 3% between the 1960s and 2015 (Morgan et al., 2015) and the United States became a top importer. This shift marked the beginning of the complex and unsustainable FF industry.

In the 1990s and early 2000s, the FF business model was solidified by mass fashion retailers led by Zara in Spain and H&M in Sweden (Eagan, 2014). Since then, retailers have followed major designers who present their lines in a biannual seasonal cycle, but also introduc new lines of relatively inexpensive clothing at a lower price and quality every four to six weeks (Black, 2010; Eagan, 2014). With economically-developed countries increasing their demand for FF, global clothing production has increased, doubling between 2000 and 2014 (M.S.L.J., 2017). While exclusive brands and luxury houses influence the design and style of FF, it is available to the masses. FF dominates the apparel and furniture industry (Black, 2010) with unusually low retail prices, which are the result of the exclusion of real environmental and human costs from the price (Leonard, 2007).

The low cost and increased accessibility and disposability of mass produced FF has perpetuated the comparison to fast food (Black, 2008; Fletcher, 2008; Geisen, 2008,

as cited in Oxford, 2012). Lee (2003) referred to FF as "McFashion," describing it as fast, disposable, easy, unintimidating, and homogeneous similar to the McDonalds global fast-food chain known for uniform and inexpensive hamburgers and French fries.

Average Americans have doubled their consumption of wardrobe items per year from 34 items in 1991 to 68 in 2011 (Eagan, 2014). Residential closets are designed 60% larger than in homes from the 1960s (Hawley, 2007 cited in Oxford, 2012). In 2015, it was estimated that the world produced around 80 billion new pieces of clothing every year (Chung, 2016)—400% more than in 1995 resulting in over 11 million tons of textile waste from the United States (Morgan et al., 2015). While most consumption has been taking place in the developed world, it is increasing in the developing world (M.S.L.J., 2017).

The fashion apparel industry is one of the most labor dependent-industries on Earth, employing over a billion people globally (Black, 2008, as cited in Oxford, 2012). It is estimated that one in six people in the world work in an aspect of the fashion industry (Morgan et al., 2015). The labor involved with FF production is based upon skilled manual labor (machine sewing and construction) outsourced by the FF brands to supplier firms in developing countries known as "Tier 1" companies (Stafford, 2018). The "Tier 1" companies then subcontract production to manufacturing companies or suppliers that are not officially authorized or affiliated with the FF brands (Stafford, 2018). The lack of authorization and registration of the bottom tier of the FF system has perpetuated a lack of oversight and legal obligation by the government and/or FF brand to provide satisfactory working conditions (Stafford, 2018).

As a result, many FF production workers are exposed to inhumane and dangerous working conditions (Stafford, 2018). Often referred to as sweatshop working conditions (Oxford, 2012), a sweatshop has been defined as any factory that violates more than one of the fundamental United States labor laws: paying a minimum wage, keeping a time card, paying overtime, and paying on time (Morgan et al., 2015), and can also encompass verbal, physical, and sexual abuse, as well as exposure to toxic chemicals (Oxford, 2012). Sweatshops originated in London and New York City's Garment District around 1830-1850 ("Sweatshop," 2020). They continue to exist in the United States with Los Angeles employing 46,000 people in the "cut-in-sew labor force" (Meagher, 2020), but FF production predominantly occurs in developing countries with more than 70% of European Union imports of textile and clothing from Asia (predominantly China and Bangladesh), many of which work in sweatshop conditions (D'Ambrogio, 2014).

Fast Fashion in the Consumption and Aesthetic Ages

The cycle of inhumane sweatshop conditions and lack of oversight is perpetuated by the consumer and aesthetic ages. The recent mass availability of consumer goods and sites for purchase since the Industrial Revolution has been referred to as the "consumption age" (Featherstone, 1990). This shift in material culture over the last century has had a significant impact upon all aspects of everyday life for ordinary people in industrial societies (Featherstone, 1990). Also referred to as a "global virus," overconsumption is perpetuated by mass communication and has become deeply entrenched in everyday lives; people are buying more than they can afford and more than makes them happy (Greenpeace International, 2017).

Thompson (2016) has addressed how deeply integrated consumption has become:

> The consumption of goods and services is so thoroughly embedded into our ordinary, everyday lives that many aspects of its practice go largely unquestioned — not only the environmental and social consequences have got lost on the way, but also the very notion that consumption itself is a choice, and that, once our basic needs are met, consumption in its symbolic sense is not necessary and thus is itself a choice. (para. 2)

Compounding the challenges of FF perception and FF consumption rate, FF designers emphasize planned obsolescence vs. longevity, resulting in a decrease in product quality (Chapman, 2005, as cited in Oxford, 2012) and a decrease in the time a product is used by the consumer. While the average person buys 60% more items of clothing, they keep them for about half as long as they did 15 years ago (Greenpeace International, 2017). Kagan (2011) has described this hyper-consumerism as the greatest obstacle to sustainability.

There are multiple, complex, psychological reasons people buy more than they need or use. For many, the process is considered a form of short-term fulfillment (Greenpeace International, 2017) or entertainment (Lee, 2003) generating excitement, confidence, and a way to relieve stress and kill time (Greenpeace International, 2017). This trend in overconsumption is evident in popular references such as “comfort buys,” “retail therapy,” and “stuffocation” coined by British cultural forecaster James Wallman (Griffith, 2017).

The consumer desire for change, novelty, and emotional pleasure is intertwined with aesthetic pleasure (Featherstone, 1990). Design and aesthetics, in the form of sensory and emotional appeals, permeate all aspects of life and are serious components of function and production (Postrel, 2009). Referred to as the aesthetic age, aesthetics have

permeated every part of society in which difference and individualism are paramount; everyday objects exist to provide aesthetic pleasure as well as function (Featherstone, 1990; Postrel, 2009). Featherstone (1990) has referred to this as the "aestheticization of everyday life" in which consumer culture exploits and attaches images of romance, beauty, and desire to sell products (p. 17). This emphasis on projecting a particular appearance or style is a global phenomenon in developed nations driven by humans' biological tendencies (Postrel, 2009). According to Postrel (2009), aesthetics are an innate form of self-expression and fundamental part of life. Brown has argued,

> Our sensory side is as valid a part of our nature as the capacity to speak or reason . . . and it is essential to both. . . . We are by nature—by deep, biological nature—visual, tactile creatures. (as cited in Postrel, 2009, p. 15)

The desire to project what Griffith (2017) has referred to as an evolving reflection of one's identity serves many psychological functions including spiritual and emotional fulfillment as well as individual and societal expression (Postrel, 2009).

The emphasis on aesthetics in conjunction with cultural pluralism in post-modernist society has inspired aesthetic pluralism. Diverse styles have been recombined and increasingly personalized. In doing so, they have blurred and broken distinctions between design, art, and advertising and between mass culture and high culture (aspects of culture considered superior and typically associated with the well-educated or wealthy [Bell, 2013]). As a result, high culture has encompassed the same space as everyday cultural consumption (Featherstone, 1990; Postrel, 2009).

The influence of the aesthetic and consumption ages in FF apparel also extends to furniture. This "take-make-dispose" apparel industry (MacArthur, 2013, p. 22) has also served as a model for the furniture industry, as consumers desire the same aesthetic standards for their furniture and personal spaces (Griffith, 2017). With fashion furniture available at discount stores such as Target, the furniture and home goods industry is a $100 billion portion of the United States retail economy (Griffith, 2017). Today's furniture is referred to as the "new fashion" (Griffith, 2017; Potvin, 2017; Schocker, 2017). According to Morrill (2016), "we are squarely in the age of 'fast furniture,' characterized by the bounty of cheap, flimsy, and disposable furnishing options on the market" (para. 1).

Consumption-based experiences have a far-reaching impact on all aspects of society. They have shaped human emotion, identity, and consciousness (Thompson, 2016) and transformed the ontology of society itself (Lee, 2000). Researchers have proposed that this emphasis on material culture has resulted in a separation of people from each other (Hanh, 2008, cited in Anderson & Guyas, 2012) and people from the natural world, with the natural world viewed as a resource to be exploited (Leonard, 2010). This human-centered perspective has been referred to as an increasingly anthropocentric way societies and individuals view themselves and the world (Lee, 2000; Thompson, 2016).

Slow and Circular Fashion

Alternative, slower models of consuming and living exist. These are rooted in the influential international Slow Food movement. Also referred to as "speeding down"

(Bedat, 2015), the Slow Food movement began around 1968 and has influenced a range of other slow movements including slow living ("Slow Food," 2020). With the guiding premise being health, the movement emphasizes a more conscious and mindful lifestyle to increase mental and physical well-being (Finkelstein, 2014; "Slow Food," 2020).

A range of alternative fashion approaches have developed in this context including sustainable or eco-fashion, which references the impact of clothing production on the environment, and ethical fashion, which references the impact of the production process on human well-being. All of these fashion models are often included under the umbrella term of slow fashion, a term coined by Kate Fletcher (2007). A slow or sustainable component in the fashion industry is relatively new (Yee & Hassan, 2016), and while slow fashion is not "abundantly available to meet the needs or budgets of most people" (Oxford, 2012), a minority, albeit growing number of fashion apparel and furniture brands and companies strive for a slow fashion model. Black (2010) has argued that they are part of a new developing era of ethical and conscientious design, production, and sourcing, which is also influencing consumers.

Slow fashion retailers began in the 1990s with pioneering companies, including Esprit and Patagonia, who questioned standards and ethics of the industry (Black, 2010). Over time, recognition of the need for more information, accountability, and transparency in the FF industry increased (Black, 2010). The collapse of the Rana Plaza garment factory in Bangledesh in 2013, the release of documentaries such as *True Cost* (Morgan et al., 2015), various publications relating to human and environmental costs of FF in journals and books, and the development of campaigns including the Greenpeace Detox

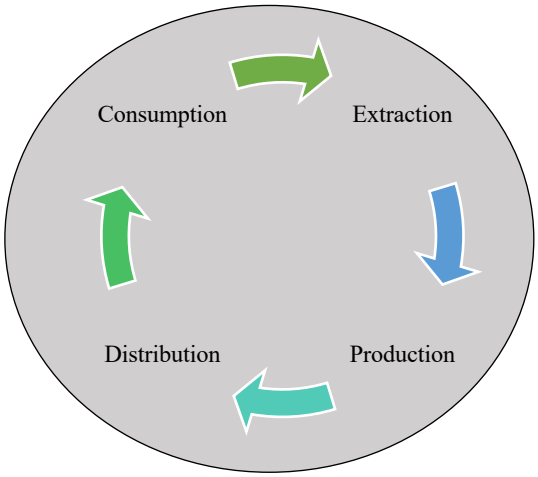
Fashion Campaign (2015) and the War on Want have increased awareness of the challenges with the FF system. Moreover, designers and brands have increased their focus on ethical and sustainable fashion. Influential figures such as Gwyneth Paltrow, Will. I. Am., Michelle Obama, and Emma Watson have been featured in the media wearing sustainable clothing and supporting designers such as Stella McCartney who employ a slower fashion model.

Today, some companies offer various services to minimize the fashion footprint and extend their products' life. Patagonia offers repair and/or secondhand and recycled product options. Other brands including H&M accept used clothes for recycling, Target has established organic apparel and bedding collections, while PUMA has biodegradable and recyclable products. The focus on extended use and quality is also evident by the growing popularity of KonMari based upon *The Life-Changing Magic of Tidying Up: The Japanese Art of Decluttering and Organizing* (Kondō & Hirano, 2014).

These slow fashion approaches strive for a circular fashion model. Circular fashion is based on the main principles of circular or closed loop economy and was coined in 2014 by Dr. Anna Brismar and H&M sustainability staff independently (Brismar, 2017). In contrast to the linear FF system, a circular system is based upon the concepts of sustainable development and a circular economy. A circular economy is a regenerative system in which waste is minimized by slowing or closing energy and material loops. Rather than intended obsolescence of FF, long-lasting design, maintenance, repair, reuse, and refurbishing are features of the closed loop system (Geissdoerfer et al., 2017) (see Figure 1).

Figure 1

Closed Loop or Circular Production Model



Source: Leonard (2007)

The circular fashion concept involves 16 principles involving the entire life cycle of a product focusing on quality, ethical production, sourcing, and ultimately consumption rather than speed and low-cost approaches. The first five principles include designing for purpose, longevity (which includes durability, long lasting style, and repair and redesign through disassembly), resource efficiency, biodegradability, and recyclability (reversible and redesignables). Principles #6-10 address sustainable sourcing and producing including simplifying use of materials by choosing closed loop, biodegradable, and nontoxic materials and doing so locally with efficiency, renewables, and good ethics. This involves utilizing higher quality clothes with longer life expectancy, reusing, and recycling production materials, and pressuring companies to slow down cycles and extending product life through classic design and durability (Brismar, 2017).

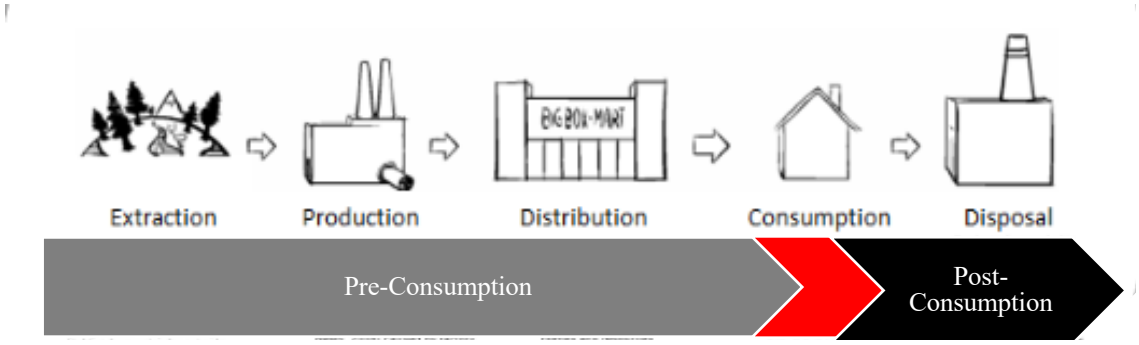
The remaining six principles of circular fashion goals encompass consumer drive and the fast fashion maintenance system. These include choices regarding the purchase, use, and disposal of FF products. Thoughtful consumption includes purchasing in terms of quality vs. quantity such as buying longer lasting and more ethically-sourced products. McDonough and Braungart (2002) have argued that rather than recycling more, the best way to reduce the environmental footprint is to produce, consume, and dispose of less. Other options include buying second hand or vintage as well as renting, loaning, swapping, making, and redesigning or repurposing clothes as opposed to buying a large quantity of new fast fashion items. Minimizing washing, drying, and dry cleaning and increasing the care and repair of products also impact the FF footprint (Greenpeace, 2017). At the end of a product's life, circular fashion encourages recycling, and repurposing, which includes reusing, recycling, or composting all remains (Black, 2010).

Fast Fashion System and Its Footprint

Unlike a circular or closed loop system, FF is built upon a linear, open loop system (see Figure 2). This "take-make-dispose" model has dominated manufacturing and accelerated since the Industrial Revolution (MacArthur, 2013, p. 22) and plays a significant role in ED. Textiles are the base of the FF system, which includes over ten steps with multiple complex networks making up the pre-consumption, consumption, and post-consumption phases (see Figure 3). Each phase involves a significant amount of energy as well as chemical and plastic pollution contaminating the hydrosphere lithosphere, and atmosphere contributing to the FF footprint and to global ED.

Figure 2

Linear Production Model



Note. The illustrations are from Leonard, 2007.

Pre-Consumption Stage: Extraction, Production, and Distribution

During the pre-consumption stage, raw fibers are extracted, cultivated, and developed in resource countries and marketed, sold, and distributed to manufacturing countries. The extraction and cultivation of the fibers is followed by spinning the fiber into natural yarns or synthetic threads or filament. The following steps in production: weaving, dyeing, printing, finishing, coating, and sewing are similar for both synthetic and natural fibers and require a large amount of chemicals, energy, and water. It has been estimated that over 8,000 chemicals (with varying levels of POPs) are employed to transform raw materials into textiles (Clement & Clement, 2011). Water is used to dissolve chemicals in one stage and then wash and rinse the same chemicals out in the next. Energy, consisting of the machinery, air conditioners, heat, steam, and chemical

production, is used to power the mills and factories resulting in carbon emission air pollution (O Ecotextiles, 2011).

Fiber Types: Natural and Manufactured. Fiber is the basic building block of textiles (Baugh, 2008) and the base of the fashion footprint. There are two broad categories of fibers—manufactured and natural fibers cultivated with conventional, chemical-free, and organic methods (Baugh, 2008). The fiber types are chosen by designers and merchandisers who visit textile shows in cities such as Paris, Milan, and New York (Baugh, 2008). Although pressure has been increasing on the fashion industry to make more sustainable natural fiber choices such as jute, ramie, flax, and hemp (which are resistant to most pests and diseases), most fiber choices have been based on aesthetic preferences rather than environmental concerns (Baugh, 2008).

Natural fibers are produced by plants, animals, and geological processes ("Natural Fiber," 2020) most of which are conventionally-grown or raised and go through unsustainable processes including harvesting, cleaning, and production (Wicker, 2016) for the highest yield (Baugh, 2008). A prime example is cotton—the world's most widely used fiber (Baugh, 2008) making up almost 40% of our clothing (Sweeny, 2015). Depending upon the climate, cotton requires a significant amount of water—up to 40,000 liters, for irrigation to conventionally grow one kilogram of cotton (Black, 2008, as cited in Lin & Oxford, 2012). It is also a heavily sprayed crop. Unless it is organic, cotton is responsible for 25% of all pesticides in the United States (Allen, 2007, as cited in Baugh, 2008). The elevated levels of pesticide residues and nitrogen and phosphate in soils from artificial fertilizers has doubled in the past century—the largest impact on the nitrogen

cycle in 2.5 billion years (Vaughan, 2016). These pesticides often contain endocrine-disrupting chemicals (EDCs) and other toxins, which end up in soil and groundwater (Mnif et al., 2011).

Natural fibers also require cleaning and purification prior to spinning the fibers into yarn. Chemicals, often toxic and/or corrosive such as Trichloroethylene and Sodium Hydroxide, are used to clean the fibers (Orzada & Moore, 2008). As a result, wastewater from washing contains pesticides and/or other chemical contaminants (IFC, 2006 as cited in Orzada & Moore, 2008). After removing the impurities, natural fibers go through a spinning process to make yarn. The yarn is then woven into fabric at textile mills, which use water, electricity, and coal resulting in emissions contributing to ED (see Table 1).

Manufactured fibers were developed to imitate more expensive and higher maintenance natural fibers (Baugh, 2008) and are divided into three categories: those made by the "transformation of natural polymers" (also called regenerated cellulosics), those made from synthetic polymers, and those made from inorganic materials (O Ecotextiles, 2010). The largest group of manufactured fibers is synthetic polymers (O Ecotextiles, 2010) made from chemical synthesis. Global synthetic fiber production is dominated by petroleum-based fibers, which are considered non-biodegradable and

Table 1

Natural Fiber Groups, Examples, and Traits

Natural Fiber Groups	Examples	Traits
Conventional	Cotton, Wool, Silk	Grown with Synthetic Fertilizers and Pesticides
Chemical Free	Cotton, Hemp, Ramie, Jute, Flax	Pesticide-free
Organic	Cotton	Meets USDA Organic Standard

Note. The fiber designations exclude potential finishes (O Ecotextiles, 2010).

non-renewable (Orzada & Moore, 2008). Petroleum-based fibers polyester, nylon, acrylic, and polyolefin account for approximately 98% (by volume) of global synthetic fiber production (O Ecotextiles, 2010).

Polyester is the most widely used fiber second to cotton (Baugh, 2008). Polyester production involves polymerization, drying, and most often melt spinning involving forcing liquid petroleum through spinnerets forming synthetic threads, which are woven into polyester fabric (O Ecotextiles, 2010). While this process involves less water than cultivating cotton, polyester production involves significant amounts of energy—nearly 70 million barrels of oil used each year—more than is used for polyethylene terephthalate (PET) plastic bottles (O Ecotextiles, 2009).

The demand for polyester has increased by over nine times since 1980, as almost all textiles including apparel, furniture, and carpeting today are made of a blend of polyester materials (Mehta & Goyal, 2013; M.S.L.J., 2017; University of Leicester, 2016). It is sometimes blended with cotton and accounts for around 80% of the global market share of manufactured fibers (O Ecotextiles, 2010). From 1990 to 2002, polyester

production more than doubled to 46 billion pounds and was 61.5 billion pounds in 2009 (O Ecotextiles, 2010). "Pleather," a plastic imitation leather, is a petroleum-based material used in shoes, purses, and other FF industry accessories (Eagan, 2014) (see Table 2).

Table 2

Manufactured Fiber Groups, Examples, and Traits

Manufactured Fiber Groups	Examples	Traits
Natural Polymer-Based	Acetate, Lyocell, Rayon, Viscose	Cellulosics made from Wood Pulp and Cotton Linter
Synthetic Polymer-Based	Acrylic, Polyolefin, Polyester	Chemical or Petroleum-Based
Inorganic Material-Based	Carbon, Ceramic, Glass, Metal	

Source: O Ecotextiles (2010).

Although unsustainable sources continue to be primary fiber sources, fibers such as Lyocell rayon can be environmentally responsible when made with a closed production system and research continues to find alternative and easily renewable raw materials for fibers (Baugh, 2008). Such materials include corn, bamboo, kenaf, and agricultural waste, protein material, waste material, and recycling fiber material (Baugh, 2008).

Textile Dyeing and Finishing. FF is the number one industrial polluter of water (Mehta & Goyal, 2013) and the second largest consumer of water in the world (McFall-Johnsen, 2019). This is primarily due to textile dyes and chemical finishes and

additives— significant sources of soil and water pollution. Textile dyeing is considered the second largest polluter of clean water after agriculture (Castiel, 2016). Factories often do not dispose of the dye wastewater appropriately resulting in untreated, hazardous waste in water bodies (Hoguet, 2014). Estimates indicate that more than 5,000 gallons of water are needed to manufacture a t-shirt and jeans ensemble (Castiel, 2016). According to Chequer et al. (2013), up to 200,000 tons of dyes end up as waste and are discharged into a river or the sea every day. While this is most common in India and China (who discharges approximately 40% of the chemicals), it ultimately reaches the sea spreading around the globe (Wicker, 2016).

After dyeing fabrics, almost all fabrics receive at least one finishing treatment (Orzada & Moore, 2008). Finishing processes involve chemical additives, which are also embedded in the yarn or applied as finishes or coatings after production. These additives are intended to increase performance and function such as durability and safety and/or to facilitate maintenance or cleaning (Chequer et al., 2013). Examples include flame retardants, anti-microbial and anti-fungal protection, permanent press treatments, water proofing, softening, antistatic protection, wrinkle and soil resistance, stain release, and insecticides (Chequer et al., 2013). Many finishing treatments such as flame retardants contain EDCs and cannot biodegrade safely even if applied to natural fabrics (Hoguet, 2014).

Behind the production processes are vast, complex networks of FF textile, apparel, and furniture designers and manufacturers who design, develop, and source the products. This is followed by retail and wholesale orders, mass production, and

distribution. During the distribution stage, both online and traditional shopping methods contribute to the fashion footprint. Ships traveling overseas are fueled by fossil fuels, but these vary widely depending upon complex factors including, but not limited to, packaging, travel method, distance, fuel type, and delivery logistics.

Consumption Stage: Use and Maintenance

In the consumption phase items are purchased, used, and maintained. Using and maintaining FF products contribute to the environmental footprint, manifested in both indoor and outdoor pollution. In the consumption stage, humans have cumulative exposure to the various chemicals used in the pre-consumption and production processes. Exposure occurs via direct skin contact from wearing and using the products as well as via dust in various indoor and outdoor environments. Chemicals and nanoparticles also leak from products onto dust and into the air and ultimately settling on the ground or other objects. Humans are then exposed via airways and hand-to-mouth contact (Landrigan & Etzel, 2013).

Caring for and maintaining FF also contributes to the fashion footprint and chemical exposure. Washing, drying, ironing, and dry cleaning involves a large amount of energy and pollution. Washing and drying a load every two days creates around 440 kg of CO2 each year, which is equivalent to flying from London to Glasgow and back with 15-mile taxi rides to and from the airports (Berners-Lee & Clark, 2010). Thirty-seven percent (37%) of the carbon footprint for a pair of Levis is dedicated to washing and drying (Bomgardner, 2016). Chemicals in conventional detergents and dryer sheets including diethanolamine, ethylenediaminetetraacetic acid (EDTA), polyethylene glycol

(PEG), quaternium-15, and optical brighteners contribute to chemical pollution in humans, clothes, as well as in indoor and outdoor environments (Clement & Clement, 2011).

During laundering, heat can cause the vaporization of organic compounds used in finishes to become airborne gases (Slater, 2005, as cited in Orzada & Moore, 2008). Most of the pollutants, a range of EDCs including, but not limited to phthalates and triclosan, recirculate in the wash and are rinsed off products ending up in water bodies (Clement & Clement, 2011). A 2012 study by the Swedish Chemical Agency showed that up to 50% of antimicrobial treatments rinsed out of the products after ten washes ended up in waterways (Hoguet, 2014).

Nanotextiles, engineered fabrics with small particles invisible to the naked eye ("Nanofabric" 2020), also contribute significantly to chemical and plastic pollution. During the laundry process, they can involve a substantial release of nano- and micro-particles in water sources (Clement & Clement, 2011). Synthetic microfibers such as polyester microfiber, also referred to as textile microplastics and the "new plastic pollution," are released during the washing cycle. They can contain and absorb chemicals and are becoming ubiquitous in groundwater and oceans—the global environment (Carrington, 2016).

Post-consumption Stage

The chemical and plastic pollution during the pre-consumption and consumption stages is compounded by waste in the post-consumption stage. The FF industry is the second largest waste producer globally, following the oil industry (Morgan et al., 2015).

Most textiles are thrown away after an increasingly shorter life cycle resulting in the production of more than 11 million tons of textile waste in American landfills per year (Morgan et al., 2015). In less than 20 years, the volume of clothing Americans toss each year has doubled from 7 million to 14 million tons equating to 80 pounds per person (Wicker, 2016). The Environmental Protection Agency (EPA) determined that if all of the textiles were recycled, it would be the equivalent of removing 7.3 million cars and their carbon dioxide emissions off the road (Wicker, 2016). But due to the high content of synthetic fibers, most textile waste is not considered biodegradable (Black, 2010; Orzada & Moore, 2008). As waste, textiles have the potential to release chemicals in the soil, groundwater, and the air including greenhouse gases, which contribute to global warming (Wicker, 2016).

Fast Fashion Footprint —Chemical and Plastic Pollution

FF is one of the largest waste producing industries of the world (McFall-Johnsen, 2019) second only to the oil industry (Morgan et al., 2015). This is the result of the wide range of applications of chemicals and plastics in the FF system. They are produced, consumed, and discarded at increasing rates with little safety regulation, as the Toxic Substances Control Act (TSCA) is outdated and in need of reform (Environmental Working Group, 2020). Of the nearly 85,000 chemicals approved for use, the EPA has assessed a few hundred for safety (Environmental Working Group, 2020).

Plastic and chemical pollution in the FF system is produced in multiple forms during each phase. Plastic pollution ranges from micro-plastics, which are invisible to the naked eye to macro-plastics such as FF apparel, furniture, and accessories. Petroleum-

based fabrics such as polyethylene, polyvinyl chloride (PVC), and nylon and their chemical additives are major sources of chemical and plastic pollution in FF. The extraction of the plastic synthetic from fossil fuels, refining it, processing it into plastics, and off-gassing contribute to chemical pollution. Petrochemicals are the primary cause of global warming, and petroleum-based plastics are non-biodegradable/persistent and often contain other toxins.

Some of the off-gassing consists of chemical additives in FF products such as phthalates, bisphenol A (BPA), and many flame retardants, which are considered EDCs (O Ecotextiles, 2015). EDCs are chemicals that disrupt the body's endocrine system and impact hormones including estrogen, testosterone, and insulin (Green Science Policy Institute, 2013). They are classified as persistent organic pollutants (POPs), which are considered hazardous organic chemical compounds in pesticides and plasticizers and include chemicals that are considered persistent, bio-accumulative, toxic, and have long-range transport (Green Science Policy Institute, 2013). POPs disrupt hormones, which affect human development, bonding behaviors, and other functions resulting in adverse developmental, reproductive, neurological, and immune effects for humans as well as wildlife (Green Science Policy Institute, 2013).

The resulting chemical and plastic pollution from the FF system depletes and contaminates multiple interacting systems in the Earth's biosphere including the atmosphere, hydrosphere, and the lithosphere as well as the cryosphere and geosphere (Hamilton, 2016). Chemical and plastic off-gassing is generated from clothing and furniture in people's homes and on their bodies (Clement & Clement, 2011). The resulting changes in

these ecological, interactive systems are complex and occur over time. They can be direct and indirect, both short- and long-term, and synergistic and disrupt the self-regulating capability of the Earth's systems (International Geosphere-Biosphere Programme, 2015).

Environmental Costs and Human Costs

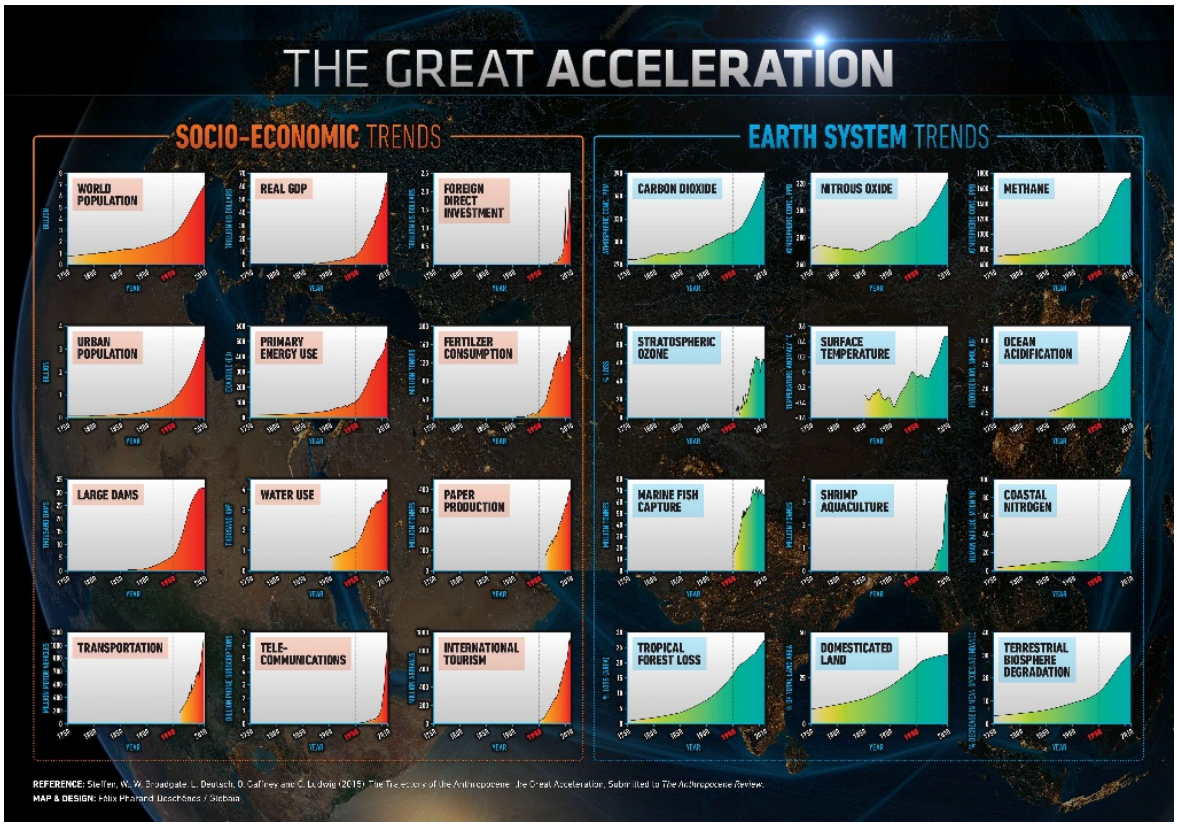
The Great Acceleration and the Anthropocene

FF chemical and plastic pollution has played a significant role in the Great Acceleration. This term references the significant increase in technological change and growth in population and consumption towards the end of the twentieth century—a period unique in the history of human existence (International Geosphere-Biosphere Programme, 2015; Waters et al., 2016; Working Group on the Anthropocene, 2019). The Great Acceleration encompasses changes in human socio-cultural and economic trends in production and consumption since the Industrial Revolution. This is evident in the Great Acceleration dashboard, which consists of data derived from the International Geosphere-Biosphere Programme and Stockholm Resilience Centre. The dashboard includes 24 graphs indicating the interaction between human activity and the Earth's systems from 1750-2015. These 12 socioeconomic and 12 Earth system trends demonstrate the significant simultaneous acceleration between human activities and impacts upon the Earth's systems since 1950 (Broadgate, 2015) (see Figure 3).

The 12 earth system trends include significant negative changes in carbon dioxide, stratospheric ozone, marine fish capture, topical forest loss, surface temperature, shrimp aquaculture, domesticated land, ocean acidification, nitrogen to coastal zone, terrestrial biosphere degradation. These are correlated with increases in population, urban

Figure 3

Great Acceleration Dashboard



Note: The dashboard shows the relationship between socioeconomic trends and the Earth's systems (International Geosphere-Biosphere Programme, 2015).

population, large dams, transportation, real gross domestic product, primary energy use, water use, telecommunications, foreign direct investment, fertilizer consumption, paper production, and international tourism (International Geosphere-Biosphere Programme, 2015).

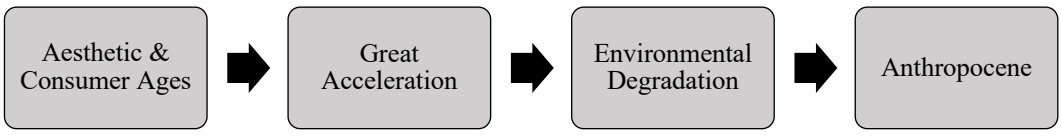
This period of unparalleled human "success" and expansion has resulted in the most profound change in the relationship between humans and the Earth in the history of humankind. This has been possible due to the exploitation of the planet's natural

resources in which human activity has consumed one third of the Earth's natural resources (Hawken et al., 1999, as cited in Leonard, 2007) and degraded the Earth's air, water, and land as well as its interacting systems— the atmosphere, hydrosphere, biosphere, geosphere, and cryosphere.

As a consequence of these actions, humanity has become a primary determinant of Earth's biophysical conditions, which has given rise to a new term for the present geological epoch—the Anthropocene (see Figure 4). The human role in the Anthropocene distinguishes it from the preceding Holocene epoch, which lasted 11,700 years (Whitmee et al., 2015). The Anthropocene term has been embraced by science and other research communities. It connects ED with the "wider world" expanding the concept of ED from being an environmental problem to being a human problem (Anderson & Guyas, 2012; Gore, 2006; Vaughan, 2016).

Figure 4

The Relationship of Consumption and Aesthetics to the Anthropocene



The current and most generally accepted start date for the Anthropocene is the mid 20th century marking the beginning of the nuclear age and the Great Acceleration (Waters et al., 2016; Working Group on the Anthropocene, 2019). It is based upon stratigraphic indicators including elevated levels of radioactive elements and changes due to chemical and plastic pollution (Carrington, 2016; Vaughan, 2016) including fertilizer use,

endocrine disrupting chemicals (Plant et al., 2008) and carbon emissions (Carrington, 2016; Vaughan, 2016) among other impacts.

In addition to physical changes in the Earth, the Great Acceleration has resulted in "highly inequitable, inefficient, and unsustainable patterns of resource consumption" (Whitmee et al., 2015, p. 1973), as corporations and manufacturers have not been required to internalize the full cost of doing business and lack incentive to engage in circular economy sustainable practices to protect the Earth.

Global Warming

One of the primary consequences of the Great Acceleration and FF is global warming. Global warming and the resulting climate change is described as "the most prominent, destructive, and threatening manifestation of the collision between human civilization and the Earth's ecological system" (Gore, 2006, p. 32). Carbon emissions, the most important anthropocentric gas responsible for global warming, have significantly increased on a global scale since the beginning of the twentieth century (Environmental Protection Agency, 2019). Since 1970, they have increased by about 90%, with emissions from fossil fuel combustion and industrial processes contributing about 78% of the total greenhouse gas emissions increase from 1970 to 2011 (Environmental Protection Agency, 2019). While the significant role transportation plays in carbon emissions is widely recognized, the role of the textile industry and FF is less understood.

The relationship between FF and global warming is under acknowledged. The textile industry is one of the largest sources of greenhouse gasses on Earth with fashion production creating 1.2 billion tons of greenhouse emissions a year (Ellen MacArthur

Foundation, 2017)—more emissions than international flights and shipping combined (United Nations Environment Programme, 2018). It has been estimated that making 1 kg of fabric generates 23 kg of greenhouse gases on average (M.S.L.J., 2017). Synthetic fibers are the greatest contributors, as they emit more greenhouse gasses (per kilogram) than natural fibers (O Ecotextiles, 2014). A polyester shirt has more than double the carbon footprint of a cotton shirt (5.5 kg vs. 2.1 kg, or 12.1 pounds vs 4.6 pounds). Polyester production released about 706 billion kgs (1.5 trillion pounds) of greenhouse gases in 2015, the equivalent of 185 coal-fired power plants' annual emissions (Drew & Yehounme, 2017).

The direct environmental implications of global warming include, but are not limited to rising sea levels, shifts in ocean currents, melting glaciers, and changing precipitation patterns leading to more extreme weather patterns and an increase in frequency and intensity of weather-related disasters such as hurricanes and floods, as well as ocean acidification. The concentrations of greenhouse gases have impacted changes and extinctions in the natural world due to habitat destruction (Hamilton, 2016). Crutzen (2002) has confirmed that extinction rates of flora and fauna are significantly above the long-term average and has predicted that 75% of species will become extinct in the next few centuries if current trends continue. Kolbert (2015) and Vaughan (2016) have proposed the possibility of a sixth mass extinction if current trends continue.

Gore (2009) argued that global warming could end human society as it is currently known. It threatens clean air, safe drinking water, adequate food and shelter, and the basic functioning of the world’s food web (also referred to food chain). It also

can play a role in nutrition and disease and other social and environmental determinants of health for humans, animals, and the planet.

Human Health Implications and Paradox

> *Many global assessments from the Global Environment Outlook to the Millennium Ecosystem Assessment (MEA) and the Intergovernmental Panel on Climate Change (IPCC) reports have warned that accelerating change to the structure and function of the Earth's natural systems represents a substantial threat to global human health and that the threat will become increasingly severe over time if steps are not taken to remedy the situation.* (Whitmee et al., 2015, p. 1976)

The impact of chemical and plastic pollution on the health of living organisms is significant, but underrealized (Morgan et al., 2015; Orzada & Moore, 2008). A report published by the World Health Organization in 2006 estimated that about "a quarter of the global disease burden and more than a third of the burden in children was attributable to modifiable environmental factors such as fine particulate air pollution and contaminated water" (Whitmee et al., 2015). The Landrigan report (2017) was the first to compile data on disease and death caused by air, water, and soil of pollution combined. It found that pollution kills nine million a year— "more people every year than all war and violence, than smoking, hunger, or natural disasters and is considered deadlier than war, disaster, and hunger" (Landrigan, 2017, as cited in Daigle, 2017).

Chemical and plastic pollution impacts living organisms in a variety of ways. Plastic debris including bags and straws on land and water entangle wildlife. Chemicals and microplastics invisible to the human eye are ingested, inhaled, and/or absorbed via the skin (Green Science Policy Institute, 2012). As a result, flame retardants have been

found in the bodies of Americans as well as human breastmilk and umbilical cord blood (Environmental Defence, 2013).

Many chemicals used in FF are untested, while others used during the production process may be considered toxic (and even handled like toxic waste), but are worn and used during the consumption phase (Clement & Clement, 2011). A prime example is formaldehyde, which can be included in dyes as well as in anti-cling, antistatic, anti-shrink, and waterproof finishes among others (Clement & Clement, 2011).

Chemicals from dyeing and finishing fabrics contribute to the pollution of the hydrosphere in multiple forms: accumulated chemicals, decreased light penetration and photosynthetic activity, disease-causing bacteria and viruses, and microfibers. Microfiber water pollution impacts multiple ecosystems and the food chain (Hammer et al., 2012). Each time a synthetic microfiber is washed, an estimated 1,900 microfibers can get rinsed out of a single piece of synthetic clothing carrying toxic materials, which can be both inhaled and ingested (Markham, 2014; van Sebille, 2016). The microfibers are turning the ocean into "plastic soup" (Parker, 2017). The smaller fish and invertebrates have been eating the microfibers and absorbing their toxins after which they find their way up the food chain and are consumed by larger fish and ultimately humans (Parker, 2017).

Humans, who are at the top of the food chain, ingest the microfiber plastic by consuming seafood and drinking the water (Hammer et al., 2012). It is estimated that a third of the food humans eat is contaminated with microfibers (Markham, 2014; van Sebille, 2016). In a study of tap water, 83% of the samples were contaminated with

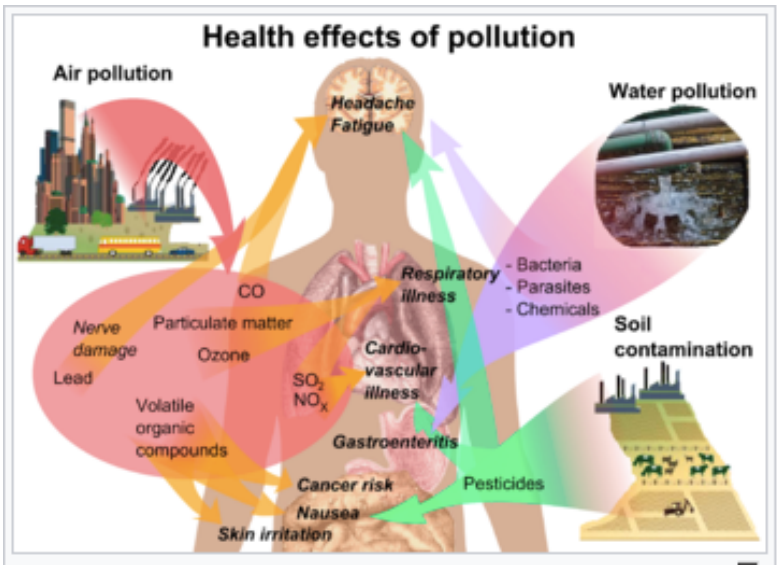
plastic fibers. The United States had the highest contamination rate at 94% (Carrington, 2016).

Studies increasingly point to negative consequences of chemical exposures for humans and the natural world (Preuss, 1991, as cited in Kollmuss & Agyeman, 2002). In 1993, a report by the National Research Council Committee on Pesticides in the Diets of Infants and Children catalyzed the field of children's environmental health, which has grown especially rapidly in recent years and is considered a new branch of pediatrics (Landrigan & Etzel, 2013). There has been strong and growing evidence that environmental exposures are important causes of the chronic diseases including asthma, birth defects, neurodevelopmental disorders, and Leukemia in children (Landrigan & Etzel, 2013). In *Killer Clothes: How Seemingly Innocent Clothing Choices Endanger Your Health*, Clement & Clement (2011) address the link between textiles and human health including fertility, respiratory disease, cancer, and other conditions. Recent studies provide evidence of this relationship between environmental exposures and health. Current research has shown links between environmental exposures and genetic modifications (McBirney et al., 2017), autism (Guo et al., 2018; Hamra et al., 2019; Volk et al., 2014), thyroid disease (Melzer et al., 2010), and dementia (Bishop et al., 2018) (see Figure 5).

The effects of chemical pollution are cumulative and can be synergistic, direct or indirect, short-term or long-term, and/or immediate or delayed. The delay in the human health effects, as well as a disconnect of well-being from nature, have contributed to the paradox of perceived health and human success in conjunction with the deterioration of

Figure 5

Relationship Between Environmental Degradation and Human Health



Source: Häggström (2014) illustrated in "Environmental Health" (2020).

the Earth's natural systems (Whitmee et al., 2015). While the exploitation of the Earth's natural systems have accelerated, the human cost of ED has been overlooked given the immediate economic and development gains of human civilization (Whitmee et al., 2015). Whitmore has argued, "Humanity has traded off many of the Earth's supportive and regulating processes to feed and fuel human population growth and development" (Whitmee et al., 2015, p. 1975).

Conclusion

Textiles began as a means to meet a basic human need for warmth and coverage, but evolved over thousands of years to embody the inherent qualities that epitomize the overconsumption and unsustainability in the Anthropocene (Black, 2010; Eagan, 2014; Fagan, 2016). FF is the result of a global, complex, linear system, and while trends of

slow fashion exist, FF dominates the fashion industry. FF is psychologically and economically entrenched in the consumption and aesthetic ages resulting in a significant level of chemical and plastic pollution produced during all stages of the FF system. This fashion footprint plays a significant, yet underrealized, role in ED, which is "unprecedented in its magnitude, pace, and severity" (Park, 2001, as cited in Ravi, 2019).

Developing the SBs needed to mitigate the complex global, ecological, and human implications of ED has been unsuccessful due to multiple challenges and factors. These include the perceived success and comfort of humans in the Great Acceleration and the delayed consequences related to human health (Whitmee et al., 2015, p. 1974). Other factors include the complex and invisible nature of ED and the pervasive Anthropocentric viewpoint in the consumer and aesthetic ages. These factors have perpetuated disconnections in society—disconnections between humans and the FF system, between humans and the natural world, and between the natural world and the economy (Whitmee et al., 2015). As a result, researchers including Saylan and Blumstein (2011) have called for new approaches to EE to promote the transformative learning required to cultivate SBs and address ED.

Chapter 3

Research and Literature Review:

Ecological Art Exhibition as Transformative Pedagogy

Introduction

Given the failure of traditional EE to effectively address the crisis of ED (Saylan & Blumstein, 2011), researchers in various fields have sought to better understand the complex nature of SBs and the factors related to the awareness-action gap in SBs. In doing so, an ecological framework and transformative learning theory have been recurring strategies.

This study addresses the factors relating to the gap and Saylan and Blumstein's (2011) call for new approaches to EE in the form of an ecological art experience. The art exhibition, CC, was designed to cultivate an environmental attitude in the form of K, V, and SBs in the realm of FF. It is based on the concept that a multimodal and multidimensional ecological art experience can promote a holistic, transformative experience to better address the factors relating to the gap between awareness and action in SBs. This study is best understood in the contexts of:

- the evolution of environmentalism, EE, and an ecological framework;
- the gap between awareness and action in SBs; and
- the role of art and the affective domain (AD) in learning and transformation.

Environmentalism in the United States

Concern for the environment and its management can be considered ancient. Cultural traditions and religions with sustainable forestry management existed in

medieval Europe (Lallanilli, 2018), and sustainable agricultural practices in Asia date from one thousand years ago (Yan, 2016) .Today, many different environmental organizations exist, ranging from small local groups to large international organizations with world-wide influence.

The environmental movement in the United States has its roots as a reaction to the Industrial Revolution and later in the philosophical movement, which inspired literary and visual artists. The transcendental movement was influenced by Eastern religion and grew from the Unitarian Universalist denomination (the dominant religion in Boston—most notably at Harvard) ("Transcendentalism," 2020), which emphasized faith in the divine power of nature (Matilsky, 1992). It revolved around writer Ralph Waldo Emerson (1803-1882) and other prominent New England intellectuals, including writer Henry David Thoreau (1817-1862) and poet Walt Whitman (1819-1892) ("Transcendentalism," 2020).

Emerson professed the intrinsic value of the natural world and its inherent spirituality (Lallanilli, 2018; "Transcendentalism," 2020). In Emerson's essay "Nature" (1836), he affirmed, "Standing on the bare ground—my head bathed by the blithe air and uplifted into infinite space—all mean egotism vanishes. I become a transparent eyeball; I am nothing; I see all; the currents of the Universal Being circulate through me; I am part or parcel of God" (p. 13). Emerson's student, Henry David Thoreau, also celebrated nature in *Walden* (1854), which described his simple lifestyle in the woods near Walden Pond in Massachusetts and professed the revolutionary concept that nature was instilled with a spirit that embraced and connected all living things (Matilsky, 1992). Thoreau

(1854) wrote, “Shall I not have intelligence with the earth? Am I not partly leaves and vegetable mound myself?” (p. 150) and “Heaven is under our feet as well as over our heads” (p. 304).

The transcendentalists helped lay the foundation for a deeply connected and interconnected view of nature, which ultimately played a role in environmental ethics and ecological thought in America (Matilsky, 1992). They influenced the Hudson River School artists who ultimately played an important role in early environmental conservation in America.

The Hudson River School was a loosely aligned group of painters who were united in their intent to create majestic images of the American landscape that represented the sublime—a higher order beyond the physical realm (Boime, 1991; Novak, 1995). The first generation included the founder painter/poet Thomas Cole (1801-1848) who painted scenes of the Hudson River Valley and surroundings. Second generation artists including Albert Bierstadt (1830-1902), Frederick Edwin Church (1826-1900), Asher B. Durand (1796-1886), and Thomas Moran (1837-1926) expanded their subjects to include scenes in New England, the Maritimes, the American West, and South America (“Hudson River School,” 2020). Influenced by the European Romanticist painting at the end of the 18th century, both generations of painters created highly-detailed sketches on-site and finished their pieces in the studio resulting in realistic and sometimes idealized oil paintings of vast mountain scenes (“Hudson River School,” 2020).

These paintings helped to shape an American artistic identity as well as perceptions of America. Beginning with a glowing review of the young American artist Cole in the *New York Evening Post* on November 22, 1825 (Boyle, 2018), the Hudson River School gained increasing attention from reviews, articles, and exhibitions. Their paintings were displayed at locations including the Tenth Street Studio Building, which became the center of the New York Art World in the 19th century ("Tenth Street Studio Building," 2020) and at the American Academy of Design (Avery, 2004).

Second generation artists, Church and Bierstadt, gained a significant following with their theatrically-presented paintings (Newhouse, 2005). In 1859, Church, with the help of a promoter, created a sensation with his one-painting exhibition of *Heart of the Andes* (1859) at New York's Tenth Street Studio Building (Newhouse, 2005) (see Figure 6). The ten-foot-wide painting was dramatically displayed in a 13 x 14 foot wooden frame with a curtain resembling a window frame producing the effect of a real landscape (Newhouse, 2005). Presented in a in black room with a spotlight, this immersive display was described by Allaback (2014) as a stage set with palm leaves and travel brochures—a 19th century equivalent of a major motion picture. The experience was popular with the public (Newhouse, 2005). In New York, it was seen by twelve thousand to 13,000 people over a three-week period who paid 25 cents each to see it on display (Stewart, 2019). Engravings of the painting were also sold, and *Heart of the Andes* subsequently traveled to other venues and was seen by large crowds in eight American cities and London (Stewart, 2019).

Figure 6

Heart of the Andes in a Reconstruction of the 1859 Display

Note. Church, F. (1859) *Heart of the Andes* From the Metropolitan Museum of Art, New York City, NY. [Oil on canvas, 66.13 x 120.19 in.]. Displayed in reconstruction of its original wooden frame measuring 156 x 168 in.] (Newhouse, 2005).

Considered by critics of the time to be "Barnumesque" (similar to the Barnum and Bailey circus), the dramatic exhibitions of Hudson River School paintings became increasingly common later in the nineteenth century (Newhouse, 2005). In 1867, Bierstadt's exhibition of his ten by 15-foot *Domes of the Yosemite* painting at the Studio Building also included two balconies for viewing from different perspectives (Newhouse, 2005).

The Hudson River School painters believed art could be an agent of moral and spiritual transformation (Cunningham et al., 2013). The paintings were considered, both patriotic and spiritual—manifestations of a higher power (Brown, 2014). But they were also manifestations of the complicated relationship between humans and nature with multiple layers of symbolism. Although industrialization, western expansion, and the railroad resulted in the exploitation of the land and the destruction of Native Americans and their culture, the Hudson River School painters were influenced by nationalism and manifest destiny, "the widely-held belief that American settlers were destined to conquer the entire continent guided by a divine hand" (Brown, 2014, p. 10). Paintings were often interpreted as celebrations of America's promised prosperity, adventurous spirit, freedom, and seemingly limitless resources (Truettner et al., 1991).

In *The West of America* (1991), Truettner argued that Thomas Moran could paint the magnificence of Yellowstone as well as smoke pouring out of factories without noticeable conflict. Based on the images in these paintings, it seemed that America could build an empire without destroying nature in the process (Cembalest, 1991). Scenes often included humans (both European and indigenous) harmoniously juxtaposed with and/or dwarfed by nature (representing the power of nature) with predictions of the conquest of nature and the human toll on it caused by the encroachment of industrialization. Cole referenced scenes of deforestation due to industrialization as well as pastoral settings where humans and nature coexisted in harmony (Brown, 2014; Matilsky, 1992) (see Figure 7).

Figure 7

View from Mount Holyoke

Note. Cole, T. (1836b). *View from Mount Holyoke, Northampton, Massachusetts, after a Thunderstorm—The Oxbow*. From The Metropolitan Museum of Art, New York City, NY [Oil on canvas, 51.50 x 75.98 in.] (Cole, 1836b).

In his five-painting series *The Course of Empire* (1836a), Cole depicted the evolution of society from a hunting/gathering state culminating in an imperial civilization in *The Savage State*, *The Arcadian or Pastoral State*, *The Consummation of Empire*, *Destruction*, and *Desolation*. In the final scene, a classical architectural column stands supporting a heron's nest, with nature reclaiming mastery over its domain (Matilsky, 1992) (see Figure 8). Cole and others, beginning in the 1840s, often used a tree stump landscape motif that alluded to the destruction of nature (Cikovsky, 1979).

Figure 8

The Course of Empire: Desolation

Note. Cole, T. (1836b) *The Course of Empire Desolation*. From: The Metropolitan Museum of Art, New York City, NY [Oil on canvas, 39.25 × 62.99 in.] (Cole, 1836a).

In addition to cultivating emotions and spiritual feelings about nature, the paintings were transformational on an intellectual level. The images were often the first depictions of unknown areas. They communicated practical information about the terrain and concepts of erosion, glaciation, and other natural forces. Paintings by members of the Hudson River School made what was invisible to many visible and encouraged a shift in perceptions from fear of the wild to heightened curiosity and appreciation of the Earth, which in turn contributed to an American identity rooted in the landscape (Matilsky, 1992).

Making the invisible visible and inspiring emotion played an essential role in the American conservation and ultimately environmentalist movements (Hickman, 2013). In 1853, George Gale, one of the first white men to visit the California Redwood forest, led the effort to skin the bark from what was referred to as the "Mother of the Forest," a 321-foot tall giant sequoia. The process killed the giant tree, which was over 2,250 years old. The bark was reassembled in 1855 and featured in the "Vegetable Wonders of the Gold Regions" exhibition in the New York Crystal Palace and in the "The Mammoth Tree from California" installation in the London Crystal Palace from 1856-1866 (Hickman, 2013). This installation of the magnificent, yet dismembered tree, provided a direct and tangible representation of what continued to be invisible to most Americans on the East coast—the immense size and history of the California redwoods and the impact of humans on the wild. Like the Hudson River School paintings, the tree installation inspired awe and served as a symbol, but the installation also influenced criticism over the destruction of the tree and the wilderness (Hickman, 2013) (see Figure 9).

This exhibition and the paintings by the Hudson River School helped promote the development of a conservation movement in America, which focused on protecting the American wilderness (Hickman, 2013). In 1864, Abraham Lincoln signed the Yosemite Grant, a land bill to protect Yosemite Valley and the giant sequoias, which lead to the designation of Yellowstone National Park in 1872—the first of America's national parks. Crucial early figures in the conservation movement include Theodore Roosevelt (1858-1919) and John Muir (1838-1914).

Figure 9

Mother of the Forest Installation

Note. View of *Mother of the Forest* installation in the London Crystal Palace. ("Mother of the Forest," 2020).

Known for being an ecological thinker, political spokesperson, and author, Muir called attention to the plight of the wilderness and profoundly shaped how Americans understand and envision their relationships with nature ("John Muir," 2020). He founded the Sierra Club in 1892 (Lallanilli, 2018) and has been referred to as the "Father of our National Parks," "Wilderness Prophet," and "Citizen of the Universe" ("John Muir," 2020; Sierra Club, 2005).

Muir's travels to Yosemite with Theodore Roosevelt ultimately influenced executive orders to protect the land and wildlife. During his presidency from 1901-1909, Roosevelt placed approximately 230,000,000 acres (930,000 km) of land under public protection ("Theodore Roosevelt," 2020). In doing so, he developed five national parks, the United States Forest Service—including 150 National Forests, 51 bird reserves, and four game preserves—and 18 national monuments ("Theodore Roosevelt," 2020).

The conservation efforts of the 19th early 20th centuries were largely overshadowed by World War I, the Great Depression, and World War II, a time when America continued its transformation from an agricultural to an industrial society. Artists continued to play a role in documenting the relationship between humans and nature and educating the public on environmental issues. The field of photojournalism expanded, contributing to public awareness of the impact of the dust bowl. Ansel Adams (1902-1984) documented the National Parks in the American West with his black and white photographs elevating nature photography to an art form and advocating for an environmental sensibility ("Ansel Adams," 2020).

Before the 1960s, conserving and preserving wildlife was the singular focus of approaching environmental problems. That approach changed later in the 20th century as industrialization and deforestation continued and levels of pollution from cars, factories, nuclear fallout, and pesticides increased. As the levels of chemicals in the environment multiplied, environmental issues became increasingly complex and science-based, and there was a growing realization that conserving wildlife and natural settings was insufficient to protect the natural world.

The publication of biologist and writer Rachel Carson's (1907-1963) groundbreaking book, *Silent Spring* (1962) referred to as her "eco-manifesto"—marked the evolution of environmentalism from conservation to a focus on ecology (Dwyer et al., 1993) (see Figure 10). Inspired by the mass deaths of sanctuary birds caused by dichloro-diphenyl-trichloroethane or DDT, Carson integrated engaging narrative with scientific information in her writing. She portrayed how chemicals travel and accumulate in the food chain, causing immediate and delayed negative impacts on all life. She also articulated the interrelationship among the health of wildlife, the planet, and humans and predicted that poisoning wildlife with DDT would also affect humans even before scientists knew the scope of its impact. Carson remarked:

> Man's attitude toward nature is today critically important simply because we have now acquired a fateful power to alter and destroy nature. But man is a part of nature, and his war against nature is inevitably a war against himself. [We are] challenged as mankind has never been challenged before to prove our maturity and our mastery, not of nature, but of ourselves. (as cited in National Resources Defense Council, 2015, p. 10)

Figure 10

Silent Spring Book Covers

Note. Birds were featured on multiple covers of Rachel Carson's *Silent Spring* (1962). The birds has been a recurring symbol related to chemical pollution used by ecological artists and is referenced in *Canary Concepts and the Hidden Danger of Ubiquitous Things*.

In *Silent Spring* (Carson, 1962)—which sold over two million copies—Carson called for humans to act responsibly as stewards of the Earth to protect their own health. She also encouraged caution, further study, and the development of safer natural alternatives to harmful chemicals. Her work influenced the broader public, scientists, and artists (Brown, 2014) as well as President John F. Kennedy. Kennedy established committees assessing the use of DDT, which was discontinued in 1972 (Griswold, 2012). After the publication of *Silent Spring* (Carson, 1962), the 1960s and 1970s saw the beginning of a "new environmentalism." It was a time of heightened awareness of the ties between environmental and social problems (Barnhill, n.d.), of more ecocentric viewpoints encompassing perspectives from many cultures and social systems; and the belief in the need for deep-seated change (Barnhill, n.d.). Lyndon B. Johnson (1908-73) signed more than 300 conservation measures into law protecting land, water, and air during his presidency (1963-69). Johnson also established an agenda of social reform called the Great Society that focused on public health, social justice, and environmental protection (Natural Resources Defense Council, 2015).

In 1968, William Anders took a photograph from Apollo 8—a view of Earth just over the horizon of the moon (see Figure 12). The photo, titled *Earthrise*, was disseminated by the National Aeronautics and Space Administration (NASA) and presented a different view of Earth. Considered by nature photographer Galen Rowell (1940-2002) to be the most influential environmental photograph even taken ("Earthrise," 2020), *Earthrise* presented a small and finite view of the planet enhancing public awareness of the fragility of the Earth (Lallanilli, 2018) (see Figure 11). Under

Figure 11

Earthrise

Note. Earthrise is a view of the Earth from the moon. It was photographed by National Aeronautics and Space Administration (NASA) astronaut William Anders in 1968 from Apollo 8 ("Earthrise," 2020.)

President Richard M. Nixon, the Environmental Protection Agency was established, and the National Environmental Policy Act was passed. In 1970, Senator Gaylord Nelson (1916-2005) founded Earth Day (Lallanilli, 2018), and 20 million people marched in the streets throughout the United States, channeling the energy of the antiwar protest movements (Zhang, 2017).

Since the 1970s, environmentalism has evolved into a multifaceted movement involving organizations at the local, state, and federal levels (Gordon, 2012). Current environmental organizations such as the Center for Health, the Collaborative on Health and the Environment, and the Environmental Working Group work towards the goal of balancing human activities and the natural world, promoting an understanding of the impact of human activity and chemicals as well as sustainable legislation and social

justice. However, Carson's (1962) message about the interconnectedness of humans and the environment has been overshadowed by significant cultural shifts in the Anthropocene. Chemicals regulations have become dated, and ED continues as President Donald Trump (1946-) continues to roll back environmental protections.

Environmental Education, Fashion, and the Awareness-Action Gap

> *The truth is that for the vast majority of Americans, the environment never makes it into their top ten list of things to worry about. Protecting the environment is indeed supported by a large majority, it's just not supported very strongly. Once you understand this, it's much easier to understand why it's been so easy for anti-environmental interests to gut 30 years of environmental protections.* (Shellenberger & Nordhaus, 2004, p. 11)

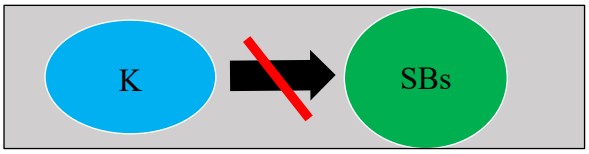
Early Environmental Education

The environmental movement led to the development of EE (Zhang, 2017), which in the 1970s revolved around work done by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the National Association for Environmental Education (now known as the North American Association for Environmental Education or NAAEE). Early educational models were related to the physical sciences and science education and emphasized cognitive understanding using an "information transmission" approach (Weston, 2004, as cited in H. J. Inwood, 2009). This approach focused on linear thinking, information acquisition, and intellectual problem-solving (Gurevitz, 2000, as cited in H. Inwood, 2008). It was based on the assumption that a linear progression of science education via directed learning would result in SBs—what is referred to as a "deficit" model of public understanding and action by Burgess et al. (1998, as cited in Kollmuss & Agyeman, 2002). Although ED awareness increased using this model, research has established that as an educational practice, EE differs from other educational

activities in that awareness does not lead to behavioral change (Hungerford & Volk, 1990, as cited in Carmi et al., 2015). This result has occurred because knowledge or awareness alone is not enough to promote SBs (Coppola, 1999; Frick et al., 2004; Grob, 1995; Wiek et al., 2011, as cited in Carmi et al., 2015) (see Figure 12).

Figure 12

Information-Based Environmental Education Model Identifying the Awareness Action Identifying the Awareness-Action Gap



Note. Knowledge of environmental degradation does not lead to SBs resulting in a gap between awareness and action.

Frick et al. 2004 (as cited in Carmi et al., 2015) found that knowledge, regardless of type, explained only 6% of the variance in behavior, which is supported by Gray and Birrell (2015), who identified that cognitive understanding might have little influence upon behaviors. The failure of this deficit model in EE has also been identified by Milton (2002), Pooley and O'Conor (2000) (as cited in Gray & Birrell, 2015), and Carmi et al. (2015) who found that awareness alone is insufficient in driving most people to change their perceptions and behaviors to mitigate ED. The result is a gap between environmental knowledge and SBs, which is referred to as the awareness-action gap (Gray & Birrell, 2015; Kollmuss & Agyeman, 2002).

The awareness-action gap is especially prevalent in FF. Although there is an increased awareness of ethical and sustainable fashion among the general public and the fashion industry has found a place in the green- and slow-living movements (Emberley 1998; Moisander & Personen, 2002, as cited in Joy et al., 2012), the issues of ethical and sustainable production of fashion have not been at the forefront of the industry as with other manufacturing and service industries such as food and transportation (Black, 2010). FF is dominated by a linear production model emphasizing speed and production, which plays a significant role in ED (Black, 2010).

Solomon and Rabolt (2004) have argued: "[S]ustainability is simply not an attribute that most consumers consider when purchasing clothing or related to the textile industry in general" (as cited in Joy et al., 2012, p. 80). Joy et al. (2012) even found that ethical fashion purchases were not a priority for fashion consumers who were conscious about the environmental and social impact of their nonfashion purchases. These consumers did not apply such principles to their consumption of fashion and exhibited little guilt regarding disposability or the discrepancy between their attitudes and FF purchases. According to Thomas (2020), Black (2010), and other authors, radical shifts in FF consumer perspectives and behavior and the FF industry are needed to address the gap and the FF footprint.

Frameworks and Factors

Researchers have proposed various frameworks that inform the awareness-action gap and SBs. They include linear progression models; altruism, empathy, and prosocial behavior models; and sociological models (Kollmuss & Agyeman, 2002). Kollmuss and

Agyeman (2002) have argued that these frameworks have validity, but the development of SBs is so complicated that no definitive explanation has been found. Gifford and Nilsson (2014) have supported this view, arguing that understanding pro-environmental concern and behavior is far more complicated than previously thought due to the large number and combinations of influences on SBs.

External Factors

Many complex and interrelated factors are associated with the awareness-action gap and SBs. They include factors not typically related to SBs, such as health and finance (Gifford & Nilsson, 2014), as well as other situational factors or influences outside people's control including:

- gender (Schahn & Holzer, 1990a, 1990b)
- socioeconomic status (Miden & Ritsema, 1983)
- mode of behavior assessment (Hines et al., 1986/87)
- group membership (environmentalists versus nonenvironmentalists: Hines et al., 1986/87)
- income (Lynne & Rola, 1988)
- access to recycling programs (Derksen & Gatrell, 1993)
- season (Becker et al., 1981)
- nationality (Meseke, 1994) (as cited in Kaiser, Wölfing, et al., 1999).

In addition to these factors, other external factors, including the invisibility and complexity of ED, are significant obstacles. Some of the most critical aspects of ED are invisible to consumers. Landrigan, lead author of the 2017 Lancet Commission on

Pollution and Health, stated that pollution is a "massive problem that people aren't seeing because they're looking at scattered bits of it" (as cited in Daigle, 2017, para. 5). Chemical and plastic pollution are often in gas form or in water as microfibers that are invisible to the naked eye. The health from these pollutants are often delayed and disassociated from their source. In addition, many aspects of the FF system are invisible to consumers. Most of the production and manufacturing processes take place in sweatshops in underdeveloped countries and are further hidden by a lack of traceability and poor labeling. These factors and others contribute to a disconnect between consumers and the FF and ED processes (Black, 2010; Oxford, 2012).

The complex and scientific nature of ED is another significant factor in the awareness-action gap (Kollmuss & Agyeman, 2002). Complex systems and concepts have been identified as a barrier to studying the impact of global environmental changes (Whitmee et al., 2015). McNeill and Engelke (2014), for example, described energy as a "vexingly abstract concept" (p. 7). Researchers have argued that the complicated scientific processes involved in climate change make it hard for nonexperts to comprehend it (Cameron, 2003; Dibley, 2011; Feygina, Jost, and Goldsmith, 2010; Salazar, 2011, as cited Gorr, 2014). Cognitive limitations of ED issues such as climate change, biodegradability, and energy can inhibit a full understanding of consequences, which can lead to underestimating a problem and to compromising emotional engagement and a willingness to act to solve it (Kollmuss & Agyeman, 2002).

The complexity and invisibility of ED including the delayed health effects of chemical and plastic pollution, contribute to the lack of relevance and accessibility of ED.

Such inaccessibility, affects the public's level of knowledge and fuels predominant value orientations.

Internal Factors: Environmental Attitude

While the complexity of developing SBs has been a prominent feature in 20th century EE literature (Kollmuss & Agyeman, 2002), the role of internal factors—specifically an environmental attitude—has had sustained attention in the EE field (Marcinkowski & Reid, 2019). An environmental attitude consisting of K, V, and intended ecological behaviors (referred to as sustainable behaviors), is considered a strong precursor and/or predictor of behavior and is considered to be the least common denominator of most EE approaches (Kaiser, Ranney et al., 1999) (see Figure 14). This relationship is referred to as an attitude-behavior relationship (A-B). A-B has been used by various researchers such as Kaiser, Wölfing, et al. (1999) and Yee and Hassan (2016) to help explain human behavior. In "Reviews of Research on the Attitude-Behavior Relationship and their Implications for Future Environmental Education Research," Marcinkowski and Reid (2019) reinforced the power of the A-B relationship by identifying "reasonably clear, consistent, and substantial evidence, within and beyond EE research, regarding the relatively moderate strength to many A-B relationships" (p. 467). In this study, potential changes in the A-B relationship are measured after experiencing an ecological art intervention, CC. The measurements consisted of K, V, and intended SBs.

Knowledge. K, or what is often referred to as "environmental knowledge" in terms of ED, is defined by Chekima and Chekima (2019) as is the amount of information

individuals have concerning environmental issues and their ability to understand and evaluate its impact on society and the environment. Kaiser, Wölfing, et al., (1999) further distinguished environmental K in terms of factual environmental K, which is K about ED, and K about ecological behavior, which is K about what and how something can be done to prevent or alleviate it. They also identified that while factual K about the environment is a precondition of one's environmental attitude, it is not strongly related to SBs (Kaiser, Wölfing, et al., 1999).

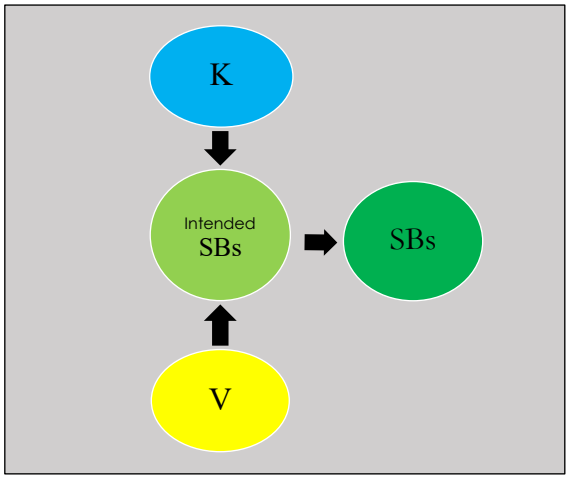
Kaiser, Wölfing, et al. (1999) contend factual K's influence is attenuated by environmental attitude and ecological behavior intention (referred to as intended SBs in this study). They identified that several studies found no relationship between K and SBs, but that the relationship between K and SBs is stronger when the K involves information about the ecological behavior (Levenson, 1974; Sia et al., 1985/86; Smith-Sebasto & Forner, 1994, as cited in Kaiser, Wölfing, et al., 1999). However, while factual environmental K of the role of transportation and greenhouse gases in ED is common, knowledge of the significant implications of the FF system on ED and human health are often overlooked (Clement & Clement, 2011; Joy et al., 2012) (see Figure 13).

Values. Given the awareness-action gap, the relationship between values—the second component of an environmental attitude— and SBs has been a focus of theorists including Kaiser, Wölfing, et al. (1999), Stern et al. (1993), and Chekima et al. (2016) who found that cultural values (along with environmental advertising) are primary influences in building green purchase intentions. According to Stern et al's. (1993) psychological model of SBs, primary motivators of environmental concern are a

combination of altruistic, biospheric, and egoistic value orientations (stemming from the altruism theory of Schwartz) (1977, as cited in Kollmuss & Agyeman, 2002). Stern et al.'s (1993) model is based upon the premise that every person has all three orientations, but in different strengths. The altruistic orientation is concerned with the removal of destruction and suffering from other people, while the biospheric orientation is concerned with the removal of destruction and suffering from the non-human world—a standard approach in traditional EE. The egoistic orientation is concerned with the removal of suffering and harm from oneself (Kollmuss & Agyeman, 2002) and has been found to be the strongest value orientation, followed by social and then biospheric concern (Stern et al., 1993).

Figure 13

Model of A-B Relationship



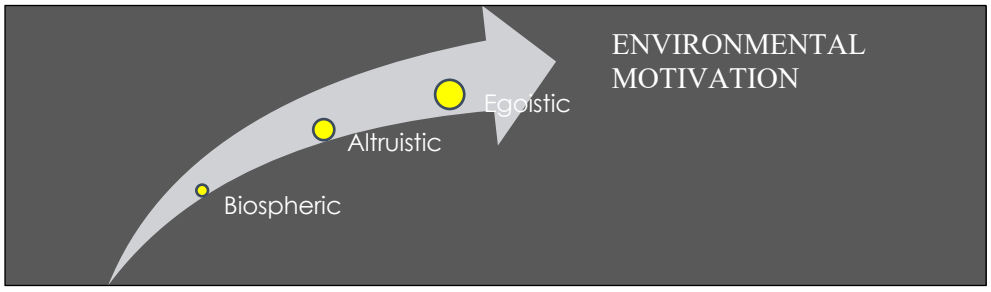
Note. This simplified model of the A-B relationship is based upon Kaiser, Wölfing, et al's (1999) environmental attitude model. Environmental attitude consists of K, V, and intended SBs, which ideally result in SBs.

The dominance of the egoist value orientation is supported by what Breithaupt and Hamilton (2019) have referred to as an "empathy deficit disorder" in the American

population and a sharp drop in dispositional empathy in American college students by 40% from 2000-2011 (Konrath et al., 2011). This drop is accompanied by a prevailing anthropocentric perspective (Heinberg, 2014). This perspective frames humans as separate from and above the natural world, which is viewed as a source of resources for humans (Davies, 2013; Jackson, 1994; Kahn, 2010; Naess, 2008; Speth, 2008, as cited in Anderson & Guyas, 2012; Martusewicz et al., 2011). This egoistic belief—also referred to as anthropocentrism or human exceptionalism—existed in Ancient Greece with philosophers, including Plato and Aristotle (Anderson & Guyas, 2012). It is embedded in many Western religions and philosophies and is fueled by a predominantly competitive and consumerist society that has transformed humanity's ontological and material existence (Anderson & Guyas, 2012) (see Figure 14).

Figure 14

Three Value Orientations Contributing to Environmental Motivation



Note. This diagram is based upon Stern et al.'s (1993) model.

Although Kagan (2011) has argued that there are healthy degrees of self-centeredness in individuals and species and against a "holistic reductionism, if the egocentric dimensions of existence are negated" (p. 351), researchers such as Heinberg (2014) contend that current levels of egocentricity in industrialized countries are narcissistic and destructive. The prevailing egoistic viewpoint, as well as the invisibility, non-immediacy, and complexity of ED, contribute to disconnections between humans and the natural world, humans and world systems, and, ultimately, humans and ED.

Within this anthropocentric context, many EE learning activities have emphasized positive outdoor nature experiences and the biospheric value orientation as a way to address humans' estrangement from nature and enhance connections with the natural world. Learning activities have ranged widely. Some have been adventure experiences centered on short-term and risk-oriented activities based on the physicality of outdoor experience (Nicholls et al., 2008, as cited in Gray & Birrell, 2015). Others have included place-based education experiences built on place-attachment theory; these activities are intended to invoke connections to the community to foster a desire to protect and conserve the environment (Nicholls et al., 2008, as cited in Gray & Birrell, 2015). In doing so, altruistic and biospheric desires to conserve and protect the Earth have been emphasized. Starting from the philosophy that you cannot protect what you do not know (Dioum, 1968, as cited in Carmi et al., 2015) nature education has emphasized humans' obligations to the environment based on its (Anderson & Guyas, 2012) moral worth, which does not depend on its usefulness to human beings (Kollmuss & Agyeman, 2002).

Studies have shown successes and shortcomings with such an approach. Short-term experiences in nature include wilderness trips (D'Amato & Krasny, 2011) and outdoor classes. Short-term experiences in nature have enhanced a connection to nature (Johnston, 2009) and helped to cultivate a positive relationship between place identity and feelings of environmental responsibility (E.K. Lawrence, 2012; Vaske & Kobrin, 2001). However, challenges exist. Studies have also indicated challenges linking EE outdoor experiences or newfound commitments to post-course environmental, day-to-day behaviors (D'Amato & Krasny, 2011; Palmberg & Kuru, 2010). Ongoing experiences are optimal for cultivating deep engagement, and outdoor nature education remains a neglected part of the public school curriculum (James & Williams, 2017) or is relegated to the realm of science (York, 2014). The challenge of focusing on the biospheric or altruistic value orientations in EE is also supported by Matthies et al. (2018) who found that consequences to humans are more important than consequences to the environment when assessing how individuals consider consequences related to forest management objectives.

The EE model focused on nature-centered activities has fostered positive connections between humans and the natural world and knowledge and awareness of environmental problems. However, such experiences may not address other factors relating to the awareness-action gap, including the invisibility, nonimmediacy, and complexity of ED (Abram, 1996; Suzuki, 1997, as cited in Coles & Pasquier, 2015). Kagan (2011) has argued that the complexity of ED must be addressed to impact consumerist culture—the greatest obstacle to sustainability.

Intended Sustainable Behaviors (SBs). The third component of an environmental attitude is intended SBs, or the plan to engage in SBs—the ultimate goal of environmentalism and environmental education (Kaiser, Wölfing, et al., 1999). Sustainable behavior is defined as behavior that encompasses values, norms, beliefs, senses of responsibility in deliberate actions focused to providing well-being of all living beings, including present and future generations (IGI Global, n.d.). These positive behaviors related to EE address the challenge of ED and are considered the ultimate goals of EE. In the EE literature, numerous, overlapping definitions and applications of terms addressing positive behaviors exist. Terms include environmentally responsible behaviors, pro-environmental behaviors, ecological behaviors, and SBs (used in this study).

Kaiser, Wölfing, et al. (1999) identified that the relationship between ecological behavior intention (referred to as sustainable behavior intentions in this study) and ecological behavior (referred to as sustainable behavior in this study) is usually the most striking relationship in the A-B model (Maloney & Ward, 1973; Maloney et al., 1975; Schahn & Holzer, 1990a, 1990b: Lansana, 1992; Augagen & Neuberger, 1994, as cited in Kaiser, Wölfing, et al., 1999) or at worst moderately related (Smythe & Brook, 1980; Stutzman & Green, 1982; Hines et al., 1986/87; Moore et al., 1994; Diekmann & Franzen, 1995, as cited in Kaiser, Wölfing, et al., 1999), although there are some types of ecological behavior in which the relationship between ecological behavior intention and ecological behavior does not exist or is small. Predictors of and factors relating to SBs

have been the focus of EE and the driving force behind the evolution of EE for the past fifty years.

Environmental Education Development

> *There are two ways to change the world: One of them is just to talk a presidential candidate into it . . . then he wins, and the whole world changes. The other way is a paradigm shift. And that takes time.* (Mark Shellenberger, 2007, as cited in Horowitz, 2007)

In the 21st century, researchers, theorists, and educators have acknowledged that significant shifts in education and perspective have been needed to address ED. Jickling and Sterling (2017) have argued that the history of EE and its predecessors have always been problematic. Johnston (2009) inquired:

> How, then, are we to 'save the planet' and all future generations (of all species) as long as environmental education and sustainability learning are stuck in the curriculum box? To borrow from Albert Einstein, we cannot stop environmental degradation with the same educational system that allowed environmental degradation to happen in the first place. (p.151)

Shellenberger and Nordhaus (2011) have argued environmentalism has become an obstacle to addressing barriers to SBs and that it must die to further engage Americans and promote necessary worldwide transformation:

> This is a crisis because environmentalism will never be able to muster the strength it needs to deal with the global warming problem as long as it is seen as a "special interest." And it will continue to be seen as a special interest as long as it narrowly identifies the problem as "environmental" and the solutions as technical. (p. 26)

A recurring criticism of EE has involved the focus on the term "environment," which Ferreira (2009) has asserted is problematic and has shortcomings. Ellis (2009) has argued that the concept of an "environmental crisis" has existed for decades, while nothing has changed for humans. Strife (2010) and others have argued that EE has been

defined too narrowly, often excluding the role played by humans and social issues (Jickling & Sterling, 2017). This concept began with Rachel Carson who asserted that a war against nature is a war against humanity.

Saylan and Blumstein (2011) have argued that learning about ED has not translated into changed behaviors, as ED needs to become relevant. In *Rethinking Education* (2015), The United Nations Educational, Scientific, and Cultural Organization (UNESCO) report supported this view emphasizing:

> Education for the common good must be achieved via a humanizing approach, which incorporates ethics and values and is based on respect for life and human dignity, equal rights, social justice, cultural diversity, international solidarity, and shared responsibility for a sustainable future. (p. 10)

Researchers and educators including Lankenau (2012), Johnston and Carter (2007), and Strife (2010) have acknowledged the need to promote a paradigm shift from how humans currently view their relationship with nature to an interrelationship—one that involves a deeper and more relevant and personal understanding that humans are interconnected with all life on the planet. Strife (2010) has argued that the definition needs to be humanized and reframed, shifting to a more socioecological-based model, especially in the context of the Anthropocene. Johnston (2009) has suggested that such a shift is needed urgently. Anderson and Guyas (2012) referred to it as an "ontological paradigm shift" that aims to develop what Naess (2008) referred to as an "eco-identity" (as cited in Anderson & Guyas, 2012). An eco-identity transcends being eco-literate. It encompasses an understanding that the world's problems "are integrally and relationally part of everyone and everything else and what destroys others or the planet destroys us as well" (Naess, 2008, as cited in Anderson & Guyas, 2012, p. 228). This paradigm shift is

also referred to as a commitment to “Deep Ecology” (Naess, 2008, as cited in Anderson & Guyas, 2012). “Interbeing” (Hanh, 2008), “more-than-human” (Barrett et al., 2017), and “ecocentric” (Weintraub, 2006, as cited in Kagan, 2011).

The goal of cultivating such a shift in EE is evident by the evolution of the EE definition since its conception in 1969 (see Figure 15). The EE definition has expanded to include concepts related to ecology, transformation, and health, as well as community, globalism, and sustainability. While many approaches to EE exist, recurring components include an ecological framework and TL.

Figure 15

EE Definition Development

1969 Definition	2015 Definition
The permanent process in which individuals gain awareness of their environment and acquire the knowledge, skills, experiences, and also the determination, which will enable them to act individually and collectively to solve present and future environmental problems. (Stapp, 1969, p. 31).	A process that helps individuals, communities, and organizations learn more about the environment and develop skills and understanding about how to address global challenges. It has the power to transform lives and society. It informs and inspires. It influences attitudes. It motivates action. EE is a key tool in expanding the constituency for the environmental movement and creating healthier and more civically engaged communities. (NAAEE, 2015, para. 1).

Ecological Framework and Post-Environmentalism

> *We can inspire global change if we don’t scare people to death.* (Cembalest, 1991, p. 103)

EE researchers and educators have increasingly applied an ecological framework and TL strategies to EE resulting in overlapping models such as transformative eco-

education (Lin & Oxford, 2012), the deep ecology movement (Naess, 2008, as cited in Anderson & Guyas, 2012), eco-justice education, and eco-social transformation (Martusewicz et al., 2011). Although these approaches have been considered synonymous with EE, their focus and educational methods contrast with traditional EE models. A primary difference between EE and EE with an ecological emphasis is the humanizing component of systems learning, which Kagan (2011), Sweeney (2017), and others have emphasized. Systems learning in EE has stressed the interrelationship between the natural world and human-based systems and processes (see Figure 16).

Kagan (2011) defined a system as "a group of interacting, interdependent components that form a complex and unified whole" (p. 96) and provided seven principles (inspired by Booth Sweeney & Meadows, 1995) that encompass ecological systems thinking:

- Look for the big picture.
- Balance the short-term with the long-term.
- Systems thinkers remind themselves that "Things change all the time, life is messy, and everything is connected."
- Systems thinkers value varied sources and forms of knowledge (e.g., both quantitative and qualitative data) and are aware of our tendency to see only what we can measure, and of our tendency to leave aside what we can't measure: Systems thinkers try not to ignore what they cannot measure, or cannot understand.
- Systems thinkers are aware that they are part of the system being observed.

- Systems thinkers are not afraid of paradoxes: The complex reality of systems is not as nicely logical as linear theories and models may be.
- Systems thinkers are curious about new tools and languages, searching for a language focusing on interconnections rather than on single events

Sweeney (2017) has identified that systems thinking principles prepares students for the complexity of the world and to better understand the short and long-term impacts of human behavior on the Earth as well as on humans themselves. Kagan (2011) and others have argued that such a shift in understanding is necessary to develop SBs and a more sustainable culture (Naess, 2008; Hanh, 2008 as cited Anderson & Guyas, 2012). Kagan (2011) also has suggested that such a shift is "a difficult and wide-ranging transformation of the modern mode of knowing" (p. 463). However, Kagan considers it the first step in opening up a field of high complexity to find alternatives to what he has referred to as the "cult of unsustainability" in the ages of consumption and aesthetics.

By humanizing ED and promoting interrelationships between humans and the world's natural systems, the ecological framework encapsulates egoistic value orientations as well as biospheric and altruistic ones. The importance of the egoist orientation or personal relevance, as identified by Saylan and Blumstein (2011), is supported by other recent models and research. Lin and Oxford (2012) emphasized the essential human benefits and consequences of environmental challenges in *Transformative Eco-Education for Human and Planetary Survival*. Kagan (2014) has argued that egocentric dimensions of existence are present in all living organisms—they

are part of the complexities of life—and must be accepted as integral to a much-needed transformation process.

According to Strife (2010), presenting issues such as climate change in a humanistic and consequential way (rather focusing on scientific evidence) has the potential to bring more personal meaning to distant environmental problems. Strife (2010) has argued that the increase in national attention to climate change is the result of a shift in focus from the natural scientists' claims about the loss of permafrost to information about the human, social, and economic consequences of global warming. This attention has been enhanced by the increase in climate-change-related weather disasters, which have had direct and far-reaching implications (Corbett, 2018). In a speech to the United Nations Climate Action Summit, activist Greta Thunberg (2019) focused on the human implications of climate change, arguing that it is the biggest crisis humanity has ever faced. Environmental issues became more relevant to humans during COVID-19 pandemic of 2020—what has been referred to as a "wakeup call for the planet" (Armstrong et al., 2020; Howard & Webb, 2020; UN News, 2020; Zhang & Chen, 2020) and "transformative" (Sommer, 2020). Quarantines forced humanity to change their behaviors. Such measures resulted in improved air and water quality featured in photos throughout the media (Meredith, 2020) and the emphasis on the interconnected quality of life (Armstrong et al., 2020; Howard & Webb, 2020). Howard and Webb (2020) argued that failing to take nature into account puts human health in danger.

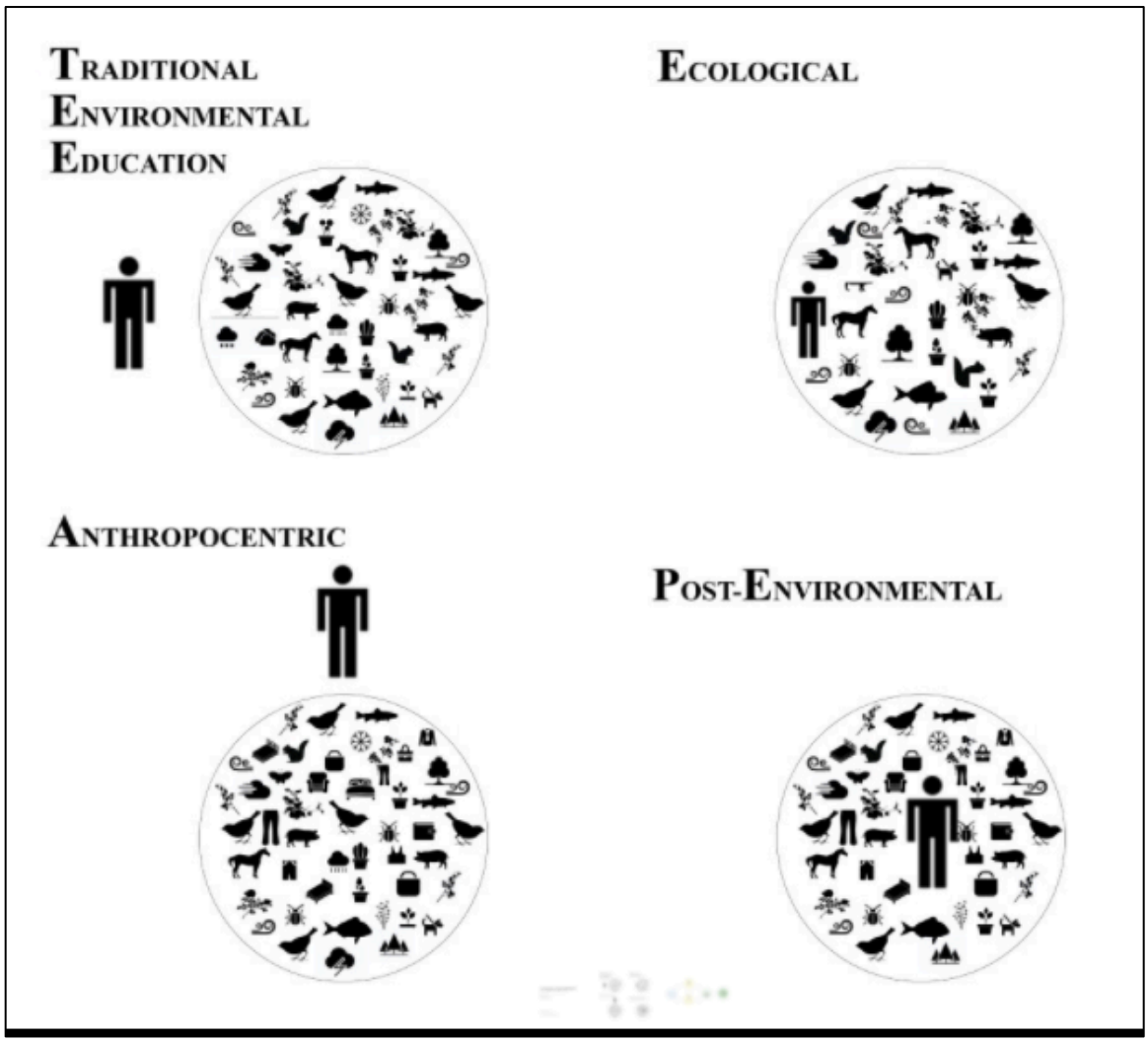
Although the emphasis on humanizing ED through an ecological framework and a shift in perspective are consistent features of ecological-based EE, humans are viewed differently within the interconnected system. More commonly humans are viewed on the same plane as their environment, while the post-environmentalists have maintained the primacy of humans over nature echoing Carson's message that humans have the fateful power to alter and destroy nature. The post-environmentalists simultaneously embrace ecological systems and the Anthropocene. They own their responsibility as the dominant life form, but also understand they are interconnected and vulnerable. In the article "Stop Trying to Save the Planet," Ellis (2009) argued that humans need to consider the planet they want to live on, as nature is going to be what humans make of it; "It's high time we saved ourselves—and not from nature," but from what Ellis has referred to as a "trashed planet" (para. 18) (see Figure 16).

McNeill and Engelke (2014) have argued that the environmental crisis will not stop the Anthropocene and that the Anthropocene will continue (barring catastrophe), as humans' powers to alter ecosystems will only increase. Shellenberger and Nordhaus (2011) argued that humans must be good stewards of the Earth for the sake of themselves and must responsibly manage the natural world to create the future they want—a good Anthropocene (as cited in Horgan, 2011). Shellenberger and Nordhaus (2011) also argued that the choices humans face are not whether to modify the environment, but how:

> What we mean is that we don't have any choice. We are now the dominant ecological force on the planet and that means that we must evermore actively manage our environment. It is both a responsibility and an opportunity, and it demands that we actually make hard choices. If we want more forests and more wild places, then we'll need more people living in cities and more intensive

Figure 16

Diagrams Illustrating the Variations in Viewpoints in Traditional EE, Ecological, Anthropocentric, and Post-Environmental Frameworks



Note. The variations of the human figure represent the variations in perspectives of human relationships with and the natural world. The ecological framework emphasizes systems theory including both natural and manufactured elements. These designs expanded upon Lehmann's (2019) diagrams addressing the disconnection of humans from nature.
Concept Drawings: Stacey Skold
Graphic Design: Stacy Asher
Icons: Hea Poh Lin from the Noun Project

> agriculture. If we want less global warming, then we'll need to replace fossil energy with clean energy, including a lot of nuclear energy. If we want to save places like the Amazon rainforest, then we have to recognize that, over the next 50 years, a lot of the Amazon is going to be developed. The choices will come down to where we want development, and what we might save in the process. (as cited in Horgan, 2011, para. 8)

In addition to the risk to humans from a "trashed planet" and weather disasters, ED threatens human health. The human health dangers of ED and pollution were first brought to the attention of the American public with the release of Rachel Carson's highly influential eco-manifesto *Silent Spring* (1962). The connection between health and the environment was renewed in 1978 by the Love Canal disaster (Davies, 2013). Hundreds of lives were affected near Niagara Falls, New York when Hooker Chemical Company (now Occidental Chemical Corporation) dumped 21,800 tons of chemical byproducts from the manufacturing of dyes, perfumes, and solvents for rubber and synthetic resins over a period of decades in a 70-acre landfill ("Love Canal," 2020). The chemical and plastic pollution was cleaned up over a period of 21 years ("Love Canal," 2020), but the disaster was considered the beginning of the environmental health movement (Davies, 2013).

Although the name implies an environmental focus, the movement has an ecological framework based on the egoist value orientation. It has placed ED, especially chemical pollution, in a human health context, reflecting the concept that direct and personal experience with the implications of chemical exposure creates increased relevance (Davies, 2013). Davies has argued that providing a human face for the health implications of ED communicates them to the public in a way that makes them more easily understandable (Davies, 2013). This emphasis on physical health has also extended

to mental health, as identified in Richard Louv's *Last Child in the Woods* (2006). This book introduced the term "nature deficit disorder," referring to the relationship between decreased time in nature and the wide range of behavioral problems in humans, especially in children.

The environmental health movement has raised awareness about the interrelationships among human health, ED, and the health of the natural world. This awareness has resulted in the growing interest in slow-living modalities, such as "slow food," which emphasizes chemical-free growing methods, and to a lesser degree "slow fashion," which emphasizes eco-friendly clothing and furniture. The lesser embrace of eco-fashion has been attributed in part to the fact that the risk perception that exists toward fast food does not exist in clothing (Petite, 2007, as cited in Joy et al., 2012). Although textiles (including apparel and furniture) are an intimate part of everyday life in the form of FF objects, the health risk perception is low (Petite, 2007, as cited in Joy et al., 2012). A disconnect continues to exist among perceptions of human health, health of the natural world, and FF (see Figures 16 & 17). According to Lieberman (2014) this is in part attributed to the "banality of the everyday" or the inherent tendency to accept the world as normal, which can have negative effects and ultimately dysevolution.

Transformative Learning

> *The global crisis of unsustainability is not only a crisis of the hardware of civilization, it is also a crisis of the software of minds. The search for a more sustainable development in the 'developed' world has, so far, been focusing too much on hardware updates, such as new technologies, economic incentives, policies and regulations, and too little on software revisions, that is cultural transformations affecting our ways of knowing, learning, valuing and acting together. The cultural software is, nevertheless, at least as much part of the*

> *fundamental infrastructure of a society as its material hardware. We need a global (environ)mental change. . . .* (Kagan, 2012, p. 10)

Changing perceptions about health risk and about the human place in nature from being disconnected to connected or interconnected (Gray & Birrell, 2015) has become a focus in EE. Cultivating SBs involves changing perceptions Such a shift is considered by Johnson to be needed urgently (as cited in D'Amato & Krasny, 2011) and the reason researchers and educators including Lankenau (2012) and Parker and Wilding (2012) have applied TL strategies to ecological-based EE models. Ecological-based EE models with TL include transformative eco-education (Lin & Oxford, 2012), transformative environmental education through the arts (York, 2014), transformative environmental education (Johnston, 2009; Lankenau, 2012), and imaginative ecological education (Judson, 2010). These models have emphasized an ontological shift to an eco-identity for both human and planetary survival to not only heal the planet, but to heal "ourselves" (Yeager & Howle, 2012).

Other researchers such as Saylan and Blumstein (2011) have focused on critical thinking components of TL to encourage a perspective shift to prompt learners to "reshape the unsustainable identities and worldviews they have inherited with the goal of fostering more sustainable personal and societal ways of being" (Lankenau, 2012, p. 1). Unlike assimilative learning (the process or type of learning that takes place when students acquire new information that fits into or augments their preexisting knowledge), TL involves a revision or restructuring of current knowledge (McGonigal, 2005). Key features of TL include critical thinking and experiencing a profound structural shift in

perspective and the basic premises of thought, feelings, and actions—a fundamental transformation of worldviews at the personal and societal levels (O'Sullivan, 2012).

TL theory was developed by Jack Mezirow in the 1970s, but was informed by varied and diverse sources, including indigenous or first people's knowledge, ancient Greek philosophy, and Eastern philosophical traditions (Parker & Wilding, 2012). Mezirow (2000) emphasized a rational questioning of assumptions and a process of revising one's thoughts, which occurred in ten phases:

1. disorienting dilemma;
2. self-examination with feelings of guilt or shame;
3. a critical assessment of assumptions;
4. recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change;
5. exploration of options for new roles, relationships, and actions;
6. planning a course of action;
7. acquiring of knowledge and skills for implementing one's plans;
8. provisionally trying of new roles;
9. building competence and self-confidence in new roles and relationships; and
10. a reintegration into one's life on the basis of conditions dictated by one's new perspective. (Mezirow, 2000, p. 22)

Other TL theorists, expanded upon Mezirow's approach. Cranton (2000), acknowledged individuality and the different degrees to which these phases occur. Edward W. Taylor, Randee Lawrence, Carolin Kreber, and John Dirkx, (as cited in Taylor & Cranton, 2012), expanded upon Mezirow's rational approach emphasizing what has been referred to as an "extrarational" approach, which extends beyond the cognitive domain into the affective domain (AD)—the realm of emotions and feelings (Taylor & Cranton, 2012). As senses and emotions were incorporated in TL theory (Carmi et al., 2015), varied TL strategies developed to access emotions.

The Role of Art in Learning and Transformation

> *One of the main strengths of the arts is an ability to provide new perspectives on the lived world, often leading to a startling defamiliarisation with the ordinary.* (Greene, 2000, as cited in Foster, 2015, p. 1)

Background

Although art is considered a peripheral component in education overall, it is deemed necessary to human culture (Parker & Wilding, 2012). First evident in pigment on caves, art has existed in all cultures and times with its impact on society dating back to Plato and Aristotle (Curtis et al., 2014). Educational pioneer John Dewey (1859-1952) has argued that art is the most effective mode of communication that exists (1934) and reflects and embodies life experiences, understandings, and meaning in aesthetic form (Anderson & Milbrandt, 2005; Dissanayake, 1988 as cited in Anderson & Guyas, 2012).

Researchers and theorists have identified how the arts promote learning and transformation in meaningful ways (Barton, 2014; Ewing, 2010; Caldwell & Vaughan, 2011, as cited in Barton & Baguley, 2014) and have examined the relationships between multifaceted art experiences and learning and transformation. They have addressed art as a tool in learning, considering the inherent value of art itself and its usefulness in learning core subjects. In the *Role of Imagery in Learning* (1987), Harry Broudy (1905-1998) developed the Discipline-Based Art Education (DBAE) framework based on the power of aesthetics, art history, art production, and art criticism as effective educational tools (Dobbs, 1998). One of its premises is that the creation and inquiry of artwork is the primary means through which we understand our experiences and transmit cultural values. Fowler (2001) has supported this premise, contending that when students were

allowed to participate in a learning process using the arts, they were more likely to become engaged in the task and learn material "from the inside out rather than from the outside in" (as cited in Song, 2012, p. 800). Dickinson (2002) has argued that the arts assist in multiskilling enhancing the grasp of difficult concepts, aiding memory retention, extending attention spans, and increasing concentration and enjoyment of learning by providing "rich multisensory experiences that engage the whole mind-body-emotional system" (p. 6).

Other theorists have focused on the arts as inherently significant in education. Educational theorist Elliot Eisner (1933-2014) argued that core subjects must be taught using strategies that come "naturally and powerfully" through the study of the arts (Cerveny, 2001, para. 9). He identified that developing the ability to think in images and symbols cultivated nine cognitive development attributes needed to be an educated and functioning adult in society, including intelligence, how to perceive and explore relationships, and an understanding that not all we know can take the form of language (Cerveny, 2001).

Dewey also addressed art as a tool for transformation. Dewey believed art functioned as an experiential artifact and a catalyst to understanding realms beyond the physical. He argued that the processes of artistic inquiry, such as looking and finding meaning, were transformative—they expanded perceptions, opened venues for understanding and action, and "extended connections with what is good and right" (Goldblatt, 2006, p. 17). Maxine Greene (1917-2014), an influential figure in the field of the philosophy of education, supported Dewey's work by focusing on experiential art as a

source of world understanding, meaning, and transformation. Greene argued that the arts can defamiliarize experience: They begin with the familiar and transfigure it into something different enough to enable persons to "hear and to see what they would not ordinarily hear and see" (Greene, 1988, p. 129). Dewey's and Green's theories on art as a transformative tool have been supported by many other theorists, including Kagan (2011) and Song (2012). Studies have identified that art experiences can impact shifts in perspectives (Acuff, 2011; Grushka, 2009; Mantie, 2008) and behaviors (Cawthon et al., 2011; Kennedy, 2019).

Art Experience: Multimodal and Multidimensional

> *You're never going to reach someone completely through intellect. You can speak to somebody until you're blue in the face and you're not going to get anywhere if there's not something to steer their heart.* (Roger Featherstone, as cited in Scarce, 2016, p. 251)

The experience of art involves multimodal and multidimensional qualities that enhance learning and transformation. Nanay (2012) has argued that experiencing art is normally multimodal—it is the rule, not the exception, as it is the result of perceptual processing in more than one sense modality. This experience can encompass multiple aesthetic components, including pictures, illustrations, audio, speech, writing and print, music, movement, gestures, facial expressions, and colors (Kennedy, 2019). By incorporating many aesthetic components, it engages the senses and functions as a metaphor that can "condense emotive knowing into an essence" (Levitin, 2008, as cited in Anderson & Guyas, 2012, p. 185).

Multimodal learning in education means teaching concepts using many different modes or channels of information—anything that communicates meaning in some way (Kennedy, 2019). Wandera (2016) has argued for purposely and strategically deploying multimodalities in the classroom for TL. Given the multiple learning styles and intelligences of individuals identified by developmental psychologist, Howard Gardner (born 1943) and the multimodal communication methods available in the 21st century, the multimodal qualities of art enhance its ability to communicate and transform (Barton & Baguley, 2014). In addition to art's ability to enhance learning, art can also stimulate a range of emotions in the AD, providing a catalyst for learning beyond traditional, cognitive ways of knowing (Lawrence, 2008, as cited in Song, 2012).

The AD is one of three domains in learning posited in Bloom's classic model, *Taxonomy of Educational Objectives* (1956). This multidimensional model encompasses the AD, which refers to growth in feelings or emotions; the cognitive domain, which relates to mental skills or knowledge; and the psychomotor domain, which involves manual or physical skills (Parker & Wilding, 2012). The three domains have been treated as separate in American education policies and programs, which have emphasized the cognitive domain (D. J. Curtis et al., 2014; Parker & Wilding, 2012). In recent years, however, there has been an increased focus on the interrelationships among the learning domains (Parker & Wilding, 2012). The interdependence among the learning domains is supported by Parker and Wilding (2012). They compared Bloom's taxonomy with MacLean's biological and evolutionary model of the "triune brain," which comprises three layers: the cognitive cortex, the emotional/limbic region, and the physical/brain

stem. Although this comparison is considered simplistic, Parker and Wilding (2012) have argued it provides a biological basis for understanding how learning is multidimensional involving many areas of the brain rather than the cognitive cortex, which has evolved relatively recently (see Figures 17 & 18).

Figure 17

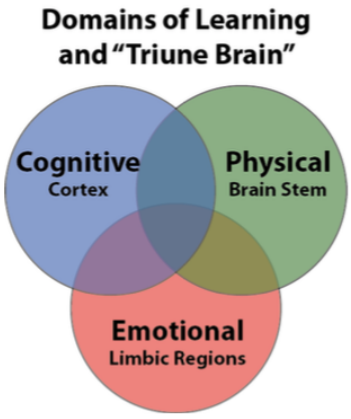
The Relationship Between Bloom's Taxonomy and MacLean's Triune Brain

Blooms Taxonomy	MacLean's Triune Brain
Cognitive: mental skills (Knowledge)	New Brain - Neomamallium - Neocortex - Thought (including planning, language, logic & will, awareness)
Affective: growth in feelings or emotional areas (Attitude)	Mid Brain - Palleomammalian –R Complex- Limbic System - Emotion (feelings, relationship/nurturing, images and dreams, play)
Psychomotor: manual or physical skills (Skills)	Old Brain - Archipallium - Reptilian Brain - Instinct (survival, breathing/swallowing/heartbeat, startle response)

Source: Parker and Wilding (2012).

Figure 18

Model of Multidimensional Learning



Source: Parker and Wilding (2012).

Researchers and educators in varied disciplines have shown that the AD is crucial in all aspects of learning application (Arnold, 2005: Csikszentmihalyi, 1990; De Vignemont & Singer, 2006; Hinds & Sparks, 2008; Le Doux, 1992, 1996, 2003; Stern, 1985, as cited in Gray & Birrell, 2015; Gray & Thomson, 2016; Parker & Wilding, 2012). Researchers have found that emotions must be activated to instill lifelong learning and behavior (Kudryavtsev et al., 2012; Lieflander et al., 2013; Perkins, 2010, as cited in Gray & Birrell, 2015; Gray & Thomson, 2016). Wilensky and Wilding (2010) (as cited in Parker & Wilding, 2012) have supported this view, identifying that the most significant activities in life involve integrating multiple learning domains.

In addition to the role the AD plays in learning and emotions, it also helps shape values and transformation. This has been supported by R.L. Lawrence's (2012) extrarational process approach to TL, which involves meaning-making through symbol, image, and emotional expression. In addition, Heath and Heath (2007) determined that ideas must be wired with feelings to make people care about those concepts because clear thoughts in the form of sensory information are absorbed easily by the human mind. Heath and Heath also found that positive and negative emotions play a role in what they refer to as defining or insightful moments when people gained an increased understanding (2017) and in changing things when change is hard (2010). They further argue that such transformative moments can be either engineered, spontaneous, negative, or positive and can precipitate a shift in perception. Christiano and Neimand (2018) support Heath and Heath's (2007) findings, as they identified that three of the five key

principles in “The Science of What Makes People Care” involves the AD: communicating in images, invoking emotion with intention, and telling better stories.

The importance of the AD in EE is supported by researchers, including Coppola,1999; Frick et al., 2004; Grob, 1995; and Wiek et al., 2011 (as cited in Carmi et al., 2015), who found emotions fully moderate the significant impact of environmental knowledge in SBs. As a result, researchers and educators have integrated varied art-related experiences with EE. These experiences range from art production activities, performance art, and art criticism and to various art forms, including poetry, digital media, filmmaking, sculpture, drawing, printmaking, music, and the visual arts, which in turn have been incorporated into outdoor experiences, nature-based education, place-based classrooms, indoor classrooms, and combinations of them. Although art augments some models, it serves as the point of departure in others. Gaff (1990), Adams (1991), Lindholdt (1999), Gurevitz (2000), McGibben, (2005), and Graham, (2007) (as cited in Inwood, 2009) have argued that affective learning can inform learners’ attitudes and behaviors related to the environment. Studies support the integration of art in EE to establish a balanced curriculum—one that York (2014) has referred to as holistic and transformative.

Sipos et al.’s (2008) framework, “Head, Hands, and Heart,” integrated transdisciplinary study, practical skill sharing and development, and translation of passion and values into behavior, implementing it across a wide range of existing curricula to achieve what they referred to as transformative sustainability learning (TSL). Upitis (2009) supported this integrated approach, concluding that incorporating art into

EE was a powerful catalyst for acquiring new habits of the mind; it also contributed to increased knowledge and transformed intended ecological habits. Gray and Birrell's (2015) "Touched by the Earth" program resulted in "love," or a closer connection to nature and the Earth. This result was supported by Gray and Thomson (2016), who found that integrating the arts and place-based pedagogies increased connectivity with the environment and helped to cultivate "socially responsible and pro-environmental learners" (p. 239).

Gradle (2007) argued that arts can bring daily life into the classroom, establishing multiple and significant meanings in a context of what Richard Louv (2006) referred to as cultural autism—the disquieting realization that students feel displaced by what Kunstler (1996, as cited in Gradle, 2007) referred to as the inauthentic, theme-park appearance of communities. Kudryavtsev et al. (2012) found that by using a school-based social and emotional learning (SEL) program, the students significantly improved their academic performance—reflected in an 11-percentile-point gain in achievement and demonstrated social and emotional skills. Parker and Wilding (2012) designed their interactive model to engage the "whole student" to change habitual patterns of thinking and behavior, resulting in enhanced individual and social learning. This was evident in increased kindness, and awareness, and attention; self-reflection; self-regulation; and mindful communication, among other qualities. They further found that eco-centric transformative learning processes generally lead to overall feelings of interconnection and an emergent "inside-out" ethical framework.

Art's ability to affect human physiology has been supported by Dissanayake (1988) and Levitin (2008) (as cited in Anderson & Guyas, 2012) and Tschacher et al. (2012). Tschacher et al. (2012), in particular, established that a direct relationship existed between aesthetic experiences and physiological responses during a museum exhibition visit. Preminger (2012) also found that art can enhance neuropsychological functions by linking experience-based brain plasticity with art experiences and can serve as a long-term transformative medium.

Art Outcomes: Organization and Visualization

Art not only can activate the AD for multidimensional learning. Curtis et al. (2014) further identified art's ability to organize and communicate EE issues and provide access to invisible and complex concepts as other specific contributions to EE. Other researchers also support this ability, including Hannon (2003, as cited in Branagan, 2005), who argued that the arts can break through habits and resistance, speak universally, and aid in drawing people together into a community of equals (Hannon, 2003; Gordon, 2004; as cited in Branagan, 2005). Branagan (2005) found that art's unique qualities could communicate in simple but powerful ways, expose covert processes, create a holistic atmosphere, reach large audiences, create inclusive movements, foster emancipatory learning, and ultimately reach the hearts of people, addressing what Peatling (2003), past Executive Director of the United Nations Environment Programme, referred to as environmentalism's "worthy but dull image" (as cited in Branagan, 2005, p. 33). Building on Curtis's earlier work, Curtis et al. (2014) developed a pathway model for how art mediates between the environment and SBs. This

model includes aiding communication and knowledge building, creating empathy towards the natural environment, and embedding the arts in ecologically sustainable development. More recently, Marks et al. (2017) found that environmental art can encourage idea exchange and dialogue, build a sense of place, clarify and enhance understanding of issues, and generate concern.

The significant role art and images can play in communication is especially evident in the media-driven age of aesthetics and consumption, when a logo or brand invokes not only an image but also an organization's mission, ultimately influencing consumer behavior (Heath & Heath, 2007). Visual art can communicate complex and scientific aspects of ED to the public (Christiano & Neimand, 2018; Manning, 2009). This struggle to communicate complex ideas is acknowledged by scientists (Curtis et al., 2012) and supported by current and wide-ranging research in EE. Farnsworth (2011) found that the genre of conservation photography provides a "unification of visual geographical and cultural literacies" and a means of addressing the challenges in EE (p. 784). Walter (2012) determined that art, humor, and drama helped promote SBs among the public, media, and government. Curtis et al. (2012) focused on the role of art in the science community. They found that using an arts program helped to communicate scientific concepts and provide a conducive environment to receive information.

The power of imagery in EE is also evident in the shifting visual associations of climate change and in the attention paid to it. In 2006, Leiserowitz found that most Americans lacked clear, personally relevant images of climate change, which helped to explain why climate change was a relatively low priority in national or environmental

issues at that time. Since then, the focus on climate change has shifted. Initially, climate change communication emphasized scientific evidence about the loss of permafrost, resulting in a predominance of abstract images of distant impacts (Leiserowitz, 2006) such as an image of a polar bear alone on an ice cap. Although this type of image can inspire emotion, it also reinforced the idea that climate change happens far away (Osaka, 2018).

In 2010, Strife identified a shift in focus on climate change from scientific evidence to an emphasis on the human, social, and economic consequences of global warming, which resulted in an increase in national attention. Strife (2010) argued that while scientific evidence could play a role in sparking social interest in climate change, presenting evidence in a humanistic way—such as the imagery used in Gore's *An Inconvenient Truth* (2006)—brings more personal meaning to ED. Osaka (2018) identified how the continued shift of climate change symbols from scientific evidence to those representing destructive weather disasters have a higher level of risk perception, given those disasters' impact on an increasing number of people (Leiserowitz, 2006).

This shift in symbolism is supported by Schroth et al. (2014), who found that interactive educational game images that focused on local impacts and adaptation of climate change shaped perception about climate change. Turner (2014) found that images related to ED can do more than change perceptions; they also can play a role in developing intended SBs. Turner (2014) found that exposure to artistic digital images had a positive impact on the intent to buy carbon offsets—and that different images generate different results.

Ecological Art as the Unification of Art and Environmental Education for Transformation

Ecological Art Background/Development

> *Artists are in a unique position to affect such environmental changes because they can synthesize new ideas and communicate connections between many disciplines. They are pioneering a holistic approach to problem-solving that transcends the narrow limits of specialization.* (Matilsky, 1992, p. 3)

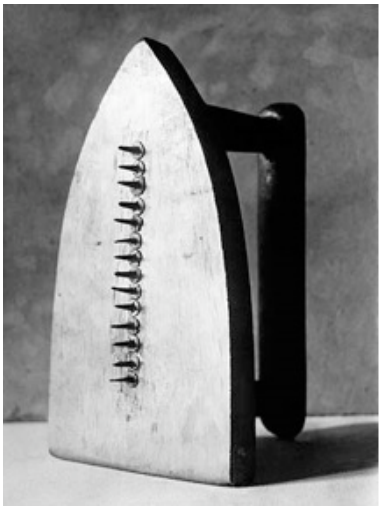
Throughout history, American visual and literary art has played a significant role in environmentalism. The sublime landscapes of the 19th-century Hudson River School painters and the literary work of Henry David Thoreau (1818-1862) and Rachel Carson (1907-1964), which laid the foundation for an ecological framework in art and for the integration of the art with EE. This began in the mid-twentieth century during what has been referred to as the earth, land, or environmental art movement (referred to as environmental art movement), which is best understood in the context of and as a reaction to consumer culture.

An integration of consumer culture, everyday objects, and art has art historical precedents in the form of Dada and Pop Art. Both art movements focused on everyday objects and motifs in the form of found objects and images to challenge notions of fine art during their respective times, but the artists' intent/approach differed. Pop Art took place in the United States and England during the 1960s when Pop artists embraced popular culture using advertising and comic books among other mass-produced subjects. An informal, international art movement early in the twentieth century, Dada was rooted in the antiart movement. Dadaists such as Marcel Duchamp (1887-1968), Francis Picabia (1879-1953), Man Ray (1890-1976), and Beatrice Wood (1893-1998) valued irony,

nonsense, and humor creating literary works, poetry, as well as assemblages, collages with often radical, sarcastic, and shocking tone. This is evident in works such as Man Ray's *Gift* (1921, replica 1958) (see Figure 19) ("Dada," 2020) and Duchamp's readymade *Fountain* (1917, replica 1964) (see Figure 20). *Fountain*, a urinal, once signed and displayed upside down in a gallery, was transformed into modern art inspiring a reconsideration of the nature of art (Newhouse, 2005).

Figure 19

Gift



Note. Ray, M. (1921, replica 1958). *Gift*. From the Collection of Museum of Modern Art, New York, NY. [painted flatiron and tacks, 6.13 x 3.63 x 4.50 in.] (Ray, 1921).

Figure 20

Fountain

Note. Duchamp, M. (1917, replica 1964). *Fountain*. From the Collection of Tate Modern, London, England [urinal, 24 x 14 x 19 in.] (Duchamp, 1917).

While the Dadaists expressed negative reactions to World War I and the conventional middle-class, Pop artists such as Richard Hamilton (1922-2011) in England and Larry Rivers (1923-2002), Jasper Johns (born 1930), and Andy Warhol (1928-1987) expressed a sense of optimism after World War II and considered mass media and advertising a natural fact of the time ("Pop Art," 2020). This is evident in Andy Warhol's (1922-1987) *Campbell's Soup Cans* (1962), which depicts 32 cans of Campbell's soup corresponding to the 32 soup varieties (see Figure 21).

Figure 21

Campbell's Soup Cans

Note. Warhol, A. (1962).*Campbell's Soup Cans.* From the Collection of Museum of Modern Art. New York, NY [synthetic polymer paint on thirty-two canvases, each canvas: 20 x 16 in., overall installation with 3 in. between each panel: 97 x 163 in.] (Warhol, 1962).

While Pop art embraced popular and mass culture, environmental artists rejected the commodification of art in traditional gallery and museum spaces, often manipulating the landscape in rural areas to create works that could not be purchased or owned. These artists used a combination of soil, rocks, vegetation, and water, often manipulated with human-made materials, to create temporary or long-term site-specific installations such as Robert Smithson's *Spiral Jetty* (1970). This 1,500-foot-long and 15-foot-wide counterclockwise coil was made from mud, salt crystals, and basalt rocks continues to jut out from the shore of the lake located in the Great Salt Lake, Utah ("Spiral Jetty," 2020). Christo's *Running Fence* (1972-1976) took four years to execute in Sonoma and Marin Counties, California and only lasted 14 days ("Running Fence," 2020). Although

environmental artists initiated a renewed focus on the land, often emphasizing cycles and rhythms of the natural world, many imposed humans' impact on nature, which was seen as in conflict with ecological principles.

During the 1960s and 70s in the United States, social and environmental issues became more prominent, as did an ecological mindset ("Spiral Jetty," 2020). An ecological framework existed in EE and in the culture at large. A growing number of publications related to ecological issues and ecological art increased in both specialty and popular press (Brown, 2014). They addressed a multitude of ecological topics including: ecoaesthetics, ecoart education, as well as ecodesign, ecofeminism, ecoliteracy, ecojustice, and ecofashion. This shift influenced the emergence of performance art, installation art, and ecological art—a progression Brown (2014) referred to as "Earth works to Earth's workers" (p. 11). While the early environmental art movement was dominated by male artists, many pioneer ecological artists were women, who were also considered eco-feminists (Wildy, 2012). Helen Mayer Harrison (1927-2018) and Newton Harrison (1932-), Nancy Holt (1938-2014), and Mierle Laderman Ukeles (1939-) inspired a reconsideration of priorities emphasizing social issues and human interrelationships with nature and the world without further imposing damage to the land (Kagan, 2011).

This focus is evident in *Sky Mound* (Kearny, New Jersey, 1988-c. 2008), in which Holt reclaimed a 57-acre landfill ("Nancy Holt," n.d.), developing an eco-friendly public park with recovery pipes to provide an alternative source of energy from 10 million tons of garbage (Archer, 1997; Matilsky, 1992; "Nancy Holt," n.d.). Ukeles proclaimed

herself a maintenance artist in her *Manifesto for Maintenance Art 1969! Proposal for an exhibition "CARE"* (1969). She addressed household cleaning, the complex social system of New York, and water pollution (Kagan, 2011) to raise awareness of the low cultural status of maintenance work of households, cities, and the Earth ("Mierle Laderman Ukeles," n.d.). Agnes Denes, who is most well-known for *Wheatfield* (1982), integrated rural America with the business world, planting and ultimately cultivating two acres of wheat in a landfill in Manhattan near Wall Street and the World Trade Center (Matilsky, 1992) (see Figure 22).

Figure 22

Wheatfield – A Confrontation Battery Park Landfill

Note. Photo of the artist, Agnes Denes, standing in her art work in downtown Manhattan (Denes, 1982).

At the end of the 20th century, the context of ecological art changed as the consumer and aesthetic ages took hold. Aesthetics became ubiquitous permeating all of society including consumer goods. Boundaries between high culture and mass culture and between art, fashion, and consumer goods blurred (Featherstone, 1990; Postrel, 2009)

(discussed in Chapter 2). Objects ranging from chairs and salad bowls to sneakers and Georgio Armani (born 1934) collections have been exhibited in art museums (Postrel, 2009)—what Featherstone (1990) referred to as "museumified" (p. 8).

During this time, ecological artists created a distinct art form that came to be defined as interconnective and transformative (Kagan, 2011), inspiring new roles for artists, their art, and the place of humans within the Anthropocene. David Floria (1991) stated that ecological art has no particular style or medium or way of looking, it was based on intention, potential, and moral consciousness (as cited in Cembalest, 1991). The same year, Gablik (1991) addressed ecological art as an aesthetic that represented a shift from modernism's nonrelational, noninteractive, and nonparticipatory orientation to what she referred to as a "connective aesthetic"—a responsible aesthetic of postmodernism. For Gablik (1991), ecological art connected art to the realities of daily living; it could effectively be used as an agent of social change. The humanization of ecological art contributed to its transformative potential, as invoking self-interest is a primary factor in transformative experiences and, as argued by Heath and Heath (2007), a reliable way of making people care —because people matter to themselves.

Ecological art—as a unification of art and EE and as a point of departure in EE—was first promoted in the 1990s by Meri-Helga Mantere in Finland with her arts-based environmental education model (van Boeckel, 2009). Mantere (1992) argued for a composite approach, seeing art as EE and seeing EE as art, ideally in nature, which should be integrated with all education efforts. Mantere's model has been supported by Jokela (1995) and Simon (2006) who argued that ecological art is a much needed, useful,

and practical tool in EE due to its integrated, participatory, and transdisciplinary nature and ability to represent systems and complexity.

Sacha Kagan (2011) focused on the ability of ecological art to address life's complexity by defining it as

> a variety of artistic practices which are nonetheless united, as social-ecological modes of engagement, by shared principles and characteristics such as: connectivity, reconstruction, ecological ethical responsibility, stewardship of interrelationships and of commons, nonlinear (re)generativity, navigation and dynamic balancing across multiple scales, and varying degrees of exploration of the fabric of life's complexity. (p. 1)

While 21st-century ecological artists and researchers are unified in their call for action, they have responded to what Wallen (2012) referred to as a "call for visionary intervention in a time of crisis" in a variety of ways (p. 1). Weintraub (2012) identified ten interrelated primary issues, approaches, and strategies and 11 primary genres used by ecological artists (see Table 3).

While ecological artists have referenced many different issues, scientific concepts have been recurring themes and range from plastic and chemical pollution and climate change to geochemistry and ecologicity (Davis & Turpin, 2015). Chris Jordan (born 1963) has addressed the implications of chemical and plastic pollution in mass consumption in *Portraits of American Mass Consumption* (2003-2005) and *Running the Numbers* (2006-). These series depict plastics and other discarded items as abstractions, connecting individual purchases with the challenges of ED (see Figures 23 & 24). Ecological art also includes individualized artistic interpretations of scientific concepts, such as David Haley's (born 1952) ecopoiesis art and Lynne Hull's (born 1956) trans-species art (see Figure 25).

Table 3

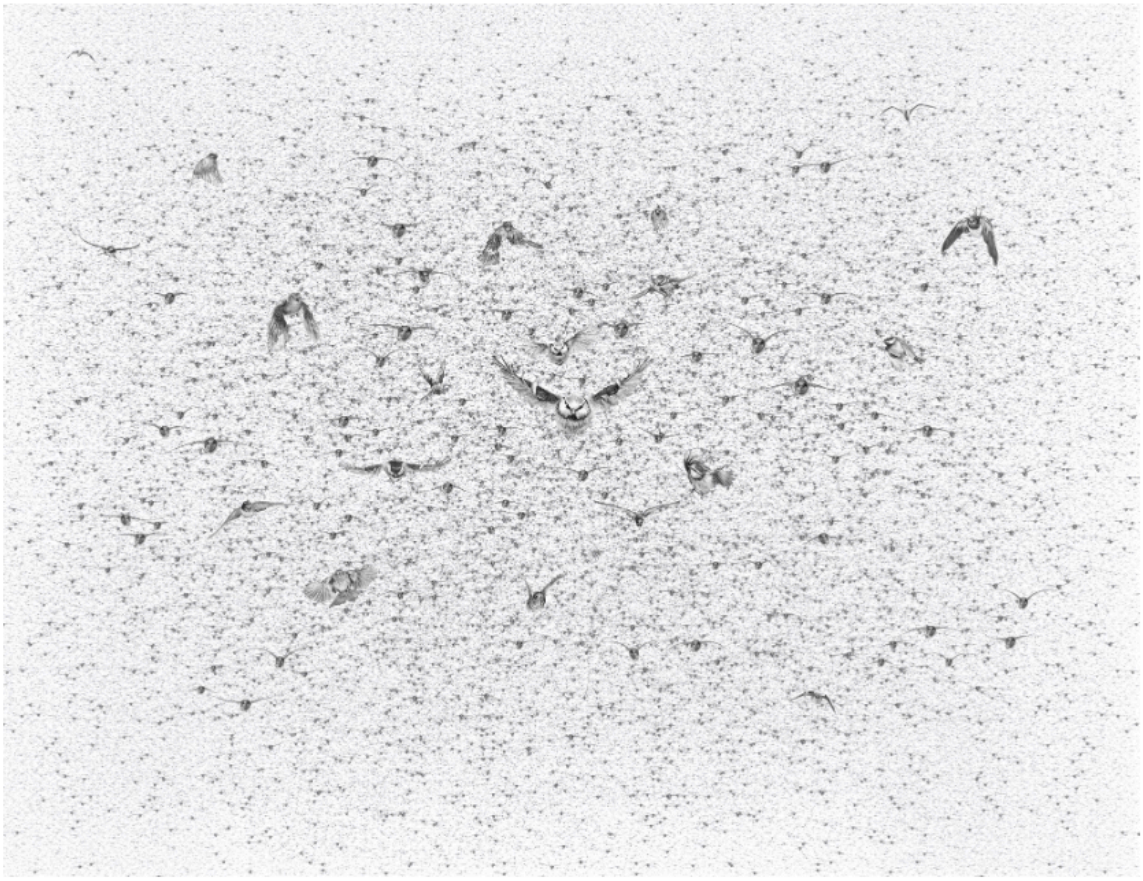
Primary Ecological Art Issues, Approaches, Genres, Strategies

Issues	Approaches	Genres	Strategies
Energy	Conservation	Paint/Print	Instruct
Waste	Preservation	Sculpture	Intervene
Climate Change	Social Ecology	Performance	Visualize
Technology	Deep Ecology	Photo/Video	Metaphorize
Habitat	Restoration Ecology	Bio/Art	Activate
Sustainability	Urban Ecology	Generative Art	Celebrate
Resources	Industrial Ecology	Social Practice	Perturb
Chaos/Complexity	Human Ecology	Digital Art	Dramatize
Systems	Ecosystem Ecology	Installation	Satirize
Reforms	Sustainable Development	Public Art	Investigate
		Design	

Source: Weintraub (2012).

Figure 23

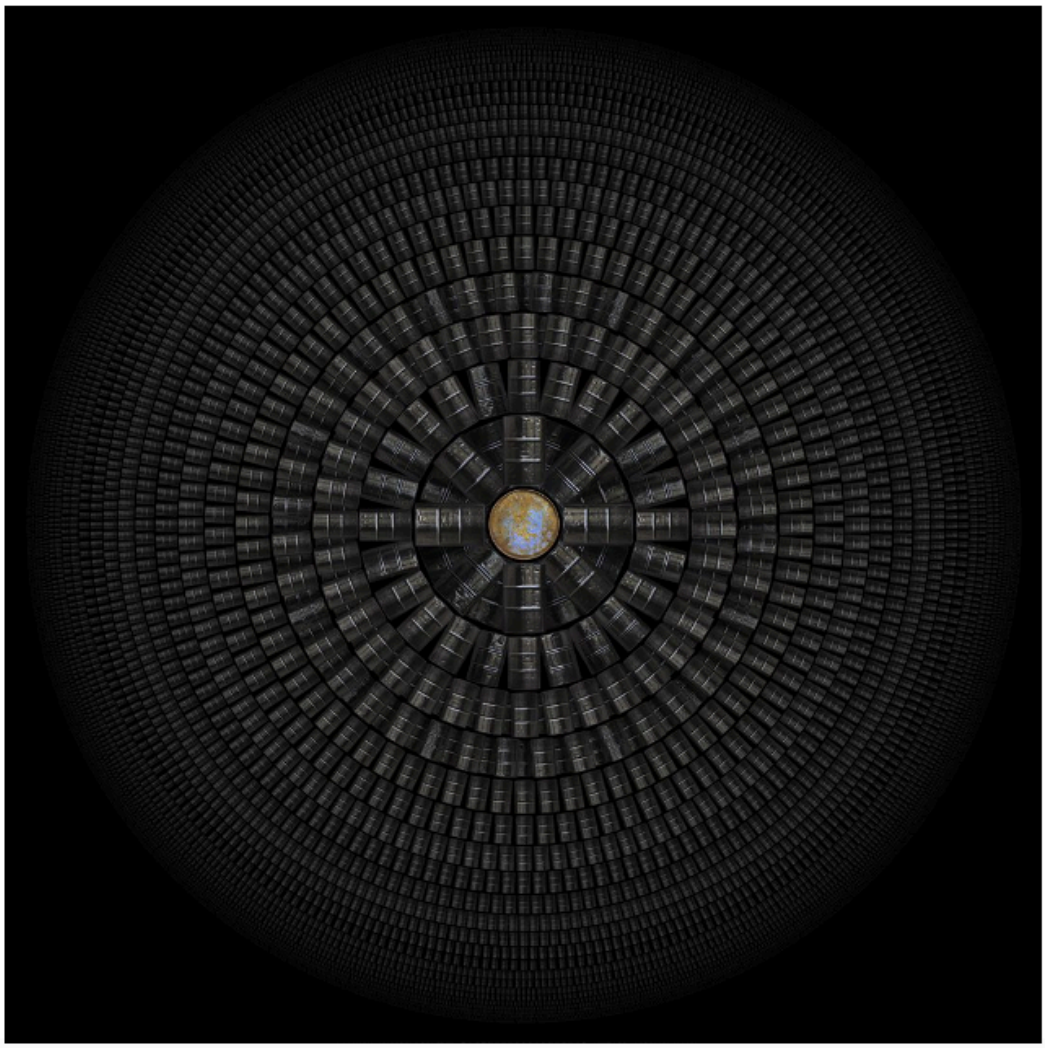
Silent Spring



Note. Jordan, C. and Clark, R. (2014). *Running the Numbers: An American Self-Portrait, Silent Spring.* [Made from 28 graphite drawings by Rebecca Clark, 60 x 80 in.]. This drawing depicts 183,000 birds, equal to the estimated number of birds that die in the United States every day from exposure to agricultural pesticides—a reference to Rachel Carson's *Silent Spring* (1962). (Jordan & Clark, 2014).

Figure 24

Oil Barrels



Note. Jordan, C. (2008). *Running the Numbers: An American Self-Portrait, Oil Barrels*. [Photograph, 60 x 60 in.] This photograph depicts 28,000 42-gallon barrels, the amount of oil consumed in the United States every two minutes (equal to the flow of a medium-sized river) (Jordan, 2008).

Figure 25

Trans Species Art

Note. Hull, L. (2006-07). *Trans Species Art.* [(clay, sand, straw mud, branches, stone and gabion box foundation, 344 x 96 in.] This wildlife viewing blind is a screen to hide people approaching the pond from the wildlife using the pond. (Hull, L., 2006-07). *Source:* Song (2009).

International and local ecological art concepts exist in indoor and outdoor settings (Kagan, 2014). They range from short interventions in natural habitats using nature itself, such as Andy Goldsworthy's (born 1956) leaf and petal sculptures (see Figure 26), to a long-term alteration of a site or human infrastructure, such as "ecoventions" by Sue Spaid (born 1961) or Fair Park Lagoon by Patricia Johanson (born 1940) (see Figure 27). Indoor two- and three-dimensional art installations focus on human consciousness and on shifting perspectives using a range of materials and technologies—including nature itself. Examples include John Sabraw's (born 1968) paintings made from oxidized sludge from abandoned coal mines (see Figure 28) and Jeff Hong's (born 1979) unhappily everafter animated characters from Walt Disney (see Figure 29).

Figure 26

Leaf and Petal Installation

Note. Goldworthy, A. (2013). Leaf and Petal installation for the Berrydown Foundation was situated at the base of a sycamore tree. In Hampshire, England. The unearthly glow was created by carefully placing leaves around the tree roots (Goldsworthy, 2013). *Source*: Funderburg (2015).

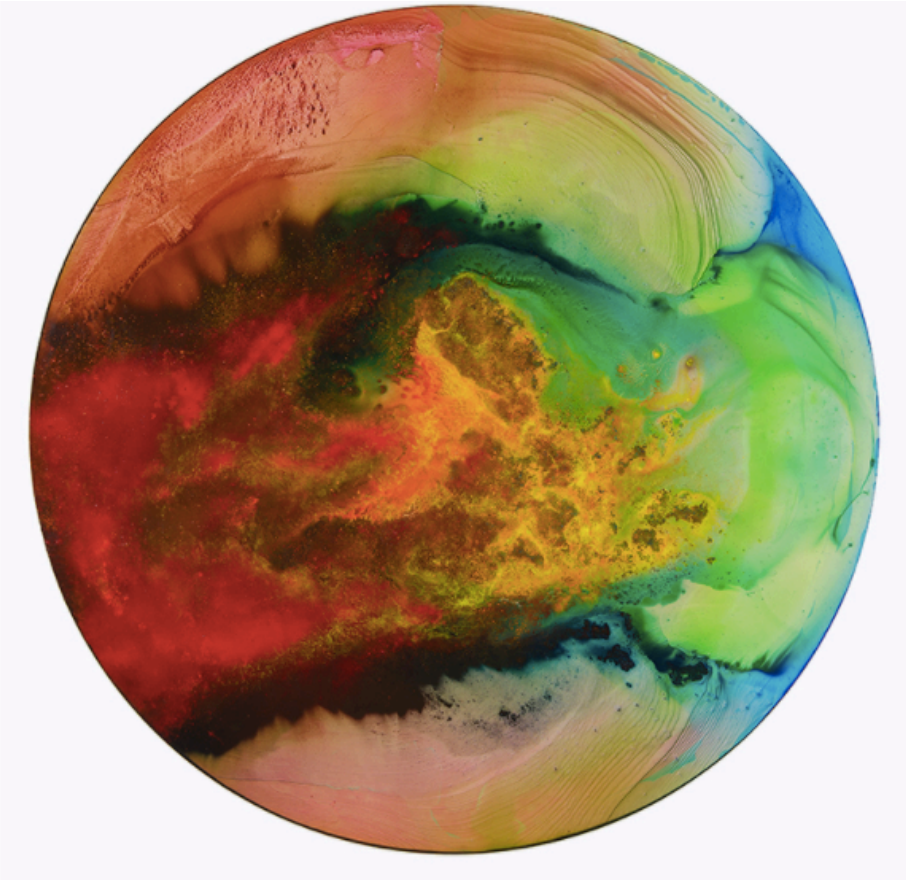
Figure 27

Fair Park Lagoon

Note Johanson, P. (1981). *Fair Park Lagoon*. [Native plants and gunite sculpture, five city blocks] Johanson integrated urban planning and nature in her architectural work. She collaborated with scientists, engineers, and community leaders to create the interactive and functional public sculpture in Dallas, Texas. (Johanson, 1981).

Figure 28

Toxic Sludge Painting



Note. Sabraw, J. (2017). *Toxic Sludge Painting.* [Painting: chroma S4 chimaera, pigments, and other paints on aluminum composite panel, 48 x 48 in.] Sabraw created toxic sludge painting by producing his own pigments from oxidized sludge of abandoned Ohio coal mines. (Sabraw, 2017).

Figure 29

Ariel Escapes an Oil Spill

Note. Hong, J. (n.d.). *Ariel Escapes an Oil Spill*. Hong juxtaposes animated, Disney fantasy worlds with real world issues such as pollution, deforestation, and other and environmental problems (Hong, n.d.). *Source*: Clarke (2014).

Ecological art processes also range from individual works to group collaborations. Early ecological art groups include Artists Contributing to the Solution (ACTS) and International Friends of Transformative Art (IFTA) (Cembalest, 1991). More recently, The Canary Project, consisting of Edward Morris and Susannah Sayler, addressed the problems of climate change with site-specific photography in *History of the Future* (2005-present) and plastic pollution with product manipulation and sticker and typographic campaigns in *There is No Way* (2010) (Sayler & Morris, n.d.). The Cape Farewell Project/Collective led by David Buckland (2001-present) includes literary,

visual, and performance artists as well as musicians. These artists partner with world-renowned institutions, to motivate and transform audiences worldwide to cultivate sustainable habits (Buckland, 2010). The Eco Art Project includes artist-researcher educators working in collaboration with multidisciplinary groups to develop an "empathetic-ecological humanity" (*EcoArt Project*, n.d.).

EE researchers and educators have developed models that begin with ecological art production in both indoor and outdoor learning environments. These models include Anderson and Guyas' (2012) E*art*h education paradigm; Barry's (2012) "Expressive Eco-psychology" model; York's (2014) Transformative Environmental Education through the Arts (TEETA) paradigm; and Kagan's (2014) transdisciplinary project, the International Summer School of Arts and Science for Sustainability in Social Transformation (ASSiSt).

Some ecological art-based studies have shown promising results. Inwood (2009) , Song (2009, 2012), Harness and Drossman (2011), and May (2011) emphasized art-making activities and classroom integration. Inwood (2009) focused on the impact of her ecological art education curricula, including studio art activities, in four elementary schools, and found it promoted learning in multiple ways. Song (2009) used Lynne Hull's outdoor ecological art as a starting point to explore connections between ecological art, nature, and school and community education and found participants gained a greater appreciation of the impact of ecological damage: "[They] feel guilty, inspired, outraged, dedicated, aware, passionate, and perhaps most importantly, engaged and capable of creating important change" (p. 11). Song's 2012 study also supported the use of

ecological art as a primary source for EE. She found the introduction of ecological art demonstrated "how ecological art can inspire and be put into action in ways that excite learners, provide direct and indirect ecological impacts, and ultimately promote thought, dialog, and changes in behavior in viewers" (p. 811).

May (2011) focused on the impact of ecological art making activities in the natural world and found that the art-making activities in nature helped inspire a metaphorical language that supported the development of an eco-identity. Harness and Drossman (2011) used a filmmaking project as an educational tool and found that provided the means to enhance SBs.

Ecological art-based EE activities that emphasized outdoor settings and art production strategies have had successes and shortcomings. Inwood (2009) argued the art production model is flexible and easy to integrate, and it promoted student excitement. She also found the advantages of an outdoor classroom—and direct experience with nature and place—could be a powerful bridge to connect to nature. These positive aspects, however, are complicated by the challenges of setting up and solidifying outdoor classrooms, implementing them on a wide scale, and carrying concepts from outdoor learning into everyday life.

Ecological Art Exhibitions and Exhibition-Based Learning

> *To engage and challenge the public, we needed to reach their hearts.* (Abram et al., 2005, p. 21).

There are promising studies addressing ecological art as a tool in EE. Yet, few studies encompass outcomes related to ecological art exhibition experiences. Although art exhibition content varies widely, the overall format does not. Art exhibitions are

multimodal, emphasize the AD, and encompass sensorial qualities of vision, sound, and emotion. These "extrarational" aspects of TL are typically supported by information, such as wall labels associated with the cognitive domain. Interactive features can encompass a variety of learning domains, including the psychomotor. This multimodal format can convey multiple complex concepts and function as a multidimensional, holistic learning model.

The first prominent ecological art exhibition in the United States was *Fragile Ecologies: Contemporary Artists' Interpretations and Solutions*, which was organized by and opened at the Queens Museum of Art in 1992 (Queens Museum of Art, 1992; Matilsky, 1992). Since then, the increase in social and ecological content in society and the art world is evidenced in the development of mission-driven museums (Abram et al., 2005). The purpose of museums has evolved from collecting and preserving art to an increasing focus on education and social change (Davis & Turpin, 2015; Villeneuve, 2007). Examples of such exhibitions include *Ecologies: Mark Dion, Peter Fend, Dan Peterman* (Smart Museum of Art, 2001); *Ecovention: Current Art to Transform Ecologies* (Spaid, 2002); *Beyond Green: Toward a Sustainable Art* (Smith, 2005); and *Common Senses* (Museum of Modern Art, 2012).

In the second decade of the 21st century, there has been an increase in the prevalence of climate change and the Anthropocene as subjects in ecological art exhibitions in science, natural history, and art museums. Exhibitions include *Weather Report: Art and Climate Change* (Lippard et al., 2007), *Sensing Change* ("Sensing Change," 2016), and *Klima X* (2007-2009) ("Klima X Exhibition," 2007) . The number

of ecological fashion exhibitions has also increased including *Eco-Fashion: Going Green* (Farley & Hill, 2010), *Eco + Fashion* (Art Gallery at City Hall, 2014), *Fashioned from Nature* (Ehrman, 2018-2019), and *Fast Fashion/Slow Art* (Obler & Rosenzweig, 2019). The power of the exhibition experience as a tool for learning and transformation is also evidenced by Fashion For Good, an Amsterdam museum dedicated to eco-fashion, established in 2018, and Art Works for Change, a traveling exhibition company dedicated to using the transformative power of art to promote awareness, provoke dialogue, and inspire action.

While the educational potential of exhibition experiences is generally accepted, learning is complex and multidimensional, and as Falk (2000, as cited in Gorman, 2007) pointed out, the inherent educational value of museums is "easy to say, harder to prove" (p. 206). Falk and Dierking (2013) argued that "understanding the true nature and extent of the learning that results from museums [and focusing in this context on exhibition visits] has been and still remains a challenge" (p. 220). Luke and Adams (as cited in Villeneuve, 2007) identified that little is known about the role art museums play in peoples' lives. There has been a lack of consensus on how to assess a museum education program or what to assess (Dierking et al., 2004; FLAG, n.d.; Gruber & Hobbs, 2002; Hicks et al., 1996; Soren, 2001, as cited in Gorman, 2007) accompanied by a state of flux in museum culture (Gorman, 2007).

Although challenges exist in assessing the exhibition visit outcomes, researchers have affirmed the value of exhibition experiences. Golding (Dierking et al., 2004; FLAG, n.d.; Gruber & Hobbs, 2002; Hicks et al., 1996; Soren, 2001, as cited in Gorman, 2007)

has argued that science centers and museums play a role in identity-building, and Brown et al. (2009) and Watson (2007) (as cited in Gorr, 2014) have identified the positive role museums play in societal change. Studies have indicated positive learning outcomes, as well as the complexity of such learning and transformation. Falk and Dierking (2013) have argued that there is an increase in evidence of the educational power of exhibition experience: "Today, the evidence is clear; there is no doubt that the public learns as a consequence of visiting art history, natural history, and children's museums, science centers, zoos, aquariums, national parks, and other comparable museumlike settings" (p. 221).

Luke and Adams (2007) reviewed art museum learning outcomes from 1984-2004, including studies by Soren (2002), Jeffers (1999), McManus, (1993), and Walsh (1991). Luke and Adams (2007) determined that a full range of complex and overlapping positive learning outcomes exist, reinforcing the rich and broad impact of museum experiences. They also identified outcomes such as increased intellectual curiosity, understanding of content, and opportunities for communication, as well as four types of learning specific to museums: learning about content, learning how to engage in aesthetic perception, learning about ourselves and others, and learning how to learn.

Falk and Dierking (2013) found that measuring museum learning is challenging, but supports significant learning that is "broader and richer than facts and concepts" and encompasses "social learning and bonding, increased self-awareness and self-confidence, and learning related to aesthetics and beauty" (p. 244). In addition, they found that visitors can become fatigued from interactive components during a visit, but if the

content was compelling, visitors would pay attention to the exhibition and even read labels. Although it is widely assumed that museum labels are not read, "research has demonstrated that surprisingly high numbers of visitors attend to text and graphic panels that are well designed and on a topic of interest to them" (Serrell, 2010, as cited in Falk & Dierking, 2013, p. 109).

DeLong et al.'s (2013) and Gorr's (2014) research supported the exhibition as a learning tool. DeLong et al. (2013) evaluated youth who visited *Redefining, Redesigning Fashion: Designs for Sustainability*, an eco-fashion exhibition at the Goldstein Museum of Design at the University of Minnesota. They found participants who engaged in varied hands-on activities related to the exhibition had increased knowledge of pro-environmental behavior strategies. They also had increased instances of feeling empowered by the interactive visual experience.

Gorr's (2014) research also supported the exhibition experience as a learning tool and the complexity of the process. Gorr (2014) examined the impact of *Klima X*, a 2009 exhibition featuring the causes, effects of, and possible solutions to global warming, on adolescent students. It supported the exhibition format as an educational tool for learning. Gorr (2014). Gorr found that while knowledge did not increase in quantity, it changed in quality, as it became more specific and more influenced by emotional engagement and personal evaluation. Some studies related to exhibition experience outcomes have shown evidence they may result in attitude change (Smithsonian Institution, 2011; Spock, 2000, as cited in Gorr, 2014), but Gorr's research highlighted the complexity and challenge of changing young visitors' attitudes (2014). She found that participants' perceived their

peers to have limited acceptance of environmental action, which may have played a role in the lack of attitude change. In addition, visitors who experienced a follow-up class after the exhibition were less likely to engage in climate-change-mitigating actions than those who did not attend such a class. This finding supports the notion that some museum visitors tend to seek confirmation of their existing attitudes and beliefs (Gorr, 2014) and attempts to increase understanding of climate change can enhance skepticism or rejection of the issue (Jones 2009; Webster 2010, as cited in Gorr, 2014). Although initial changes in understanding and attitude can be temporary (Adelman et al., 2000; Cakir, 2008; Direking et al., 2004, as cited Gorr, 2014), Gorr concluded that students who were motivated and processed information comprehensively increased the probability for attitude changes. Gorr (2014) also found that affirmative social surroundings, personal interest in Earth sciences, and learning skills—which allowed for better access to linguistic stimuli and abstract concepts—were positive influences in promoting climate change actions.

Conclusion

Art has played a significant role in America's longstanding tradition of environmentalism. It started with the transcendentalists and the Hudson River School painters who influenced the conservation movement of the 19th century. In the 20th century, Rachel Carson's *Silent Spring* (1962) galvanized the environmental health movement. Recent researchers have argued that as the ED crisis has escalated in the 21st century, cultivating the changes necessary to mitigate the challenge of ED requires more

than an environmental mindset or a human connection with nature. It requires an ontological transformation to an interconnected, eco-identity.

Studies have demonstrated that the process of transformation and learning is enhanced by the AD and that art can function as a conduit to the AD. Art's potential as a transformative medium in EE is supported by Strife (2010), who has attributed the lack of the AD in EE to the lack of receptivity to EE. In contrast, the inclusion of the AD and a human-centered, ecological approach has promoted a growing acceptance of the green movement, leading many organizations, businesses, and schools to aspire to be "green." Parker and Wilding (2012) have supported this view, referring to the lack of the AD as societal "blind spot" in society and pedagogy and the reason why efforts to increase SBs fall short of the United Nations Educational, Scientific and Cultural Organization.

Although there has been an increased emphasis on the AD and TL in EE theory, in practice, the role of the AD has been "largely silent" in environmental sociology and social psychology literature (Curtis et al., 2014, p. 2). A similar gap also exists in ecological art exhibitions pedagogy. The power of art as a learning tool is accepted in museum culture, and museum exhibitions are considered inherently educational (Falk, 2000, as cited in Gorman, 2007), yet there is little understanding of the role ecological art exhibitions play in addressing the ED crisis. This study attempts to address gaps in the literature by determining an association between an ecological art exhibition experience focusing on FF and an environmental attitude consisting of knowledge, sensitivity, and intended SBs.

Chapter 4

Exhibition Methodology:

Canary Concepts and the Hidden Danger of Ubiquitous Things

> *The complexity of the challenge of achieving sustainability, in the face of a complex crisis of civilization combining ecological, social, cultural, and economic dimensions, demands integrated understandings and responses.* (Kagan, 2011, p. 93)

Exhibition Content, Framework, Design, and Strategies

This study is based upon an ecological art exhibition titled, *Canary Concepts and the Hidden Danger of Ubiquitous Things* (CC). CC was on display at the Robert Hillestad Textiles Gallery in the Department of Textiles, Merchandising, & Fashion Design at the University of Nebraska-Lincoln from April 11-22, 2016. The author served as curator, educator, and designer of the exhibition and as an artist creating five of the six multimedia installations: *Bought* (Skold, 2016b), *Beaten* (Skold, 2016a), *Wrapped* (Skold, 2016f), *Stuffed* (Skold, 2016c), and *Thread for Thought* (Skold, 2016e). The sixth installation, *Midway: Message from the Gyre* (2009-renamed *Albatross* in 2017) was a film by ecological artist, Chris Jordan.

Content and Framework

The CC exhibition was conceived over a period of two+ years. It was built upon ecological, TL, and post-environmental frameworks accepting the dominant (but not superior) role of humans in the planet. The CC content was the relationship between FF and ED: its complex external and sociocultural factors and the implications for humans and the natural world. In the gallery, this was realized by the intersection of consumer goods from the FF world—ubiquitous things—with nature and human health. CC

installation objects included FF goods including pleather purses, ottomans, and blue jeans, which were juxtaposed in unexpected ways with ecological content to encourage a heightened focus and reconsideration of the nature of the object and its interrelationship with humans and the natural world. Chicago artist Michael Paha (1991) stated: "Taking something out of its indigenous area and putting it in a gallery heightens your awareness. . . . You smell it, you hear the running water" (as cited in Cembalest, 1991, p. 103).

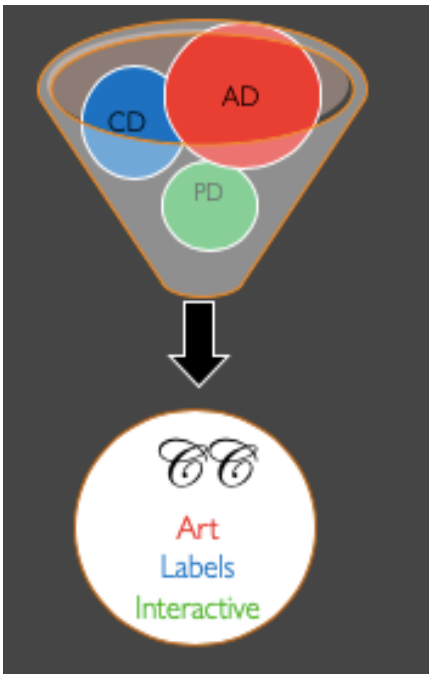
Design and Strategies

The goal of CC was to create transformative learning experience by influencing perspectives and cultivating an eco-identity or environmental attitude to increase SBs. This transformation would be the result of changes in internal factors—knowledge, values, and ultimately intended SBs—related to FF and ED.

Multiple strategies were utilized to enhance the transformative power of CC. At the most basic level, visual art has the ability to promote the visualization of invisible and complex issues—external factors associated with the gap between awareness and action in SBs. A second strategy was holistic— multimodal, multisensorial, and multidimensional. CC as-a-whole—with its combination of multisensorial and multimodal art installations, corresponding label information, and interactive components—integrated the affective, cognitive, and psychomotor domains. This integration created the potential for a multimodal and multidimensional or holistic experience—an educational strategy proven to enhance learning and transformation (see Figure 30).

Figure 30

Multidimensional Components of CC



The visitor-centered framework with self-directed learning techniques was a third strategy. Visitor-centered exhibition design is geared towards an introspective visitor experience with an emphasis on engagement and multisensory experiences. Such a design typically involves varied options that allow visitors to follow their curiosity and share experiences in a relaxed atmosphere to foster relevance (Villeneuve, 2017). In CC, multi-sensory and interactive components were integrated with the immersive installations allowing the visitor to share space with the artwork. Two of the installations incorporated sound, which permeated the gallery. Study participants had the opportunity to pick up and examine components of one installation, *Stuffed*, and provide shared, written

feedback regarding any aspect of CC on a chalkboard (a media related to the installation, *Wrapped*) and photograph the exhibition without guards who may intimidate the visitor.

Participants were also encouraged to interact independently with the installations and didactics at their own pace as outlined in the invitation to participate in the study (see Appendix F). This self-directed learning process—a form of self-regulated arts inquiry—is intended to facilitate introspection and a TL experience (Merriam et al., 2007). Psychologists have argued that young people are only likely to change their attitude or behavior towards climate change when they become aware, e.g. by means of informal learning experiences, of their own ability to impact the global environment (Cameron 2003; Dibley 2011; Hebda 2007; Paloniemi and Vainio 2011; Salazar 2011; Skamp, Boyes, and Stanisstreet 2007, as cited in Gorr, 2014).

This power of informal and self-guided learning is supported by the fact that the adolescent students who attended the post-exhibition classroom guided activity for the *Klima X* climate change exhibition (2007-2009) were less likely to engage in related SBs than those who only attended the exhibition experience (Gorr, 2014). Gorr (2014) identified that students who visited the exhibition and had a follow-up class showed a "decreased intent to act against climate change compared to the group that only experienced the exhibition" (p. 105).

A fourth strategy was the ecological framework incorporating systems learning and an emphasis on the human place in FF and ED to create relevance. The exhibition design was also informed by TL strategies. The exhibition experience was intended to provide an opportunity for the first seven phases of TL. The exhibition space design was

intended to suspend everyday reality and isolate the viewer from the outside world and their routine creating what Mezirow (1995) referred to as a disorienting dilemma—the first phase in TL. To achieve this, a minimalist aesthetic was applied to the exhibition design by including a small number of installations relative to the almost 736-square-foot gallery space. This served to allow the viewer to experience the exhibition with the least possible distractions and enhance the importance and introspection of the installations (Newhouse, 2005) (see Appendix C). Although there were a small number of objects, some were surprisingly large to immerse the viewer—a strategy also used by the Hudson River School (Newhouse, 2005). The dramatic gallery lighting also served to transport the viewer. Recalling Church's theatrical lighting for his one-painting exhibition in 1859 (Newhouse, 2005), spotlights lit the installations in an otherwise dark space to give the viewer the illusion that light emanated from the object itself. The lighting in conjunction with the visual and auditory stimulation and attention to scale were intended to elicit an emotional response and potentially psychologically transport the viewer from their day-to-day life into another realm of thinking.

Other TL strategies include methods for making things stick outlined by Heath and Heath (2007). These strategies emphasize six qualities of "sticky concepts," which are understood, remembered, and change something such as behavior or values. These qualities include simplicity, credibility, unexpectedness, concreteness, emotional, and stories and were applied throughout the exhibition. Many aspects of CC involved unexpected qualities. Other unexpected qualities included the simple, unexpected, one-word titles and unusual exhibition title, *Canary Concepts and the Hidden Danger of*

Ubiquitous Things. Information relating to the title and the exhibition-as-a-whole was included in the introductory wall label (see Figure 31) (see Appendix B).

Figure 31

Introductory Wall Label for the Exhibition

Canary Concepts
and the
Hidden Danger of Ubiquitous Things

INSTALLATIONS BY STACEY SKOLD
MIDWAY: MESSAGE FROM THE GYRE
BY CHRIS JORDAN

I know what you are thinking… What do canaries have to do with textiles or fashion for that matter? Throughout history, birds have been powerful symbols of concepts ranging from freedom to our future. Canaries are no different. In the past, the songbirds had a special place in the mining industry—they were used as barometers for air quality. If dangerous gases such as methane or carbon monoxide leaked into the mine, the gases would kill the canary before killing the miners —a warning to leave the tunnels. This gives the bird connotations of testing and sacrifice—characteristic references, which have stuck.

In a wider interpretation, being a canary is to be a subject to an experiment relating to changes in the environment. It seems the reference is used more and more often these days…. The Canary Party, Canary Security Systems, Canary application by Apple, The Canary Foundation, and the Canary Project to name a few… all of which relate to health, safety, and environmental concerns. Some believe we humans—especially our children—are modern-day canaries in a world where chronic disease is the norm and natural is not.

The Hidden Danger of Ubiquitous Things references the inherent tendency we humans have to accept the world around us as normal (the banality of the everyday). There are surprising ways provenance and content of everyday objects—including textiles and fast fashion—can be harmful to the planet, to wildlife, and to us.

Canary Concepts and the Hidden Danger of Ubiquitous Things consists of visual connections between the challenging issues in our modern life and our everyday life. The installations are conversations about the visual and philosophical relationships between science, nature, and childhood—attempts to find a way to both love our clothes and take care of our world.

Note. The actual size is 36 x 22 in.

Exhibition Didactics

In addition to the introductory panel, each installation included a label with the artist, title, date, and materials related to the piece. The body of the label text was 18 point Baskerville font for readability. Other informational labels addressed both types of environmental K: factual information related to the name of the particular installation and information about SBs related to the installation. The behavioral information was addressed in three labels beginning with: "What Can I Do About… ?" These labels included reasonable steps an individual could take to develop SBs (see Appendix B). To enhance credibility, the labels ended with source citations from scientific organizations, journals, and studies. Book sources included *The Textbook of Children's Environmental Health* (Landrigan & Etzel, 2013); *Killer Clothes: How Seemingly Innocent Clothing Choices Endanger Your Health and How to Protect Yourself* (Clement & Clement, 2011); *Sustainable Fashion and Textiles: Design Journeys* (Fletcher, 2008); and Daniele Lieberman's *The Story of the Human Body: Evolution, Health, and Disease* (2014).

Art Installations

CC consisted of six multi-media art installations, which encompassed multiple art genres including found objects, video, and print. This section will include a detailed description of each installation including the conceptual and physical content, and the accompanying wall didactics, followed by the interactive components.

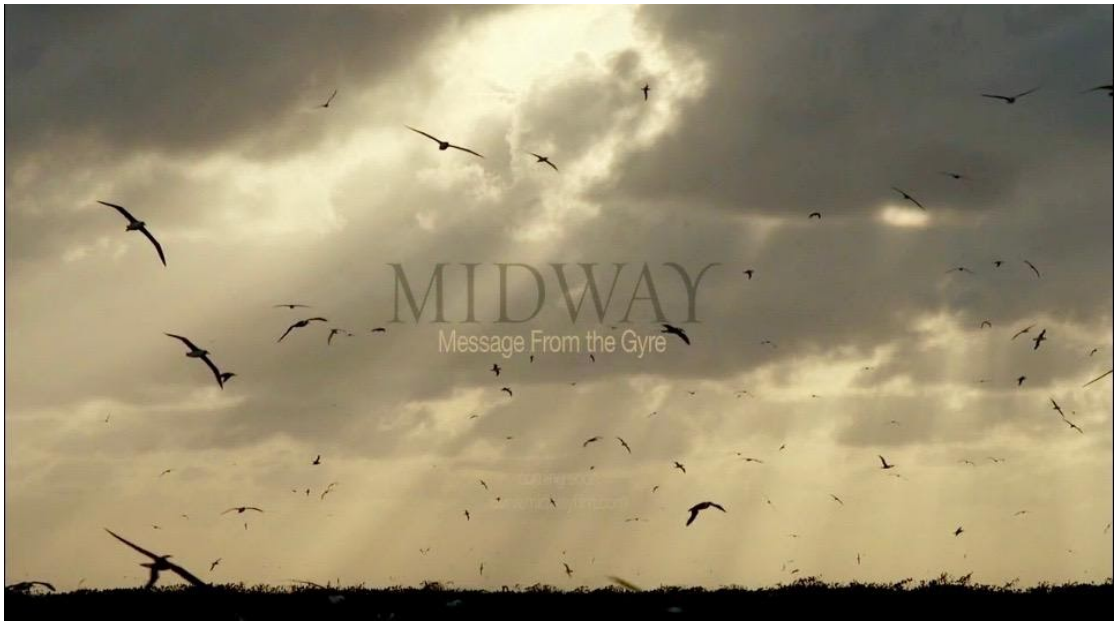
***Midway: A Message from the Gyre* (2009-)**

Midway: Message from the Gyre (2009-renamed *Albatross* in 2011) served as a conceptual and aesthetic inspiration for the author's five installations: *Bought* (Skold,

2016b), *Beaten* (Skold, 2016a), *Wrapped* (Skold, 2016f), *Stuffed* (Skold, 2016c), and *Thread for Thought* (Skold, 2016e). The three minute and 54-second-film by ecological artist Chris Jordan was projected floor-to-ceiling with a bench for viewing. Viewers were immersed in the large-scale imagery and sound (see Figure 32). The sound from *Midway: Message from the Gyre* consisted of birds, ocean, and the artist's voice and enveloped the CC exhibition (even while viewing the other installations).

Figure 32

Midway: Message from the Gyre



Note. Jordan, C. (2009-). *Midway: Message from the Gyre.* Still from movie trailer featuring the life and death of the Albatross due to plastic pollution. (Jordan, 2009-).

The dramatic film was emotionally-charged with beautiful, yet disturbing imagery. Best known for his photographs addressing American consumerism, Jordan utilized film to tell the story of the impact of plastic pollution on the albatross birds of the Midway Atoll (a 2.4 square mile group of islands in the North Pacific Ocean midway

between North America and Asia—2000 miles from the nearest continent) (Bennett, 2013). In *Midway: Message from the Gyre*, the birds mistake the colorful plastic pollution floating in the ocean for food, consume it, and feed it to their young facing death as a result. For Jordan, the plastic in the stomachs of these birds mirrors humanity—an elegy and warning of humans' uncontrolled consumption:

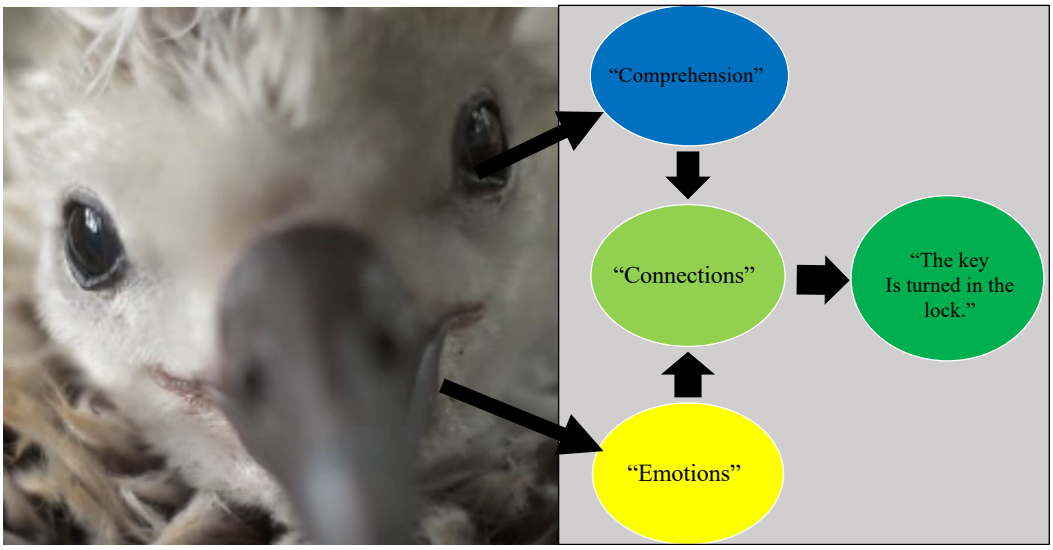
> *Like the albatross, we first-world humans find ourselves lacking the ability to discern anymore what is nourishing from what is toxic to our lives and our spirits. Choked to death on our waste, the mythical albatross calls upon us to recognize that our greatest challenge lies not out there, but in here*. (Jordan, 2011).

Jordan's educational philosophy and intent in *Midway: Message from the Gyre* (2009) reflect larger issues associated with CC and this study. This is evident in the following interview excerpt (included in the exhibition wall label) in which Jordan references the importance of making the invisible visible and the multidimensionality to cultivate meaning and relevance for learning and SBs (see Appendix D). For Jordan, beauty and emotions can inspire a transformative experience:

> I sure do [think there is a connection between making the invisible visible and empathy]. Our connection with the world is our feelings. If we see something happen, but have no feeling for it, there's no connection. If we do have a feeling, whether it's anger or rage or grief or whatever, we're connected to that thing. And in order to feel what is going on, we have to comprehend it.
>
> [To overcome fear of opening up to the seriousness of the ecological crises], One powerful elixir is beauty. There is nothing quite like beauty. When you bring beauty and grief together, you can't look at it, because it's so sad and you can't look away, because it's so beautiful. It's a moment of being transfixed, and the key is turned in the lock. (Bennett, 2013) (see Figure 33).

Figure 33

Model of A-B Relationship as a Function of Visualization



Note. This A-B model is based upon Jordan's narrative (preceding figure 33). Art and beauty have the potential to make the invisible visible and captivate the viewer. Visibility (of the suffering of an albatross chick) can stimulate comprehension (a function of K), emotions, and connections (functions of V), resulting in "the key turned in the lock"—transformation (a function of intended SBs and SBs). The albatross image is a still from *Midway: Message from the Gyre*. *Source:* Jordan (2009-).

Bought served as a bridge between the macro plastic pollution in the ocean in *Midway: Message from the Gyre* —a more common conception of plastic pollution—and the implications of plastic pollution from the FF system (see Figures 34 & 35). It consisted of an over six-foot-tall mound of pleather purses, wallets, and other textile accessories weighing approximately 1190 lbs. Referred to as "pleather" or plastic leather (Eagan, 2014), these leather-looking objects are a major contributor to non-biodegradable plastic waste on the planet. The FF system, including synthetic fabrics and pleather, is one of the largest sources of greenhouse gasses on Earth due to its vast size.

Figure 34

Bought

Note. Skold, S. (2016). *Bought.* [Mixed media installation including approximately 214 pleather purses, 83 small purses and/or wallets, chicken wire mesh, wooden tree branches, pussy willows, and twigs; approximately 1190 lbs, and six+ ft high] The pleather purse and textile accessories were loaned courtesy of Goodwill Industries, Lincoln, NE. (Skold, 2016b).

Figure 35

Bought (foreground) and Midway (Background)

Note. Skold, S. (2016). *Bought* (foreground) was situated near Chris Jordan's movie trailer, *Midway* (background).The still from Jordan's movie trailer featured plastic pollution consumed by the dead albatross. (Skold, 2016b).

The purses were built upon in a human-sized bird's nest made of tree branches, pussy willows, and twigs. The non-biodegradable, colorful, bright, and shiny pleather purses were full-of-life and on loan from Goodwill Inc., but discarded by their owners. The installation process involved going through the purses and stuffing them with other cast-off bags (that were on loan from Goodwill), meticulously balancing size and color. Although *Bought* addressed issues of waste, disposability, and the carbon footprint of the FF industry, *Bought* was built to be aesthetically pleasing. In the dark room, it was lit

from all sides and featured prominently in the center of the primary gallery space so that the viewer could walk around the entire piece.

The installation was placed near Jordan's video projection so both art installations could be viewed simultaneously, as *Bought* (Skold, 2016b) referenced the piles of plastic remains from Chris Jordan's albatross and the birds' nests they created for their young. In *Bought*, the birds from Jordan's movie are gone, but the plastic remained. Like the albatross, humans consume beautiful plastic treasures in the sea of merchandise feeding this tradition on to the next generation—choking them with habits of consumption.

Bought didactics included factual information—statistics relating to waste, the amount of clothing and accessories owned and discarded each year, and the carbon footprint or total amount of greenhouse gas emissions caused by synthetic textiles and the textile industry as-a-whole. Sources included the World Economic Forum, *Science /Ocean Conversation*, Goodwill Industries, and Eagan's *Wear no Evil* (2014). *Bought* labels also included information about ecological behavior. The "What Can We Do About Plastic Pollution?" didactic addressed the "4 R's Pledge: Refuse, Reuse, Reduce, and Recycle" from the Plastic Pollution Coalition organization (n.d.) (see Appendix C).

The *Beaten* installation consisted of a $9.99 pair of Wallflower jeans made from distressed denim pinned to the wall with t-pins (see Figures 36 & 37). Immediately below was a crime scene on gray ceramic tiles that resembled concrete. The outline of the jeans in white chalk was accompanied by evidence-marking number labels used in law enforcement. The installation references the dangerous and violent production process involved with this seemingly simple article of clothing.

Figure 36

Beaten

Note: Skold, S. (2016). *Beaten.* [Wallflower denim jeans, pleather belt, evidence marking tents, crime scene barricade tape, ceramic tile, t-pins, and chalk, 96 x 40 x 96 in.] (Skold, 2016a).

Figure 37

Beaten (detail)

Note. Skold, S. (2016) *Beaten* (detail). (Skold, 2016a).

This process includes unsustainable practices beginning with the cultivation of cotton, dyeing, and styling. During the manufacturing, stressing the fabric purposely fades and ages the fabric to give the denim a vintage worn look similar to that found in raw denim that has been broken in by the wearer. The denim processes can include stone washing, enzyme washing, acid washing, sandblasting, emerizing, microsanding, fraying hems and seams, and ripping and tearing the denim (*What Does Distressed Mean?*, 2019). Many of the destructive processes are chemical-laden exposing sweatshop workers, consumers, and the natural world to toxic chemicals.

The three crime scene evidence numbers corresponded to yellow label numbers on them with labels with factual information addressing what could be considered a crime related to the scene: how the jeans were made, who made them, and what impact they had. The introductory label also consisted of a short story about finding and buying the $9.99 pair of jeans and the consumer's feelings about their purchase.

> *The perfect pair of jeans for only $10. . . . We think about them. We think about HOW to pay for them, WHERE to wear them, WHO else is wearing them, and WHAT to wear them with. . . . But we don't generally consider HOW they are made, WHERE they come from, WHO made them, or WHAT impact they have on our planet.*

This personal story included the highs of finding such a great deal to engage the viewer and bring relevance to the concept of denim production and waste in the fashion industry. In the fast, technology-based industrialized society, humans have become out-of-touch and desensitized to the origin, process, and chemical makeup of items in our everyday life. Not only are most unaware of where, how, and with what things are made, but many are unaware of where our items go and what happens to them after the consumption phase.

Lieberman (2014) stated, "evolutionary logic suggests that humans become accustomed to novel, unhealthy behaviors and aspects of our environment when they become quotidian" (p. 320). This is yet another challenge of the FF system—FF and chemicals have become the norm. Isolating and recontextualizing the jeans, a ubiquitous consumer good in our daily lives as well as a powerful symbol of the fashion industry, was intended to promote a reconsideration of apparel on multiple levels.

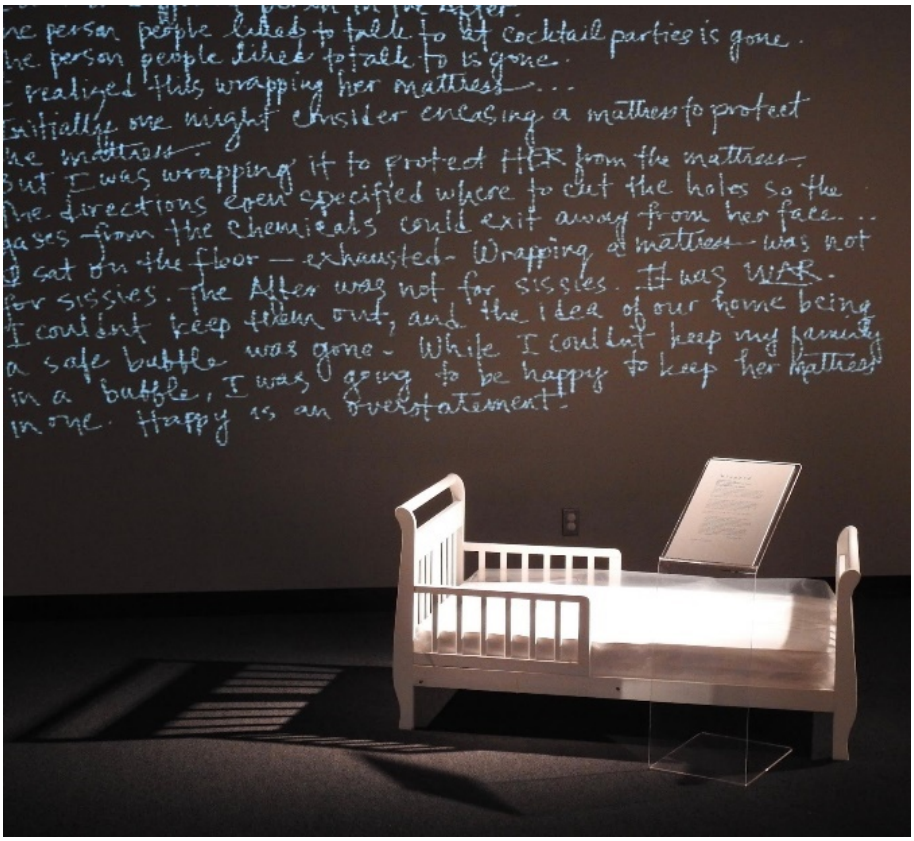
The "What Can We Do About Fast Fashion and its Footprint?" label addressed information about ecological behavior in regard to consumption, maintenance, and post-consumption behaviors (see Appendix D). This label was accompanied by the cover of the Clean Clothes Campaign's *Breathless for Blue Jeans* report (2013) and a reproduction of a glass of clean water. Other label sources included the Natural Resources Defense Council's Clean by Design program (2016) and Eagan's *Wear No Evil: How to Change the World with Your Wardrobe* (2014) among others.

Wrapped and *Stuffed* installations represented the intersection of seemingly diverse areas: science, nature, and childhood. They addressed our modern predicament related to the use of chemicals and what artist Chris Jordan identified as our "inability to discern what is nourishing from what is toxic tour lives and spirits" (2011). The focus of the *Wrapped* installation was a toddler bed with its mattress wrapped in a polyethylene Harlow Earth Crib mattress cover (with a vent under the mattress) (see Figure 38). At first glance, the cover may seem to protect the mattress from spills or wear and tear. In the story and label, it becomes clear that the vent holes were made to direct, neurotoxic off-gassing chemicals away from the sleeping baby or child.

Wrapped was enveloped by a projection and sound recording of the artist writing a story—an excerpt from "The After" (Skold, 2016d). The sound recording mimicked the sound of chalk on a chalkboard writing the story and permeated the gallery. (This video alternated with Jordan's *Midway: Message from the Gyre*, which appeared adjacent to *Wrapped*.) Serving as a backdrop to *Wrapped*, the writing referenced the author's process of developing an ecological identity as a new parent. What was supposed to be a magical

Figure 38

Wrapped



Note. Skold, S. (2016). *Wrapped.* [Wooden toddler bed, Harlow's Earth Crib mattress cover, and video projection, 108 x 108 x 72 in.]. The video component of *Wrapped* consisted of a projection of chalkboard writing and was completed under the direction of Michael Burton, Faculty Advisor. (Skold, 2016f).

time was permeated with complex and conflicting information related to infant and children's consumer goods:

> I am a different person in The After. . . .
> The person people liked to talk to at cocktail parties is gone.
> The person people liked to talk to is gone.
> I realized this wrapping her mattress. . . .
> Initially, one might consider encasing a mattress to protect the mattress.
> But I was wrapping it to protect <u>HER</u> from the mattress.

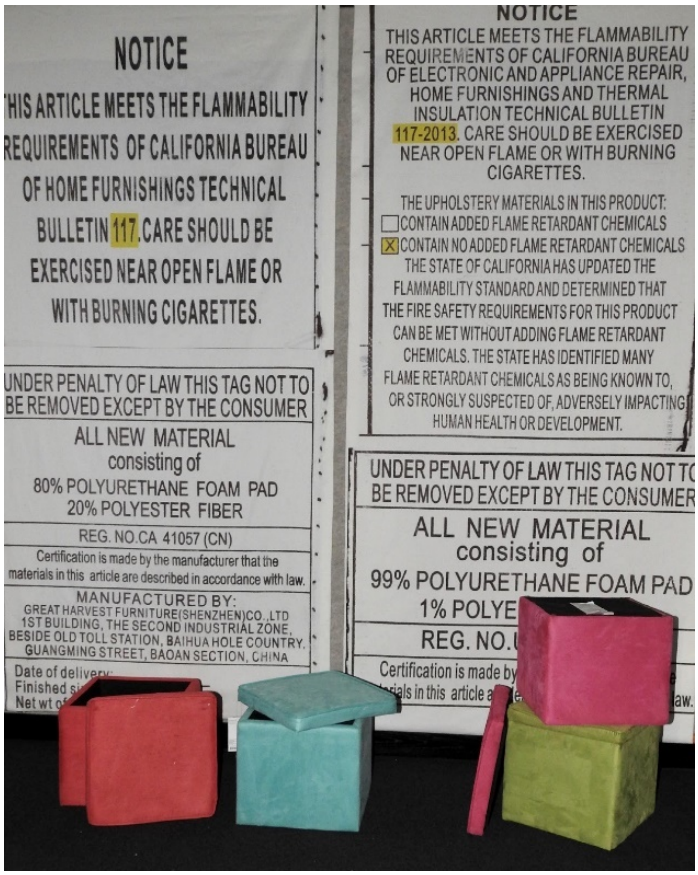
> The directions even specified where to cut the holes so the gases from the chemicals could exit away from her face. Six-millimeter food-grade polyethylene plastic (PVC-free of course) worked well. . . .
> I sat on the floor—exhausted.
> Wrapping a mattress was not for sissies.
> The After was not for sissies.
> It was WAR.
> I couldn't keep them out of our house. The idea of one's home being a protective bubble was gone. While I couldn't keep my family in a safe bubble, I was going to keep her mattress in one.
> Such is life in The After. . . . . (Skold, 2016f).

Wrapped was an attempt to reconcile protecting family while navigating through a world in which chronic disease was the norm and natural is not. It is a world where parents buy more and more stuff to protect their family from everyday stuff—a world where even the act of sleeping is not exempt.

Stuffed featured four brightly-colored Room Essentials ottomans from Target. They were situated across the floor near a wall with large-scale reproductions of their content labels (see Figure 39). While whimsical in nature with an invitation to pick up and move them like children's building block toys, *Stuffed* was a tangible manifestation of the complex challenges associated with the multitude of chemicals in FF—specifically flame retardants. In doing so, *Stuffed* integrated science and the legislative process with the visually appealing, playful ottomans. While seemingly similar except for their color distinctions, the ottomans were quite different in terms of their chemical content depending upon the year they were manufactured. This difference was highlighted in the floor-to-ceiling background text and addressed in the wall labels.

Figure 39

Stuffed



Note. Skold, S. (2016). *Stuffed.* [Four 4-15 x 15 x 15 in. Room Essentials microsuede ottomans (c. 2012-2015) with enlarged ottoman manufacturer's label printed on 10 oz Jacquard artist canvas using fiber reactive dyes] Printing process completed in the Textiles, Merchandising & Fashion Design Digital Textile Printing Lab by Leah Sorensen-Hayes, Ardis James Professorship Studio Assistant. (Skold, 2016c).

Many FF chemicals such as those found in dyes, anti-stain and wrinkle finishes, and flame retardants include toxins such as phthalates (and other endocrine disruptors), and lead (and other heavy metals) that are outlawed in other products (Cameron 2003; Dibley 2011; Hebda 2007; Paloniemi and Vainio 2011; Salazar 2011; Skamp, Boyes, and Stanisstreet 2007, as cited in Gorr, 2014). Flame retardants became common additives in American furniture in 1976 with the development of a California flammability standard

Technical Bulletin 117 (TB117). This standard was inspired by the increase in smoking and accidental fires, the development of petroleum-derived fabrics (which are more easily ignited than many natural fabrics), and the interests of the chemical industry (Green Science Policy Institute, 2013).

In 2012, the Green Science Policy Institute demonstrated that flame retardants added to furniture foam to meet TB117 did not prevent ignition resulting in a new standard without a flame-retardant requirement—TB117-2013 (Green Science Policy Institute, 2013). Although the standard changed and some flame retardant chemicals have been banned due to toxicity, the Toxic Substances Control Act is been outdated allowing untested chemicals to exist in our consumer goods. As a result, new flame retardants have been developed and other toxic chemicals can be found in FF items including plastics.

Like *Wrapped*, *Stuffed* addressed the challenge of discerning what FF consumer goods are helping from those that are hurting. The label didactics addressed "The Stuff in our Stuff" and "So, What could be Wrong Something Intended to Protect Us From Fires?" (see Appendix D). *Stuffed* wall labels also described the persistence of flame retardants in the environment and the varied and multiple routes of exposure—ingestion, inhalation, and skin absorption for humans, pets, and wildlife (Green Science Policy Institute, 2013; Landrigan & Etzel, 2013). Sources included the Green Science Policy Institute and the Safer States Organization among others. While visitors were encouraged to pick up and move the ottomans, they may have reconsidered handling those with the TB-117 label. The interactive installation made the invisible chemical content and legislative process of furniture visible and highlighted the connection between consumer

goods and human health. The *Stuffed* "What Can we do About Toxic Chemicals?" label addressed reading content labels, buying natural fibers, and learning about policies in Nebraska.

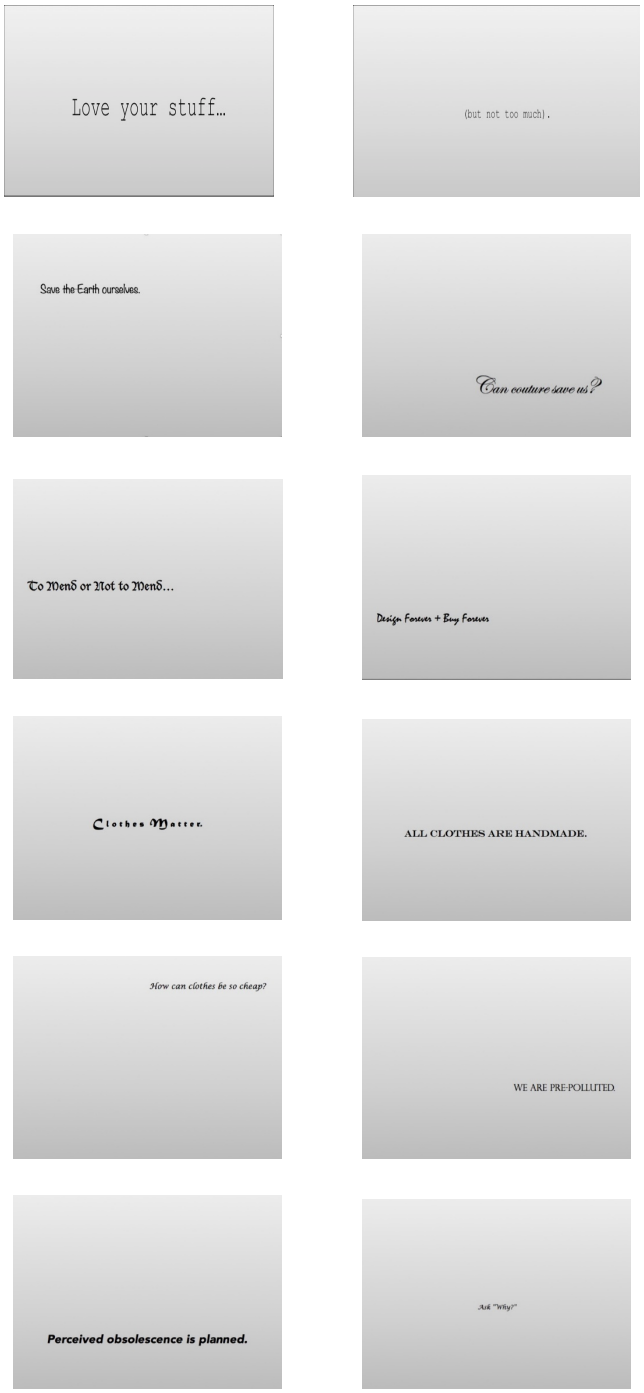
Thread for Thought consisted of 12 graphic text designs displayed on a 20 ½ inch high x 36-inch-wide monitor including short questions or quotations addressing the complexities of FF consumption (see Figure 40). The phrases consist of different fonts and sizes relating to their content. They include (left to right): "Love Your Stuff," "but not too much," "Save t~~he Earth~~ Ourselves," "Can Couture Save Us?," "To Mend or Not to Mend?," "Design Forever + Buy Forever," "Clothes Matter," "All Clothes are Handmade," "How Can Clothes Be So Cheap?," "We are Pre-Polluted," "Perceived Obsolescence is Planned," and " Ask Why." The concepts driving many of these phrases were addressed in the exhibition and various sources such as "Fast Fashion, Sustainability, and the Ethical Appeal of Luxury Brands" (Joy et al., 2012). Didactics near the monitor also directly referenced further sources for information such as websites and local retail sources (see Appendix D).

Interactive Components

The incorporation of the movable ottomans in *Stuffed* and a 36 x 48 inch chalkboard allowed study participants to physically interact with objects in the exhibition (see Figures 41, 42 & 43) and functioned as a psychomotor domain component, the third domain in learning. The chalkboard featured the projected chalkboard writing in *Wrapped* and functioned as a means to engage the participant and as a feedback mechanism. Labels encouraged visitors to write their thoughts on the chalkboard.

Figure 40

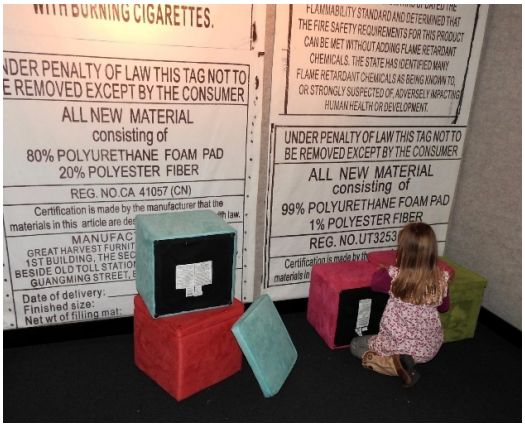
Thread for Thought



Note. Skold, S. (2016). *Thread for Thought*. [12 stills from 20 ½ x 36 in. monitor] (Skold, 2016e).

Figure 41

Visitor Interaction with Stuffed Installation



Note. Skold, S. (2016). *Stuffed* (detail). [Four 4-15 x 15 x 15 in. Room Essentials microsuede ottomans (c. 2012-2015) with enlarged ottoman manufacturer's label printed on 10 oz. Jacquard artist canvas using fiber reactive dyes]. Printing process completed in the Textiles, Merchandising, & Fashion Design Digital Textile Printing Lab by Leah Sorensen-Hayes, Ardis James Professorship Studio Assistant. (Skold, 2016c).

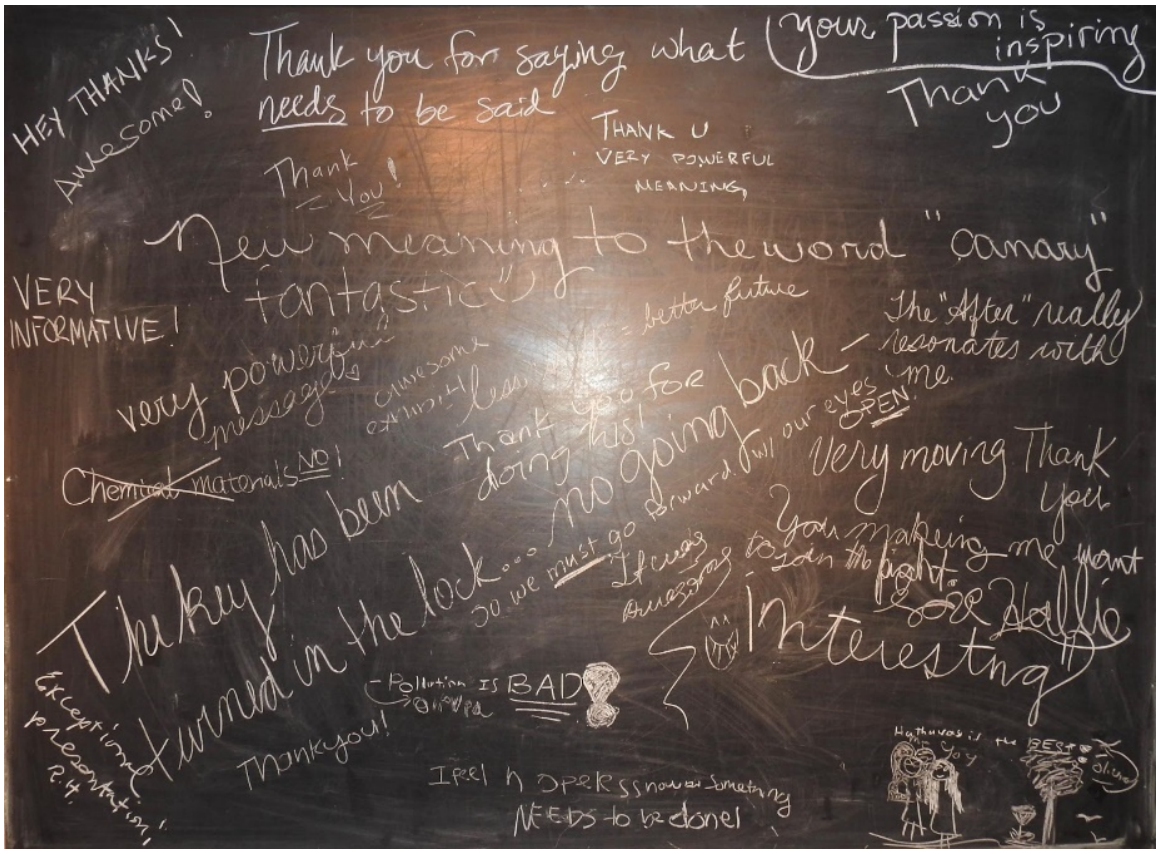
Figure 42

View of Wrapped Installation with Chalkboard for Visitor Interaction

Note. Skold, S. (2016). *Wrapped*. [Wooden toddler bed, Harlow's Earth Crib mattress cover, and video projection, 108 x 108 x 72 in.] (Skold, 2016f).

Figure 43

Chalkboard with Visitor Feedback



Note. Chalkboard. The 36 x 48 in. chalkboard provided an interactive opportunity for visitors to share feedback. (*Chalkboard*, 2012).

Over the course of the exhibition, visitors shared their ideas and feedback.

Some messages include:

"Very informative."

"Thank you for saying what needs to be said."

"New meaning to the word canary."

"We need to go forward with our eyes open.

"The key has been turned in the lock—no going back—."

Conclusion

The multidimensional and multimodal components in CC were integrated with FF and ED content and an ecological systems and TL framework. The components were integrated to facilitate visualization of and an understanding of FF and ED and to cultivate emotions. The ecological art exhibition experience is an underutilized tool in EE, and the CC experience contrasted with traditional EE educational experiences. The differences in pedagogical methods include its ecological (vs environmental) emphasis and its approaches to K and V. Rather than emphasizing nature and the environment using biospheric and altruistic value orientations to address ED, CC involved an ecological or systems-based framework using egoistic as well as altruistic and biospheric value orientations. The CC experience was intended to be multidimensional, multimodal, and holistic with an emphasis on the AD in contrast to an emphasis on the cognitive domain in traditional EE. CC was designed utilizing TL approach and experiential and self-directed learning techniques in contrast to information-based and directed learning approaches in traditional EE (see Table 4).

Table 4

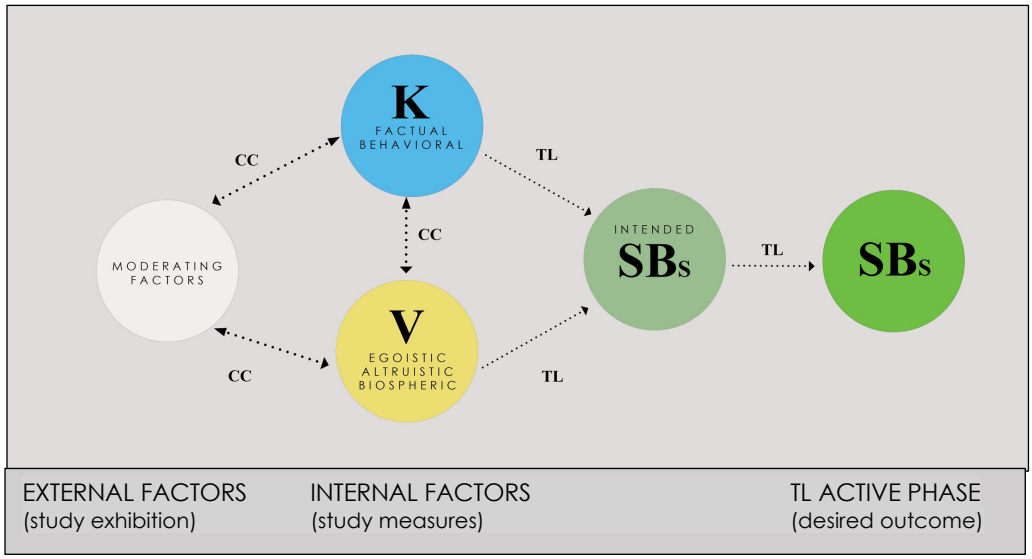
Pedagogical Differences Between Traditional EE and the CC Exhibition Model

Traditional EE Pedagogy	CC Exhibition Pedagogy
Environmental Focus	Ecological Focus: Systems Learning
Directed Learning	Self-Directed Learning
Information-Based Learning	TL/Experiential/Multimodal Learning
Cognitive Domain Emphasis	AD/Multidimensional/Holistic Emphasis
Biospheric and Altruistic Value Orientations	Egoistic, Biospheric, and Altruistic Value Orientations

The exhibition site was designed to provide a holistic context for participants to experience TL. In doing so, the intent was to facilitate an engagement in the pre-active/seven phases of TL as outlined by Mezirow (1995). These phases include a disorienting dilemma (the gallery space itself), an examination of feelings, a critical assessment of assumptions, a realization of shared discontentment, an exploration of options for new roles, relationships and actions, planning a course of action, and acquiring knowledge and skills for implementing one's plans. In theory, the under-utilized exhibition experience as an EE pedagogy has potential to address external factors—the non-immediacy, invisibility, and complexity—of issues related to ED—and ultimately internal factors—K, V, Perspectives, and intended SBs (see Figure 44).

Figure 44

TL and SB Model as a Function of Environmental Attitude, External Moderating Factors, and the CC Exhibition Intervention



Note. This model expands upon Kaiser, Wölfing, et al.'s (1999) model of ecological behavior as a function of environmental attitude consisting of K, V, and intended SBs. This model also references Yee and Hassan's (2016) environmental attitude model emphasizing external moderating factors and TL (transformative learning). Moderating factors in this study range and include those inherent with ED including the invisibility of ED, the complexity of ED, and the delayed implications of ED. Sociological factors include the consumption age, the aesthetic age, the anthropocentric viewpoint, and lack of critical thinking in society.
Concept Drawing: Stacey Skold.
Graphic Design: Stacy Asher.

Table 5

Desired Shifts in K, V, Perspectives, Intended SBs, and SBs Associated with CC

Pre-Exhibition	Post-Exhibition
Invisible ED, Relationships, and Consequences	Visible ED, Relationships, and Consequences
Anthropocentric View : Disconnection Between Humans, Natural World, FF, and ED	Ecocentric View: Connection and Interconnection Between Humans, Natural World, FF, and ED
Awareness of Human role and Implications in ED	Deeper Understanding of Human Role in and Human Implications of ED
Awareness of ED/FF Implications	Deeper Understanding of ED/FF Including Critical Thinking
ED Irrelevant	ED Relevant
FF is Disposable/Ubiquitous	FF is Relevant and Loved
ED is a Political/Environmental Problem	ED is a Personal, Human Problem
Low Risk Perception of ED/FF	Higher Risk Perception of ED/FF
Unknown Level of Intended SBs	Higher Level of Intended SBs
Inaction/Thoughtless Consumption	SBs/Thoughtful Consumption
Awareness-Action Gap/Attitude-Action Gap	Closed Gaps
Linear FF System	Circular FF System

The desired shifts resulting from the CC exhibition intervention include making invisible and disconnected relationships and consequences of ED visible and connected leading to increased levels of K and emotions related to FF and ED and of the relevance of ED and FF pollution. An increase in relevance of ED and FF could influence a change in perception of ED and FF pollution from an environmental problem to a personal, human problem (see Table 5). The desired outcome of these multiple shifts is the development of an environmental attitude consisting of higher levels of K, V, and intended SBs. In theory, an environmental attitude including higher levels of intended SBs would result in SBs in the active phase of TL, a closed awareness-action gap, and, ultimately, on a societal/global level, a circular FF system.

Chapter 5

Study Methodology

Introduction

The primary objective of this study was to determine whether CC, an ecological art exhibition addressing the implications of FF, is related to an environmental attitude consisting of K, V, and intended SBs. The study also analyzed whether participants reported emotions, new information, and/or perspectives as a result of visiting CC and if so, as well as which exhibition components as associated with emotions, new knowledge, and/or perspectives. Possible relationships between sample characteristics and study findings were explored.

Study Participants

The study sample (n = 163) consisted of University of Nebraska-Lincoln (UNL) student-participants. A non-probability sample, convenience sampling, was utilized, as the exhibition gallery was accessible to students. The students were predominantly between the ages of 18 and 22 years (80.9%) (see Table 6). Ninety-one percent (91%) were female and 9% were male (see Table 7). Forty point seven percent (40.7%) of the participants were raised in a suburban setting, 31% were raised in a rural area, and 28.3% were raised in an urban area (see Table 8).

The student population was a receptive audience for an ecological art exhibition, which took place from April 11-22, 2016, at the Robert Hillestad Textiles Gallery on the second floor of the Home Economics Building—home to classes in the College of

Table 6

Age in Years (*n* = 163)

Age	Frequency *n* = 163	Valid Percent
18	5	3.1
19	62	38.0
20	30	18.4
21	18	11.0
22	17	10.4
23	4	2.5
24	2	1.2
26	1	.6
30	1	.6
32	1	.6
34	2	1.2
Unknown	19	11.7

Note. One age was not reported because it fell outside of the age range of the participants.

Table 7

Gender of Study Sample

Gender	Frequency *n* = 163	Valid Percent
Female	132	91
Male	13	9
Unknown	18	

Table 8

Area Type where Study Participants were Raised

	Frequency *n*= 163	Valid Percent
Rural	45	31
Urban	41	28.3
Suburb	59	40.7
Unknown	18	

Education and Human Sciences. To increase accessibility to the exhibition given the time constraints of students, participants were recruited from five classes. Four classes took place in the Home Economics Building, and one education class was an online format. All classes were from the College of Education and Human Sciences; three were in the Child, Youth, and Family Studies Department, and two classes were in the Textiles, Merchandising & Fashion Design Department.

Implementation Procedures and Timeline

Prior to implementing the study, the author installed the CC exhibition and the pretest and posttest survey questions were finalized with specialized input from Dr. Julia Torquati, Creswell's *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (2012) and Dillman et al.'s *Internet, Mail, and Mixed Mode Surveys: The Tailored Design Method* (2009) informed strategies related to question formation and response format. The surveys were entered into a Qualtrics web-based research tool to provide online access to manage the data and to provide access to the study participants and the Institutional Review Board.

After the UNL Institutional Review Board reviewed and approved the surveys, the study protocol, and all related documentation including the recruitment letters, the author began recruiting participants on April 4, 2016. The author visited classes and read the recruitment letter, which was posted electronically for the online class to read (see Appendix F). This letter highlighted the nature and timeline of the study. To reduce non-response error, the instructors offered an extra-credit incentive for those participating in the study. Those who chose not to participate in the study also had the opportunity to earn the same amount of extra credit by completing an alternative project developed by the instructor. These alternative options ranged, but included writing a two-page reflection paper about sustainable practices of clothing brands and attending an art and/or design-based lecture followed by a two-page response paper about the lecture.

Between April 4th and 10th, 2016, participants took the pre-exhibition survey online and visited the exhibition between April 11th and April 22nd, 2016. During the duration of the exhibition, the gallery kept its normal hours Monday through Friday and provided extended hours on the weekend for maximum access. Participants were able to take the post-exhibition survey online between April 25 and 30, 2016 (see Table 9).

Survey Instruments

The quasi-experimental research study consisted of a pretest and posttest. The pretest consisted of 88 questions addressing the primary objective and sample characteristic information (see Appendix I). The posttest consisted of 74 questions addressing the primary and secondary objectives (see Appendix J). The methodology, variables, and plans of analyses are addressed in terms of the two objectives.

Table 9

Timeline for Study Related to the CC Exhibition

Date	Study Phase	Location
2014-2016	Exhibition and study were conceptualized and planned.	Varied
April 4 -April 7, 2016	Participants recruited.	Classrooms and one online class
April 4-10, 2016	Participants took pretest (prior to visiting exhibition).	Online
April 6-11, 2016	Exhibition installed.	Robert Hillestad Textile Gallery.
April 11-22, 2016	Participants visited exhibition.	Robert Hillestad Textile Gallery
April 25-30, 2016	Participants took posttest.	Online
April 23-25 2016	Exhibition deinstalled.	Robert Hillestad Textile Gallery

Primary Objective

The primary study objective was to determine whether visiting CC was associated with changes in environmental attitude—specifically K, V, and intended SBs. Marcinkowski and Reid (2019) have defined attitude as being characterized as a mental and neural state of readiness and the most distinctive and indispensable concept [construct] in contemporary social psychology' (p. 460) and is primarily evidenced in relation to a person's evaluative dispositions and judgments about an 'object' (e.g., a being, thing, event, idea, issue, or action that are derived, at least, in part from their experience or situation) (Marcinkowski & Reid, 2019, p. 461). An environmental attitude has been considered a consistent base in the complex, multi-factorial process of developing SBs and a powerful predictor of ecological behavior (Kaiser, Wölfing, et al., 1999).

The relationship between attitudes and SBs is referred to as the attitude-behavior model (A-B). The A-B model is based upon the theory of planned behavior (Ajzen, 1985, as cited in Kaiser, Wölfing, et al., 1999). The A-B model as a predictor of SBs has been supported by Marcinkowski and Reid's (2019) review of research on the A-B model in EE, in which the authors identified "reasonably clear, consistent, and substantial evidence, both within and beyond EE research, regarding the relatively moderate strength to many A-B relationships" (p. 467).

Kaiser, Wölfing, et al. (1999) developed a skeleton theory of planned behavior in EE consisting of K, V (including feelings of obligations), and ecological behavior intention (referred to as intended SBs in this context), which are the basis for this study methodology. Survey questions were modeled after Kaiser, Wölfing, et al.'s (1999) K, V, and intended SB categories in *Environmental Attitude and Ecological Behavior,* but were adjusted given the FF emphasis. Changes in attitude were measured by assessing changes in K, V, and/or intended SBs cores. These were established by comparing the results of paired, repeated measures t-tests of UNL student visitor-participants to CC. In doing so, the independent variable was time, and the dependent variables were the mean scores for K, V, and SBs.

Knowledge

Kaiser, Wölfing, et al., (1999) distinguished two types of environmental knowledge. The first is factual environmental knowledge, which references knowledge about the natural world and current environmental problems (Kaiser, Wölfing, et al., 1999). The second is knowledge about ecological behavior, which is knowledge about

what and how something can be done in relation to ED (Kaiser, Wölfing, et al., 1999). Kaiser, Wölfing, et al. (1999) identified factual knowledge as a precondition of any attitude, but not directly related with ecological behavior and that the relationship between knowledge and SBs is stronger when the knowledge involves information about the ecological behavior (Levenson, 1974; Sia et al, 1985/86; Smith-Sebasto & Forner, 1994, as cited in Kaiser, Wölfing, et al., 1999).

The CC exhibition and surveys addressed both types of knowledge in relation to the FF industry and their impact on humans and the natural world. This factual information was referenced in the art installations and included in the wall labels. Knowledge about strategies for individuals to mitigate the impact of ED was included in the wall labels. The K scale consisted of 17 matched pair questions in the pretest and in the posttest (see Appendices H & I). The K section included two subscales: Mass Consumption and Pollution/Health (including both plastic and chemical pollution). The Mass Consumption subscale included five questions assessing K about mass consumption and its relationship to ED and humans in the present and future. The Pollution/Health subscale included 12 questions and assessed participants' familiarity with plastic and chemical pollution and related concepts including biodegradability and their relationship to everyday FF objects, humans, and the natural world.

Values

There are numerous, overlapping definitions and applications of values in EE literature. In the context of the survey, environmental value is defined generally as one's judgment of what is important in life (Lexico, 2020). The value scale included five

questions, which were modeled after Kaiser, Wölfing, et al.'s (1999) measures in *Environmental Attitude and Ecological Behavior*. Questions assessed levels of obligations to and the importance of the natural world (see Appendices H & I).

Intended SBs

Intended SBs are the third component of an environmental attitude and are considered to have the most powerful relationship to SBs (Kaiser, Wölfing, et al., 1999)—the active phase of TL. The SB scale of the survey consisted of 11 questions. They were informed by Kaiser, Wölfing, et al.'s (1999) behavior scale and were applied to behaviors related to the FF industry (see Appendix H). The SB scale had two subscales. The first subscale, Buy, included six questions addressing consumer behavior related to FF consumption. The second subscale, Do, included five questions related to other types of SBs including recycling, volunteering, writing a letter, and talking to people about ED.

Design and Plan of Analysis

The primary objective questions were designed using an interval, seven-point Likert-type scale. Participants rated each item on a scale from a 7 (agree strongly) to a 1 (disagree strongly). The change in scores for K, V, and intended SBs were computed using repeated-measures/paired sample two-tailed t-test procedures comparing pretest and posttest response data. In doing so, measures of central tendency (*M*) and variability (*SD*) were applied. An alpha level of .05 was adopted to indicate a statistically significant increase in scores in the posttest.

Secondary Objective

The secondary research objective was to examine responses regarding CC exhibition components in terms of K, value/perspectives, SB intentions, and emotions and to consider the responses in terms of potential differences between K, V, and SB pre-exhibition and post-exhibition survey scores. The inclusion of an emotions measure is based upon the role of the AD in TL and in attitude formation. Marcinkowski and Reid (2019) proposed that attitudes have an affective component involving feelings or emotions and that the nature and strength of emotions can be a predictor factor of behavior.

To assess emotions, participants responded to two questions to determine whether they reported emotions as a consequence of experiencing CC and if so, what type of emotions. The first question involved a 7-point Likert-type scale. The second question was a check-all-that apply format with nine emotion options: sad, angry, motivated, inspired, confused, happy, surprised, betrayed, empathetic, and other. These scores were computed and analyzed using descriptive statistics; frequency distribution tables comparing differences in response numbers.

To measure whether participants reported new K, perspectives, and/or new intended SBs, and to which exhibition components they attributed potential new K, perspectives, and/or SB intentions, participants responded to four questions each asking them to rate 14 exhibition components. The components included the installations (*Midway*, *Wrapped*, *Stuffed*, *Bought*, *Beaten*, and *Thread for Thought*), wall labels, quotes, sound (from

Midway and *Wrapped*), interactive components (ability to examine ottomans), exhibition experience as-a-whole, ability to leave feedback, and other.

Participants rated each component using a slider from 0 (low) to 100 (high): zero indicating no new K, V/perspectives, or intended SBs were reported and 100 indicating a high level of new K, V/perspectives, and/or SB intentions were reported. The scores were analyzed using descriptive statistics: frequency distribution tables comparing differences in averages and standards of deviation and minimum and maximum levels for each CC component. Results were examined in relation to the outcome variables as well as in relation to each other to determine whether exhibition components moderate the other predictors. New information scores were associated with environmental knowledge, new perspectives scores were associated with environmental values, and new intended SBs scores were associated with intended SBs.

Sample Characteristics

The demographic and background characteristics of the study participants were also measured and considered in relation to the outcome variables and in relation to each other. Participants responded to three questions addressing demographic characteristics. The gender and the geographic area questions were multiple choice. The age measure was fill-in-the blank format.

Background characteristics consisted of four Likert-scale questions and one multiple choice question addressing background knowledge and values. The participants answered two questions about background experiences in terms of individual elective reading and academics related to EE. The elective reading question was fill-in-the blank

ranging from zero to over eleven books or articles. The academic background question was a Likert-scale question related to exposure to EE issues in school.

The participants also answered three Likert-scale questions related to background characteristics related to health, art, and their family and the natural world. Participants rated each item on a scale from 1 (agree strongly) to 7 (disagree strongly). The scoring or coding system for the data was a 7 for “strongly agree” and a 1 for “strongly disagree.”

These variables were measured using single-item scores based upon frequency distribution tables. They were examined in relation to the outcome variables as well as in relation to each other to determine whether demographic and/or background variables and exhibition components moderated the other predictors.

Chapter 6

Results

Reliability/Data Reduction

The primary objective was to determine whether visiting CC was associated with changes in attitude based upon differences between pretest and posttest scores related to K, V, and intended SBs. Responses from participants who did not take both the pretest and posttest and responses from any non-students were identified and excluded from the paired t-tests. Data were generated from the Qualtrics software program in conjunction with the Nebraska Evaluation and Research Center.

Cronbach's alpha coefficients were analyzed to determine the reliability of the measured items K, V, and SBs. A Cronbach's coefficient alpha of .70 or higher was considered acceptable (Nunnally, 1967).

K Scale

Good reliability was demonstrated for the K pretest scale (M = 58.25, SD = 10.54, coefficient a = .82) and the K posttest scale (M = 39.14, S = 9.47, coefficient a = .85). Good reliability was demonstrated for the K Mass Consumption pretest subscale (M = 12.83, SD = 4.65, coefficient a = .83) and the K Mass Consumption posttest subscale (M = 9.25, SD = 3.69, coefficient α = .91). Good reliability was demonstrated for the K Pollution/Health pretest subscale (M = 45.45, SD = 7.41, coefficient a = .74) and the K Pollution/Health posttest subscale (M = 29.84, SD = 6.57, coefficient a = .74). One question was deleted from the Pollution/Health scale as different scale points were assigned.

V Scale

The V scale initially consisted of six questions with a lower than desirable level of reliability for the V pretest scale (M = 12.12, SD = 4.13, coefficient α = .67) and good reliability for the V posttest scale (M = 11.19, SD = 4.25, coefficient α = .73). To enhance reliability, one question was excluded from the V scale. The resulting set of five V questions demonstrated good reliability for the pretest scale (M = 9.21, SD = 3.15, coefficient α = .75) and for the posttest scale (M = 8.47, SD = 3.28, coefficient α = .82)

Intended SB Scale

Good reliability was demonstrated for the intended SB pretest scale (M = 41.88, SD = 10.85, coefficient α = .87) and the SB posttest scale (M = 24.59, SD = 7.64, coefficient α = .89). Good reliability was demonstrated for the SB Buy pretest subscale (M = 27.22, SD =7.31, coefficient α = .89) and the SB Buy posttest subscale (M = 13.76, SD = 4.33, coefficient α = .83). Good reliability was demonstrated for the SB Do pretest subscale (M =14.66, SD = 4.89, coefficient α: 0.70) and the SB Do posttest subscale (M = 10.84, SD = 3.90, coefficient α = .80).

Findings

Primary Objective

The primary research objective included three hypotheses based upon visiting CC: the K scores will increase, the V scores will increase, and the SB scores will increase (1a, 1b, and 1c).

Hypothesis 1a. As expected, there was a statistically significant increase in participants' K scores after visiting CC. The means (with standard deviations in

parenthesis) for the K scale, the K Mass Consumption subscale, and the K Pollution/Health subscale were 1.08 (0.43), 0.74 (0.81), and 1.21 (0.46) respectively.

Hypothesis 1b. As expected, there was a statistically significant increase in participants' V scores after visiting CC. The mean (with standard deviation in the parenthesis) for the V scale was 0.18 (0.57).

Hypothesis 1c. As expected, there was a significant increase in participants' SB scores. The means (with standard deviations in parenthesis) for the SB scale, the SB Buy subscale, and the SB Do subscale were 1.59 (.83), 2.26 (1.10), and 0.78 (.83) respectively (see Table 10).

Secondary Objective

The secondary research objective assessed whether participants report an association between CC and emotions and/or new knowledge, perspectives, and/or intended SBs and if so, to which exhibition component(s) they are associated with. There are three hypotheses (2a, 2b, and 2c) addressing the secondary research objective.

Hypothesis 2a. Participants will report an increase in information attributed to didactics and interactive components. In this case, the null hypothesis was not rejected. The majority of participants attributed an increase in knowledge to the exhibition experience as-a-whole (*M*: 77.84) (see Table 11).

Hypothesis 2b. Participants will attribute critically examining assumptions and beliefs to Chris Jordan's *Midway: A Message from the Gyre*. The majority of participants reported that the exhibition inspired them to consider alternative or different views and

Table 10

Comparison of K, V, and Intended SBs Scales and Subscales Before and After Viewing the CC Exhibition

	Pretest		Posttest			
Scale	*M*	*SD*	*M*	*SD*	*T*	*p*
K *n* = 135	5.42	0.66	6.02	0.62	-13.74	.000
K (MC) *n* = 135	5.43	0.96	6.17	0.72	-10.52	.000
K (PH) *n* = 135	5.42	0.63	5.96	0.63	-11.80	.000
V *n* = 135	6.16	0.64	6.32	0.64	-3.72	.000
SB *n* = 135	4.16	0.97	5.74	0.69	-22.25	.000
SB (BUY) *n* = 135	3.42	1.18	5.69	0.72	-24.40	.000
SB (DO) *n* = 135	5.03	0.99	5.81	0.78	-10.85	.000

Table 11

Average Ratings of Exhibition Components in Terms of New K, V Perspectives, and Intended SBs

Exhibition Components	K (2a.)	V (2b.)	SBs (2c.1)	SBs (2c.2)
Midway Trailer	66.29 *n* = 143	65.92 *n* = 144	72.57 *n* = 139	71.48 *n* = 140
Wrapped	74.08 *n* = 143	65.64 *n* = 144	66.36 *n* = 138	73.48 *n* = 139
Stuffed	70.17 *n* = 142	56.70 *n* = 145	64.41 *n* = 138	70.09 *n* = 137
Bought	71.98 *n* = 143	70.87 *n* = 145	74.40 *n* = 139	75.89 *n* = 140
Beaten	66.06 *n* = 143	61.74 *n* = 144	67.09 *n* = 139	69.67 *n* = 138
Installation Titles	60.11 *n* = 140	55.24 *n* = 140	60.56 *n* = 133	59.47 *n* = 133
Labels	72.17 *n* = 143	65.93 *n* = 144	69.01 *n* = 137	69.01 *n* = 139
Thread for Thought	66.76 *n* = 140	62.01 *n* = 142	65.18 *n* = 136	65.53 *n* = 136
Quotes	63.90 *n* = 140	63.59 *n* = 145	64.84 *n* = 136	65.44 *n* = 135
Sound	59.71 *n* = 139	63.95 *n* = 144	63.07 *n* = 130	62.64 *n* = 130
Interactive Options	63.72 *n* = 141	59.20 *n* = 142	61.86 *n* = 131	63.55 *n* = 133
Exhibition as-a-Whole	77.84 *n* = 143	81.54 *n* = 115	76.26 *n* = 138	75.25 *n* = 139
Ability to Leave Feedback	60.30 *n* = 128	56.52 *n* = 139	59.47 *n* = 119	60.21 *n* = 115
Other	58.40 *n* = 5	36.92 *n* = 12	44.17 *n* = 12	58.38 *n* = 13

Note. Scale: 0 = nothing new was learned, 100 = a great deal was learned.

perspectives (see Table 14) or to critically examine assumptions, beliefs, and/or values (see Table 15). The null hypothesis was not rejected. The majority of participants attributed critically examining assumptions and beliefs to the exhibition experience-as-a-whole (*M*: 81.54) (see Table 11).

Hypothesis 2c. Participants will attribute an increase in intended SBs to CC as-a-whole. There were two questions addressing SBs: 2c1 and 2c2. For 2c1, the null hypothesis was not rejected, as most participants attributed an increase in SBs such as recycling clothing, plastic, and or paper or to volunteer and /or donate money to an environmental cause to the exhibition experience as-a-whole (*M*: 76.26) (see Table 11). For 2c2, participants attributed an increase in intended SBs including reading furniture labels, recycling, or buying more thoughtfully to *Bought* (*M*: 75.89) followed by exhibition-as-a-whole (75.25) (see Table 11).

In terms of the emotion measure, participants reported emotions associated with CC. The majority of the participants reported that the exhibition instilled an emotional response in them with the most frequently reported emotions being surprised (60.7%), sadness (55%), and inspired (50.3%) (see Tables 12 & 13).

Prior Exposure to Environmental Issues

The participants answered questions about their source of ED information in terms of individual reading and formal education. Most study participants had exposure to educational experiences related to environmental concerns. The majority (60.8%) indicated they had read between one and five books and/or articles electively on-line or in

Table 12

Proportion of Participants Reporting that the Exhibition Provoked an Emotional Response

	Frequency $n = 163$	Valid Percent
Strongly Agree	25	17.4
Agree	69	47.9
Somewhat Agree	39	27.1
Neither Agree nor Disagree	9	6.3
Somewhat Disagree	2	1.4
Unknown	19	

Table 13

Emotions Associated with CC Exhibition as Reported by Study Participants

	Frequency $n = 163$	Valid Percent
Sad	90	55.2
Angry	51	31.3
Motivated	72	44.2
Inspired	82	50.3
Confused	23	14.1
Happy	7	4.3
Surprised	99	60.7
Betrayed	9	5.5
Empathetic	63	38.7
Other	7	4.3

Note: "Other" consisted of "ashamed" .6%, "confused" .6%, "forlorn" .6%, "freaked out" .6%, "hopeful" .6%, "hopeless" .6%, "upset" .6%.

Table 14

Proportion of Participants Reporting that the Exhibition Inspired them to Consider Alternative Views and Perspectives

	Frequency *n* = 163	Valid Percent
Strongly Agree	21	14.5
Agree	73	50.3
Somewhat Agree	43	29.7
Neither Agree nor Disagree	8	5.5
Unknown	18	

Table 15

Proportion of Participants Reporting that the Exhibition Inspired them to Critically Examine Assumptions, Beliefs, and/or Values

	Frequency *N* = 163	Valid Percent
Strongly Agree	21	14.5
Agree	71	49.0
Somewhat Agree	39	26.9
Neither agree nor Disagree	11	7.6
Somewhat Disagree	2	1.4
Disagree	1	.7
Unknown	18	

print relating to environmental concerns such as mass consumption, climate change, and chemical pollution (see Table 16). Nineteen percent (19%) read between six and ten sources and 8.5% read 11+ sources. Eleven point 8 percent (11.8%) read zero sources on the subject. The majority (50.4%) of the pretest sample (n = 163) reported they learned about environmental issues including mass consumption and chemical pollution in school. Thirty-seven point nine percent (37.9%) "somewhat agreed" with this statement (see Table 17). The participants also answered questions about their family's values related to the natural world. The majority of participants (60.1%) reported that their immediate family (the people who raised them) valued the natural world (see Table 18).

Table 16

Proportion of Participants who Reported Reading Independently about ED

	Frequency n = 163	Valid Percent
0	18	11.8
1-5	93	60.8
6-10	29	19.0
11+	13	8.5
Unknown	10	

Table 17

Proportion of Participants who Reported Learning about Environmental Issues in School

	Frequency *n* = 163	Valid Percent
Strongly Agree	18	11.8
Agree	59	38.6
Somewhat Agree	58	37.9
Neither Agree nor Disagree	5	3.3
Somewhat Disagree	7	4.6
Disagree	6	3.9
Unknown	10	

Table 18

Proportion of Participants who Reported that their Family Values the Natural World

	Frequency *n*= 163	Valid Percent
Strongly Agree	28	18.3
Agree	64	41.8
Somewhat Agree	45	29.4
Neither agree nor disagree	10	6.5
Somewhat disagree	2	1.3
Disagree	3	2.0
Strongly Disagree	1	.7
Unknown	10	

Interest in Art and Health

Fifty three percent (53%) (*n* = 163) reported an interest in art (see Table 19). The majority of participants (85%) (*n* = 163) considered health to be a priority in their life (see Table 20) and 72.4% were inspired to further increase their attention on their health after the CC exhibition experience (see Table 21).

Table 19

Proportion of Participants who Reported an Interest in Art

	Frequency *n*= 163	Valid Percent
Strongly Agree	31	20.3
Agree	50	32.7
Somewhat Agree	50	32.7
Neither Agree nor Disagree	10	6.5
Somewhat Disagree	7	4.6
Disagree	3	2.0
Strongly Disagree	2	1.3
Unknown	10	

Table 20

Proportion of Participants Reporting that their Health is a Priority

	Frequency *n* = 163	Valid Percent
Strongly Agree	67	43.8
Agree	63	41.2
Somewhat Agree	21	13.7
Somewhat Disagree	2	1.3
Unknown	10	

Table 21

Proportion of Participants who Reported an Increase in Motivation to Focus on Health After Visiting the Exhibition

	Frequency *n* =163	Valid Percent
Strongly Agree	37	25.5
Agree	68	46.9
Somewhat Agree	29	20.0
Neither Agree nor Disagree	8	5.5
Somewhat Disagree	3	2.1
Unknown	18	

Chapter 7

Discussion

The following discussion will outline the limitations and sample characteristics of the study followed by deliberation in terms of the primary and secondary objectives. The section ends with a focus on future research.

Limitations

The following limitations should be considered in terms of the study results. The use of convenience sampling is considered a limitation. The participants were all University of Nebraska college students enrolled in Education and/or Textile Merchandising, and Fashion Design classes with specific interests and values geared towards those subjects. In addition, 91% of the students were women, which does not represent the population at large or a generalized population of college students. Also, the experiences reported visiting CC cannot be generalized for all ecological art exhibitions. The context of the CC exhibition and study addressed specific moderating factors/gap factors in the context of FF including invisibility and complexity and excluded others such as comfort, convenience, and habits in other realms of human behavior (Kollmuss & Agyeman, 2002).

Unanswered survey questions and self-reported data are also limitations. In addition, although commonly used in psychological studies, self-reported data can be subject to memory quality and cannot be independently verified. As a result, it can, potentially, contain sources of bias, as participants may be inclined to answer favorably towards positive environmental K, V, and/or intended SBs. The independent variable of

time can also function as a limitation. It is possible study participants encountered other variables during the course of the time from when they took their pre-exhibition survey and when they took their post-exhibition survey, which could have played a role in their responses.

Although the exhibition gallery was a space isolated from classrooms and student traffic and care was taken to ensure as consistent experience as possible for all visitors, each participant experienced the exhibition differently. Time and focus varied for each participant, and although students were encouraged to read labels in their invitation to participate letter, it cannot be verified that labels were read. In addition, it is possible participants' perceptions of the exhibition could have been influenced by others visiting the exhibition. Background conversation or direct conversations with other gallery visitors could have influenced participants' perception negatively or favorably.

Sample Characteristics

There are multiple sample characteristics that may have influenced a positive response to an ecological art exhibition about FF with an emphasis on transformative learning. These include age range, gender, interest in health and art, coursework, and background knowledge of EE. The majority of the study participants (80.9%) were between 18 and 22 years of age and all identified themselves as students at the University of Nebraska (see Table 6). They grew up in a cross-section of areas with most participants from the suburbs closely followed rural and then urban areas (see Table 8). This relatively young, student population is relevant, as the college years are considered a time of substantial growth and evolution for students (Landino, 2020).

The gender of the study participants may have also influenced an increase in predisposed the sample to positive changes in K, V, and/or intended SBs. The majority of the study participants (91%) (see Table 7) were women. Studies have shown that gender plays a role in environmental views (Ballew et al., 2018). Although it has been shown that men have more knowledge related to ED issues including climate change (Ballew et al., 2018), women tend to have stronger environmental attitudes and behaviors than men (Milfont & Sibley, 2016). Several explanations exist including social dominance orientation (Milfont & Sibley, 2016), value orientations, and risk perception (Ballew et al., 2018).

Stern et al. (1993) found that women's beliefs about consequences relating to the self, others, and the biosphere are stronger than those of men. This is supported by Ballew et al. (2018), who identified that women have higher risk perceptions about global warming and environmental problems that pose health risks than men. Milfont and Sibley (2016) argued that women had higher levels of environmental values because they were more empathetic than men, and that men's lower levels of environmental values were related to their higher social dominance orientation. Women, in turn, were found to be more willing to change and more emotionally engaged (Fliegenschnee & Schelakovsky, 1998; Lehmann, 1999, as cited Kollmuss & Agyeman, 2002). Kollmus and Agyeman (2002) have argued that the stronger a person's emotional reaction, the more likely that person will engage in pro-environmental behavior.

In addition to age and gender, the interest and background of the study population may have influenced an increase in K, V, and SBs. The majority of participants reported

an interest in art (53% strongly agreed or agreed; 32.7% somewhat agreed) (see Table 19) and two of the five classes that made up the study many were recruited from the Textiles, Merchandising & Fashion Design Department. Students in that Department and those interested in art would have a greater vested interest in art and fashion than the population at large. They may be more inclined to find relevance in an exhibition about FF and ED. In addition, a large majority indicated an interest in health (85.0% strongly agreed or agreed and 13.7% somewhat agreed) (see Table 20).

Given the egoist value orientation is the strongest value orientation, learning about lesser-known negative implications of FF and ED on human health would be especially relevant for those who prioritize their health. Health-minded individuals may be more likely to score higher in terms of K, V, and intended SBs due to an increase in risk perception of FF. The CC exhibition also inspired the majority of participants (72.4% strongly agreed or agreed and 21% somewhat disagreed) to further increase their emphasis on health (see Table 21).

Overall, the participants are considered to have prior knowledge about environmental issues. The majority of participants (50.4% strongly agreed or agreed and 37.9% somewhat agreed) that they learned about EE issues in school (see Table 17). Given the criticism of public education in terms of EE, it is likely the information was limited and excluded the topic of FF, which is supported by the high level of surprise reported in terms of an emotional response to CC. Ninety eight point three percent (98.3%) electively read at least one book or article related to environmental concerns (see

Table 16). In addition, (60.1% strongly agreed or agreed and 29.4% somewhat agreed) that they had a family who valued the natural world (see Table 18).

Primary and Secondary Objectives

The primary objective of the study was to determine whether CC, an ecological art exhibition, was associated with an environmental attitude regarding FF and ED as measured by K, V, and intended SBs. The second objective assessed whether the study participants attributed potential changes in K, V, and intended SBs to particular exhibition components and determined if emotions were reported. The statistically significant increase in K, V, and intended SBs results supports the hypotheses that CC is associated with K, V, and intended SBs—components of an environmental attitude (Kaiser, Wölfing, et al., 1999).

Knowledge

The statistically significant increase in scores relating to K including the mass consumption (MC) and pollution/health (PH) subscales indicated that an CC was an effective way to cultivate factual K related to mass consumption and pollution/health from the FF industry. While the exhibition included cognitive aspects of learning in the form of wall labels, the importance of the role of the AD and multidimensionality of CC was heightened by the secondary objective results. Participants attributed new K (as well as perspectives and one of the two intended SBs measures) to the exhibition-as-a whole in contrast to wall labels/cognitive component. This supports the concept of a holistic art experience—specifically a multidimensional, multimodal, ecological art experience—in acquiring cognitive information as well as V, new perspectives, and intended SBs. This

finding is consistent with research by Broudy (1905-1998), Fowler (2001), Dickinson (2002), and Eisner (1933-2014) who identified that art (in this case specifically ecological art) can play an important role in learning. It is also consistent with Kagan's (2011) argument that an integrated response is needed for a complex crisis encompassing ecological, social, cultural, and economic dimensions.

The statistically significant increase in K should also be considered in the context of reported emotions related to the exhibition. The majority of participants reported an emotional response to the exhibition experience. It seems likely emotions played a role in changes in K, given the emphasis on the AD in learning by Arnold (2005), Csikszentmihalyi (1990), De Vignemont & Singer (2006), Hinds and Sparks (2008), Le Doux (1992, 1996, 2003), Stern (1985) (as cited in Gray & Birrell, 2015), Gray and Thomson (2016), and Parker and Wilding (2012) and others. The results are also consistent with research by Coppola (1999); Frick et al. (2004); Grob (1995); and Wiek et al. (2011) (as cited in Carmi et al., 2015), who found emotions fully moderate the significant impact of environmental K.

It is noteworthy that the highest emotional response reported by the participants in relation to CC was "surprise." This may be explained by the fact that FF has not typically been associated with ED. This may necessitate a higher increase in K than in other areas of ED such as climate change to impact intended SBs. The high response rate of "surprise" may also be attributed to the application of Heath and Heath's *Made to Stick* (2007) strategies. Unexpectedness as well as emotions and stories are three of the Heath and Heath's (2007) qualities for making ideas stick. Numerous aspects of CC were

unexpected, including presenting everyday objects in unusual contexts. Applying this quality and others to the planning and execution of CC was intended to enhance the emotional response, cognitive retention, and the relevance of the exhibition content to make them stick.

Values

The V scale had the highest pretest score (*M*=6.16) and the smallest increase between pretest and posttest scores (*M*=6.32) of the three scales. The increase in V scale scores was statistically significant suggesting the CC experience was associated with shifts in perspectives of the relationship between humans and the natural world. In CC, the human role in ED and the human implications of ED were featured within the ecological framework as evident in *Midway: Message from the Gyre*—the anchor of the exhibition. Overall, the content of the installations was intended to encompass egoistic concern for self as well as biospheric and altruistic concerns for the natural world. This is in contrast to other approaches to EE, which have focused on altruistic and/or biospheric value orientations.

The increase in V scores may also be attributed to the human health emphasis in CC in which humans were placed in the context of plastic and chemical pollution of ED to increase the relevance of ED. Human concern for human health is an egoistic value orientation, which some consider the dominant value orientation (Stern et al., 1993). The majority of study participants (85.0%) reported that they strongly agreed or agreed that health is a priority in their life (see Figure 20). The focus on human implications in the context of the increase in V scores is consistent with Davies (2013) view that health

implications inspire greater relevance of the ED crisis. The increase in V scores in the context of increased intended SB scores and the reporting of new perspectives supports Shellenberger and Nordhaus (2011), Kagan (2011), and Jordan (2011) who contend that shifts in perspectives and values are necessary to address ED. And, as Jordan (2011) asserts, to recognize that "our greatest challenge lies not out there, but in here" (para. 2).

Intended Sustainable Behaviors

Although the SB scale posttest score (*M*=5.74) and SB buy subscale posttest score (*M*=5.69) were the lowest posttest scores, the SB buy subscale had the greatest increase in average scores: SB pretest (*M*=3.42) and SB posttest (*M*=5.69). The changes in SB scale (and V scale) scores in conjunction with high scores on emotions and new perspectives suggest that participants may have undergone a TL experience visiting CC. Emotions and a reconsideration of V are primary components of TL and necessary to promote SBs (Heath & Heath, 2007; Taylor & Cranton, 2012). R. L. Lawrence (2012), Heath and Heath (2007), and others have outlined the significant role the AD plays in V and TL. This is supported by the fact that the majority of participants (64.8%) reported the exhibition inspired them to consider alternative or different views and perspectives and to critically examine assumptions, beliefs, and values (see Tables 14 & 15). Although intended SBs are not part of the active phase of TL (Mezirow, 2000), they have the most striking relationship to SBs (Kaiser, Wölfing, et al., 1999).

The greatest increase in SB intentions was in terms of intended consumer behaviors related to FF—specifically how the purchase of a garment may impact wildlife and/or the environment as well as one's health. The majority of participants indicated when they

shop for clothes, they will consider how the garment may impact wildlife and/or the environment.

Participants were also asked about what they did with an article of clothing when they no longer wore it. While the majority indicated they already donated clothing, the greatest change was in the number of people who planned to throw an article of clothing in the trash. The number decreased, and there was also a 9.5% increase in those who planned to consign.

It should be noted that there were two questions addressing intended SBs in relation to exhibition components. The first question addressed the level of influence each aspect of the exhibition influenced SBs relating to actions other than consumption including recycling clothing, plastic, and/or paper or to volunteer and/or donate money to an environmental cause. The majority of participants reported exhibition as-a-whole. The second measure addressing SBs and exhibition components emphasized consumer behavior such as reading furniture labels, recycling, or buying more thoughtfully. In this case, most of the participants reported that the installation *Bought* (Skold, 2016b) closely followed by and exhibition-as-a-whole had the higher scores and were reported as the greatest influence in changes in intended SBs (see Table 11). It is noteworthy that *Bought*, an approximately six+ foot high, 1,190 pound mountain of bright, multi-colored pleather purses resting in a nest, was the largest three-dimensional installation and specifically related to Jordan's *Midway*, the anchor of the exhibition.

In this context, it is interesting to consider the largest increase in the K scale was in the mass consumption (MC) subscale. The questions addressed the ability to define mass

consumption and whether it was a problem for humans and/or the environment in the present and future.

The statistically significant change in intended SBs in conjunction with the higher scores attributing new K, a reconsideration of V, and intended SBs to the exhibition-as-a whole supports the concept of a cumulative and possibly synergistic effect of integrated cognitive, affective, and psychomotor domains in CC. The statistically significant increase in the intended SB scores is consistent with the A-B model (Kaiser, Wölfing, et al., 1999; Marcinkowski & Reid, 2019) in which Kaiser, Wölfing, et al. (1999) argued that while K may not play a direct role in SBs, knowledge about environmental issues moderates attitudes.

The different facets of the CC exhibition—an immersive, yet isolated gallery environment; emotive and aesthetically-charged installations with dramatic lighting, space, and sound; and interactive components may have worked synergistically as the experience as-a-whole was greater than its individual parts. The importance of the experience overall also supports with Mezirow's (2000) inclusion of a disorienting dilemma as a component of TL. The CC gallery space was intended to isolate the participant from everyday life to more fully engage them in the CC installations.

Future Research

During the process of conducting this study, it became clear that the ecological art exhibition format warrants further attention as a pedagogical tool in EE especially given the context of Saylan and Blumstein's (2011) call for paradigm shifts in education for EE to successfully address ED. Numerous related subjects were identified as relevant in

terms of future research. They include a longitudinal format, consumption reduction, and the value of an associated curriculum.

Future research should expand upon monitoring intended SBs over a more meaningful time period with an increased focus on consuming less. Participants reported SB intentions including changing consumption habits and consuming more thoughtfully, but it is unclear whether they would be willing to consume less. In addition, although intended SBs have the most striking relationship to SBs (Kaiser, Wölfing, et al., 1999), it is unknown whether the intended SBs in this study translated to SBs. A longitudinal study format could indicate whether an ecological art exhibition experience could play a role in transitioning from intended SBs in Mezirow's (2000) first seven phases of TL to the final, active phase in which one becomes actively engaged with SBs. Such a format is critical to ascertain whether the exhibition was truly a vehicle for transformation and whether an increase in K, V, and intended SBs resulted in consistent behavior changes.

In addition, a follow up study to this particular study could address qualitative components with an increased focus on the blackboard and survey notes. While this study addressed multiple moderating factors, they were not isolated in the reporting process and a determination of the relevance of CC in terms of specific moderating factors was not made. A further assessment of CC (or other ecological art exhibitions) could include specific measures regarding the invisibility and complexity of ED as well as the anthropocentric viewpoint. Determining whether an ecological exhibition format, can indeed as suspected, address challenges related to the invisibility and complexity of ED,

and whether they may be associated with changes in K, V, and/or intended SBs would provide additional insight.

Future research could also assess whether a guided curriculum for CC (or other ecological art exhibition) would further enhance SB intentions or SBs. An ecological art exhibition curriculum could take many forms including collaborative experience planning and installing the exhibition or incorporating outdoor nature education. CC was optimally designed for an adult visitor, but curriculum could be adapted for other audiences. Further insight regarding the relationship between a self-guided exhibition experience and a guided follow up curriculum (such as the *Klima X* curriculum discussed in chapter four) would be valuable.

Finally, during the course of this research, the challenges associated with the term "environmental" were ever present. While ecological terminology was utilized consistently throughout the study, breaking away from the term environmental proved to be a formidable challenge. Only time will tell whether a new name or label for ED will "stick" and facilitate a more complete understanding of and a broader engagement with one of the biggest issues facing humankind. This new reference could help shift the perception of ED from being a problem that is, as Jordan (2011) argued, "out there" in nature—separate from humanity— to one that is "in here" (para. 2).

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Appendix A

Definitions

Definitions

Affective domain (AD)—The realm of emotions and feelings (Taylor & Cranton, 2012).

Anthropocene—A term many scientists are now using to describe the significant global impact that humans are having on Earth's air, water, and land—or more specifically, on its interacting systems, including our atmosphere, hydrosphere, biosophere, geosphere, and cryosphere (Hamilton, 2016).

Anthropocentric—Considering human beings as the most significant entity of the universe. Also, interpreting or regarding the world in terms of human values and experiences ("Anthropocentric," n.d.)

Antimicrobial—An antimicrobial is an agent that kills microorganisms or stops their growth ("Antimicrobial," 2020).

Art exhibition—An event or place in which (in the most general sense) meet an audience, and they often occur in museums and galleries ("Art Exhibition," 2020).

Atmosphere—An atmosphere is a layer or a set of layers of gases surrounding a planet or other material body, that is held in place by the gravity of that body ("Atmosphere," 2020).

Attitude—In defining attitude, Marcinkowski and Reid (2019) asserted that over the last fifty years theorists and researchers (both within and beyond the field of EE) have come to view attitudes where it is primarily evidenced in relation to a person's evaluative dispositions and judgments about an 'object (e.g. a being, thing, event, idea, issue, or action) that are derived, at least, in part from their experience or situation (p. 461).

Attitude-behavior relationship (A-B)—Attitude-behavior consistency exists when there is a strong relation between opinions and actions. For example, a person with a positive attitude toward protecting the environment who recycles paper and bottles shows high attitude-behavior consistency ("Attitude-Behavior Consistency," 2016)

Bioaccumulation—The mechanism by which chemicals accumulate in living organisms and get passed along the food chain (Greenpeace International, 2012).

Biocentrism—claims that nature has an intrinsic moral worth that does not depend on its usefulness to human beings, and it is this intrinsic worth that gives rise directly to obligations to the environment. Humans are therefore morally bound to protect the environment, as well as individual creatures and species, for their own sake. In this sense, biocentrics view human beings and other elements of the natural environment, both living and often nonliving, as members of a single moral and ecological community (DesJardins, n.d.).

Biodegradable—Materials that readily decompose to become soil over time (Spaid, 2002, p. 145).

Biodiversity—An abbreviation of biological diversity; biodiversity means the variability among living organisms from all sources, including inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part. This variability includes diversity within species between species, and of ecosystems (Whitmee et al., 2015, p. 1975).

The presence of multiple species, so as to balance the needs of all species (Spaid, 2002, p. 145).

Biosphere—It can also be termed the zone of life on Earth, a closed system (apart from solar and cosmic radiation and heat from the interior of the Earth), and largely self-regulating. By the most general biophysiological definition, the biosphere is the global ecological system integrating all living beings and their relationships, including their interaction with the elements of the lithosphere, geosphere, hydrosphere, and atmosphere ("Biosphere," 2020).

Canary Concepts and the Hidden Danger of Ubiquitous Things (CC)--An ecological art exhibition that took place at the Robert Hillestad Textile Gallery in the Home Economics Building at the University of Nebraska-Lincoln from April 11-22, 2016. The author served as curator, educator, and designer of the exhibition and as an artist creating five of the six multimedia installations: *Bought* (2016b), *Beaten* (2016a), *Wrapped* (2016f), *Stuffed* (2016c), and *Thread for Thought* (2016e). The sixth installation, *Midway: Message from the Gyre* (2009-, retitled *Albatross* in 2017), was by ecological artist, Chris Jordan.

Carbon emissions—The byproduct of burning fossil fuels including natural gas, coal, and oil, which are used in transportation, heat and electricity, and manufacturing—primary energy sources for industrializing economies (Patawary, 2016).

Cellulosics—Cellulosics are synthetic plastics, but they are not synthetic polymers; they are made from a naturally occurring polymer, cellulose, which is obtained from wood pulp and cotton linters (*Cellulosics*, 2002).

Chemical—Any substance consisting of matter including any liquid, solid, or gas. It is any pure substance (an element) or any mixture (a solution, compound, or gas) and can occur naturally or be made artificially (Helmenstine, 2019).

Chemical Pollution—Chemical pollution is defined as the presence or increase in our environment of chemical pollutants that are not naturally present there or are found in amounts higher than their natural background values. . . . Chemical compounds are organic or inorganic chemicals that are the main causes of chemical pollution (*What Is Chemical Pollution | Environmental Pollution Centers*, n.d.).

Circular fashion—Clothes, shoes, or accessories that are designed, sourced, produced and provided with the intention to be used and circulate responsibly and effectively in society

for a s long as possible in their most valuable form, and hereafter return safely to the biosphere when no longer of human use (Brismar, 2017).

Circular or Closed-Loop System—A circular economy is a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing energy and material loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and closed recycling loops (Geissdoerfer et al., 2017). This is in contrast to a linear economy which is a 'take, make, dispose' model of production (MacArthur, 2013).

Consumption Age—The expansion of capitalist commodity production which has given rise to a vast accumulation of material culture in the form of consumer goods and sites for purchase and consumption. This has resulted in the growing salience of leisure and consumption activities in contemporary Western societies…(Featherstone, 1990).

Cotton—Cotton is a soft, fluffy staple fiber that grows in a boll, or protective case, around the seeds of the cotton plants of the genus Gossypium in the mallow family Malaceae. The fiber is almost pure cellulose. Under natural conditions, the cotton bolls will increase the dispersal of the seeds ("Cotton," 2020).

Directed learning (see teacher-directed learning).

Dyes—Dyes are substances that, when applied to a substrate provide color by a process that alters, at least temporarily, any crystal structure of the colored substances (Chequer et al., 2013).

Ecocentrism—Putting the entire natural world at the center of a culture's meaning system. Humans are seen as living within the natural world with all other living species as moral equals, deserving of the same respect as humans (Martusewicz et al., 2011, p. 87).

Ecofeminism—A branch of feminism that sees environmentalism and the relationship between women and the Earth as foundational to its analysis and practice. Ecofeminist thinkers draw on the concept of gender to analyze the relationsips between humans and the natural world ("Ecofeminism," 2020).

Eco-Identity—An eco-identity transcends being eco-literate and encompasses an understanding that the world's problems "are integrally and relationally part of everyone and everything else and what destroys others or the planet destroys us as well" (Naess, 2008, as cited in Anderson & Guyas, 2012, p. 228). This paradigm shift in thinking is also referred to as a commitment to "Deep Ecology" (Naess, 2008, as cited in Anderson & Guyas, 2012). "interbeing" (Hanh, 2008), "more-than-human" (Barrett et al., 2017), and "ecocentric" (Weintraub, 2006, as cited in Kagan, 2011).

EcoJustice—The understanding that local and global ecosystems are essential to all life; challenging the deep cultural assumptions underlying modern thinking that undermine those systems; and the

recognition of the need to restore the cultural and environmental commons (Martusewicz et al., 2011, p. 20).

Ecological art—An art genre and artistic practice that seeks to preserve, remediate, and/or vitalize the life forms, resources and ecology of Earth, by applying the principles of ecosystems to living species and their habitats throughout the lithosphere, atmosphere, biosphere, and hydrosphere, including wilderness, rural, suburban, and urban locations. It is a distinct genre from Environmental art in that it involves functional ecological systems-restoration, as well as socially-engaged, activist, community-based interventions. Ecological art also addresses politics, culture, economics, ethics and aesthetics as they impact the conditions of ecosystems. Ecological art practitioners include artists, scientists, philosophers and activists who often collaborate on restoration, remediation, and public awareness projects ("Ecological Art," 2020).

Ecological footprint—The ecological footprint measures human demand on nature, ie the quantity of nature it takes to support people or an economy ("Ecological Footprint," 2020).

Ecology—The study of the relationships between living organisms, including humans, and their physical environment; it seeks to understand the vital connections between plants and animals and the world around them (What Is Ecology? – The Ecological Society of America, n.d.).

Ecosystem—A community of living organisms in conjunction with the nonliving components of their environment, interacting as a system. These biotic and abiotic components are linked together through nutrient cycles and energy flows ("Ecosystem," 2020).

Education for Sustainability—A transformative learning process that equips students, teachers, and school systems with the new knowledge and ways of thinking we need to achieve economic prosperity and responsible citizenship while restoring the health of the living systems upon which our lives depend (The Cloud Institute for Sustainability Education, n.d.).

Endocrine disrupting chemicals (EDCs)—Chemicals or mixtures of chemicals that interfere with the way the body's hormones work (*Endocrine-Disrupting Chemicals EDCs | Endocrine Society*, n.d.).

Environment (see natural environment).

Environmental Attitude—A mental and neural state of readiness and the most distinctive and indispensable concept [construct] in contemporary social psychology' and is primarily evidenced in relation to a person's evaluative dispositions and judgments about an 'object' (e.g., a being, thing, event, idea, issue, or action that are derived, at least, in part from their experience or situation) (Marcinkowski & Reid, 2019, p. 461).

Environmental Degradation (ED)—The deterioration of the environment through depletion of resources such as air, water, and soil; the destruction of ecosystems; habitat destruction; the extinction of wildlife; and pollution. It is defined as any change or disturbance to the environment perceived to be deleterious or undesirable ("Environmental Degradation," 2020).

Environmental Education (EE)—A process that helps individuals, communities, and organizations learn more about the environment and develop skills and understanding about how to address global challenges. It has the power to transform lives and society. It informs and inspires. It influences attitudes. It motivates action. EE is a key tool in expanding the constituency for the environmental movement and creating healthier and more civically engaged communities (NAAEE, 2015).

Environmentalism—Or environmental rights is a broad philosophy, ideology, and social movement regarding concerns for environmental protection and improvement of the health of the environment, particularly as the measure for this health seeks to incorporate the impact of changes to the environment on humans, animals, plants, and non-living matter. While environmentalism focuses more on the environmental and nature-related aspects of green ideology and politics, ecology combines the ideology of social ecology and environmentalism ("Environmentalism," 2020).

Fabric—Any flexible material that is woven, knitted or can be fused into a sheet by heat (Grossman, 2016).

Fashion footprint—The fast fashion industry impact on nature or the amount of nature required in the fast fashion industry.

Fast fashion (FF) —The clothing-related analogue of fast food. It is cheap, mass produced, and almost ubiquitous (Black, 2008; Fletcher, 2008; Giesen, 2008, as cited in Oxford, 2012).

Fiber—Something whose shape resembles a thread or filament of some kind. (in nutrition) Components of many fibrous plant-based foods. These so-called non-digestible fiber tends to come from cellulose, lignin, and pectin — all plant constituents that resist breakdown by the body's digestive enzymes (Grossman, 2016) .

Finishing—Treatments with chemical compounds aimed at improving the quality of the fabric. Permanent press treatments, water proofing, softening, antistatic protection, soil resistance, stain release, and microbial/fungal protection are all examples of fabric treatments applied in the finishing process (Moore & Ausley, 2004).

Flame retardants—Chemicals that are added to manufactured materials (including textiles and furniture) to meet flammability standards. Halogenated and Organophosphorous flame retardants present concerns to humans and the natural world (Green Science Policy Institute, 2013).

Geosphere—In modern texts and in Earth system science, geosphere refers to the solid parts of the Earth; it is used along with atmosphere, hydrosphere, and biosphere to describe the systems of the Earth ("Geosphere," 2019).

Global warming—The heating of the planet due to excess energy use and hot gases (Spaid, 2002, p. 145).

Great Acceleration (The)—Changes in human socio cultural and economic trends in production and consumption since the Industrial Revolution and resulting impact of ED are referred to as the Great Acceleration. This term references the great acceleration of technological change and growth in population and consumption towards the end of the twentieth century— a period unique in the history of human existence (International Geosphere-Biosphere Programme, 2015).

Greenhouse effect—he heating of the atmosphere due to solar radiations being trapped in ozone, water vapors, and carbon dioxide in the Earth's atmosphere (Spaid, 2002, p. 145).

Greenhouse gases—Carbon dioxide (CO2), methane (CH4), Nitrous Oxide (N20), and Chlorofluorocarbons (Spaid, 2002, p. 145).

High culture—Aspects of culture (material and nonmaterial) considered superior and typically associated with and consumed by the elites of society: the well-educated or wealthy (Bell, 2013).

Holistic Education—A relatively new movement in education that seeks to engage all aspects of the learner, including mind, body, and spirit ("Holistic Education," 2020).

Holocene—A geological epoch that bean about 11, 700 years ago and encompass most of the time period during which humanity has grown and developed, including all of its written history and development major civilisations (Whitmee et al., 2015, p. 1975).

Hydrosphere—All the elements that are a part of the water bodies and their sources (*The Effects of the Three Major Types of Environmental Pollution - Help Save Nature*, n.d.).

Intended Sustainable Behaviors—See Sustainable Behaviors.

Interbeing—The belief that the environmental crisis can be addressed by changing the relationship with the Earth to include an understanding that one is integrally and relationally part of everyone and everything else (Anderson & Guyas, 2012).

Knowledge (K) (often referred to as environmental knowledge)—In this context, K is considered in terms of ED and is defined as the amount of information individuals have concerning environmental issues and their ability to understand and evaluate its impact on society and the environment. Kaiser et al, (1999) addressed K in terms of factual environmental knowledge, which is knowledge about ED, and knowledge about ecological behavior, which is knowledge about what and how something can be done.

Lithosphere—This system in the biosphere includes everything land-based; every minor and major constituent that exists on the Earth's crust is included (*The Effects of the Three Major Types of Environmental Pollution - Help Save Nature*, n.d.)

Love Canal—A neighborhood in Niagara Falls, New York, infamous as the location of a 70-acre landfill that became the site of a massive environmental disaster in the 1970s. Decades of dumping toxic chemicals harmed the health of hundreds of residents; the area was cleaned up over the course of 21 years in a Superfund operation. In the 1920s, the canal became a dump site for municipal refuse for the city of Niagara Falls. During the 1940s, the canal was purchased by Hooker Chemical Company, now Occidental Chemical Corporation, which used the site to dump 21,800 short tons of chemical byproducts from the manufacturing of dyes, perfumes, and solvents for rubber and synthetic resins ("Love Canal," 2020).

Manufactured Fibers—Fibers produced from a variety of raw materials, which can be divided into two main categories: fiber produced using plant-based raw material (such as viscose, HWM, and lyocell rayons and acetate fibers) and fibers produced using petroleum-based raw material (such as nylon, polyester, olefin, acrylic, and spandex) (Baugh, 2008).

Motivation—Motivation is the reason for a behavior or a strong internal stimulus around which behavior is organized (Wilkie, 1990, as quoted in Moisander, 1998, as cited in Kollmuss & Agyeman, 2002).

Multidimensional Learning—Learning that encompasses the AD, which refers to growth in feelings or emotions; the cognitive domain, which relates to mental skills or knowledge; and the psychomotor domain, which involves manual or physical skills (Parker & Wilding, 2012).

Multimodal Learning—Teaching concepts using many different modes or channels of information—anything that communicates meaning in some way (Kennedy, 2019). This can encompass multiple aesthetic components, including pictures, illustrations, audio, speech, writing and print, music, movement, gestures, facial expressions, and colors (Kennedy, 2019).

Nanotextiles (also referred to as Nanofabrics)—Textiles that are designed/manipulated for specific functions including strength, durability, absorbency, repellency, resistancy, and color fast using nanotechnology—molecules at a level smaller than the width of a human hair invisible to the human eye (Clement & Clement, 2011).

Natural Environment (often referred to as the natural world)—All living and non-living things occurring naturally, meaning in this case not artificial. The term is most often applied to the Earth or some parts of Earth. The environment encompasses the interaction of all living species, climate, weather, and natural resources that affect human survival and activity ("Natural Environment," 2020)

Natural Fibers—Fibers that are produced by plants, animals, and geological processes ("Natural Fiber," 2020). Examples include linen, cotton, wool, silk, flax, jute, ramie, and hemp (Baugh, 2008).

Nylon—Produced in 1938, the first completely synthetic fiber developed. Known for its high strength and excellent resilience, nylon has superior abrasion resistance and high flexibility. A manufactured fiber in which the fiber-forming substance is a long chain synthetic polyamide ("Nylon," n.d.).

Off-gassing—A by-product of every day solid materials that emit toxic substances (Spaid, 2002, p. 146).

Open-loop or linear system (often referred to as a linear economy)—A "take, make, dispose" model of production (MacArthur, 2013, p. 2).

Outdoor Adventure Learning—Learning that often utilizes outdoor classrooms and/or natural areas such as parks focusing on physical activities such as field trips, hiking, and camps to promote a connection to nature and the environment (Nicholls et al., 2008, as cited in Gray & Birrell, 2015).

Ozone Depletion—This form of ED occurs when chlorofluorocarbons (CFCs) and halons—gases formerly found in aerosol spray cans and refrigerants—are released into the atmosphere (*The Ozone Hole and Global Warming | Union of Concerned Scientists*, n.d.) .

Persistence—The property of a chemical whereby it does not degrade in the environment, or degrades very slowly (Greenpeace International, 2012).

Persistent Organic Pollutants (POPs)—Chemicals that have the following properties: Persistent, in that it does not break down into safer chemicals in the environment. Long-range transport which travels far from the source of release and is distributed around the world. Bio-accumulative means that it builds up in people and other animals, becoming most concentrated at the top of the food chain. Toxic in that they are harmful to life (Green Science Policy Institute, 2013).

Perspective—A particular attitude toward something; a way of thinking about something—a viewpoint ("Perspective," n.d.).

Pesticides—Substances that are meant to control pests, including weeds. The term pesticide includes all of the following: herbicide, insecticides (which may include insect growth regulators, termiticides, etc.) nematicide, molluscicide, piscicide, avicide, rodenticide, bactericide, insect repellent, animal repellent, antimicrobial, and fungicide. The most common of these are herbicides which account for approximately 80% of all pesticide use. Most pesticides are intended to serve as plant protection products (also known as crop protection products), which in general, protect plants from weeds, fungi, or insects ("Pesticide," 2020).

Petroleum (also referred to as petrochemicals)—A naturally occurring, yellowish-black liquid found in geological formation beneath the Earth's surface. It is commonly refined into various types of fuels ("Petroleum," 2020). Petroleum-based chemicals including fossil fuels (oil, coal, and natural gas) are used for powering industry and manufacturing, running vehicles, and providing electricity for homes. Petrochemicals are the primary cause of global warming, and petroleum-based plastics are non-biodegradable/persistent and often contain other toxins. Petroleum-based fabrics such as such as polyethylene**,** polyvinyl chloride (PVC), and nylon and their chemical additives are major sources of chemical and plastic pollution in FF (*Plastic Pollution Coalition*, n.d.).

Place-based Education—Educational approach that emphasizes connection to community to foster a desire to protect and conserve the environment (Nicholls et al., 2008, as cited in Gray & Birrell, 2015).

Planned Obsolescence—A concept that refers to the intended "limited functional life design and options for repair. This design for transient fashion and for functional enhancement that requires adding new product features" eventually leads to reduced satisfaction (Guiltinan, 2009, as cited in Joy et al., 2012, p. 276).

Plastic—Plastics are a wide range of synthetic or semi-synthetic organic compounds that are malleable and so can be molded into solid object ("Plastic," 2020). Plastics are typically organic polymers of high molecular mass and often contain other substances. They are usually synthetic, most commonly derived from petrochemicals, however an array of variants are made from renewable materials such as polylactic acid from corn or cellulosics from cotton linters ("Plastic Pollution," 2020).

Plastic Pollution—Pollution that involves the accumulation of plastic products in the environment that adversely affect wildlife, wildlife habitat, or humans. Plastics that act as pollutants are categorized into micro-, meso-, or macrodebris, based on size ("Plastic Pollution," 2020).

Pollutant (also referred to as a contaminant)—A chemical, biological or other substance that is unwanted or unnatural in an environment such as water, soil, air, or food. Some contaminants may be harmful in the amounts at which they occur or if they are allowed to build up in the body over time (Grossman, 2016).

Pollution—Pollution is the introduction of contaminants into the natural environment that cause adverse change. Pollution can take the form of chemical substances or energy such as noise, heat, or light. Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants. In 2015, pollution killed 9 million people in the world ("Pollution," 2020).

Polyester—A synthetic material used chiefly to make fabrics. The actual chemical name for the material used is polyethylene terephthalate (Grossman, 2016)

Polyethylene Terephthalate—Sometimes written poly(ethylene terephthalate)), commonly abbreviated PET, PETE, or the obsolete PETP or PET-P, is the most common thermoplastic polymer resin of the polyester family and is used in fibers for clothing, containers for liquids and foods, thermoforming for manufacturing, and in combination with glass fiber for engineering resins ("Polyethylene Terephthalate," 2020).

Polymer and Polymerization—a large molecule, or macromolecule, composed of many repeated subunits. Due to their broad range of properties, both synthetic and natural polymers play essential and ubiquitous roles in everyday life. Polymers range from familiar synthetic plastics such as polystyrene to natural biopolymers such as DNA and proteins that are fundamental to biological structure and function. Polymers, both natural and synthetic, are created via polymerization of many small molecules, known as monomers. Their consequently large molecular mass relative to small molecule compounds, produces unique physical properties including toughness, viscoelasticity, and a tendency to form glasses and semicrystalline structures rather than crystals. The terms polymer and resin are often synonymous with plastic ("Polymer," 2020).

Printing—The process of applying color to fabric in definite patters or design {Citation} (Niir Board, 2009).

Self-directed Learning—Any increase in knowledge, skill, accomplishment, or personal development that an individual selects and brings about by his or her own efforts using any method in any circumstances at any time (Gibbons, 2003).

Self-regulated Learning—A widely recognized as a core feature of metacognition. The extent to which a person recognizes what enhances his or her learning and how he or she consciously chooses strategies to learn more effectively marks the degree of self-regulation present in the learning process (Montalvo & Torres, 2004: Reynolds & Miller, 2003; Zimmerman, all cited in Upitis, 2009).

Sense of Place—The creation of meaning at a setting by an individual (Williams & Patterson, 1996, as cited in Marks et al., 2017), and encompasses three components: 'the physical environment, human behaviors, and social and/or psychological processes'(Stedman, 2003, p. 671, as cited in Marks et al., 2017).

Slow Fashion—Slow fashion, the alternative to fast fashion and part of what has been called the "slow movement", advocates for principles similar to the principles of slow food, such as good quality, clean environment, and fairness for both consumers and producers ("Slow Fashion," 2020).

Spinning—The process of converting natural/cotton or synthetic fiber into yarn to be used for weaving (Niir Board, 2009).

Sustainability—The ability to exist constantly. In the 21st century, it refers generally to the capacity for the biosphere and human civilization to coexist. It is also defined as the process of people maintaining change in a homeostasis balanced environment. In which

the exploitation of resources, the direction of investments,, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspiration.

Sustainable Behaviors (SBs)—Behavior that encompasses peoples' values, norms, beliefs, senses of responsibility in deliberate actions focused to providing well-being of all living beings, including present and future generations (IGI Global, n.d.). Intended sustainable behaviors are intentions or plans to engage in sustainable behaviors.

Sustainable Materials—Healthy, long-lasting and kind to those who use them, make them and live with them (Spaid, 2002, p. 146).

Sweatshop—Any factory that violates more than one of the fundamental US labor laws: paying a minimum wage, keeping a time card, paying overtime, and paying on time (Morgan et al., 2015).

Synthetic Fiber—Fibers made by humans through chemical synthesis, as opposed to natural fibers that are directly derived from living organisms. They are the result of extensive research by scientists to improve upon naturally occurring animal and plant fibers. In general, synthetic fibers are created by extruding fiber-forming materials through spinnerets, forming a fiber ("Synthetic Fiber," 2020).

System—Kagan defined a system as a group of interacting, interdependent components that form a complex and unified whole (2011, p. 96).

Teacher-directed Learning—Any increase in a student's knowledge or skill brought about by initiatives taken by a teacher, which includes a selection of the learning to be accomplished, presentations about it, assigned study and practice activities, and a test to measure mastery (Gibbons, 2003). This is in contrast to self-directed learning.

Textile Industry—The industry concerned with the design and production of yarn, cloth, clothing, and their distribution. The raw material may be natural or synthetic using products of the chemical industry ("Textile Industry," 2020).

Toxic—Poisonous or able to harm or kill cells, tissues or whole organisms. The measure of risk posed by such a poison is its toxicity (Grossman, 2016).

Transformative Eco-Education—Environmental education that is literally needed to transform and save our planet, especially during the global ecological crises of our present century (Grossman, 2016).

Transformative Learning (TL)—As a theory, TL involves the process of "perspective transformation" with three dimensions: psychological (changes in understanding of the self), convictional (revision of belief systems), and behavioral (changes in lifestyle). TL is the expansion of consciousness through the transformation of basic worldview and specific capacities of the self; TL is facilitated through consciously directed processes

such as appreciatively accessing and receiving the symbolic contents of the unconscious and critically analyzing underlying premises. Perspective transformation, leading to TL, occurs infrequently. Jack Mezirow believes that it usually results from a "disorienting dilemma" which is triggered by a life crisis or major life transition—although it may also result from an accumulation of transformation in meaning schemes over a period of time Less dramatic predicaments, such as those created by a teacher, also promote transformation ("Transformative Learning," 2020).

Transformative Sustainability Learning—A series of learning objectives corresponding to cognitive (head), psychomotor (hands) and affective (heart) domains of learning that facilitate personal experience for participants resulting in profound changes in knowledge, skills and attitudes related to enhancing ecological, social and economic justice (Sipos et al., 2008, p. 69).

Values—One's judgement of what is important in life (Lexico, 2020).

Volatile organic compounds (also referred to as VOCs)—Primary contributors to off-gassing (Spaid, 2002, p. 146).

Wastewater—Any water that has been used for some purpose (such as cleaning) and no longer is clean or safe enough for use without some type of treatment. Examples include the water that goes down the kitchen sink or bathtub or water that has been used in manufacturing some product, such as a dyed fabric (Grossman, 2016).

Water Cycle—The process by which water circulates through the ecosystem. Water enters the ecosystem by water vapors produced by plants and animals, as it rises, cools, and condenses, it forms clouds that then produce rain, bringing the water back to the Earth Surface for consumption by plants and animals (Spaid, 2002, p. 146).

Weaving—The method of textile production in which two distinct sets of yarns or threads are interlaced at right angles to form a fabric or cloth into a usable material (Niir Board, 2009).

Wool—Usually associated with fiber or fabric made from the fleece of sheep or lamb. However, the term "wool" can also apply to all animal hair fibers, including the hair of the Cashmere or Angora goat or the specialty hair fibers of the camel, alpaca, llama, or vicuna. Commonly used in slacks and outerwear ("Wool," n.d.).

Appendix B

Wall Labels

(The labels have been scaled down, but the design and format were maintained whenever possible.)

Canary Concepts

and the

Hidden Danger of Ubiquitous Things

INSTALLATIONS BY STACEY SKOLD

MIDWAY: MESSAGE FROM THE GYRE
BY CHRIS JORDAN

I know what you are thinking… What do canaries have to do with textiles or fashion for that matter? Throughout history, birds have been powerful symbols of concepts ranging from freedom to our future. Canaries are no different. In the past, the songbirds had a special place in the mining industry—they were used as barometers for air quality. If dangerous gases such as methane or carbon monoxide leaked into the mine, the gases would kill the canary before killing the miners —a warning to leave the tunnels. This gives the bird connotations of testing and sacrifice—characteristic references, which have stuck.

In a wider interpretation, being a canary is to be a subject to an experiment relating to changes in the environment. It seems the reference is used more and more often these days…. The Canary Party, Canary Security Systems, Canary application by Apple, The Canary Foundation, and the Canary Project to name a few… all of which relate to health, safety, and environmental concerns. Some believe we humans—especially our children—are modern-day canaries in a world where chronic disease is the norm and natural is not.

The Hidden Danger of Ubiquitous Things references the inherent tendency we humans have to accept the world around us as normal (the banality of the everyday). There are surprising ways provenance and content of everyday objects—including textiles and fast fashion—can be harmful to the planet, to wildlife, and to us.

Canary Concepts and the Hidden Danger of Ubiquitous Things consists of visual connections between the challenging issues in our modern life and our everyday life. The installations are conversations about the visual and philosophical relationships between science, nature, and childhood—attempts to find a way to both love our clothes and take care of our world.

Bought

Wooden twigs, chicken wire, hangers
Approximately 1700 pounds of accessories
Loan courtesy of Goodwill Industries, Lincoln, NE

***…Like the albatross, we first-world humans find ourselves lacking the ability to discern anymore what is nourishing from what is toxic to our lives and our spirits. Choked to* death on our waste, the mythical albatross calls upon us to recognize that our greatest challenge lies not out there, but in here.**

—Chris Jordan, February, 2011

In *Bought*, the birds are gone and the plastic remains. Like Jordan's albatross birds, we too are "feeding" our young more than their fair share of plastic… *Bought* represents 3% of 53,783 pounds of belts and purses sold by Goodwill Industries serving southeast Nebraska in 2015.

That same year, Lincoln area Goodwill stores sold 2,971,088 pounds of donations in their retail stores and recycled 2,239,744 pounds. In total, Goodwill diverted 5,210,832 pounds of clothing and accessories from the landfill. That is good news, as Americans have been steadily expanding their wardrobes— sixty-eight new wardrobe items a year in 2011—a number that has doubled since 1991. Who has a closet to accommodate that much clothing? Not many of us. Even with sources for donating available, the truth is that most of the clothing and accessories are considered disposable and end up in landfills.

Janice Breen Burns proposes, "My solution to all of fashion's ills—its mountains of poly-crap, canyons of toxic waste, cruelties and collateral deaths? We should love it more. A return to love—of quality cloth, pernickety hand stitches, simply beautiful-clothing-like-they-used-to-make-in-the-old-days and most especially, of elegant provenance—could save fashion's sorry arse."

Goodwill Industries, Southeast Nebraska, Communications Specialist, 2016.
Greta Eagan, *Wear No Evil*, 2014.
Janice Breen Burns, "Style and Sustainability," *The Age,* December 2011.

More Plastic than Fish…

The World Economic Forum announced there will be more plastic than fish in terms of weight in the world's oceans by 2050.

When we think of plastic pollution, we tend to think of things like grocery bags, Tupperware containers, and children's products…The fashion industry is often overlooked as a significant contributor. Not only do pleather (plastic leather) accessories play a role, synthetic fabrics are also oil-based and do not biodegrade. So, not only are your boots and bags contributing, but many of your shirts and pants are too!

In fact, wardrobes and washing machines are two of the biggest culprits in ocean pollution. An estimated 1,900 microfibers can get rinsed out of a single piece of synthetic clothing each time it's washed. The most abundant form of waste material found in habitats around the world is clothing fibers—in the water, air and food. The fibers carry toxic materials and can be inhaled and ingested… It is is estimated that a third of the food we eat is contaminated with this material.

Derek Markham, "Your Clothes are Polluting the Ocean Every Time You Do Laundry," *Science/Ocean Conservation*. November 6, 2014.

Erik van Sebille, World Economic Forum, "How Much Plastic Is There in the Ocean?" January 12, 2016.

Pleather vs. Leather

Pleather (plastic leather)

Pros:

+ Does not jeopardize an animals' life.
+ Cuts down on environmental costs related to raising livestock.
+ Can have a very long life itself.

Cons:

- Is made from Polyvinyl Chloride (PVC), which doesn't biodegrade.
- Is a chemically-rich and energy-demanding fiber to produce.
- Doesn't age well over time the way leather does.
- Its production is fairly toxic to the environment.

Leather

Pros:

+ Ages well over time.
+ Will eventually biodegrade.
+ Holds up in the quality sector.
+ High environmental cost raising livestock.

Cons:

- Can be quite toxic. In the tanning process, chrome is used leaching chromium into water and soil.

Greta Eagan, *Wear No Evil*, 2014.

What can we do?

about plastic pollution

REFUSE disposable plastic whenever and wherever possible. Choose items that are not packaged in plastic, and carry your own bags, containers and utensils. Say 'no straw, please.'

REDUCE your plastic footprint. Cut down on your consumption of goods that contain excessive plastic packaging and parts. If it will leave behind plastic trash, don't buy it.

REUSE durable, non-toxic straws, utensils, to-go containers, bottles, bags, and other everyday items. Choose glass, paper, stainless steel, wood, ceramic, and bamboo over plastic.

RECYCLE what you can't refuse, reduce or reuse. Pay attention to the entire life cycle of items you bring into your life, from source to manufacturing to distribution to disposal.

"Take the 4 Rs Pledge," Plasticpolutioncoaltion.org.

Beaten

Wallflower denim jeans, evidence marking tents, ceramic tile, hanger, tape, chalk

Once upon a time clothing came from a place of necessity...
Denim jeans were initially produced to give mining workers a durable pair of pants to work in. Things changed in the 1950s and 60s when income and advertising took off and changed the fashion industry forever. With fashion houses becoming dominating international brands, they began to use cheaper materials and outsource production to make "luxury fashion" available to all. Fast fashion or what many call McFashion was born. Just as we can enter a McDonald's in diverse cities and order the same meal, we can "order" the same jeans at Gaps across the globe. Like fast food, clothes have largely become homogenous and affordable—all at lightening speed.

Fashion is exciting. Finding a great deal is exciting...
The perfect pair of jeans for only $10... We think about them. We think about HOW to pay for them, WHERE to wear them, WHO else is wearing them, and WHAT to wear them with...

But we don't generally consider HOW they are made, WHERE they come from, WHO makes them, or WHAT impact do they have on our planet. They have no origin and no real story. Even with a fancy label, sequins, and just the right amount of faux wear, they are usually cast aside and thrown away when we are done with them—anonymous victims of McFashion.

What is wrong with that? Why *NOT* buy those $10 jeans?
I think deep down, we all know there is something not quite right with $10 jeans. Over the past two decades, we have accepted and benefited from the "race to the bottom" in fashion—intense competition to create clothing for the lowest prices. But while the jeans didn't cost us much, they cost the planet a lot...

Fast fashion and the textile industry are full of environmental abuses as well as ethical ones. It turns out denim jeans, one of the most ubiquitous pieces of clothing, are one of the worst offenders. A single pair has a big carbon footprint and a big impact on our resources.

What can we do?

about fast fashion and its footprint…

Change goals… better not more. Produce, design, sell, and consume thoughtfully. Support eco-friendly designers, retailers, and Clean by Design manufacturers. Look for durability and design that is here-to-stay. Some companies such as Patagonia mend your clothes for free.

Be a conscientious consumer… When it comes to jeans, look for fair trade, Selvedge, raw, American made, and/or organic denim. Seek out and ask for low impact or natural dyes.

Wash less! A large part of our fashion footprint relates to washing and drying. One can air dry clothes. If there are no stains, freeze your smelly jeans! Freezers kill odor-causing bacteria and are more eco-friendly than washing and drying jeans.

Recycle jeans and other clothes… Take them to Goodwill or check for a drop-off site for Blue Jeans Go Green. They recycle denim into building insulation. Turn clothes info cleaning rags.

Look for those who utilize Carbon Credits! A carbon credit is a dollar amount that will go toward offsetting emissions. Individuals and companies buy credits through environmental improvement agencies.

Love your jeans.

Greta Eagan, *Wear No Evil: How to Change the World with Your Wardrobe*, 2014.
Blue Jeans Go Green: Bluejeansgogreen.org.
Grist.org: $8 Shirt
Natural Resources Defense Council:
https://www.nrdc.org/stories/fixing-fashion-industry/

1 *HOW* are they made?

Cotton is one of the thirstiest crops. It takes 1800 gallons of water to grow the cotton required to make a single pair of jeans. The textile industry uses 100 million gallons of water annually. In 2012 Global Trends 2030 reported that annual global water requirements will hit 6,900 billion cubic meters by 2030, which is 40 percent above current sustainable water supply levels.

In addition, conventional cotton is treated with pesticides. Approximately $2 billion worth of chemicals are sprayed on cotton crops worldwide every year, half of which are designated toxic by the World Health Organization. The pesticides end up in our soil and our jeans and on our skin.

To get *that season's* shade of blue for that perfect pair of jeans, denim fabric must be dunked over and over again in giant tanks of synthetic indigo, a dye often made from coal or oil. Major fashion brands often use manufacturers in areas (second-and third-world countries) where toxic dyes are still permitted. These endanger the workers and often end up in water sources without properly being treated.

Linda Greer, Health Program Senior Scientist with the Natural Resources Defense Council, states, "You know the colors and fashions of next season by the color of the rivers in China."

Manufacturers have various techniques to "finish" jeans to give them the distressed or pre-worn look—popular since the 1980s. This is achieved in a variety of ways. In addition to applying toxic chemicals such as potassium permanganate and sodium metabisulphate, jeans are
Beaten, tumbled and ***blasted***.
Giant tumblers, volcanic pumice rocks, and silica dust are just a few necessities with this process. These are bad for mining operations, factory workers, and bad for the rivers and streams.

Greta Eagan, *Wear No Evil: How to Change the World with your Wardrobe*, 2014.
Clean Clothes Campaign:
http://www.cleanclothes.org/news/press-releases/2013/07/09/denim-workers-pay-deadly-price
Natural Resources Defense Council, Clean by Design Program:
https://www.nrdc.org/stories/fixing-fashion-industry

2 *WHO* makes them? *WHERE* are they from?

The real victims of fast fashion are the people making the clothes.
The garment industry involves a number of deadly practices and toxic chemicals—especially in denim production.

To obtain their clothes at rock bottom prices, major fashion brands typically use manufacturers in second-and third-world countries where the labor is cheap and the conditions are poor. Half of the world's blue jeans come from six denim factories in the southern part of China—the province of Guangdong.

Many of the dangerous practices involve techniques to achieve the distressed or pre-worn look. One primary way of achieving this is sandblasting. Even though many popular brands have banned the use of sandblasting, the "Breathless for Blue Jeans Report" outlined that the practice, which exposes workers to potentially fatal illnesses, continues behind closed doors. Sandblasting involves firing abrasive sand onto denim with high pressure. This can be done in a machine booth or with an air gun. Sweatshop workers are rarely given the necessary safety training or ventilation or protective equipment. Many are forced to work up to 15 hours each day to live. In 2009, the Turkish Government introduced a national ban on sandblasting, but the practice continues often combined with other harmful finishing techniques such as hand sanding, tumbling, or chemical spraying.

Breathless for Blue Jeans: Health Hazards in China's Denim Factories
A report by: Clean Clothes Campaign, War on Want, Students & Scholars Against Corporate Misbehaviour, and The Hong Kong Liaison Office of the International Trade Union Movement:
http://www.cleanclothes.org/resources/publications/Breathless

3 *WHAT* impact do they have?

The Footprint of Fashion…

The uncomfortable truth is that overconsumption is a major factor in climate change.
—Dr. Jo Paoletti, "How Climate Change Will Affect What We Wear," 2012.

To understand our fashion footprint, one must understand our carbon footprint. Our carbon footprint is the amount of carbon dioxide or greenhouse gases emitted into the atmosphere by the activities of an individual, company, or country. Greenhouse gases are gases that keep heat in the Earth's atmosphere. Factors that contribute to a carbon footprint include travel methods and energy usage.

The Footprint of Fashion is often overlooked in terms of our carbon footprint with travel a primary contributor. But everyday fabrics and textiles contribute substantially. CarbonTrust.com issued an annual report on the international carbon flows of clothing. It took into account the global production of clothing annually including in-use emissions from washing and drying, ironing, dry-cleaning combined with the other CO2 sectors that comprise the total CO2 fashion industry emissions. The apparel and textile industry came in second on a scale of highest CO2 emissions, with 2.1 million tons produced annually, just behind the petroleum industry.

Greta Eagan, *Wear No Evil: How to Change the World with Your Wardrobe*, 2014.
Carbon Trust:
www.carbontrust.com/media/38358/ctc793-international

W r a p p e d

Wooden toddler bed
Harlow's Earth Crib Mattress Cover
Video projection
Michael Burton, Faculty Advisor

W r a p p e d represents the intersection of science, nature, and childhood. It is an attempt to reconcile the need to protect our children while navigating through a world where chronic disease the norm and natural is not. It is a world where we buy stuff to protect us from our everyday stuff—a world where even the act sleeping is not exempt.

The mattress is wrapped in a Harlow's Earth Crib Mattress Cover. The six-millimeter virgin polyethylene plastic is made to encase an infant or toddler's mattress acting as a barrier to the gases in the mattress. There are vent holes strategically located on the underside of the cover to release the heavy gases downward away from the sleeping child.

The video-projected writing is an excerpt from "The After".
The story ends…

> …We are trying to give our children the tools to live in
> the after. In *The Green Boat*, Mary Pipher writes,
> "…If we don't sail carefully and tend to those on board, we will perish. If we manage to keep our boat afloat, our world can sail on, not as it is today, but in a more joyous, peaceful, and beautiful way…."
> It is my hope we are fixing it enough for them—and even more for their children. I long for a world more beautiful than my before and my after—a world with fewer and safer chemicals, better legislation, and a whole lot more trust. That is a beautiful world.
> —Stacey Skold, 2016

Mary Pipher, *The Green Boat*, 2013.

S t u f f e d

Room Essentials microsuede ottomans (c. 2012-2015) Enlarged ottoman manufacturer's label printed on 10 oz. Jacquard artist canvas using fiber reactive dyes
Printing in the TMFD Digital Textile Printing Lab by Leah Sorensen-Hayes,
Ardis James Professorship Studio Assistant

We frequently mistake comfort for well-being…

—Daniel E. Lieberman

The Story of the Human Body: Evolution, Health, and Disease, 2013.

Other than their color, these ottomans appear to be quite similar… It turns out their cushion stuffing is quite different—the result of a change in furniture standards.

To understand why this is important, one must consider that until relatively recently, products were made out of natural materials such as cotton, wood, and metals. In the 1970s, manufacturers began replacing natural materials with far more combustible materials—those derived from human-made petrochemicals. These include plastics as well as synthetic fabrics including polyester, acrylic, and nylon.

This, in conjunction with the increase in fires started by cigarette smoking, prompted a California agency called the Bureau of Home Furnishings and Thermal Insulation to develop TB-117 in 1975. TB-117 mandated that foam inside upholstered furniture (including children's furniture and other items considered to be furniture) withstand exposure to a small flame for 12 seconds without burning. As a result, large quantities of chemical flame retardants have been added to furniture and various other common objects including electronics, cars, plastics, and clothing. Even though TB-117 was a California standard, manufacturers throughout the US and Canada have typically complied with TB-117 to streamline their inventory and to avoid liability claims.

Green Science Policy Institute
http://greensciencepolicy.org/topics/flame-retardants/

So, what could be wrong... with something intended to protect us from fire?

There are multiple flame retardant compounds. Much scrutiny has developed surrounding the efficacy and health impact of many including two major types: organohalogenated and organophosphorous. Considered toxic and persistent, these chemicals accumulate in our bodies and the environment and are related to health risks such as cancer and neurological system function. Brominated flame retardants are considered endocrine disrupting chemicals. These impact our hormones including estrogen, testosterone, and insulin, which affect human development, bonding behaviors, and other functions.

These chemicals have found their way into unexpected places such as breastmilk and even umbilical cord blood—babies are being born pre-polluted. In addition, wind and ocean currents have dispersed these chemicals as far as the Arctic, where they have been accumulating in the fatty tissue of animals such as polar bears. If they are making their way to the Arctic, imagine how easy it is to ingest them in your own home!

Not only do many flame retardants produce toxic dust, they also produce toxic smoke, which is considered as dangerous as fires themselves (especially to firefighters). Testing has shown placing flame retardants inside a couch did not necessarily slow down or prevent fires. This is why the Green Science Policy Institute worked to change TB-117. In 2013, TB117-2013, a new standard that allows fire safety without the need for flame retardants was born. The new standard does not ban flame retardants. It is quite possible they will remain in furniture.
(TB 117-2013 does not impact the use of flame retardants in non-furniture items.)

Green Science Policy Institute
http://greensciencepolicy.org/topics/flame-retardants/
Environmental Defense Study, *PRE-POLLUTED: A Report on the Toxic Substances in the Umbilical Cord Blood of Canadian Newborns,* 2013.
http://environmentaldefence.ca/prepolluted
Marla Cone, "Polar Bears Face New Toxic Threat: Flame Retardants," *Los Angeles Times,* January 9, 2006.
The Endocrine Disruption Exchange: http://endocrinedisruption.org/

The Stuff in our Stuff

It has been estimated that over 8,000 chemicals are employed to transform raw materials into clothes. Synthetic clothing now commonly contains such toxins as formaldehyde, brominated flame retardants, and perfluorinated chemicals like Teflon for non-iron and nonwrinkle durability. Insecticides are even being applied to fibers in the name of protecting health. Certain flame retardants have been banned, but soon replaced with new ones—chemicals that are equally or more toxic.

If some chemicals are so dangerous, how can they be allowed in all of our stuff?

The Toxic Substances Control Act (TSCA) is the 1976 United States law that sets standards for the industry and is supposed to regulate chemicals. Unfortunately, this law is outdated. The primary problem with TSCA is that the government has to provide actual harm in order to control or replace a dangerous chemical. This is in contrast to other countries that apply the precautionary principle and must demonstrate that their products are safe before they are available to the public. As a result, chemical companies developing flame retardants that could be made cheaply while increasing their marketing and lobbying efforts. Even when one flame retardant such as PBDE is proven to be harmful and removed from the market, it can be replaced with chemicals that may be equally or more toxic

There have been multiple attempts to revise TSCA. Ultimately, it is the individual states who have successfully stepped up to enact legislation involving chemicals regulation. At present, 23 states are considering 98 policies to protect people from toxic chemicals. 165 state policies have been adopted in 34 states. In regard to flame retardants, there are 19 current policies in 14 states and 30 adopted policies in 12 states.

Safer Chemicals Healthy Families: https://saferchemicals.org/
Safer States Organization: http://www.saferstates.org/

Children are especially vulnerable…

There are multiple ways we are exposed to chemicals… Airways, our skin, and hand-to-mouth contact. Children and fetuses are at greater risk for chemical exposures on a body-weight basis. For one, their metabolism is immature so their ability to metabolize and excrete toxic chemicals is different. In addition, infants and children spend time in different locations and are exposed to more dust and vapors near the floor. They also put their hands and other objects in their mouths more and wash their hands less.

Our skin and toxin absorption….

While most are aware of toxic exposures via digestion and the lungs, the high permeability of our skin is an under-appreciated source. Unlike toxins that enter the body via the mouth and end up in the intestines where they are transported by the blood into the liver—the body's detoxifier, toxins absorbed via the skin bypass the liver. According to toxicology specialist, Dr. Samuel Epstein, our skin is a primary means of toxin absorption. It is more permeable than the intestines, and a child's skin is even thinner and more permeable than an adult's. This makes synthetic and flame retardant-fabric problematic for them.

Anna Maria Clement and Brian R. Clement, *Killer Clothes*, 2011.
Philip Landrigan and Ruth Etzel, *Textbook of Children's Environmental Health,* 2014.

Detox Fashion

Greenpeace has led a Detox Fashion campaign. Beginning in 2011, it has challenged some of the world's most popular clothing brands to eliminate all releases of hazardous chemicals. Thanks to the support of over half a million designers, bloggers, and activists, twenty global fashion leaders have made a commitment to detox their clothes. Many of these brands are working towards toxic-free fashion for their customers and future generations to come.

Greenpeace defines DETOX LEADERS as companies leading the industry towards a toxic-free future with credible timelines, concrete actions, and on-the-ground implementation. The GREENWASHERS are detox-committed companies that are so far failing to walk the talk and take responsibility for their hazardous chemical pollution. The DETOX LOSERS are the companies that refuse to take responsibility for their toxic trail and have yet to make a credible, individual commitment

DETOX LEADERS

Adidas
Benetton
Burberry
C&A
Espirit
G-Star Raw
H&M
Inditex (Zara)
Levi Strauss & Co. (Dockers)
Limited Brands (Victoria's Secret)
Mango
Marks & Spencer
Primark
Puma
Fast Retailing (Helmut Lang)
Valentino (Missoni)

DETOX LOSERS /

Armani
Bestseller
Only the Brave
Dolce & Gabbana
Gap Inc.: Old Navy, Piperline, Athleta,
Hermes
LVMH Group/Christian Dior Couture:
Louis Vuitton, Celine, KENZO, Givenchy,
Mark Jacobs, Fendi, Emilio Pucci, Thomas Pink, and
Donna Karan
Meters/bonwe
PVH: Calvin Klein, Hillfiger, Van Heusen, IZOD,
ARROW, Speedo, Olga, Warner's, and GH Bass
Vancl
Versace

GREENWASHERS

Li-Ning
Nike, Inc. (Converse)

from **Greenpeace.org**
http://www.greenpeace.org/international/en/campaigns/detox/fashion/detox-catwalk
(Greenpeace—The Detox Catwalk, 2015)

What can we do?

about toxic chemicals

If you would like to avoid flame retardants in stuffed furniture such as an ottoman, look for products with a TB117-2013 label. If there is no label, verify with the manufacturer that the product does not contain flame retardants.

Seek out natural or organic fibers and be on the look out for new alternatives such as cornhusk and wheat gluten-based fibers being developed in the Textile, Merchandising, and Fashion Design Department at UNL!

Get involved. Get to know the policies in your own State. Write a letter, send an email, or follow Saferstates.org, Talk to people about this issue!

RELATED WEBSITES

OTHER

SaferStates.org
http://www.saferstates.org/

Healthy Child Healthy World
http://www.healthychild.org/

Environmental Working Group
http://www.ewg.org/

Green Science Policy Institute
http://greensciencepolicy.org/

Blog Relating to the Textile Industry
https://oecotextiles.wordpress.com/

Story of Stuff Website
http://storyofstuff.org/

Story of Stuff Original Movie
http://storyofstuff.org/movies/story-of-stuff/

Labor Behind the Label Website
http://labourbehindthelabel.org/

Clean Clothes Campaign
http://www.cleanclothes.org/

ART

Chris Jordan's Midway Movie Trailer
http://midwayfilm.com/

Other artwork by Chris Jordan
http://chrisjordan.com/

Other artwork by Stacey Skold
http://www.aobfineart.com/Artist-Detail.cfm?ArtistsID = 799

Complete version of "The After" by Stacey Skold (Text used in the "Wrapped" installation) (Skold, 2016d)
https://oecotextiles.wordpress.com/

CONSUMER RESOURCES

Baby Mattress Covers
http://www.babymattresscovers.com/

Prevent Toxic Off-Gassing when You Can't Afford to Buy an Organic Mattress
https://www.healthychild.com/prevent-toxic-off-gassing-when-you-cant-afford-to-buy-an-organic-mattress/

Nebraska Natural Mattress Company
http://naturalbed.com/

from **Greenpeace.org**
http://www.greenpeace.org/international/en/campaigns/detox/fashion/detox-catwalk

M I D W A Y
Message from the Gyre, 2009-

A short film by Chris Jordan

Midway: Message from the Gyre is a powerful visual journey. The remote Midway Islands are a 2.5-mile cluster in the North Pacific—approximately equidistant (2000 miles) between North America and Asia. There, albatross parents who forage over the vast Pacific Garbage Patch mistake floating trash for food and feed their chicks lethal quantities of plastic. Every year tens of thousands of albatross chicks die on Midway from starvation, toxicity, and choking.

A Conversation with Chris Jordan

LB: Your work, which began with making the invisible visible, has progressed to a place of developing tremendous empathy for all of life. Do you think that there is a connection between making the invisible visible and empathy?

CJ: I sure do. Our connection with the world is our feelings. If we see something happen, but have no feeling for it, there's no connection. If we do have a feeling, whether it's anger or rage or grief or whatever, we're connected to that thing. And in order to feel what is going on, we have to comprehend it.

LB: Still, many people fear opening up to the seriousness of the ecological crises we now face. What do you think can help us overcome that?

CJ: One powerful elixir is beauty. There is nothing quite like beauty. When you bring beauty and grief together, you can't look at it, because it's so sad—and you can't look away, because it's so beautiful. It's a moment of being transfixed, and the key is turned in the lock.

For updates on Chris Jordan's work:
www.Chrisjordan.com www.midwayjourney.com.
Lisa Bennett, *An Abiding Ocean of Love: A Conversation with Chris Jordan, ecoliteracy.org*

Feel free to write a message on the chalkboard.

Feel free to photograph the exhibition.

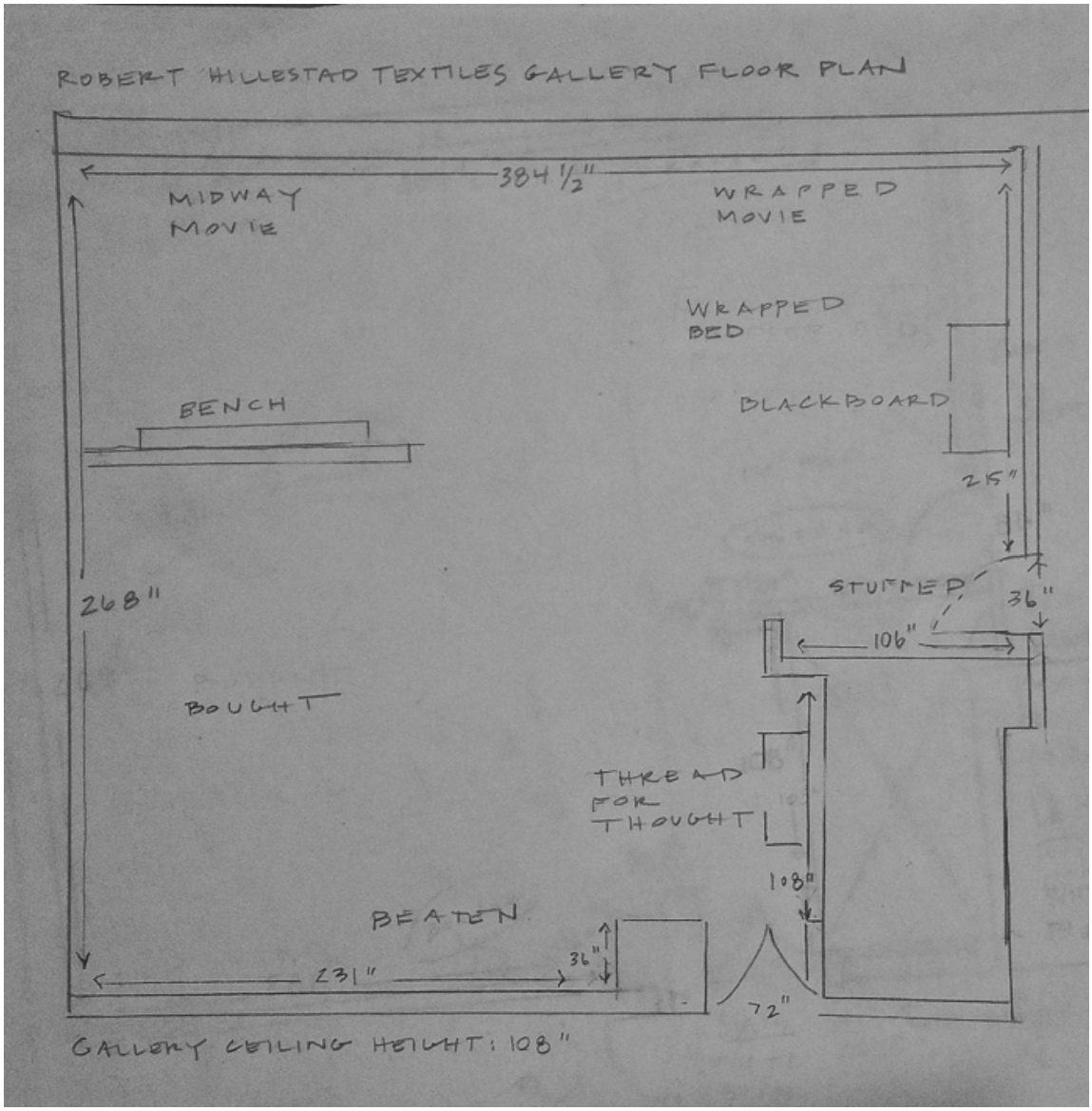
Gallery visitors may pick up the ottomans. Check out the manufacturer's labels!

Gallery visitors may pick up the mattress. Check out the vent holes!

Appendix C

Gallery Floor Plan

Gallery Floor Plan



*

Appendix D

Research Examples and Descriptors

Research Examples and Descriptors

http://0-web.ebscohost.com.library.unl.edu/ehost/resultsadvanced?sid = 659af069-6955-4894-b7b8-bad9f4242c16%40sessionmgr14&vid = 8&hid = 25&bquery = (environmental+art)+AND+(research+study)&bdata = JmRiPWFheCZ0eXBlPTEmc2l0ZT1laG9zdC1saXZl

Link for ecological art, research study in Art Abstracts (not helpful):

http://0-web.ebscohost.com.library.unl.edu/ehost/resultsadvanced?sid = 659af069-6955-4894-b7b8-bad9f4242c16%40sessionmgr14&vid = 7&hid = 25&bquery = (ecological+art)+AND+(research+study)&bdata = JmRiPWFheCZ0eXBlPTEmc2l0ZT1laG9zdC1saXZl

Link for environment, art, research study in Art Abstracts (not helpful):

http://0-web.ebscohost.com.library.unl.edu/ehost/resultsadvanced?sid = 659af069-6955-4894-b7b8-bad9f4242c16%40sessionmgr14&vid = 5&hid = 25&bquery = art+AND+environment+AND+research+study&bdata = JmRiPWFheCZ0eXBlPTEmc2l0ZT1laG9zdC1saXZl

Link for environmental education, art, research study in Ebesco/academic search premier:

http://0-web.ebscohost.com.library.unl.edu/ehost/resultsadvanced?sid = 09ebcdd7-0f4f-44e6-8718-cb06b0703f6f%40sessionmgr12&vid = 2&hid = 25&bquery = (environmental+education)+AND+(art)+AND+(research+study)&bdata = JmRiPWFwaCZ0eXBlPTEmc2l0ZT1laG9zdC1saXZl

Link for environmental activism, arts, research study in Ebesco/Academic Search Premier:

http://0-web.ebscohost.com.library.unl.edu/ehost/resultsadvanced?sid = 09ebcdd7-0f4f-44e6-8718-cb06b0703f6f%40sessionmgr12&vid = 3&hid = 25&bquery = (environmental+activism)+AND+(arts)+AND+(research+study)&bdata = JmRiPWFwaCZ0eXBlPTEmc2l0ZT1laG9zdC1saXZl

Link for ecological art, research study in Ebesco/Academic Search Premier:

http://0-web.ebscohost.com.library.unl.edu/ehost/resultsadvanced?sid = 09ebcdd7-0f4f-44e6-8718-cb06b0703f6f%40sessionmgr12&vid = 9&hid = 25&bquery = (ecological+art)+AND+(research+study)&bdata = JmRiPWFwaCZ0eXBlPTEmc2l0ZT1laG9zdC1saXZl

Link for Journal of Environmental Education and art in Ebesco/Academic Search Premier:

http://0-web.ebscohost.com.library.unl.edu/ehost/resultsadvanced?sid = 761fc545-07cc-4bb6-8e2e-9e0b1cc43c77%40sessionmgr11&vid = 5&hid = 1&bquery = (SO+(journal+%22of%22+environmental+education))+AND+(art)&bdata = JmRiPWFwaCZ0eXBlPTEmc2l0ZT1laG9zdC1saXZl

Appendix E

UNL Institutional Review Board Approval Letters

UNL Institutional Review Board Approval Letters

4/1/2016
IRB - Project Approved - Certification of Exemption –
New Project Form
Your project has been approved by the IRB.

Project Title: Dissertation Research Study: Ecological Art Exhibition.

Approvers Comments:
Dear Stacey Skold and Dr. Barbara Trout,

Project ID: 17074
Form ID: 35788
Review Type: New project form Exempt Review
Title: Dissertation Research Study: Ecological Art Exhibition.

This project has been certified as exempt. You are authorized to begin your research.

The stamped and approved form(s) have been uploaded to NUgrant. Please use the
Stamped form(s) to make copies to distribute to participants. If changes need to be made,
please submit the revised form(s) to the IRB for approval prior to use.

This project was certified as Exempt, category 2.

Please allow sufficient time for the official IRB approval letter to be available within
NUgrant.

Cordially,

Lindsey Arneson
Research Compliance Services
Human Research Protection Program

4/12/2016
IRB - Project Approved - Certification of Exemption - Change Request Form
Your project has been approved by the IRB.

Project Title: Dissertation Research Study: Ecological Art Exhibition.

Approvers Comments:
Dear Stacey Skold and Dr. Barbara Trout,

Project ID #16074
Title: Dissertation Research Study: Ecological Art Exhibition.
Form ID #35924
IRB Approval #20160416074EX

The change request form has been approved to implement the following change(s)
and procedures as described in the form:

Include Ahn Dos CYAF 160 courses to the list of instructors offering extra credit for
participation in the study

Please allow sufficient time for the official IRB approval letter to be available within
NUgrant.

Cordially,

Lindsey Arneson
Research Compliance Services
Human Research Protection Program

Appendix F

Informed Consent/Recruitment Letter

Informed Consent/Recruitment Letter

April 2016

Dear UNL Students

This letter is an invitation to participate in an experimental research study—a primary component of my PhD dissertation. This study is designed to assess the potential role of an ecological art exhibition in environmental education. As you may be aware, environmental education is a strategy to increase awareness and understanding of environmental implications of human activities with the global ecosystem. Your involvement in this project would provide new insight in the subject of environmental education and the development of environmentally responsible behaviors.

The study has been approved by the University of Nebraska-Lincoln Institutional Review Board (IRB) and developed with the oversight of UNL professor-committee members. It consists of a pre-exhibition questionnaire, a post-exhibition questionnaire, and a visit to the Robert Hillestad Textile Gallery on East campus. The surveys will take approximately 20 minutes. The study schedule is as follows:

The week of Monday, March 28th, 2016: Instructors will invite students to participate in the study and provide them with information including what consenting to the study means. The consent form will be integrated in the web-based survey program. The extra credit incentive options (for participating and otherwise) will be presented. In addition, students will be reassured that their responses are confidential, that the study is approved by the IRB, and that participation will help further research addressing art-based environmental education.

The week of Monday, April 4th, 2016: Participating students will be instructed take the pre-exhibition survey via the internet. Instructors will email details including the timeline and the link to the students. The survey will include a consent form as well as an introduction to the dissertation project and study.

Monday, April 11th- Friday, April 22nd, 2016: During this time, students will visit the CCHD exhibition. During that week, instructors will remind participating students of their responsibility to visit CCHD.

The week of Monday, April 25th, 2016: Students will be directed to take the post-exhibition survey via the web, which will include links for additional information. (Visits to the additional links can be tracked via Qualtrics.)

Monday, September 5th, 2016: Relay information regarding the 3rd survey (if utilized). The nature of the third form is to be further discussed.

(Please refer to the end of this letter for Gallery location, hours, and parking information.)

While your participation is voluntary and not required as part of the class, participants can receive extra credit. Another extra credit option (or the same amount of credit) is available to students who may not participate in the study.

If you choose to participate in this research study, you have a right to ask questions and to have those questions answered. You are giving your consent to participate in this project, and your results would be kept completely confidential. In addition, you are free to decide not to participate in the Study and can withdraw at any

time without harming your relationship with the researchers or the University of Nebraska-Lincoln.

I greatly appreciate your consideration with regard to this project. Please do not hesitate to contact me, my Co-Committee Chairs: Dr. Trout and Dr. Casto, or the UNL IRB if you have questions.

Sincerely,

Stacey Skold, Principal Investigator sskold@yahoo.com

Dr. Barbara Trout: btrout1@unl.edu

Dr. Mary Casto: mcasto2@unl.edu

Institutional Review Board (IRB): 402-472-6965

GALLERY LOCATION:

The Robert Hillestad Textiles Gallery is on the UNL East Campus. It is located on the second floor of the Home Economics building at 35th and Holdrege Streets.

HOURS: The Gallery is open to the public without charge Monday through Friday from 8:30 a.m. - 4:00 p.m. and weekends by special request. Call (402) 472-2911, to request weekend opening. It is closed University holidays and between shows.

PARKING: Visitors to the Robert Hillestad Textiles Gallery are welcome to park on East Campus in areas marked "Visitor Parking." Parking passes for these areas can be obtained at the time of your visit in Room 105 or Room 234 of the Home Economics Building.

Appendix G

Survey Reminder Email

Survey Reminder Email

Dear Survey Participant:

Thank you for agreeing to participate in this research project. Your involvement is most appreciated. This email serves as a reminder that participants should visit the Robert Hillestad Textiles Gallery between April 11th and April 22nd. During your 30-minute-minimum visit, you are expected to read all wall labels associated with each exhibition object. In addition, you should read the accompanying exhibition brochure.

Please do not hesitate to contact my co-committee chairs: Dr. Barbara Trout or Dr. Mary Casto or myself, with questions regarding this process. Questions regarding participants' rights can be addressed to the University of Nebraska-Lincoln Institutional Review Board (IRB).

Sincerely,

Stacey Skold, Principal Investigator: sskold@yahoo.com

Dr. Mary Casto: mcasto2@unl.edu

Dr. Barbara Trout: btrout1@unl.edu

Institutional Review Board: (402) 472-6965

GALLERY LOCATION:

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Appendix H

Primary Objective Reliability Scales

Secondary Objective Exhibition Component Questions

Primary Objective Reliability Scales

K Scale/MC Subscale Pretest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 152	Coefficient α if Deleted
1. I believe mass consumption, including fast fashion, is a problem for humans in the present.	.663	.784
2. I believe mass consumption, including fast fashion, will be a problem for humans in the future.	.736	.761
3. I believe mass consumption, including fast fashion, is harmful to the environment including wildlife now.	.715	.772
4. I believe mass consumption is harmful to the environment including wildlife in the future.	.715	.771
5. I can describe/articulate what mass consumption is.	.347	.871

K-MC Subscale Posttest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 144	Coefficient α if Deleted
1. You believe mass consumption, including fast fashion, is a problem for humans in the present. (Th…	.788	.888
2. You believe mass consumption including fast fashion will be a problem for humans in the future.	.843	.876
3. You believe mass consumption including fast fashion is harmful to the environment including wildlife…	.821	.881
4. You believe mass consumption is harmful to the environment including wildlife in the future.	.848	.876
5. You can describe/articulate what mass consumption is.	.579	.929

K-PH Subscale Pretest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 152	Coefficient α if Deleted
6. I believe some chemicals (including flame retardants) found in everyday objects can be harmful to…	.491	.703
7. I believe some chemicals (including flame retardants) found in everyday items can be harmful to the….	.524	.703
8. The textile industry has a significant carbon footprint. (Merriam-Webster defines carbon footprint…	.514	.703
9. I am familiar with the term plastic pollution.	.368	.719
10. The textile and fashion industries are major contributors to plastic pollution.	.450	.708
11. Plastic harms the environment including wildlife.	.541	.704
12. Plastic harms humans.	.470	.704
13. My physical health related to the environment.	.377	.716
14. The furniture or clothes I buy can impact my health.	.474	.703
15. The furniture or clothes I buy can impact the environment or wildlife.	.551	.697
16. Manufactured objects have labels indicating an item's content.	.095	.746
17. All textiles or fabrics are biodegradable, meaning that when they are discarded, they do break down…	.062	.750
18. Flame retardants are biodegradable, meaning that when they are discarded, they do break down in the…	-.016	.772

K-PH Posttest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 143	Coefficient α if Deleted
6. You believe some chemicals (including flame retardants) in everyday objects can be harmful to hu…	.487	.709
7. You believe some chemicals (including flame retardants) found in everyday items can be harmful to…	.518	.710
8. The textile industry has a significant carbon footprint. (Merriam-Webster defines carbon footprint…	.563	.700
9. You are familiar with the term plastic pollution.	.594	.696
10. The textile and fashion industries are major contributors to plastic pollution.	.549	.700
11. Plastic harms the environment including wildlife.	.493	.711
12. Plastic harms humans.	.602	.692
13. Your physical health is related to the environment.	.601	.696
14. The furniture or clothes you buy can impact your health.	.638	.687
15. The furniture or clothes you buy can impact the environment or wildlife.	.684	.686
16. Manufactured objects have labels indicating an item's content.	.206	.741
17. All textiles or fabrics are biodegradable, meaning that when they are discarded, they do break down…	.009	.767
18. Flame retardants are biodegradable, meaning that when they are discarded, they do break down in s…	-.239	.835

V Pretest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 153	Coefficient α if Deleted
1. The natural world is important to me. (Merriam-Webster Dictionary defines natural world as "all o…	.556	.598
2. Wildlife has as much right as humans to exist.	.454	.603
3. I feel a sense of obligation towards the environment/wildlife.	.594	.572
4. Spending time out-of-doors is important to me.	.316	.650
5. I believe environmental concerns and human health concerns are intertwined.	.501	.595
6. The Earth's value does not depend upon people; it is valuable in [and of] itself.	.293	.749

V Posttest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 144	Coefficient α if Deleted
1. The natural world is important to you. (Merriam-Webster Dictionary defines natural world as "all…	.574	.680
2. Wildlife has as much right as humans to exist.	.493	.690
3. You feel a sense of obligation towards the environment/wildlife.	.681	.633
4. Spending time out-of-doors is important to you.	.453	.703
5. You believe environmental concerns and human health concerns are intertwined.	.635	.659
6. The Earth's value does not depend upon people; it is valuable in [and of] itself.	.333	.818

V Pretest Adjusted Reliability Scale

Measure	Item Coefficient α Correlation *n* = 153	Coefficient α if Deleted
1. The natural world is important to me. (Merriam-Webster Dictionary defines natural world as "all o…	.626	.675
2. Wildlife has as much right as humans to exist.	.407	.758
3. I feel a sense of obligation towards the environment/wildlife.	.663	.649
4. Spending time out-of-doors is important to me.	.396	.744
5. I believe environmental concerns and human health concerns are intertwined.	.546	.692

V Posttest Adjusted Reliability Scale

Measure	Item Coefficient α Correlation *n* = 145	Coefficient α if Deleted
1. The natural world is important to you. (Merriam-Webster Dictionary defines natural world as "all…	.623	.782
2. Wildlife has as much right as humans to exist.	.567	.797
3. You feel a sense of obligation towards the environment/wildlife.	.725	.747
4. Spending time out-of-doors is important to you.	.531	.805
5. You believe environmental concerns and human health concerns are intertwined.	.625	.779

SB BUY Pretest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 153	Coefficient α if Deleted
1. I attempt to learn what materials and/or chemicals are in some of the objects I purchase.	.622	.878
2. When I shop for clothes, I consider whether the material is natural or synthetic.	.792	.850
3. When I shop for clothes, I consider the production process of the garment.	.773	.854
4. When I shop for clothes, I consider how the garment may impact my health.	.735	.861
5. I am willing to spend more money on an item if it is considered environmentally friendly.	.539	.890
6. When I shop for clothes, I consider how the garment may impact wildlife and/or the environment.	.744	.859

SB BUY Posttest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 144	Coefficient α if Deleted
1. In the future, you will attempt to learn what materials and/or chemicals are in some of the objects…	.634	.804
2. When you shop for clothes, you will consider whether the material is natural or synthetic.	.721	.781
3. When you shop for clothes, you will consider the production process of the garment.	.759	.773
4. When you shop for clothes, you will consider how the garment may impact your health.	.573	.813
5. In the future, you intend to spend more money on an item if it is considered environmentally friend…	.627	.806
6. When you shop for clothes, you will consider how the garment may impact wildlife and/or the environment…	.347	.849

SB DO Pretest Reliability Scale

Measure	Item Coefficient α Correlation *n* = 153	Coefficient α if Deleted
1. I know things I can do to help improve environmental issues such as mass consumption and/or chemical…	.389	.674
2. I recycle paper, glass, or plastic in public places such as on campus, parks, or restaurants when…	.445	.654
3. I recycle paper, glass, and/or plastic from my living space.	.389	.681
4. I would volunteer my time or write a letter in support of an environmental cause.	.449	.650
5. I have talked with other people about issues including climate change, mass consumption, and or c….	.616	.568

SB DO Posttest Reliability Scale ()

Measure	Item Coefficient α Correlation *n* = 142	Coefficient α if Deleted
1. You know things you can do to help improve environmental issues such as mass consumption and/or c….	.555	.758
2. You intend to recycle paper, glass, or plastic in public places such as on campus, parks, or rest…	.534	.765
3. You intend to recycle paper, glass, and/or plastic from your living space more than in the future.	.575	.754
4. In the future, you intend to volunteer your time or write a letter in support of an environmental …	.644	.737
5. In the future, more than in the past, you will talk with other people about issues including climate…	.625	.732

Secondary Objective Exhibition Component Questions

K

Rate each aspect of the exhibition according to the level of new information it provided. Move the bar to indicate your answer.

V

Rate each aspect of the exhibition according to whether it inspired you to critically examine your assumptions, beliefs, and/or values in how you see yourself and/or the world

Intended SB a.

Rate how much each aspect of the exhibition influenced your intent to further develop environmentally-responsible behaviors such as recycling clothing, plastic, and/or paper or to volunteer and/or donate money to an environmental cause.

Intended SB b.

Rate the extent to which each aspect of the exhibition influenced your intent to develop more environmentally responsible behaviors such as reading furniture labels, recycling, or buying more thoughtfully.

Appendix I

Pretest Survey Questions

Pretest Survey Questions

Pre-Exhibition Survey

Q76

NU Grant Project ID#16074
Informed Consent Letter
for
Participation in an Ecological Art Exhibition Study

The purpose of this letter is to provide information regarding participation in my Ecological Art Exhibition Research Study—a primary component of my PhD dissertation. This study is designed to assess the potential role of an ecological art exhibition in environmental education. The study has been approved by the University of Nebraska-Lincoln Institutional Review Board (UNL IRB). If you are taking a course in which you will earn credit for participating in the study, you must complete all three parts of the study:

1. Completing an online pre-exhibition survey any time prior to visiting the exhibition (maximum 10 minutes).
2. Visiting "Canary Concepts and the Hidden Danger of Ubiquitous Things" (CCHD), an ecological art exhibition at the Robert Hillestad Textile Gallery located on the second floor of the Home Economics building on East campus between April 11th —April 22nd, 2016. You may spend as much time as you like at the CCHD exhibit. See below for visitor information.
3. Completing an online post-exhibition survey (maximum 20 minutes). This should be done any time between April 25th April 30th, 2016.

There are no risks anticipated as a consequence of participating in this study. There are no direct benefits to you, but knowledge gained from this research will help us to learn about whether and how art can be an effective tool in environmental education.

Your information will be kept completely confidential. You will be prompted to provide your name and email address at the end of the surveys. This is for the purpose of providing student participant names to instructors who are providing extra points for study participation or for potentially contacting you if you indicate you are interested in participating in future research. At the end of the study, your name and email information fields will be separated from the survey data, and UNL student participant names will be provided to instructors. Only the researcher and statistical analysts will have access to the data, which will be stored on a password-protected computer. Results will be reported in a doctoral dissertation, conference presentations, and scholarly publication, but will be

reported as group statistics only. No individuals will be identified. Here is a link to the Qualtrics privacy policy:
http://www.qualtrics.com/privacy-statement/

You are voluntarily making a decision whether or not to participate in this research study. If you choose to participate in this research study, you must be 19 years old or older. You have a right to ask questions and to have those questions answered. If you have questions about your rights as a research participant, you may contact the University of Nebraska-Lincoln IRB 402-472-6965. You are free to decide not to participate in the study and can withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln. You may print a copy of this consent form to keep. If you have questions, please contact Dr. Trout, the UNL IRB, or me.

Sincerely,
Stacey Skold, Principal Investigator, sskold@yahoo.com
Dr. Barbara Trout, Secondary Investigator: btrout1@unl.edu
Institutional Review Board (IRB): 402-472-6965

GALLERY VISITOR INFORMATION
Location: Robert Hillestad Textiles Gallery, 2nd floor, Home Economics Building, 35th and Holdrege Streets.
Hours: During the Exhibition, the Gallery is open to the public without charge Monday through Friday from 8:30am - 4pm and on the weekend from 12am - 6pm. Call 402-472-2911 or 402-314-1611, to request an extended weekend visit.
Parking: Student visitors are welcome to park at designated areas near the Home Economics Building.
http://parking.unl.edu/maps/EastCampusParkingMap.pdf“>
Map: <a href = “http://cehs.unl.edu/textilegallery/”>http://cehs.unl.edu/textilegallery/

YOU MAY PRINT A COPY OF THE CONSENT FORM TO KEEP.

Q77 I consent to participate in this research study.
❍ Yes
❍ No

Q78 Please type your name to indicate consent.

Q1 I am interested in art.
- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q2 In my lifetime, I have visited an art museum and/or art gallery:
- ❍ 0 times
- ❍ 1-3 times
- ❍ 4-6 times
- ❍ 7+ times

Q4 I am interested in environmental concerns such as mass consumption and chemical pollution. (The Oxford Dictionary defines mass consumption as "The use or purchase of goods or services by a large number of people".)
- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q3 In my lifetime, I have read the following number of books and/or articles (elective reading) on line or in print relating to environmental concerns (such as mass consumption, climate change, chemical pollution). This is a best guess; the number is approximate.
- ❍ 0
- ❍ 1-5
- ❍ 6-10
- ❍ 11+

Q54 I learned about environmental issues including mass consumption and chemical pollution in school.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q4a I believe mass consumption, including fast fashion, is a problem for humans in the present. (The Oxford Dictionary defines mass consumption as "The use or purchase of goods or services by a large number of people". The MacMillan Dictionary defines fast fashion as "Cheap and affordable clothes, which are the result of catwalk designs moving into stores in the fastest possible way in order to respond to the latest trends".)

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q52 I believe mass consumption including fast fashion will be a problem for humans in the future.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q49 I believe mass consumption including fast fashion is harmful to the environment including wildlife now.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q53 I believe mass consumption is harmful to the environment including wildlife in the future.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q55 I can describe/articulate what mass consumption is.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q50 I believe some chemicals (including flame retardants) found in everyday objects can be harmful to humans.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q60 Identify the risk level for chemical exposure. Which of the following is most accurate?

- ❍ Children are at greater risk than adults for chemical exposure.
- ❍ Adults are at greater risk than children for chemical exposure.
- ❍ Adults and children have the same risk level for chemical exposure.

Q51 I believe some chemicals (including flame retardants) found in everyday items can be harmful to the environment including wildlife. (Merriam-Webster Dictionary defines flame retardant as “made or treated so as to resist burning”.)

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q5 I can name one example of an everyday object, which contains toxic chemicals.

- ❍ yes
- ❍ Maybe
- ❍ No

Q6 Can toxic chemicals be included in flame retardants? (Merriam-Webster Dictionary defines flame retardant as made or treated so as to resist burning”.)

- ❍ yes
- ❍ Maybe
- ❍ No

Q7 Flame retardant chemicals can be found in the following. Check all that apply.

- ☐ food
- ☐ baby toys
- ☐ electronics
- ☐ mattresses
- ☐ clothing
- ☐ flooring
- ☐ insects
- ☐ eating utensils
- ☐ building materials
- ☐ cosmetics

Q8 The textile industry has a significant carbon footprint. (Merriam-Webster defines carbon footprint as the amount of greenhouse gases and specifically carbon dioxide emitted by something [such as a person's activities or a product's manufacture and transport] during a given period.)

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q24 Manufactured objects have labels indicating an item's content.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q61 Chemical exposure pathways include the following. Check all that apply.

- ☐ inhalation
- ☐ ingestion
- ☐ skin

Q11 Common chemical exposure sources for humans include the following. Check all that apply.

- ☐ food
- ☐ clothing
- ☐ water
- ☐ dust
- ☐ air
- ☐ hands
- ☐ furniture
- ☐ buildings
- ☐ streets

Q59 I am familiar with the term plastic pollution.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q12 The textile and fashion industries are major contributors to plastic pollution.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q13 Plastic harms the environment including wildlife.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q59 Plastic harms humans.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q62 All textiles or fabrics are biodegradable, meaning that when they are discarded, they do break down in soil.

- ❍ Definitely yes
- ❍ Probably yes
- ❍ Might or might not
- ❍ Probably not
- ❍ Definitely not

Q64 Flame retardants are biodegradable, meaning that when they are discarded, they do break down in the soil.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q15 My physical health is related to the environment.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q46 All chemicals go through a testing process to assess their safety before use in manufactured products.

- ❍ Yes
- ❍ Maybe
- ❍ No

Q56 The furniture or clothes I buy can impact my health.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q57 The furniture or clothes I buy can impact the environment or wildlife.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q16 The natural world is important to me. (Merriam-Webster Dictionary defines natural world as “all of the animals, plants, and other things existing in nature and not made or caused by people”.)
- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q18 Wildlife has as much right as humans to exist.
- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q19 The earth's value does not depend upon people; it is valuable in itself.
- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q21 I feel a sense of obligation towards the environment/wildlife.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q20 Spending time out-of-doors is important to me.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q47 I believe environmental concerns and human health concerns are intertwined.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q63 I feel sympathetic towards the environment and/or wildlife.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q17 Generally, my immediate family (the people who raised me) values the natural world.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q23 I attempt to learn what materials and/or chemicals are in some of the objects I purchase.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q25 I know things I can do to help improve environmental issues such as mass consumption and/or chemical pollution.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q26 I recycle paper, glass, or plastic in public places such as on campus, parks, or restaurants when given the opportunity.

- ❍ Strongly Agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q27 I recycle paper, glass, and/or plastic from my living space.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q65 When I shop for clothes, I consider the production process of the garment.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q66 When I shop for clothes, I consider whether the material is natural or synthetic.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q67 When I shop for clothes, I consider how the garment may impact my health.
- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q68 When I shop for clothes, I consider how the garment may impact wildlife and/or the environment.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q58 When I no longer wear an article of clothing, I usually (check all that apply).

- ❑ give it to another person
- ❑ donate it to a place such as Goodwill.
- ❑ throw it in the trash.
- ❑ consign it.
- ❑ Other _____

Q28 I am willing to spend more money on an item if it is considered environmentally-friendly.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q30 I would volunteer my time or write a letter in support of an environmental cause.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q31 I have talked with other people about issues including climate change, mass consumption, and/or chemical pollution.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q32 My health is a priority in my life.

- ❍ Strongly agree
- ❍ Agree
- ❍ Somewhat agree
- ❍ Neither agree nor disagree
- ❍ Somewhat disagree
- ❍ Disagree
- ❍ Strongly disagree

Q60 I believe visiting an ecological art exhibition will enhance my learning about mass consumption and chemicals in the fashion and textile industries.

- ❍ Yes
- ❍ Maybe
- ❍ No

Q62 Are you a student at the University of Nebraska-Lincoln?

- ❍ Yes
- ❍ No

Q44 If you are taking this survey in conjunction with a UNL course for extra credit OR course credit, please indicate the instructor.

- ❍ Dr. Casto
- ❍ Dr. Starkey
- ❍ Dr. Torquati
- ❍ Anh Do

Q69 If you are a UNL student and you are taking this survey for class credit, please provide your FIRST NAME. (Your name will be separated from survey data and sent to your instructor.)

Q63 If you are a UNL student and you are taking this survey for class credit, please provide your LAST NAME. (Your name will be separated from survey data and sent to your instructor.)

Q67 If you are a UNL student and you are taking this survey for class credit, please provide your email address. (Your email address will be separated from the survey data.)

Q45 If you would be willing to be contacted for an opportunity to participate in another study on the same topic in the future, please include your name and email address. (Your contact information will not be available to any other investigator. It will be separated from the other data and stored for one year on a password-protected computer and then destroyed. It is possible that future research may involve studies. During this span of time, if you would like your name removed from the list, contact the principal investigator at sskold@yahoo.com and specify you do not wish to be contacted regarding future research.)

Name

Email Address

Appendix J

Posttest Survey Questions

Posttest Survey Questions

Post-Exhibition Survey

Q79 NU Grant Project ID#16074 Informed Consent Letter for Participation in an Ecological Art Exhibition Study The purpose of this letter is to provide information regarding participation in my Ecological Art Exhibition Research Study—a primary component of my PhD dissertation. This study is designed to assess the potential role of an ecological art exhibition in environmental education. The study has been approved by the University of Nebraska-Lincoln Institutional Review Board (UNL IRB). If you are taking a course in which you will earn credit for participating in the study, you must complete all three parts of the study: Three parts: Completing an online pre-exhibition survey any time prior to visiting the exhibition (maximum 10 minutes) Visiting "Canary Concepts and the Hidden Danger of Ubiquitous Things" (CCHD), an ecological art exhibition at the Robert Hillestad Textile Gallery located on the second floor of the Home Economics building on East campus between April 11th–April 22nd, 2016. You may spend as much time as you like at the CCHD exhibit. See below for visitor information. Completing an online post-exhibition survey (maximum 20 minutes). This should be done any time between April 25th–April 30th, 2016. There are no risks anticipated as a consequence of participating in this study. There are no direct benefits to you, but knowledge gained from this research will help us to learn about whether and how art can be an effective tool in environmental education. Your information will be kept completely confidential...You will be prompted to provide your name and email address at the end of the surveys. This is for the purpose of providing student participant names to instructors who are providing extra points for study participation or for potentially contacting you if you indicate you are interested in participating in future research. At the end of the study, your name and email information fields will be separated from the survey data, and UNL student participant names will be provided to instructors. Only the researcher and statistical analysts will have access to the data, which will be stored on a password-protected computer. Results will be reported in a doctoral dissertation, conference presentations, and scholarly publication, but will be reported as group statistics only. No individuals will be identified. Here is a link to the Qualtrics privacy policy: http://www.qualtrics.com/privacy-statement/ You are voluntarily making a decision whether or not to participate in this research study. If you choose to participate in this research study, you must be 19 years old or older. You have a right to ask questions and to have those questions answered. If you have questions about your rights as a research participant, you may contact the University of Nebraska-Lincoln IRB 402-472-6965. You are free to decide not to participate in the study and can withdraw at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln. You may print a copy of this consent form to keep. If you have questions, please contact Dr. Trout, the UNL IRB, or me. Sincerely, Stacey Skold, Principal Investigator sskold@yahoo.com Dr. Barbara Trout, Secondary Investigator: btrout1@unl.edu Institutional Review Board (IRB): 402-472-6965 YOU MAY PRINT A COPY OF THIS CONSENT FORM TO KEEP GALLERY VISITOR

INFORMATION Location: Robert Hillestad Textiles Gallery, 2nd floor, Home Economics Building, 35th and Holdrege Streets. Hours: During the Exhibition, the Gallery is open to the public without charge Monday through Friday from 8:30am - 4pm and on the weekend from 12am - 6pm. Call 402-472-2911 or 402-314-1611, to request an extended weekend visit. Parking: Student visitors are welcome to park at designated areas near the Home Economics Building.
http://parking.unl.edu/maps/EastCampusParkingMap.pdf Map:
http://cehs.unl.edu/textilegallery/

Q80 I consent to participate in this research study.
- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Survey

Q81 Please type your name to indicate consent.

Q1 You have continued to think about the exhibition since visiting it.
- ❍ A great deal (1)
- ❍ A lot (2)
- ❍ A moderate amount (3)
- ❍ A little (4)
- ❍ None at all (5)

Q3 The exhibition instilled an emotional response in you.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q4 If the exhibition instilled an emotional response (s), check all the emotions that apply.

- ❑ sad (1)
- ❑ angry (2)
- ❑ motivated (3)
- ❑ inspired (4)
- ❑ confused (5)
- ❑ happy (6)
- ❑ surprised (7)
- ❑ betrayed (8)
- ❑ empathetic (9)
- ❑ other (10) _____

Q7 The exhibition inspired you to consider alternative or different view(s) and /or perspective(s).

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q72 The exhibition inspired you to critically examine your assumptions, beliefs, and/or values in how you see yourself and/or the world.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q73 This exhibition experience inspired to you to do the following.

- ❍ Visit more art exhibitions than in the past. (1)
- ❍ Visit the same number of art exhibitions I have in the past. (2)
- ❍ Visit fewer art exhibitions than I have in the past. (3)

Q79 You are interested in art.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q80 You are interested in environmental concerns such as mass consumption and chemical pollution.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q75 Rate each aspect of the exhibition according to whether it inspired you to critically examine your assumptions, beliefs, and/or values in how you see yourself and/or the world..(0 would indicate it did not inspire critical examination or consideration, 100 would indicate that it inspired a great deal of critical examination and/or consideration.)Move the bar to indicate your answer.

_____ Midway Trailer (1)
_____ Wrapped (2)
_____ Stuffed (3)
_____ Bought (4)
_____ Beaten (5)
_____ Titles of Installations (8)
_____ Wall Labels: Information (14)
_____ Thread for Thought (10)
_____ Quotes (9)
_____ Sound (Midway or Wrapped) (6)
_____ Interactive Component (Ability to Examine the Ottomans) (7)
_____ Exhibition Experience as a Whole (11)
_____ Ability to Leave Feedback (12)
_____ Other (13)

Q10 You believe mass consumption, including fast fashion, is a problem for humans in the present.(The Oxford Dictionary defines mass consumption as “The use or purchase of goods or services by a large number of people”.The MacMillan Dictionary defines fast fashion as “Cheap and affordable clothes which are the result of catwalk designs moving into stores in the fastest possible way in order to respond to the latest trends”.)

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q11 You believe mass consumption including fast fashion will be a problem for humans in the future.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q12 You believe mass consumption including fast fashion is harmful to the environment including wildlife now.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q14 You believe mass consumption is harmful to the environment including wildlife in the future.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q15 You can describe/articulate what mass consumption is.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q16 You believe some chemicals (including flame retardants) in everyday objects can be harmful to humans.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q70 Identify the risk level for toxic chemical exposure. Which of the following is most accurate?
- ❍ Children are at greater risk than adults for chemical exposure. (1)
- ❍ Adults are at greater risk than children for chemical exposure. (2)
- ❍ Adults and children have the same risk level for chemical exposure. (3)

Q50 You believe some chemicals (including flame retardants) found in everyday items can be harmful to the environment including wildlife. (Merriam-Webster Dictionary defines flame retardant as “made or treated so as to resist burning”.)
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q51 You can name one example of an everyday object, which contains toxic chemicals.
- ❍ Yes (1)
- ❍ Maybe (2)
- ❍ No (3)

Q53 Can toxic chemicals be included in flame retardants? (Merriam-Webster Dictionary defines flame retardant as “made or treated so as to resist burning”.)

- ❍ Yes (1)
- ❍ Maybe (2)
- ❍ No (3)

Q54 Flame retardant chemicals can be found in the following. Check all that apply.

- ❑ food (1)
- ❑ baby toys (2)
- ❑ electronics (3)
- ❑ mattresses (4)
- ❑ clothing (5)
- ❑ flooring (6)
- ❑ insects (7)
- ❑ eating utencils (8)
- ❑ building materials (9)
- ❑ cosmetics (10)

Q55 The textile industry has a significant carbon footprint. (Merriam-Webster defines carbon footprint as the amount of greenhouse gases and specifically carbon dioxide emitted by something [such as a person's activities or a product's manufacture and transport] during a given period.)

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q56 Manufactured objects have labels indicating an item's content.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q57 Chemical exposure pathways include the following. Check all that apply.
- ❑ inhalation (1)
- ❑ ingestion (2)
- ❑ skin (3)

Q71 Common chemical exposure sources for humans include the following. Check all that apply.
- ❑ food (1)
- ❑ clothing (2)
- ❑ water (3)
- ❑ dust (4)
- ❑ air (5)
- ❑ hands (6)
- ❑ furniture (7)
- ❑ buildings (8)
- ❑ streets (9)

Q17 You are familiar with the term plastic pollution.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q18 The textile and fashion industries are major contributors to plastic pollution.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q19 Plastic harms the environment including wildlife.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q86 Plastic harms humans.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q74 All textiles or fabrics are biodegradable, meaning that when they are discarded, they do break down in soil.
- ❍ Definitely yes (1)
- ❍ Probably yes (2)
- ❍ Might or might not (3)
- ❍ Probably not (4)
- ❍ Definitely not (5)

Q81 Flame retardants are biodegradable, meaning that when they are discarded, they do break down in soil.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q20 Your physical health is related to the environment.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q58 All chemicals go through a testing process to assess their safety before use in manufactured products.
- ❍ Yes (1)
- ❍ Maybe (2)
- ❍ No (3)

Q59 The furniture or clothes you buy can impact your health.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q60 The furniture or clothes you buy can impact the environment or wildlife.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q49 Rate each aspect of the exhibition according to the level of new information it provided. (0 would indicate you did not learn anything new, 100 would indicate that you learned a great deal from this aspect of the exhibition.)Move the bar to indicate your answer.

_____ Midway Trailer (1)
_____ Wrapped (2)
_____ Stuffed (3)
_____ Bought (4)
_____ Beaten (5)
_____ Titles of Installations (8)
_____ Wall Labels: Information (10)
_____ Thread for Thought (14)
_____ Quotes (9)
_____ Sound (Midway or Wrapped) (6)
_____ Interactive Component (Ability to Examine the Ottomans) (7)
_____ Exhibition Experience as a Whole (11)
_____ Ability to Leave Feedback (12)
_____ Other (13)

Q61 The natural world is important to you. (Merriam-Webster Dictionary defines natural world as "all of the animals, plants, and other things existing in nature and not made or caused by people".)

❍ Strongly agree (1)
❍ Agree (2)
❍ Somewhat agree (3)
❍ Neither agree nor disagree (4)
❍ Somewhat disagree (5)
❍ Disagree (6)
❍ Strongly disagree (7)

Q64 Wildlife has as much right as humans to exist.

❍ Strongly agree (1)
❍ Agree (2)
❍ Somewhat agree (3)
❍ Neither agree nor disagree (4)
❍ Somewhat disagree (5)
❍ Disagree (6)
❍ Strongly disagree (7)

Q65 The earth's value does not depend upon people; it is valuable in itself.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q66 You feel a sense of obligation towards the environment/wildlife.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q26 Spending time out-of-doors is important to you.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q27 You believe environmental concerns and human health concerns are intertwined.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q22 The exhibition increased your sensitivity or feelings of empathy to the environment and/or wildlife.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q29 Rate how much each aspect of the exhibition influenced your intent to further develop environmentally-responsible behaviors such as recycling clothing, plastic, and/or paper or to volunteer and/or donate money to an environmental cause. (0 would indicate the aspect was not important, 100 would indicate the aspect was very important.)Move the bar to indicate your answer.

_____ “Midway Trailer” (1)
_____ “Wrapped” (3)
_____ “Stuffed” (4)
_____ “Bought” (2)
_____ “Beaten” (5)
_____ Titles of Installations (8)
_____ Wall Labels: Information (10)
_____ Thread for Thought (13)
_____ Quotes (9)
_____ Sound (Midway or Wrapped) (6)
_____ Interactive Component (Ability to Examine Ottomans) (7)
_____ Exhibition Experience as a Whole (11)
_____ Ability to Leave Feedback (14)
_____ Other (12)

Q30 In the future, you will attempt to learn what materials and/or chemicals are in some of the objects you purchase.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q32 You know things you can do to help improve environmental issues such as mass consumption and/or chemical pollution.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q33 You intend to recycle paper, glass, or plastic in public places such as on campus, parks, or restaurants when given the opportunity in the future.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q34 You intend to recycle paper, glass, and/or plastic from your living space more than in the future.
- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q82 When you shop for clothes, you will consider the production process of the garment.
- ❍ Strongly agree (6)
- ❍ Agree (7)
- ❍ Somewhat agree (8)
- ❍ Neither agree nor disagree (9)
- ❍ Somewhat disagree (10)
- ❍ Disagree (11)
- ❍ Strongly disagree (12)

Q83 When you shop for clothes, you will consider whether the material is natural or synthetic.

- ❍ Strongly agree (6)
- ❍ Agree (7)
- ❍ Somewhat agree (8)
- ❍ Neither agree nor disagree (9)
- ❍ Somewhat disagree (10)
- ❍ Disagree (11)
- ❍ Strongly disagree (12)

Q84 When you shop for clothes, you will consider how the garment may impact your health.

- ❍ Strongly agree (5)
- ❍ Agree (6)
- ❍ Somewhat agree (7)
- ❍ Neither agree nor disagree (8)
- ❍ Somewhat disagree (9)
- ❍ Disagree (10)
- ❍ Strongly disagree (11)

Q85 When you shop for clothes, you will consider how the garment may impact wildlife and/or the environment.

- ❍ Strongly agree (4)
- ❍ Agree (5)
- ❍ Somewhat agree (6)
- ❍ Neither agree nor disagree (7)
- ❍ Somewhat disagree (8)
- ❍ Disagree (9)
- ❍ Strongly disagree (10)

Q67 When you no longer wear an article of clothing, you intend to (check all that apply).

- ☐ give it to another person. (1)
- ☐ donate it to a place such as Goodwill. (2)
- ☐ throw it in the trash. (3)
- ☐ consign it. (4)
- ☐ Other (5) _____

Q35 In the future, you intend to spend more money on an item if it is considered environmentally friendly.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q68 In the future, you intend to volunteer your time or write a letter in support of an environmental cause.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q37 In the future, more than in the past, you will talk with other people about issues including climate change, mass consumption, and/or chemical pollution.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q40 After visiting the exhibition, you are inspired to make your health more of a priority in your life.

- ❍ Strongly agree (1)
- ❍ Agree (2)
- ❍ Somewhat agree (3)
- ❍ Neither agree nor disagree (4)
- ❍ Somewhat disagree (5)
- ❍ Disagree (6)
- ❍ Strongly disagree (7)

Q41 Rate the extent to which each aspect of the exhibition influenced your intent to develop more environmentally responsible behaviors such as reading furniture labels, recycling, or buying more thoughtfully. (0 would indicate the aspect was not important, 100 would indicate the aspect was very important.) Move the bar to indicate your answer.

_____ "Midway" Trailer (1)
_____ "Wrapped" (3)
_____ "Stuffed" (4)
_____ "Bought" (2)
_____ "Beaten" (5)
_____ Titles of Installations (8)
_____ Wall Labels: Information (10)
_____ Thread for Thought (13)
_____ Quotes (9)
_____ Sound (Midway or Wrapped) (6)
_____ Interactive Component (Ability to Examine Ottomans) (7)
_____ Exhibition Experience as a Whole (11)
_____ Ability to Leave Feedback (14)
_____ Other (12)

Q46 You took a photograph of the exhibition.

❍ Yes. I took a photo of: (1) _____
❍ No (2)

Q69 You followed up on a resource such as a website provided in the exhibition wall labels. If so, please describe the resource.

❍ Yes, I followed up on the following information: (1) _____
❍ No (2)

Q76 You talked to other people about this exhibition.

❍ Yes (1)
❍ No (2)

Q83 I identify myself as a:

❍ Female (1)
❍ Male (2)

Q77 Age in years:

Q84 If you currently identify with a religion, please write it in the blank. If not, select NA.

❍ Click to write Choice 1 (1) _____
❍ NA (2)

Q85 The following best describes the type of area I grew up:
- ❍ Rural (1)
- ❍ Urban (2)
- ❍ Surburb (3)

Q76 Are you a student at the University of Nebraska-Lincoln?
- ❍ Yes (1)
- ❍ No (2)

Q68 If you are taking this survey in conjunction with a UNL course for extra credit OR course credit, please indicate the instructor.
- ❍ Dr. Casto (1)
- ❍ Dr. Starkey (3)
- ❍ Dr. Torquati (4)
- ❍ Anh Do (5)

Q72 If you are a UNL student and you are taking this survey for class credit, please provide your FIRST NAME. (Your name will be separated from survey data and sent to your instructor).

Q78 If you are a UNL student and you are taking this survey for class credit, please provide your LAST NAME. (Your name will be separated from survey data and sent to your instructor.)

Q52 Overall, you believe visiting an ecological art exhibition enhanced your learning about mass consumption and chemicals in the fashion and textile industries.
- ❍ Yes (1)
- ❍ Maybe (2)
- ❍ No (3)

Q42 Are there any comments you would like to share about the exhibition?

Q86 Where did you acquire information about or see images related to the exhibition? Check all that apply.
- ❍ classroom (1)
- ❍ invitation card (2)
- ❍ poster (3)
- ❍ Gallery newsletter (5)
- ❍ online source (6)
- ❍ Cube video screen at Railyard (7)
- ❍ word-of-mouth (8)
- ❍ Other, please indicate. (9) _____

Q77 If you are willing to be contacted for future research on this topic, please include your name. (Your contact information will not be available to any other investigator. It will be separated from the other data and stored for one year on a password-protected computer and then destroyed. It is possible that future research may involve studies. During this span of time, if you would like your name removed from the list, contact the principal investigator at sskold@yahoo.com and specify you do not wish to be contacted regarding future research.)

Q78 If you are willing to be contacted for future research on this topic, please include your email address. (Your contact information will not be available to any other investigator. It will be separated from the other data and stored for one year on a password-protected computer and then destroyed. It is possible that future research may involve studies. During this span of time, if you would like your name removed from the list, contact the principal investigator at sskold@yahoo.com and specify you do not wish to be contacted regarding future research.)

Q48 Would you like to learn more information about any of these subjects?

- ❍ No (1)
- ❍ Yes (2)

If No Is Selected, Then Skip To End of Survey

Q82 For more information, visit:
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