LAUNDRY TRAINING FOR GENERATION Z: EXPLORING THE ROLE OF AUGMENTED REALITY IN TRAINING SUSTAINABLE GARMENT CARE

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To my beloved husband & family, and my advisor who supported me during this challenging time.

ABSTRACT

The purpose of this study is to explore the use of Augmented Reality (AR) as a mediator for training sustainable garment care (washing, drying, and ironing) to Generation Z. There are around 60 distinct laundry indications that explain how items should be laundered. This thesis deals with a prevalent issue as the tendency of individuals to be rely on personal habits and routines due to the variety of instructions and lack of proper training. Unsustainable Personal habits significantly impacts environmental issues like high level of energy and water consumption, considerable amount of greenhouse gasses emission, and low clothes durability. To tackle this issue, marker-based Augmented Reality (AR) experiences are designed for endangered species that are affected directly or indirectly by the fashion industry. In this study, 24 individuals participated, and the data collection and analysis method employed was ethnographic research with a thematic content analysis approach. Findings revealed a generally positive perception towards the use of AR technology. Participants exhibited higher awareness, engagement, and agreed on its effectiveness, eliciting strong positive emotions. Despite some initial unfamiliarity with AR at the pre-experiment stage, most respondents acknowledged the beneficial role of AR in training for sustainable garment care.

Keywords: Augmented Reality, Garment Care, Generation Z, Sustainability, Training

ÖZET

Bu tezin temel amacı, Z kuşağının sürdürülebilir giysi bakımı (yıkama, kurutma ve ütüleme) eğitimini sağlamak için Artırılmış Gerçeklik (AR) teknolojisinin nasıl bir aracı olarak kullanılabileceğini araştırmaktadır. Giyim bakım için kullanılan yaklaşık 60 farklı simge ve çamaşır yıkama talimatı mevcuttur. Bu çeşit fazlalığı ve eğitim eksikliği nedeniyle, birçok kişi yıkama yöntemini kendi rutinlerine göre belirler. Bu alışkanlık, ev içi enerji ve su tüketiminin artması, sera gazlarının salınımı ve giysi dayanıklılığının azalması gibi çevresel sorunları önemli ölçüde etkilemektedir. Bu sorunun üstesinden gelmek için, moda endüstrisinden doğrudan veya dolaylı olarak etkilenen nesli tükenmekte olan türler için işaret tabanlı Artırılmış Gerçeklik (AR) deneyimleri tasarlanmıştır. 24 kişinin katıldığı bu çalışma, veri toplama ve analiz yöntemlerinin kullanıldığı vetematik içerik analizi yaklaşımının uygulandığı etnografik bir araştırmadır. Bulgular, katılımcıların AR kullanımına yönelik olarak genel anlamda olumlu olduklarına dair bir algı sunmaktadır. Katılımcılar, farkındalıklarının arttığını, daha fazla katılım sağladıklarını ve bu yöntemin etkinliğini kabul ettiklerini belirtmişlerdir. Tüm bu faktörler katılımcılardaki güçlü olumlu duyguları tetiklemiştir. Deney öncesi aşamada AR'ye ilk başta aşina olmamalarına rağmen, yanıt verenlerin çoğu AR'nin sürdürülebilir giysi bakımı eğitimindeki olumlu rolünü kabul etmiştir.

Anahtar Kelimeler: Artırılmış Gerçeklik (AR), Eğitim, Giysi Bakımı, Sürdürülebilirlik, Z Kuşağı

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AR: Augmented Reality
BRS: Business for Social Responsibility
GINETEX: The International Association for Textile Care Labeling
GHG: Green House Gas
DEFRA: Department for Environment, Food & Rural Affairs
WWF: World Wildlife Fun

CHAPTER I

INTRODUCTION

1.1. Justification for Research

While textiles play a crucial role in our daily lives, this industry has a negative reputation for its high environmental carbon footprint (Chorbot et al., 2018). The impact of clothing care, particularly in terms of energy and water use, is a critical aspect of textiles' environmental effects. For instance, domestic washing machines alone are estimated to consume approximately 20 trillion liters of water and 100 TWh of electricity globally per year (Pakula & Stamminger, 2010). Water pollution, greenhouse gas emissions, and possible toxicity of microplastics are all possible negative impacts of textile care. Changes in the frequency of washing garments, cleaning methods, and selecting right detergent all can help to reduce the total environmental footprint of textiles (Carbontrust, 2011). Strategies such as laundering at lower temperatures and selecting air drying instead of using a dryer machine, can make a significant difference in energy consumption and CO2 emissions (Gooijer & Stamminger, 2016).

The environmental impact of laundering methods varies globally because of factors like technical gaps, rules & regulations, available infrastructure, and cultural & social norms (Spencer, Lilley, & Porter, 2015). Individual's habits and usage patterns (number of cleanings per week, washing temperature, and drying preferences) affects the frequency and intensity of laundry. Despite considerable research on clothing care methods and its environmental impact, there are still knowledge gaps, specifically in sustainable garment care training for consumers and the role of emerging technologies. The purpose of this research is to fill these gaps

by evaluating the possibility of utilizing Augmented Reality (AR) capacities as a medium for sharing laundry tips with Generation Z customers. There are various reasons that this study focuses on Generation Z. First, this generation has grown up with the internet and used to have access to digital devices, online games, and social media as essential components of their lives. Second, members of Generation Z are open to brand-new digital experiences as well. Moreover, there is a significant gap in studying Generation Z behavior and sustainable lifestyle training (Dabija, Bejan, & Dinu, 2019). By focusing on this generation and exploring their attitudes, so this study seeks to contribute valuable insights into effective methods of sustainable training for the younger population.

1.2. The Aim of the Study

The purpose of this research is to examine the role of Augmented Reality (AR) as a mediator in sustainable garment care training for Generation Z. The study aims to fill knowledge gaps in consumers and to assess the potential influence of emerging technologies on encouraging sustainable laundering practices. The study will investigate Generation Z's attitudes toward the fashion industry and their perceptions of sustainable garment care. Furthermore, it will review how Generation Z evaluates the use of Augmented Reality technology in learning laundry tips. By conducting a qualitative study consisting of three phases (pre-experiment interviews, experiment, and post-experiment interviews), the research aims to gather valuable insights about Generation Z’s attitudes, opinions, and feedback to promote sustainable practices in garment care among this group of fashion consumers.

1.3. Research Questions and Scope

The primary aim of this study is to investigate the role of AR as a mediator tool for training. By addressing the following research questions, this research aims to provide valuable insights about attitudes, opinion, and feedback among Generation Z's regarding sustainable care definition and method, as well as their evaluation of Augmented Reality as a means of learning sustainable laundry tips:

- How does Generation Z perceive their relationship with the fashion industry?
- What are the perceptions of Generation Z regarding sustainable garment care?
- How does Generation Z evaluate the effectiveness of Augmented Reality in learning sustainable laundry tips?

The scope of this research includes testing marker-based Augmented Reality experience among any individuals with age ranging from 18 to 26 years old who live in Istanbul and speak Turkish but Turkish does not necessarily is their primary language. The study aims to examine their attitudes and perceptions toward sustainable garment care training, with a particular emphasis on Cotton-based garments. The research is conducted in a physical retail store, providing an opportunity to engage with garments physically.

1.4. Summary of Research Methodology

Qualitative research is a valuable approach that offers insights for unstructured data like reasoning and opinions. It is defined as flexible and exploratory in nature, focusing on capturing the depth and uniqueness of human experiences. It includes various research techniques such as interviews, observations,

focus groups, case studies and etc. which allow researchers to dig into individuals' perspectives, motivations, and behaviors. Qualitative research empowers researchers to explore new and emerging phenomena or topics when limited information is available on a particular subject and provides a foundation for generating hypotheses, and theories in order to establish a deeper understanding of the topic. It also enables researchers to approach the research problem with an open mind to gain unexpected insight from the data especially when the subject is complex and has multi-aspects.

In addition, qualitative research is a compelling research method choice as it allows researchers to study a specific event or phenomenon. It allows researchers to go beyond surface-level descriptions and uncover the underlying meanings, thoughts, feelings, and perceptions through in-depth interviews & observation of participants which leads to a more holistic understanding of the phenomenon under investigation. For the purpose of this study, a qualitative research approach is employed to examine individuals' opinions about the use of Augmented Reality (AR) in learning sustainable laundry tips. This approach allows the researcher to gain comprehensive insights about individuals’ attitudes, perceptions, and preferences. Ethnographic research is a type of qualitative research approach based on anthropology and sociology studies. Ethnographic research focuses on studying the social and cultural dynamics which involves observations, interactions with participants, and the collection of rich data through various methods & techniques to gain a holistic understanding.

The ethnographic research techniques used in this study include sampling to select relevant participants, observation, and conducting open-ended interviews in pre and post-experiment phases to gather insights and analyze the collected

qualitative data through open coding techniques to identify patterns, themes, and deeper meanings. besides, sentiment analysis is conducted to evaluate the participants' opinions and feedback on the experiments.

1.5. The Originality of the Study and Contribution to the Field

As mentioned earlier, there is a considerable gap in the sustainable garment care literature and this study uniquely focus on exploring the role of emerging technologies, particularly AR, by reviewing Generation Z's thoughts and feedback toward this brand-new experience. The findings from this research provide valuable insights into the attitudes and preferences of Generation Z, who are the future major consumers of the fashion industry. Understanding how Generation Z defines their relationship with the fashion industry and perspectives on sustainable garment care, can help future studies to design and develop well-defined educational programs.

Furthermore, this research has important implications for the fashion industry and fashion brands as it shows AR can be a useful and creative tool to engage and educate Generation Z about sustainability. The results of this study can be used to create future AR-based apps and content with learning purposes to increase awareness and persuade consumers to adopt more sustainable behaviors.

CHAPTER II

LITERATURE REVIEW

2.1. Garments' Life Cycle

The production of raw materials, manufacture of fiber, garments, and consumption of clothes all contribute significantly to environmental damage caused by the worldwide fashion industry (Claudio, 2007; Muthu, 2014). While clothing production has doubled since the beginning of 2000 (Remy, Speelman, & Swartz, 2016), garments have a shorter ownership & consumption period (Daystar, Chapman, Moore, Pires, & Golden, 2019). Due to this issue, there has been an increase in both the demand for global resources and the environmental damage caused by the production of apparel and basic materials.

The short life cycle of clothing negatively impacts the environment by consuming excessive amounts of energy, chemicals, and water. Cotton production is a major consumer of synthetic pesticides, accounting for an estimated 10% of global annual consumption. This is due to the crop's sensitivity to insect pests (Gam, Cao, Farr, & Kang, 2010). The long-term environmental effects of pollution will result in a loss of natural resources. Furthermore, the dyeing process (coloring) of one pound of textile requires 132.5 Liters of water consumption (Hiller Connell and Kozar, 2012). A significant amount of gasoline is consumed for transportation from supply chains to the end consumers. Laundry is also hazardous to the environment because of the various chemicals used in dry cleaning and home laundry (Hiller Connell, 2011). Clothing, except if reused or recycled, may eventually end up in landfills, increasing the earth's solid waste loads.

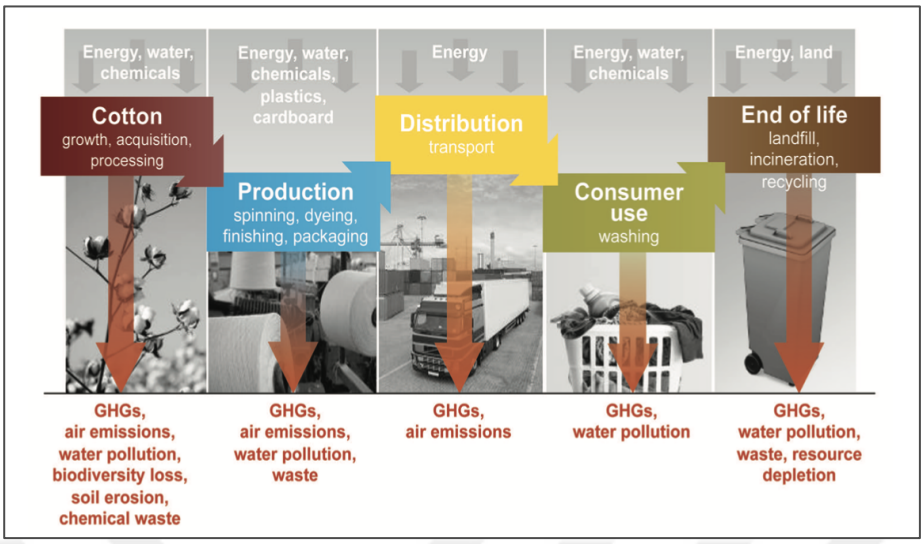

Figure 2.1.
Environmental impacts of cotton across its lifecycle (Department for Environment, Food & Rural Affairs, 2011)

2.1.1. Consumers "Use" Stage

It's not only the manufacturing of the materials that influence the environment when it comes to clothing. The consumer usage phase which includes washing, drying, and ironing, can have a significant environmental impact (Golden, Subramanian, Irizarri, White, & Meier, 2010). Many studies mention that the key greenhouse gases (GHG) sources are spotted at the beginning of the clothing life cycle specially during the production of fiber and spinning phase, besides of the consumer use phase. Because of the fact that energy consumption for washing, drying, and ironing clothes during the consumer use phase is high, this phase is critical to consider. For instance, according to the Business for Social Responsibility (BSR) study, production of H&M textiles emits various amounts of GHG across its garments' life cycle and the consumer usage phase being responsible for a significant share of GHG emissions (Business for Social Responsibility, 2009).

In addition to these considerations, there is an emerging category of research that is concerned with the issue of microfiber pollution in water. Research has shown microfibers that are produced by washing synthetic fabrics like polyester are a significant cause of microfiber pollution (Napper & Thompson, 2016).

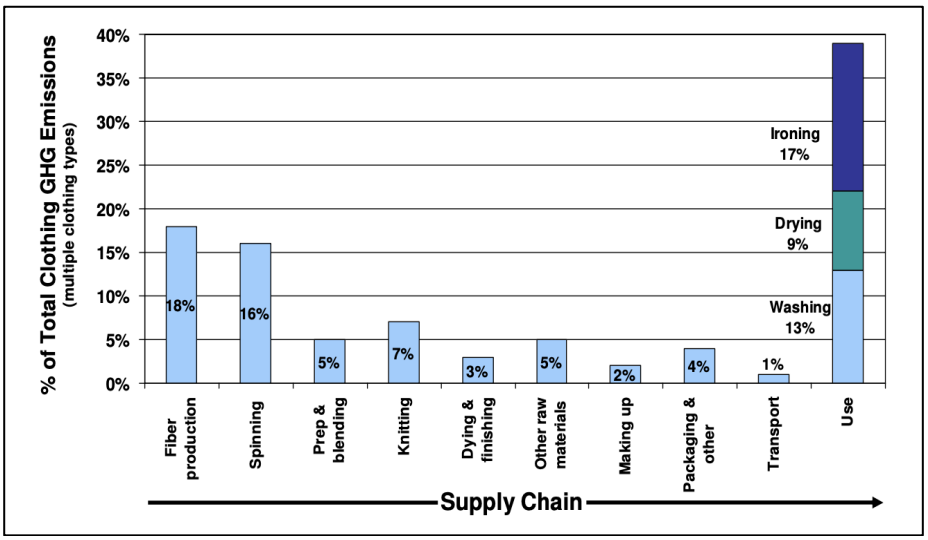

Figure 2.2.
The percentage of emitted GHG during H&M brand's garments life cycle (Business for Social Responsibility, 2009)

2.1.1.1. Washing, Drying, and Ironing Garments

Regarding the study that has been done by Business for Social Responsibility, there are several forms of laundry that may be done throughout the usage period of a garment. This information is gathered and illustrated in Figure below.

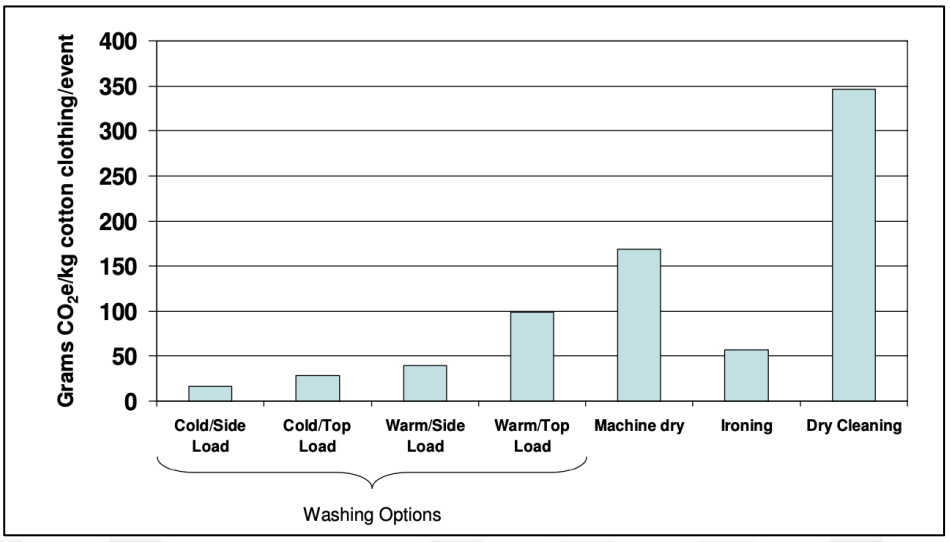

Figure 2.3.
Comparative GHG Emissions per laundry events (Business for Social Responsibility, 2009)

The above chart, illustrates the quantity of greenhouse gas emission in grams of carbon dioxide (CO2) per kilogram of cotton-based garments during a single event of washing, drying, and ironing, or dry cleaning. When doing laundry at home, individuals can choose between two different water temperatures (cold and warm) and two types of washing machines types (side or top load). According to the chart, dry cleaning is responsible for the highest emissions of GHG per instance. However, it's crucial to know that this doesn't necessarily mean that dry-cleaned items produce more GHG emissions during their usage phase compared to non-dry-cleaned clothes. This is because garments requiring dry cleaning may be washed less frequently than clothes that are cleaned at home (Business for Social Responsibility, 2009).

Domestic washing choices have various effects, resulting in emissions ranging from 11g CO2 when using cold water in a side load machine to 64g CO2 when using warm water in a top load machine, leading to in lower efficiency. Drying

and ironing are two optional processes in which results may vary dependent on the temperature setting and the amount of time spent performing the process. In the BRS research, despite the fact that fibers influence GHG emissions, did not consider. For example, various kinds of fibers need different quantities of energy to be used during laundering: Cotton, for instance, needs more energy to dry than Polyester, but Cotton only needs a fraction of energy than linen for ironing (Van Winkle, Edeleanu, Prosser, & Walker, 1978).

2.2.1.2. Textile Care Labels History and Principles

The International Association for Textile Care Labeling, known as GINETEX, has accumulated more than five decades of experience. This company was established in 1963 following a series of Textile Care Labeling Symposiums held during the 50s. GINETEX is an innovative company that developed a symbol-based method for labeling textile caring which is universally applicable. This approach provides customers and textile companies with accurate guidance on how to care for textile items. To prevent any damage to textile products, these symbols are helpful to have a comprehensive care instruction (“Care Symbols”, 2023).

GINETEX owns the registered trademarks for the pictograms used to show care instructions on clothes. These trademarks have been registered with WIPO, and all signatory countries to the Madrid Agreement have applied that their protection be extended. Licensees of these trademarks are required to follow the criteria and ensure that they are used correctly. Unauthorized or incorrect usage of the symbols may result in legal consequences. The care labeling system is critical in providing customers and textile firms with accurate information about how to care for textile items. GINETEX (2023) defines and promotes the care labeling symbol system,

coordinating its technical aspects on a global basis. Technical laws include the fundamental aspects required for establishing this system, which is constantly modified to reflect new technical developments, sustainability issues, and changes in consumer behavior.

The five care symbols were initially developed as registered trademarks, fully recognized by the ISO 3758 standard. These trademarks are protected in most countries and cannot be reproduced, issued, or used without a special license contract with GINETEX. Commercial companies, such as distributors and importers, are responsible for ensuring that their suppliers, or manufacturers, follow the rules for accurate care labeling when placing orders. Consumers should carefully examine textiles before buying them to look for care symbols, which provide important information for the best possible care. Following the instructions on the label ensures that the textile product will not be harmed, but it does not guarantee that all forms of dirt and stains will be removed completely.

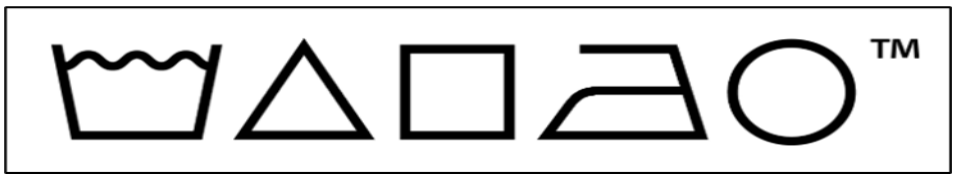

Figure 2.4.
Order of textile caring symbols regarding GINETEX guidelines ("Care Symbols", 2023)

2.2. Fashion Movements

2.2.1. Fast Fashion

Fast fashion refers to low-cost garments' collections based on high-end luxury fashion trends. By definition, fast fashion is a quick-response system that

promotes disposability (Fletcher, 2008). Companies like H&M group (H&M, COS, Monki, Weekday, & Other Stories, Cheap Monday, H&M Home, and ARKET brands) and INDITEX (parent company of Zara, Pull&Bear, Massimo Dutti, Bershka, Stradivarius, Oysho, and Zara Home brands) have reduced the formerly usual six-month delivery time from catwalk to customer to just a few weeks, with considerable increases in their revenues (Tokatli, 2008). Fast fashion businesses depend on fast cycles of rapid development, small batches with a wide range of products, and more efficient shipping and delivery. As a result of such rapid and constant change, a new type of seemingly contradictory mass exclusivity has evolved (Joy, Sherry Jr, Venkatesh, Wang, & Chan, 2012). Furthermore, lower production and labor costs result in lower total production costs, which leads to lower pricing and reflects a significant amount of consumer demand. Companies such as Zara, which used to manufacture all of its clothing in Europe for higher-quality control, now outsource at least 13% of their production to China and Türkiye. Shipping from China to Europe can take three weeks, resulting in a significant environmental impact (Joy et al., 2012).

Customers are now used to visiting fast fashion branches every three weeks or so in order to shop for new arrivals. The fast fashion business generates a steady stream of ever-improved, ever more enticing items, that emerge as a result of such impulsive behavior. These practices include limited functional design and alternatives for repair, design aesthetics that ultimately lead to diminished pleasure, and design for ephemeral fashion. Fashion, more than any other business in the world, prioritizes obsolescence; fast fashion just increases the stakes (Abrahamson,

2011). "McFashion" is a nickname that has been given to fast fashion due to the ease of gaining satisfaction from purchasing fast fashion clothing items.

The framework is worldwide, and the phrase "McFashion" is, to some extent, accurate. "McDonaldization" is a word that became common in characterizing developments in capitalist economies as they progressed toward more simplification," Ritzer (2011). Manufacturing handmade products is a unique system, unlike those based on mass production. The term "craft" refers to the utilizing skillful specialist and high-quality tools and raw materials to produce unique and exclusive items that are limited to a limited group of society. For instance, customers of Hermes may experience a wait time period of four to five years before being able to purchase a specific handbag (Tungate, 2009). In contrast, fast fashion operates on the principle of replacing styles super-fast with a low-cost method. Fast fashion has replaced exclusivity, elegance, and uniqueness as the common qualities of luxury goods with ever changing, low cost, and constant need for more in consumption culture (Toktali, 2008).

2.2.2. Slow and Sustainable Fashion

The idea of slow fashion is still relatively new in the textile and apparel industry, and academics have been working toward determining a clear and precise definition of the term that will separate it from the many existing concepts such as social responsibility, and sustainability. The fashion industry has become associated with speed, efficiency, and trendiness seems to contradict the word "slow". However, the goal of the "slow fashion" movement is not to slow down the supply chain for textiles and apparel; rather, it is to place a greater overall emphasis on developing a process that is more environmentally friendly, which includes design planning,

production sourcing, and consumer education (Clark, 2008; Fletcher, 2010). The term "slow fashion" is defined in a variety of ways by contemporary scholars. According to Clark (2008), there are three aspects to the "slow fashion" concept: giving value to local resources and economies, maintaining openness in the manufacturing chain, and designing goods with longer useable life.

Holt (2009) suggests that the idea of slow fashion is the polar opposite of the notion of fast fashion. However, the concept of slow fashion is not meant to be taken in its literal sense (Clark, 2008; Fletcher, 2010); rather, slow fashion has distinct aims and priorities, and it is less "materially growth-focused." Fletcher, is considered to be one of the well-known authors on the topic of slow fashion, tries to shed light on the following aspects in her description: The term "slow fashion" refers to an alternative view of sustainability in the fashion industry that is based on a variety of principles and objectives relevant to the current century. It is necessary to modify the existing infrastructure and lower the number of commodities that pass through.

Fletcher claims that slow fashion is one component or module of slow culture. To understand fashion properly, it is necessary to situate it within the context of wider economic and sociological systems. When she talks about slow fashion, some of the concerns she considers are as follows: "What are the societal and ecological ramifications of [creating more fashion]?" ‘Do the advantages justify the additional expenses? And what kinds of fashion systems would be most effective in meeting all of our requirements?’’ (Fletcher, 2010). Her point of view is that rather than literally "slowing down" fashion, we need to take a look at the fashion industry as a whole within a new and more sustainable framework.

Slow fashion can be considered an umbrella term for other words with similar meanings & goals. The terms eco-, green-, and ethical-fashion are occasionally used interchangeably with the term "sustainable fashion," which is a part of the wider "slow fashion" movement that has been evolving over the last several decades (Carey & Cervellon, 2014). It is a common practice to incorrectly characterize sustainable fashion, which is a component of the slow fashion movement, as the polar opposite of fast fashion. The concept of slow fashion originates from a philosophical ideal that is centered on the principles of sustainability, such as improving working conditions and decreasing the amount of damage done to the environment (e.g. Bourland 2011; Pookulangara & Shephard 2013). The concept of sustainable fashion was first pioneered in the 1960s when customers first became aware of the negative effects that the production of clothes had on the environment and requested that the fashion industry adjust its business methods (Jung & Jin, 2014). It took the rise of anti-fur movements in the 1980s and 1990s, followed by a growing interest in ethical clothes in the late 1990s, for people to see eco-fashion positively. Fair working conditions, a sustainable company strategy (Joergens, 2006), organic and ecologically friendly materials (Johnston, 2012), certifications, and traceability are all connected with ethical or eco-fashion (Henninger, 2015).

2.2.3. Efforts Toward Sustainable Clothing

In an ideal scenario, all participants in the fashion industry would collaborate to maximize positive effects on the environment, society, and the economy, while minimizing negative impacts. According to Khandual and Pradhan (2019), sustainability in the clothing industry can be achieved by considering the

environmental and social consequences throughout the entire lifecycle of garments. However, attaining this ambitious goal requires prioritizing various modifications and striking a balance. To address these concerns, the UK's Department of Environment, Food, and Rural Affairs (DEFRA) partnered with numerous stakeholders, including fashion schools, design councils, clothing brands, retailers, and e-commerce companies. Together, they devised a comprehensive plan called the "Sustainable Clothing Action Plan" (Department for Environment, Food & Rural Affairs., 2010). This plan outlines goals to enhance the sustainability of the clothing industry, such as reducing environmental impact during production, promoting circular consumption, and fostering collaboration between government, industry, and civil society. Here's a summary of the action plan:

- Minimizing environmental influence: The primary objective of the plan is to reduce the environmental impact of garment production by addressing factors like water and energy consumption, carbon emissions, and waste generation. The UK government aims to work with the industry to adopt more sustainable practices and environmentally friendly materials, thus lowering the environmental footprint of clothing manufacturing.
- Encouraging a circular economy: The plan promotes a circular economy approach to clothing, emphasizing reuse, repair, and recycling of goods. Overconsumption and waste are significant concerns for the UK government, and they aim to address both issues simultaneously. Collaboration with multiple sectors is envisioned to advance circular economy principles and minimize waste throughout the production and supply chain.

- Improving sustainability in the supply chain: The plan calls for enhancing sustainability across the entire supply chain, from fiber production to end-of-life considerations. The UK government plans to collaborate with the industry to achieve this, encouraging the adoption of sustainable manufacturing techniques and the use of environmentally friendly materials.

Additionally, the strategy focuses on promoting responsible consumption, urging individuals to purchase quality items that can be used for extended periods and reduce excessive consumption. Through awareness programs and collaborations with the business sector and civil society, the UK government aims to encourage responsible consumption practices. Furthermore, collaboration and partnerships among the government, industry, and civil society are crucial to promote sustainability in the apparel business. The government intends to work with representatives from the clothing industry and civil society members to address the negative environmental and societal impacts caused by the industry.

Similar efforts were undertaken by the Mistra Future Fashion program, an interdisciplinary research initiative funded by the Swedish Foundation for Strategic Environmental Research. Conducted from 2011 to 2019, this program proposed various solutions, as summarized by Chalmers University of Technology (Sandin, Roos, Spak, Zamani, & Peters, 2019), to mitigate the environmental and social impacts of the clothing industry. Recommendations included adopting sustainable production and consumption practices, reducing the use of hazardous chemicals, promoting sustainable materials, and encouraging companies to take responsibility for the entire lifecycle of their products. Sandin et al. (2019) argue that consumers have a vital role in promoting sustainability by choosing apparel made from

sustainable materials. Also, consumers can drive demand for sustainable clothing and encourage companies to adopt more environmentally friendly practices.

Consumers are advised to prioritize garments produced in ethical and environmentally friendly conditions, as well as items designed to be durable and easily repairable or reusable. Sandin et al. (2019) emphasizes on consumers' power that drive change in the industry by advocating for better environmental and social practices, supporting sustainable businesses, and demanding companies to reform their harmful strategies. Ultimately, changing consumer behavior is seen as critical factor to reduce the environmental and social impacts of the apparel industry.

It is worth noting that extending the lifespan of garments and caring for them in a sustainable manner can have a significant positive impact on the environment. Using a garment twice as often during its lifetime can reduce its environmental footprint by nearly 50% (Sandin et al., 2019). This approach minimizes waste production and reduces greenhouse gas emissions associated with manufacturing and transportation of goods.

2.2.4. Fashion Brands Contributions

In this section, I delve into both international and Turkish fashion brands, providing an overview of their business values and activities. The objective is to examine the efforts made by these fashion businesses to encourage responsible consumption and minimize the environmental impact of the industry.

Among globally recognized brands, Patagonia stands out as a renowned outdoor clothing brand that has been at the forefront of sustainability for many years. They prioritize the use of recycled materials in their products and have committed to achieving 100% renewable and recycled materials by 2025. Additionally, Patagonia

promotes their "Worn Wear" program, which encourages customers to repair and recycle their clothing instead of discarding it. Another notable brand is Everlane, which prides itself on transparency and ethical production practices. They utilize high-quality materials and collaborate with ethical factories to create their clothing. Notably, Everlane provides full cost breakdowns of each product on their website, including material, labor, and transportation expenses. Levi's, a renowned denim brand, has made significant strides towards sustainability. They have implemented eco-friendly practices in their production process, utilizing recycled materials and reducing water usage by over 96% in some factories. Additionally, Levi's has introduced a program called "Second Hand," which facilitates the buying and selling of used Levi's clothing.

Turning to Fashion Week Istanbul (Gür, 2021), brands like OhSevenDays, One Square Meter, Máh-Roc, and Sculpture have embraced slow and ethical fashion approaches, defining their values and strategies accordingly. For example, One Square Meter crafts handmade garments using eco-friendly and durable materials. They encourage consumers to adopt a slow fashion mindset by purchasing fewer items and choosing timeless, versatile pieces that can be worn for years.

Reflect Studio, a Turkish apparel brand, focuses on wildlife preservation and has an official partnership with The World Wildlife Fund (WWF). WWF, a global organization dedicated to environmental protection and biodiversity conservation, actively engages in the fashion industry to promote sustainability and reduce its environmental impact. One of their approaches involves partnering with companies, such as H&M and C&A, to promote sustainable cotton production and minimize the use of hazardous chemicals in clothing manufacturing. Furthermore,

WWF conducts research and publishes reports on the environmental effects of the fashion industry. They also provide consumers with valuable information and resources to make sustainable fashion choices, including purchasing clothes made from eco-friendly materials, supporting ethical fashion brands, and practicing responsible consumption.

2.3. Laundry and Gender Division

The traditional division of laundry work is one of the most controversial gender inequalities topics in the home setting. The gender gap in housework hours has narrowed over time since 1965 to the present, but it remains large as women are still more likely to do laundry than men (Bianchi, Milkie, Sayer, & Robinson, 2000). This gendered division of labor is often explained by the idea that women are naturally more suited to laundry tasks, as they are seen as being more nurturing and detail-oriented. However, there is no scientific evidence to support this claim.

There are a number of factors that contribute to the gendered division of laundry labor. One factor is the ideology of separate territories, which assigns women to the domestic territory and men to the public area (Pink, 2016). Laundry is seen as a domestic task, and therefore it is seen as women's work. Another factor is the availability of labor-saving technologies. The introduction of washing machines and dryers has made laundry less time-consuming and physically demanding. This has led to some men taking on laundry duties, but women still do the majority of laundry. This is because the ideology of separate territories is still continuing, and women are still seen as being primarily responsible for the home and family (Pink, 2016).

The gendered division of laundry labor can have a number of negative consequences for women. It can add to their workload and stress levels. It can also contribute to feelings of inequality and dissatisfaction. In addition, it can reinforce traditional gender stereotypes (Bianchi, Milkie, Sayer, & Robinson, 2000).

There are a number of solutions that can be done to challenge the division of laundry work. First is to raise awareness of the issue as individuals need to be made aware of the fact that laundry is not a natural skill that women are born with. It is a learned skill that anyone can learn. Second is changing the way that laundry is advertised. Laundry ads often picture women doing laundry, and they often reinforce traditional gender stereotypes. Ads should be more inclusive and should show men and women doing laundry together. Finally, parents can play a critical role in challenging the perception of laundry labor division by teaching their children that laundry is a shared responsibility, and they can model fair behavior at home. By raising awareness, challenging stereotypes, and changing the way that laundry is advertised and trained, we can make progress towards a more equitable distribution of laundry labor among the next generation.

2.3.1. Generation Z's Characteristics

The generational theory was first proposed by Inglehart in 1977. It asserts that a population can be divided into distinct groups of individuals, or generations, that are comparable to one another in terms of their values, norms, characteristics, expectations, experience, history, lifestyle, and the significant events that have had an influence on their life. These characteristics influence the identity of the generation (Egri and Ralsston 2004). In the context of this research, this affects the shopping behaviors of the members of a generation as well as their priorities

regarding particular brands and products, methods of obtaining information, shopping, returning products, using, and so on (Parment, 2013).

The birth years of individuals are used to determine the borders between generations, and these limits typically cover intervals of twenty to twenty-five years (Williams and Page, 2010). This time frame exemplifies the amount of time required for a person to mature into adulthood and give birth to a new generation (Strauss and Howe, 1991). From this viewpoint, the 20th & 21st centuries are split into six generations: the generation that lived before the Great Depression of the 1930s (the Greatest Generation), the generation that lived through the Great Depression (also known as the senior generation or the silent generation), the Baby Boomers (1946–1964), Generation X (1965–1979/1980), Millennials or Gen Y (1980/1–1994/1995), and Generation Z (1994/1995–2010/2011) (Weingarten 2009; Twenge et al. 2010; Dabija et al. 2017). The generational theory has been implemented in a variety of industries and sectors. As a result, it is incredibly important and vital for companies in the process of planning and developing the product and/or service offerings for each specific generation. This theory's application has value in a variety of fields, including fashion production, retail marketing, and more (Leask et al., 2014).

It is possible that Generation Z may turn out to be the first true generation of "digital natives" (Francis and Hoefel, 2018). They were the first children who have been born into a generation that had access to the internet from the moment they were born, and they cannot conceive of a world in which there is no internet connection (Wood, 2013). The members of Generation Z have access to information from all over the world, allowing them to stay in constant and quick contact with their friends, favorite brands and corporations, and celebrities they follow. The

Generation Z population has a high level of proficiency in the use of many forms of technology and exhibits an innately inventive and creative character in learning and using internet capacities. Because of their desire for personalized goods and/or services, they are always looking for unique solutions on their own. They attempt to apply their creativity in every part of life, and challenge past belief and gender related stereotypes which immediately affects both their information-seeking, and buying behaviors as a result of the fact that they have grown up in a dynamic environment (Matthews, 2008). Members of Generation Z show behavior that is completely distinct from their parents or elder sisters/brothers who are Millennials. Members of this generation are more environmentally conscious, digitally aware, and focused on sustainability and gender equality (Dabija and Lung, 2019). This matter is mostly taken into account that by those businesses, and in particular, brands, who are able to connect with their customers and enrich both their experiences and their emotions. For instance, merchants need to be more mindful of the tastes and expectations of young customers when it comes to the development of their brand values and the messaging of their brands. There is a good chance that it is not even viable to sell items to younger customers in today's market without depending on environmentally friendly techniques, either in the manufacturing processes or in marketing such products using sustainable principles (Arora and Manchanda, 2022).

2.4. Augmented Reality

2.4.1. History of Augmented Reality

Backed by Tom Cadell’s work experience in Boeing company in designing a Head-Mounted Display (HMD) to assist airplane manufacturing process, the word of Augmented Reality (AR) is invented by him & his colleague, David Mizell.

However, the concept of AR technology is excited way earlier than the 90s. During World War II, the British military developed a radar technology that displayed information on the airplane window so the pilot can distinguish enemies from the British Air Force easily. AR is an interactive technology recorded in three dimensions and mixes real-world and digitally-created images (Berryman, 2012).

As Berryman (2012) mentioned in his work, during the 50s, a cinematographer names Morton Heiing had the idea that cinema was an activity that could have the ability to immerse viewers into the action that was taking place onscreen by effectively appealing to all of the viewer's senses. In 1962, Heilig constructed a prototype of his vision, which he outlined in 1955 in "The Cinema of the Future," and called Sensorama. Following Heiing efforts, Ivan Sutherland in 1966 created an HMD that combined computerized data with the real world. By 1968, Sutherland and his team developed the first augmented reality system using this display. The system was a complex device, with the head-mounted display connected to heavy computers of that era with cable connections to the ceiling. In 1975, Myron Krueger invented the Videoplace, which was a room that assisted people to interact with virtual objects for the first time. These continued efforts, tests, and development paved the way for Tom Caudell and David Mizell to invent the phrase “Augmented Reality (AR)”. This technology refers to a real-time view of a real environment that has been augmented by a computer-generated digital asset.

Paul Milgram and Fumio Kishino introduced the concept of a reality-virtuality continuum in 1994 and it ranges from a virtual environment to a real setting. Augmented Reality has a closer connection to the real environment than any

other Augmented Virtuality (AV) and or Virtual Reality technologies (Milgram and Kishino, 1994).

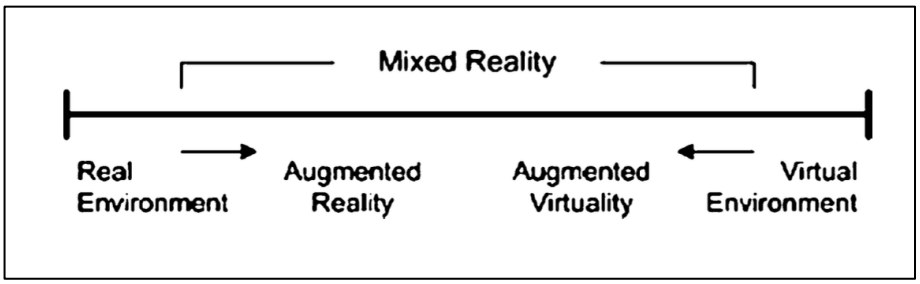

Figure 2.5.
Milgram's reality-virtuality continuum (Milgram and Kishino, 1994)

Augmented Reality's purpose is to make the user's life easier by integrating virtual information into the present moment. Augmented reality (AR) enhances users' perception of possibilities and potentials that lie in live interaction with real surroundings. AR technology enhances the perception of reality by combining virtual objects and cues in the real world.

2.4.2. Types of Augmented Reality Applications

Two major categories of AR technology are Marker-based versus Marker-less augmentation. Marker-based refers to a physical object or GPS location which triggers a digital experience. It works by scanning an image, a text, or a QR code and overlying the digital image or video on a trigger object (Edwards-Stewart, Hoyt, & Reger, 2016). AR trigger object means a reference point for the AR system to overlay the virtual elements in the real environment. This method assures that the physical object and the digital content are accurately linked and interact properly. The regular use case of marker-based AR is in printed media, including posters, banners, brochures, and product packaging.

Marker-less Augmented Reality involves scanning the real environment and inserting a digital object on an identifiable surface, like a wall, table, or even user's face, without the need for a trigger through computer vision technology. This method relies on geometry to add the digital object in an accurate manner (Edwards et al., 2016). Marker-less Augmented Reality is widely used in gaming like Pokémon Go. Besides gaming, social networks like Instagram and Snapchat integrated this technology with their platform and serve users with a variety of facial effects.

2.4.3. Augmented Reality & Training

The utilization of Augmented Reality (AR) in education and training has been explored by Johnson, Levine, Smith, & Stone (2010). who highlighted its potential for providing immersive learning experiences within real-world contexts, as well as interactive exploration and discovery of information (Johnson, Levine, Smith, & Stone, 2010). Thanks to recent technological advancements, utilizing this technology in training and business settings has become increasingly viable. With its expanded capabilities and broader reach, content creators can now employ it not only in corporate environments but also in academic settings for various purposes. The rise of wireless mobile devices like smartphones and tablets has particularly facilitated the expansion of AR into the mobile space, offering promising applications, especially in the area of upskilling and training.

AR serves as a collaborative and interactive tool in corporate settings, facilitating skill development, providing explanations, and offering support for workers, managers, and customers. Many companies are interested in testing and exploring the use cases of AR for product & service design to improve customer satisfaction and generate financial values for companies as well (Lee, 2012). In

classroom based-learning, educators are highly curious to explore the capabilities of this technology. However, cost of infrastructure blocks their way to use this technology in a broad scale (Shelton, 2002). Regarding Lee (2012), AR can be utilized in various business settings. This application and areas are summarized in below table:

Table 2.1.
Augmented Reality use cases in various industries with educational purpose

Industry	AR application
Tourism	Virtual tours, historical information overlays
Museums	AR exhibits, interactive storytelling, virtual artifacts
Defense	AR training simulations, situational awareness
Medical	Surgeries and anatomical visualization
Industrial Maintenance	AR-guided repair and maintenance procedures

While AR has been widely used in cosmetic and fashion industry for virtual try-on feature (Qin, Peak, & Prybutok, 2021), its capabilities in training in this industry has not been explored. This research aims to study the implication of Augmented Reality in customer training, specifically sustainable garment care training.

CHAPTER III

DATA COLLECTION & METHODOLOGY

This chapter fundamentally has the objective to review the qualitative research methodology implemented in this thesis. By employing ethnographic techniques, the research undertakes an exploration of individuals' understanding of laundry symbols. The chapter provides the process of research design, methodology selection, data collection, and the analytical procedure used in the study.

3.1. Research Question

The primary aim of this study is to investigate the role of Augmented Reality (AR) as an intermediary tool for sustainable garment care training among Generation Z. This research aims to provide valuable insights into Generation Z's attitudes and opinions regarding sustainable clothing care practices, as well as their evaluation of Augmented Reality as a means of learning sustainable laundry tips by addressing the following research questions:

- How does Generation Z perceive their relationship with the fashion industry?
- What are the perceptions of Generation Z regarding sustainable garment care?
- How does Generation Z evaluate the effectiveness of Augmented Reality in learning sustainable laundry tips?

As part of our research, these questions target how Generation Z engages with the fashion sector as digital generation and common consumers of the garments, their purchasing habits, preferences, shape the way of perspective of the fashion and

sustainability. The last question includes their opinion on AR as a facilitator of training to deliver the main takeaways of sustainability and apply in real lifestyle.

3.2. Selected Methodology

Qualitative research is an invaluable research approach that offers unique insights into underlying reasons, opinions, and experiences. It is characterized by its open-ended and exploratory nature, aiming to capture the richness and depth of human experiences. By employing techniques such as interviews, observations, and focus groups, qualitative research allows researchers to delve into the complexities of individuals' perspectives, motivations, and behaviors. One of the key strengths of qualitative research lies in its ability to explore new and emerging phenomena or topics when limited information is available on a particular subject (Creswell, 2013). Qualitative research provides a foundation for generating hypotheses, developing theories, and establishing a deeper understanding of the topic. It allows researchers to approach the research problem with an open mind, enabling unexpected insights to emerge from the data. This flexibility is valuable during studying complex and multifaceted issues, as qualitative research allows for a comprehensive exploration of various dimensions and perspectives. Researchers can gain access to the lived experiences of participants, capturing the nuances and intricacies of their subjective realities. This qualitative exploration adds depth and context to the research findings, providing a more holistic understanding of the phenomenon under investigation.

To examine individuals' opinions about the applicability of Augmented Reality (AR) in learning sustainable laundry tips, a qualitative research approach was the most appropriate method given its capacity to provide comprehensive insights.

3.2.1. Ethnographic Research

Primary objective of Ethnographic research method is to investigate and comprehend the social and cultural dynamics of communities, institutions, and other settings (Schensul, Schensul, & LeCompte, 1999). One key characteristic of ethnographic research is the creation of an ethnography, which is a comprehensive written account that encompasses all the observations, conversations, discoveries, and insights gathered throughout the research process. Fetterman (1998) describes the writing of an ethnography as a blend of art and science, where the ethnographer acts as both a storyteller and a scientist, delving into the daily lives of people and examining predictable patterns of human thoughts, behavior, and routines. Ethnography is the practical work undertaken by ethnographers during field research, which involves a combination of formal education, fieldwork, and study.

Ethnographic research as a holistic approach is used to observe and study multiple aspects of the environment to gain a main pattern of theme, rather than focusing merely on individuals, small groups, traits, or behaviors. The ethnography itself covers a range of components including beliefs, attitudes, perceptions, emotions, communication methods, social networks, group behaviors, tool use, artifact manufacturing, and spatial-temporal patterns (Schensul, Schensul, & LeCompte, 1999). Ethnographic research not only serves practical purposes but also contributes to solving societal issues. Ethnographers primarily rely on their own observations and listening skills as data collection tools, but they may also employ various techniques such as interviews, focus groups, surveys, questionnaires, visual methods, case studies, and more to study specific communities or phenomena (Fetterman, 1998).

3.2.2. Applying Ethnographic Research

According to Fetterman (2009), the ethnographic research method is a set of techniques and approaches used by ethnographers to study and understand human cultures and social phenomena. These techniques can be implemented in the social context which is being studied, observing and interacting with participants, and collecting rich qualitative data. This research aims to explore the habits, preferences, actual behavior, and knowledge of a specific group of people. The following steps are the main procedure of ethnographic research which is adopted by Fetterman's work. Here some steps of ethnographic research are adopted with the design and characteristic of participants and modified to be aligned with research target:

- Sampling and Observation: To understand what type of individuals can be studied while maintaining a professional distance for observation and data recording, the random selection of people who were intentionally interested in participating in the experiments has been used. The method of conducting interviews involves establishing a natural and comfortable space while collecting interview or survey data. As an example, in this study, the sampling of study covers the age ranges of 18-24 years old of Z generation and a random selection of who visits the store to see or buy a garment.
- Interviewing: Open-ended interviews often merge with conversations, and questions emerge naturally from the dialogue. Factors such as timing, interactivity, and sensitivity to the participant's tone are crucial factors in conducting successful interviews, whether they are structured, semi structured, or informal/unstructured. In this thesis, the questions are semi-

structured to help participants understand the theme and focus better on the questions. The interview is divided into pre and post-experiment phases.

- Dimension: Once the interviews and recordings of the participants have been gathered, the subsequent stage involves analyzing the qualitative or textual data. In line with the ethnographic research approach, this process is referred to as coding the texts. It entails scrutinizing the collected data to identify patterns, themes, and underlying meanings by breaking down keywords and uncovering significant phrases that reflect individuals' reactions, thoughts, and emotions. In this phase, I leverage the technological support of Speech to text application of OpenAI platform to assist in coding and deciphering texts.
- Text (feeling) analysis: Ethnographers typically collect data in the form of frequencies, ranks, or quantified names, which are often measured on nominal or ordinal scales (Nasukawa & Yi, 2003). In brief, ethnographers primarily rely on non-parametric statistics and qualitative methods to analyze data collected through participant observation, interviews, and other ethnographic techniques. In this research, the feelings of participants are broken down to rank and find the patterns to see their collective directions, insights, and feedback on the experiments. The table below summarizes the steps of the research method employed in this study. Later on, the details of the steps are outlined separately.

Table 3.1.
Summary of ethnographic research method and steps employed in the thesis

Steps	Description
Observation and Sampling	Individuals ranging from 18-26 years old who were in the Z generation category visited the physical store as an experiment place and showed intention to attend the experiment. Then they were instructed to participate in the pre and post experiment.
Interviewing	Interviews were conducted in two phases as pre and post-experiments. There were 12 open-ending questions and the interview format was conversational.
Ethnographic data collection	The participants' voices were recorded with their consent and transcribed into text to begin the coding phases. During the experiment, participants were scanning the AR triggers to watch the videos and shared their thoughts on it based on the questions.
Analysis	After checking the transcriptions, the coding of texts and extracting phrases and keywords were the main parts of qualitative analysis. Transcriptions were analyzed separately and then prepared for a cumulative analysis.
Extracting dimensions	Once all the transcripts were coded, the codes and identification of commonalities, patterns, and connections between different participants were reviewed. Similar codes are grouped to form themes/ definite categories. Themes capture the essence of the data and reflect the participants' perspectives and experiences.
Text Analysis (sentiment and feelings)	The ranking, text frequencies, and positive, neutral, and negative feelings are recognized and interpreted as a result of the study.

Determining the appropriate sample size in an ethnographic study does not follow a fixed rule. Instead of focusing on statistical power, the goal is to attain data saturation (Guest, Bunce, & Johnson, 2006); Morse & Field, 1995). Data saturation refers to the point at which new data no longer contribute additional insights or themes (Guest, Bunce, & Johnson, 2006). While Creswell (2013) acknowledges that sample sizes in qualitative research can vary from one to hundreds of participants, Morse (1995) suggests that a sample size of 12 to 20 participants might be adequate

for achieving data saturation. In this study, the final number of participants was 24 as determined by saturation.

3.3. Research Procedure

3.3.1. Research design

This qualitative study consisted of three phases: pre-experiment, experiment, and post-experiment. Initially, a brief interview was arranged and carried out with volunteers. The purpose of this interview was to gather contextual information about the participants and ensure that each individual met the research criteria. During the experiment phase, participants were invited to engage in four Augmented Reality-based experiences within a physical in-store setting. These experiences involved watching stories about endangered animals and receiving laundry tips. Subsequently, a follow-up interview was conducted to capture participants' perceptions and thoughts regarding the experiment. During this interview, participants shared their feedback on the overall experience, memorable moments, and their views on the use of Augmented Reality for sustainable laundry training.

3.3.1.1. Selecting the Type of Characters

Türkiye is known for its significant population of street animals, and Istanbul is particularly famous for its high number of street animals, specifically dogs, and cats. Continuous efforts are being made in this Middle Eastern country to enhance animals' welfare (Fortuny, 2019). Additionally, a study highlighted the differences between Australians' and Turks' perspectives on various aspects related to animals (İzmirli & Phillips, 2012). According to this study, Australians exhibited a greater acceptance of practices such as killing young animals, using animals for

entertainment or sport, hormonal de-sexing, using animals for food or clothing, keeping animals in zoos, and branding or ear notching, compared to Turks. Notably, there was a distinct difference in the acceptance of killing young animals. Turkish respondents generally deemed it extremely unacceptable, while Australian respondents rated it as neither acceptable nor unacceptable. Considering the role of animals in Turkish culture and the importance of empathy towards animal welfare, the characters in the experiment were chosen from endangered animals instead of humanoid characters. The selection of kind of endangered animals for the narrative development considered three factors: a) the impact of the fashion industry on the animals' lives or habitats, b) the availability of the animals' figure in the Reflect Studio (WWF Market) clothing line, and c) the availability of the animal figure in Zoom avatars.

Polar bears, Fox, Panda, and Grizzly bears were chosen for this study as they are directly or indirectly affected by the fashion industry (Stirling & Derocher, 2012; Furfreealliance, 2023; WWF, 2021; McLellan, 1989).

3.3.1.2. Selecting the Experiment Environment

As previously mentioned, the study was carried out in a physical setting, with the objective of conducting research prior to the purchasing stage; at the beginning of the garments' use phase. In relation to this, a thorough review and evaluation of various slow or sustainable fashion brands in Istanbul, Türkiye, was undertaken. The decision to focus on the Reflect Studio clothing brand was based on several reasons. Firstly, the brand has an official partnership with WWF Türkiye, indicating its commitment to sustainability. Secondly, Reflect Studio has a long history of engaging in eco-friendly activities and adopting a business strategy that

prioritizes sustainability (B Certified corporation). Lastly, the brand possesses a strong brand identity and compelling brand story that resonates with many Generation Z consumers, leading to a loyal customer base (WWF Market, 2023).

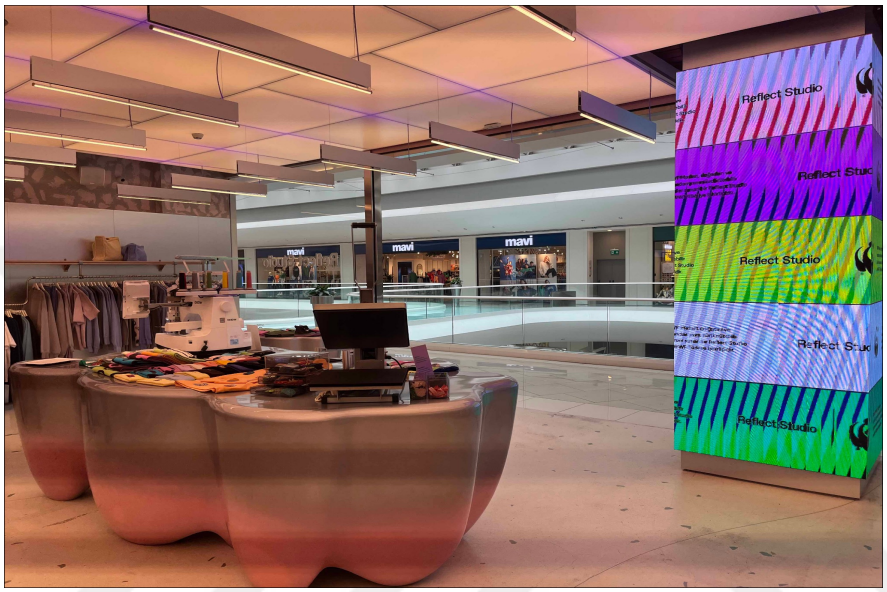

Figure 3.1.
Reflect Studio (WWF Market) store at the Akasya Shopping Mall, Istanbul, Türkiye

3.3.1.3. Developing Narratives

The main goal of each narrative had two key aspects. Firstly, it aimed to establish a deep emotional bond between individuals and the endangered animal. Secondly, it aimed to convey practical tips in a manner that is simple to understand and retain. Here is an example of the narrative that was created for the fox character:

"My name is Luna and I'm a fox living in a forest. I love running and playing with my family and friends. Unfortunately, the fashion industry is affecting my life by using pesticides and other harmful chemicals in the production of cotton, which is the major material used in your clothes. If you want to help me and my

family, please take good care of your clothes. So, your clothes last longer, you'll need fewer new items, and in the end, the fashion industry will harm my habitat less. Lowering the washing temperature to 30 degrees and not using tumble drying are important choices to keep your garments in good condition. Please take your clothes out of the washing machine in a short time and hang them to dry to prevent wrinkling in the machine. By doing so, your garment needs ironing at a lower temperature."

3.3.1.4. Recording Videos

In order to create digital representations of animals, this research utilizes Zoom avatars. These avatars replace the users' faces with virtual animal appearances that mimic the movements and facial expressions of their heads. The narratives for each character were recorded using a male voice, which was then edited and adapted accordingly. To record each video, the narrator would switch their Zoom avatar and read the narrative aloud. A total of four videos were recorded, each lasting approximately one minute. Below, you can find an example of the captured Fox avatar.

Figure 3.2.
Zoom AR avatars, from left to right: Grizzly bear, Panda, Polar bear, and Fox

3.3.1.5. Selecting Augmented Reality Triggers

While the primary criterion for selecting the clothes was the type of fabric (based on cotton) and the type of animal depicted on the clothing, the quality of the stitching was also important to ensure that the scanning process would not encounter any issues. After reviewing and evaluating available garments, 4 pieces including a hat, a T-shirt, a hoodie, and trousers with the below figures were selected:

Figure 3.3.
AR triggers on the garments, from the top left: Grizzly bear on a hat, Panda on a T-shirt, Polar bear on a hoodie, and Fox on trousers

3.3.1.6. Creating Augmented Reality Experiences

In order to transform videos into Augmented Reality experiences, several marker-based Augmented Reality platforms, that do not require coding, were examined. The selection criteria for these platforms included factors such as user-friendly onboarding, pricing, and security and privacy features. One platform that stood out was Overly, which is a marker-based Augmented Reality development platform. It is designed to empower users in exploring the potential of immersive

technologies and developing creative ideas with reasonable pricing. The image below demonstrates the process of merging the AR trigger (Fox image) with its corresponding video as an example of experiment creating process.

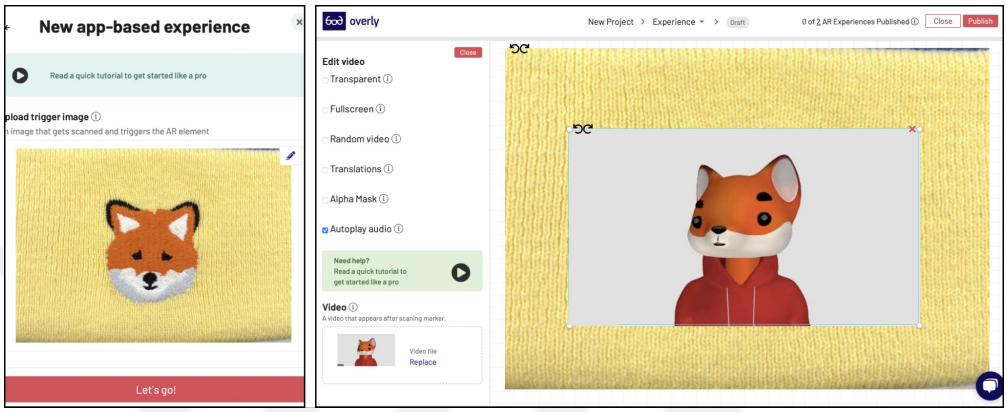

Figure 3.4.
Overly platform and the process of creating an Augmented Reality experience by connecting the Fox trigger image to its video

3.3.1.7. Conducting the Experiment

During the experiment, participants scanned trigger images on the clothing and then watched the animal's story through the Overly mobile application via the iPhone mini 13. Each video featured an animal that provided sustainable washing, drying, and ironing tips while also urging participants to help preserve their habitats by following sustainable garment care practices. The garment care tips were sourced from the Reflect Studio ("Bir Ürünün Hikayesi", 2023) website, and they were rewritten by researcher and scientific articles specific to each animal.

Participants were instructed to reflect on their thoughts, emotions, and any insights gained regarding sustainable laundry tips. The researcher closely observed participants during the experiment to gain a comprehensive understanding of their experiences and behavior. After the augmented reality experience, a follow-up

interview was conducted with each participant. The interviews were semi-structured, allowing participants to freely express their thoughts and feelings.

Figure 3.5.
Two participants involved and scanning AR triggers to watch the videos at the Reflect Studio store during our experiment

3.3.2. Study Participants

In a two-month period, in-person interviews with randomly selected volunteers who visited the Reflect Studio store were conducted. The sample is drawn from a population of Generation Z, mixed gender, ages between 18-26 years old who were fluent in Turkish, but Turkish was not necessarily their native language. Participants were recruited during their visit to the store through flyer announcements distributed in the Reflect Studio (WWF Market) clothing brand brick-and-mortar store located on the third floor of Akasya shopping mall, Istanbul, Türkiye.

The size of participants reached 24 individuals,16 female and 8 males. Before starting the test, participants were given brief about the interview and gave consent to record the conversations, analyze the transcription, and capture photographs. The participants' eligibility criteria had been specified in the announcement. People who met the eligibility criteria were invited to participate in the experiment.

3.4. Data Collection Process

The data collection for this research was meticulously divided into two phases: the pre-experiment phase and the post-experiment phase. The interview method was employed to gather data from participants. In the pre-experiment phase, participants were asked an initial demographic question to collect background information, specifically focusing on age ranges within the Generation Z. This contextual understanding was essential for framing the subsequent post-experiment phase. The interview itself consisted of 12 open-ended questions, prepared and presented to participants in Turkish to ensure effective communication. The questionnaire, provided in both Turkish and English versions, is included as an appendix 2.

Data collection took place over a three-month period, from March to May 2023, at the Reflect Studio Store. Each session lasted approximately 15 minutes. A total of 24 participants, comprising both male and female individuals, were involved in the study. All participant responses were recorded in Turkish using an iPad mini as a voice recorder. Prior to the interview, each participant was given a consent form that outlined the research's purpose, data collection methods, and participants' rights. The consent form, written in clear and straightforward Turkish language, had to be

read and signed by participants before proceeding with the research activities. This step was crucial to ensure the ethical considerations outlined in section 3.6 of the study. During the experiment, participants were instructed to scan four animal symbols on pre-prepared clothing items. After the experiment, participants were invited to share their impressions and reactions by completing a post-experiment questionnaire. Once verbal data collection was complete, the process transitioned into the text analysis phase.

3.5. Data Analysis Procedure

3.5.1. Transcribing the Collected Audio Files to Plain Texts

Recent advancements in artificial intelligence (AI) and the availability of powerful tools like OpenAI, Google Bard, and Large Language Models (LLMs) have empowered researchers to analyze and study interview data swiftly. This is achieved by converting recorded audio files into text through an automated transcription process. This approach not only saves time but also enhances accuracy, enabling researchers to derive meaningful insights from various forms of unstructured data, including text, audio, and even images. In this study, OpenAI API-Whisper is utilized for the transcription phase.

Whisper Speech-to-Text, driven by the OpenAI API, uses state-of-the-art deep learning models to accurately convert spoken language into written text. To analyze our data, we employ the Whisper API to transcribe audio voices into written text. The process involves setting up the OpenAI Python library, configuring the API key, and making a request to the Whisper API for audio transcription in Turkish. The audio files provided for transcription are in the m4a format, following the instructions for the 'whisper-1' model. The basic steps involve importing the library,

providing the audio file as input, and formulating a transcript command. By executing a file named try.py in the Visual Studio console, we successfully transcribe all 24 audio recordings from the interview phase into Turkish transcriptions.

Figure 3.6.
Transcribing process of converting audio to text with Visual Studio console and Whisper API Key

3.5.2. Reviewing the Accuracy and Familiarization

Ensuring the accuracy and maintaining participant privacy were key considerations during the conversion of audio files to text. To address these concerns, a meticulous manual review process was implemented while prioritizing data confidentiality. Each audio recording was attentively listened to, with the dialogue transcribed carefully and steps taken to anonymize the content. This thorough review not only provided a tangible familiarization with the dataset for analysis but also facilitated cross-verification of the transcribed text, ensuring its accuracy and fidelity. Although time-consuming, this step was crucial in upholding the integrity and reliability of our data.

3.5.3. Open Coding: Extract the Main Phrases and Keywords

By using the OpenAI console (platform.openai.com), an open coding process was conducted and meaningful units of data from the raw text data were identified and labeled. Large language models like OpenAI are able to pull out the text frequency, the semantic meaning of the text, and segmentation of the key information according to defined dimensions such as ‘Lifestyle and Shopping Habits’, ‘Fashion Brand Preferences’, ‘Familiarity with Laundry Symbols’, and so forth. After checking the accuracy of transcription (matching the voices with transcripts), all participants' texts on‘ by one were inserted into the console as illustrated no. 3.8 to start the text open coding. Multiple prompts (an input or command text to analyze the body of raw transcription), have been tested to assure that it works in alignment with the research purposes.

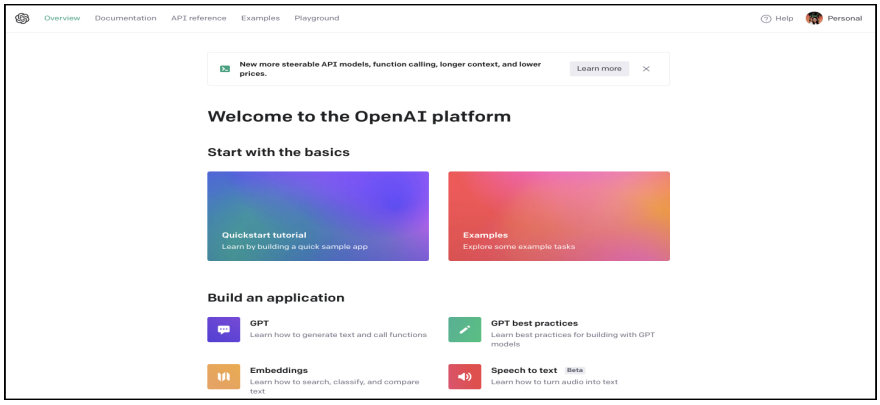

Figure 3.7.
OpenAI Platform for text analysis uses cases

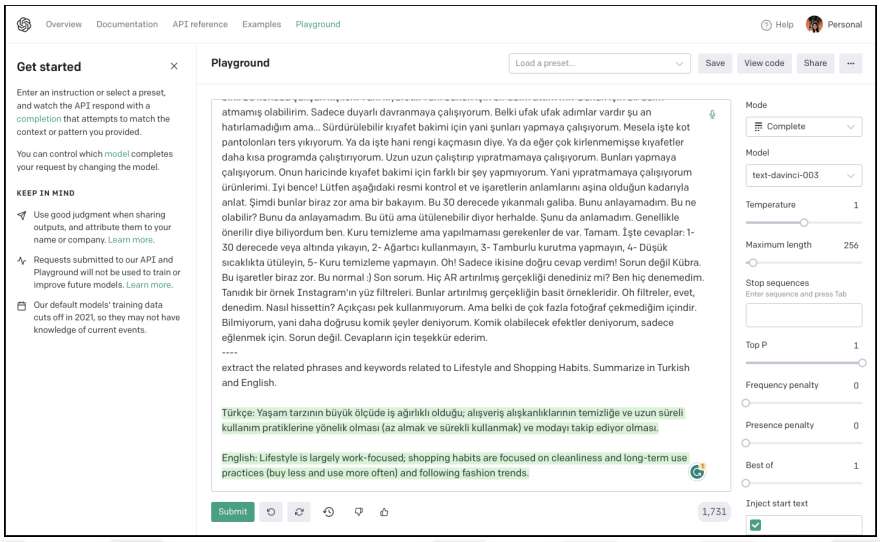

Figure 3.8.
Extracting main keywords of an interview transcription by OpenAI

3.5.4. Defining Dimensions for the Analyzed Text

In order to classify phrases & keywords, the researcher established a set of dimensions defined based on questionnaires which allowed her to assign codes to every response. For instance, a participant's approach to Lifestyle & Shopping Habit dimension may be coded as either a 'Trend Follower' or a 'Needs-based Shopper'. Once all the responses are coded, these codes were compiled into the Codebook which serves as a comprehensive directory of the text data. The Codebook file with a complete set of data is available in the appendix 6.

Along with a thorough examination of all codes and the identification of recurring themes, a thematic analysis approach was adopted as the research method. In this case, the main topics were determined by the researcher without utilizing generative AI. Artificial intelligence was intentionally avoided to generate any dimensions. In the following part dimensions are extracted and presented regarding research questions:

1) How does Generation Z define their relationship with the fashion industry?

This question has delved into three main dimensions: A) demographics. The dimension includes age, gender, education level, and marital status. These dimensions provide a foundation for understanding the diverse backgrounds of the participants and how these individual characteristics may influence the study's findings. B) lifestyle and shopping habits. This dimension is about lifestyle, particularly the fashion shopping habits of participants. In other words, to understand motivation and preferred ways of buying participants. C) fashion brand preferences. This examines the participants' affinity towards certain fashion brands over others or the reasons for such preferences, which can be based on various elements such as quality, price, brand reputation, or environmental considerations.

2) What are the perceptions of Generation Z regarding sustainable garment care?

This question can be categorized into four dimensions as follows: A) laundry responsibilities. This is about understanding the participants' roles and responsibilities regarding laundry in their households. We try to understand how the participants do laundering, whether it is shared, done by the mother, by a caregiver or by themselves. B) awareness of sustainable garment care. This aspect explores the participants' understanding and practice of sustainable garment care definition & methods. It covers their knowledge about the environmental impact of garment care and their willingness to adopt sustainable methods. C) familiarity with laundry symbols. To what extent participants are familiar with symbols that are usually found on garment labels. The dimension assesses their ability to correctly interpret the

symbols and the influence of their laundry practices. D) impact on perception in the post-experiment. This dimension examines how the experiment influenced the participants' perception, specifically after doing the experiment. Is it any shift in their beliefs, attitudes, or behaviors post-experiment.

3) How does Generation Z evaluate the utilization of Augmented Reality in learning sustainable laundry tips?

Lastly, the third question is into another four distinct categories: A) familiarity with Augmented Reality in pre-experiment phase. This dimension probes the participants' prior exposure and understanding of Augmented Reality. It assesses their usage, comfort level, and perception of AR in various fields. B) overall Experience in post-experiment. This dimension is about capturing the participants' comprehensive experience during the experiment. It includes feelings, sentiments, difficulties, or pleasures experienced during the process. B) standout moment in post-experiment. This aspect focuses on any particular instance or feature during the experiment that left a significant impression on the participant. C) opinion on the Use of AR during the post-experiment. Finally, this factor assesses the participants' views on the use of AR in learning sustainable laundry and how it can improve the knowledge and then the behavior of the user. The table below shows the classified dimensions in pre and post experiment phases:

Table 3.2.
Dimension of experiment and components of data analysis part

Dimension	Pre-Experiment	Post-Experiment
A. Demographic Representation (age range, gender distribution, educational and marital status)	+	
B. Lifestyle, Shopping habits of participant	+	
C. Brand Preferences (fast vs eco-friendly fashion brand)	+	
D. Laundry Handling	+	
E. Awareness of Sustainable Care	+	
F. Laundry Symbols Knowledge	+	
G. Familiarity with Augmented Reality	+	
H. Overall Experience on AR Experiment		+
I. Standout Moment as Emotional Reactions		+
J. Impact on Perception		+
K. Opinion on the Use of AR in Experiment		+

As mentioned earlier, the dimensions are prepared by the researcher, and the analysis of transcriptions to categorize them into the dimensions are analyzed by the power of Artificial Intelligence through OpenAI. The platform functionality is employed to label and classify all the plain responses regarding Generation Z's connection with the fashion industry, their views on sustainable garment care, and their assessment of the utilization of AR in learning sustainable laundry practices. It should be noted that any modification, change, or alteration of the original text is avoided strictly and all transcriptions are proofread by the researcher.

3.5.5. Cluster Transcriptions into Dimensions by OpenAI

After framing the dimensions, the transcribed texts should be consolidated into the dimension as presented in Table 3.2. The subsequent step involves analyzing the frequency and distribution across all responses. This analysis aims to uncover patterns such as the prevalence of certain themes and their correlation with demographic factors. This analysis is particularly relevant to questions like 'General Sentiment Towards AR and Sustainable Fashion Care,' where responses were classified as positive, negative, or neutral. By examining these sentiments in relation to other themes and demographic factors, a deeper understanding is gained.

OpenAI played a vital role in automating the open coding process by identifying and labeling text segments based on their underlying meaning. Furthermore, it facilitated clustering and the creation of categories from the body of texts, text frequencies, and summarization, which allowed for the classification of sentiment in all responses. This thematic framework enabled a systematic and organized analysis of the interview responses. The focus of this research is to explore the interplay between demographics, fashion and lifestyle preferences, sustainability awareness, and familiarity with AR among participants aged 18-26.

The pre-experiment phase, primarily focused on gathering necessary data about participants, demographic details, lifestyle habits, fashion preferences, familiarity with laundry care symbols, laundry responsibilities, sustainable garment care practices, and overall knowledge of AR. Then the previous experience with AR was considered to compare how they react to the post-experiment. Lastly, we utilized sentiment analysis to classify the expressed sentiment in responses as positive, negative, or labels to rank or measure. This will provide deeper insights when cross-

referenced with other themes - for instance, whether positive sentiments towards AR correlate with more reported 'Impactful Moments'. Finally, the research goal is to offer a comprehensive understanding of our participants' preferences, awareness, and experiences in relation to fashion, sustainability, and AR.

3.5.6. Text and Sentiment Analysis

To unleash the overall patterns, basic stats like counts and percentages of feelings, and notable insights within each dimension are presented. OpenAI helped to identify themes or sentiments, facilitating a more comprehensive understanding of the participants' perspectives and word frequencies. The process of reporting has started in a structured manner, presenting our findings about Generation Z's behaviors, preferences, and their interaction with the fashion industry and technologies like AR. These results are derived from the original transcriptions of the participants of the study, with the OpenAI model as a tool to analyze the text data fast and more accurately. In Chapter 4, the graphs, plots, and tables are shown as details of the data analysis part.

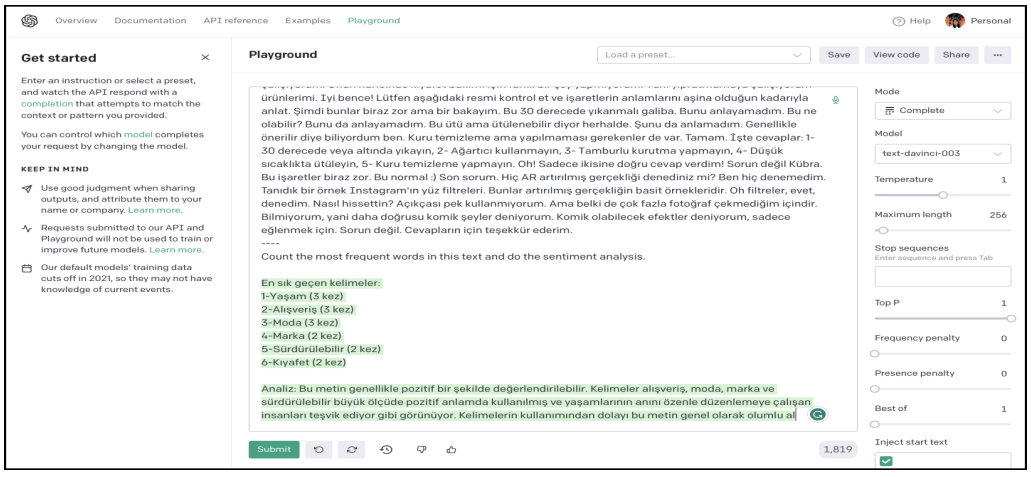

Figure 3.9.
The final output of frequent words of transcription using OpenAI

3.6. Ethical Considerations

It is important to emphasize that the researcher has no personal affiliation with the brand and does not actively engage with the Reflect Studio (WWF Market) fashion brand. The selection of this particular business was solely for the purpose of studying and conducting tests as outlined in the research design section (3.3.1.2) and based on the findings from primary research on available slow or sustainable fashion brands in Istanbul, Türkiye, as presented in section 2.4.2. Throughout the recruitment, experiment, and post-experiment phases, no personal data of the participants were collected. Prior to commencing the experiment, all participants read and signed the consent form, titled in Turkish “Gönüllü Katılım Onay Formu”, which can be found in Appendix C.

During the Augmented Reality experiment phase, an iPhone 13 mini and a wireless headset were utilized. Participants used the phone to scan a trigger image, after which they experienced various animal stories in Augmented Reality, both visually and audibly. Following the experiment, the interview was conducted, and the conversations with the participants were recorded solely for data analysis purposes using an iPad mini5. Once the recordings were transferred to the researcher's computer devices, the files were promptly erased after transcription. Access to the interview transcript is restricted to the researcher and any academic researchers with whom she may collaborate as part of the research process.

CHAPTER IV

ANALYSIS

This chapter of the thesis provides a wider picture with an overview of the data analysis, presenting the main findings about dimensions discussed through chapter one and two such as demographic details, lifestyle and shopping habits of the participants, their level and knowledge of sustainable garment care practices, and lastly familiarity with Augmented Reality. The chapter progresses to qualitative reasoning, beginning with the pre-experiment phase and transitioning to the post-experiment findings in order. In each dimension the main aspect of qualitative and some basic numeric data will be discussed.

4.1. Data Presentation: Demographics

This section explains the demographic variables of interviewees or the sample size of the research population. The distribution of age, gender, education, and marital status of 24 interviewed participants are plotted in the following graphs and tables. These findings demonstrate the profile of participants to differentiate them into gender type, age range, marital status, and education levels. The pre and post-experiments dimensions are summarized and key insight of participants' opinions will be discussed. Due to privacy and respect to ethical guidelines for collection data, all names of individuals have been anonymized before doing the text analysis of transcriptions.

4.1.1. Gender of Participants

Out of 24 individuals, the gender distribution within the dataset revealed a higher representation of females (16 females over 8 males), constituting approximately 66.67% of the participants according to figure 4.1. On the other hand,

males represented around 33.33% of the sample. Gender distribution is an important aspect to consider in the context of the experiment, as it may influence the contextual analysis or preferences disparity. The relatively higher representation of females suggests that their responses or behaviors may have a greater impact on the overall outcomes of the results compared to male participation.

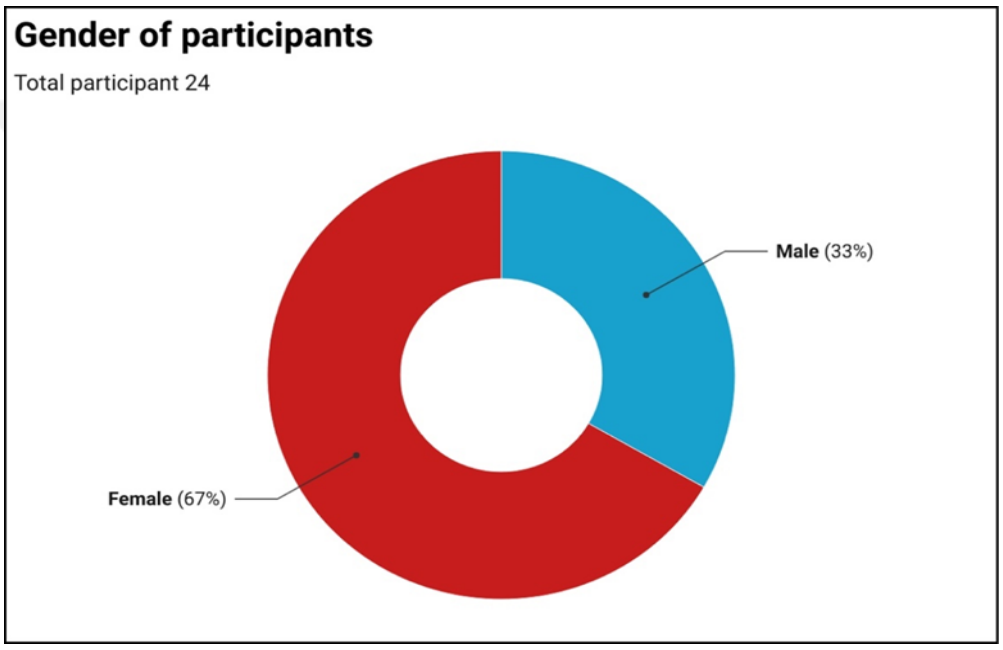

Figure 4.1.
Pie chart of gender type of participants

4.1.2. Age Distribution

The participants are between the ages of 21 and 26. The most common age among the participants is 26, with six individuals out of twenty-six falling into this category. Coming to the age ranges as shown in Figure 4.2, the overall age distribution is 24-26 category. The legend of the pie chart represents the proportion or percentage of participants as a gender category. As females consist of two-thirds of the total size, the overall age is affected by gender too. If we consider the age

ranges regardless of gender, the average age of participants is around 23.5 as representation of Generation Z. The age symbolizes the preference, the knowledge and adoption of AR as one of the important dimensions of thesis and it worth to discuss in details too.

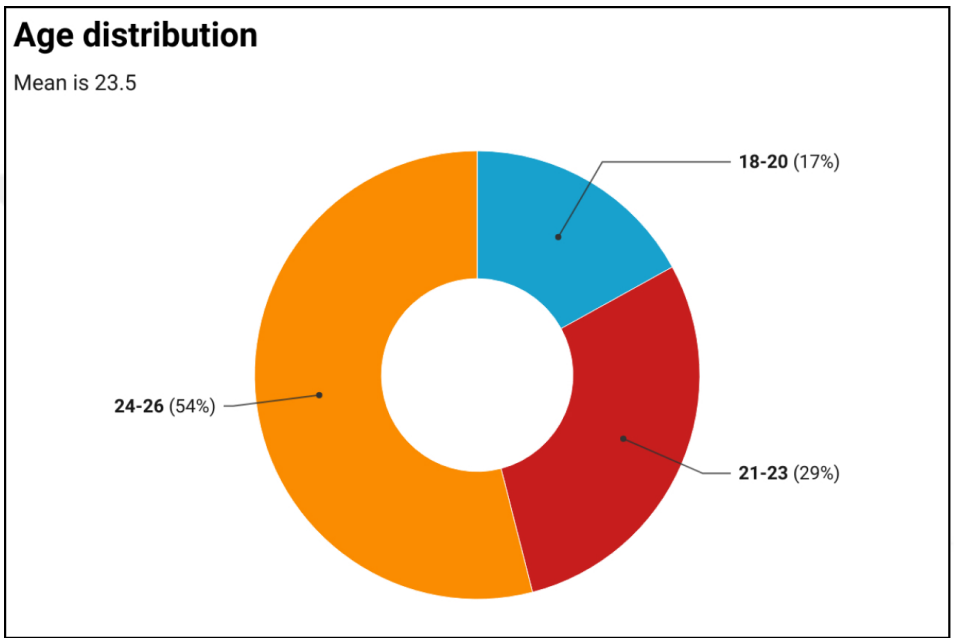

Figure 4.2.
Pie chart of the age distribution of participants

The pie chart as age distribution (Figure 4.2) shows the age range groups in three groups of 18-21, 22-24, and 25-26 years old respectively. The mean age is obtained by summing up all the ages and dividing it by the total number of participants as 23.5. In addition, the most frequent age of participants is 26 (5 times). Moreover, the most common combination of gender and age is 25-year-old females which is occurring 4 times based on collected data.

4.1.3. Education Level

The bar chart of Figure 4.3 provides data about the educational background of the individuals apart from their gender within the study. According to the plot, it reveals that the majority of individuals 79 % percent hold or study Bachelor's degrees, and around 13 % percent who obtain or are studying for a Master's degree. In addition to this, 8% of individuals (two out of twenty-four) already have a high school diploma and one individual who is currently studying for a university entrance exam.

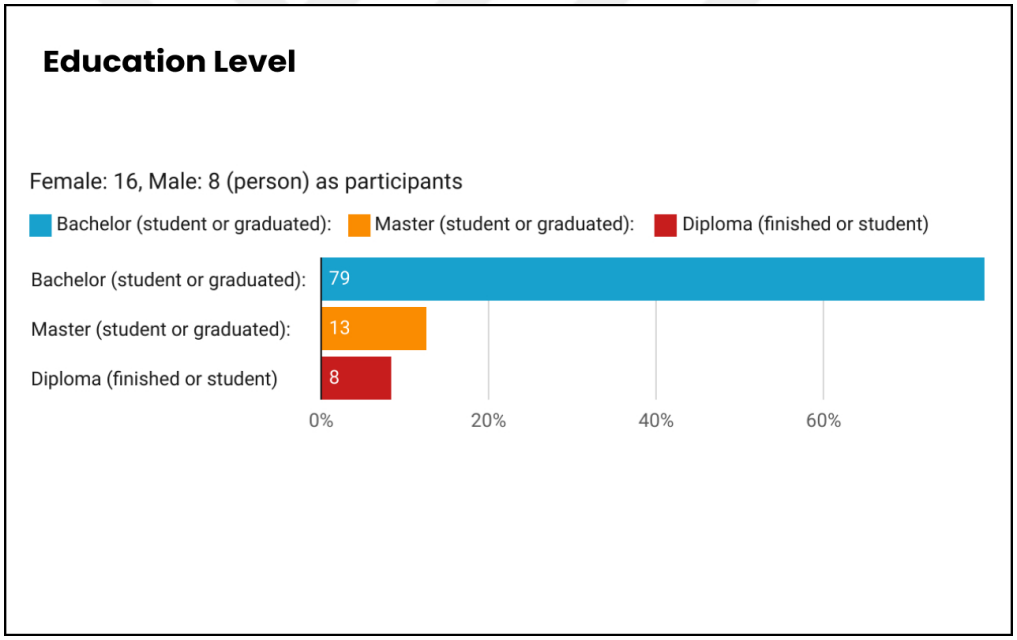

Figure 4.3.
Bar chart of the education level of participants

Comparing the education level with gender difference, in the male group, total size is 8. Out of these, 4 individuals hold a bachelor’s degree, 3 individuals are currently studying bachelor’s degree, and 1 individual already holds a master’s degree. Hence, there is no male with a diploma in this group. On the other hand, the

female group comprises of 16 individuals. Among them, 8 have obtained a bachelor's degree, 4 individuals are currently studying for a bachelor's degree, and 1 female participant holds a master's degree. As additional education and gender combinations, there is 1 individual who is a master's student and 2 individuals with a diploma, and one is currently preparing for the university entrance exam.

Table 4.1.
Education level of participants based on self-report data

Gender	Bachelor	Bachelor Student	Master	Master Student	High School Diploma	Total
Male	4	3	1	0	0	8
Female	8	4	1	1	2	16
Total	12	7	2	1	2	24

4.1.4. Marital Status

Figure 4.4 demonstrates the plotted data about the marital status distribution of all participants without gender difference calculations. Total participants who are in engagement status are 2/24 (8%), married are 5/24 (24%) and the majority of participants is considered as single or not-married yet individuals 17/24 (68%).

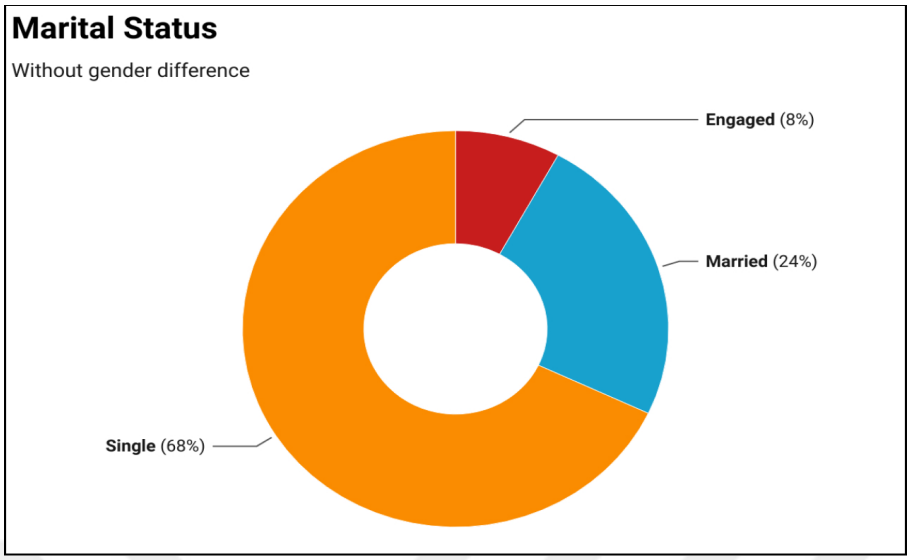

Figure 4.4.
Pie chart of marital status in percentage

In the other case, if we consider the combination of gender and marital status, it reveals that the majority of individuals both male and female participants, are single. Coming to the ratio of marital status, the table 4.2. shows the mixture of gender and marital status percentages. Interestingly no men are engaged and the majority of males and females are now in single status. It seems that the ratio of single status for both genders is quite similar.

Table 4.2.
Gender and marital status data

Marital Status	Female	Male	Overall
Single	75%	62.5%	68%
Engaged	12.5%	0%	8%
Married	12.5%	37.5%	24%
Total	100%	100%	100%

Moving on to the married category, 12.5% of the females are married compared to 37.5% of the married males' percentages. This indicates that the ratio of married men is three times higher than that of women when considering the genders separately.

4.2. Findings and Results

Upon analyzing the demographic data, in some cases the demographic findings can be comparable within dimensions discussed in Chapter III. In this section the pre and post experiments findings and impacting factors of demographic data will be analyzed to create holistic and detailed findings. In the following section, the pre-experiment dimensions are provided as follows:

4.2.1. Lifestyle, Shopping Habits, and Brand Preference

Within the scope of this thesis, an essential part of our findings is about breaking down the dimension into meaningful insights. Based on the collected text data as recorded from the participants, each dimension shed light on the perspectives of Generation Z and their preference, feelings and experiences. This in-depth exploration further enriches our understanding and contributes to a comprehensive picture of the research findings. As transcriptions are categorized, coded and analyzed:

Table 4.3.
Preference of fashion brands among participants

Category	Total
Preference of Fast-Fashion Brands	17 (70 %)
Preference of Sustainability-Oriented Brands	3 (13%)
Not Brand-Oriented / Prefer Quality	4 (17%)

- Brand direction/preference: The majority of participants (around 70%) showed the preference for fast-fashioned by mentioning directly the brand names (international and local brands), only 13% mentioned specifically the sustainable producer brand names (Reflect studio is mentioned 2 times) and the rest (17%) has not declared any specific preference of fashion brands. Shopping habits: The 4 out of 24 total participants exposed that they shop frequently or enjoy it (considering keywords of comments like "Love to travel, not much into shopping, etc.). Other individuals mention that they shop less frequently and more deliberately (comments in Turkish and if we translate it like: "...don't shop frequently, …prefer buying items that match my style", ".... not shop often, …. not follow fashion closely, … I prefer to buy in a style she likes"...) shows the distribution of shopping habits.
- Fashion consciousness: Many comments reflect an awareness and interest in fashion, with a mix of specific style preferences and a focus on self-expression. This sub-item shows the maximum intention of interest of participants around (30%) percent of total as criteria for lifestyle. Lifestyle: There are references of keywords or found in transcription as activities like "traveling", "playing video games", "working" ... which form part of participant lifestyle. The digital lifestyle may impact the adoption and use of AR. Moreover, the learning of AR content can be facilitated if we understand the lifestyle and relationship with AR technology.Preference: Many comments express a preference for comfort or high-quality products ("Prefer quality and texture over brands", "Prefer buying less but high-quality items", etc) as qualities or quantities of brand. This may answer how

the individuals choose the garment as shopping criteria. The price is another important criterion of participants.Eco-consciousness: Only 4 individuals (16%) of total prefer for sustainable products and applies partially the practices ("... try to shop from brands which care about sustainability", "Recently interested in vegan and recyclable products", ".... a sporty lifestyle or …... environment-friendly living", "Aware of the increasing importance of sustainable and eco-friendly products") are some main extracted comments and keywords of the whole transcriptions to understand the sustainable direction of individuals.

To summarize these findings, the significant portion of participating individuals as Generation Z are interested in quality and durability in their shopping habits. It refers to a preference for long-lasting items but not directly mentioned fast fashion or sustainable products. Additionally, the participants specifically mentioned shopping online as a way of buying clothes, which aligns with the digital nature of Gen Z and applicable for sustainable awareness while they choose and finish the purchase. Coming to gender differences:

Both male and female participants showed a trend toward valuing personal style, comfort, and quality. Sustainability is a factor for both genders in our data, but it seems more pronounced among the female participants (two participants vs one male participant). Most participants prefer shopping from brands as table 4.3 depicted. A few people (both males and females) mentioned they are not brand-oriented and prefer quality, texture, or affordability over a specific brand. One female participant prefers local (Turkish) brands, indicating a preference for supporting local businesses. This analysis highlights that Gen Z participants, in general, value

personal style, comfort, quality, and sustainability in their fashion choices, aligning with the broader trends known for this generation. It is worth mentioning that this data is not enough to generalize as it is a very small sample size, but at least shows the overall direction of participants who visited the store of Reflect Studio even to check the sustainability of clothes.

4.2.2. Laundry Responsibilities

This dimension is important to have data about how participants view the usage of water or sustainable resources and instruction for handling laundry. Among all participants based on the direct question of who handles the laundry at home, the responses are in four main categories as below. In addition, we consider the demographic profile as gender:

Male Participants:

- Self-Handling: 37.5% of the male participants handles their own laundry. Their habits directly impact the sustainability of their garment care as they are in the front line of using laundry and resources.
- Mother Handles Laundry: In 37.5% of cases, male participants' laundry is handled by their mothers. The sustainability of their garment care will be heavily influenced by the mothers' habits.
- Shared Responsibility: 12.5% of male participants share laundry duties, in this case with a sibling, which allows some shared influence over garment care practices.
- Wife Handles Laundry: For 12.5% of male participants, the laundry is handled by their wives.

Female Participants:

- Self-Handling: 25% of female participants handle their own laundry, having direct control over the sustainability of their garment care practices akin to what is discussed for males.
- Mother Handles Laundry: In 18.75% of cases, female participants' laundry is managed by their mothers, with the sustainability implications depending on their mothers' habits.Shared Responsibility: A significant 56.25% of female participants share laundry responsibilities, often with their mothers, which results in shared influence over the sustainability of their garment care.

If we compare these two data figures: a slightly higher percentage of male participants (37.5%) handle their own laundry compared to female participants (25%) of total women. Interestingly the percentage of male and female participants whose laundry is handled by their mothers is quite similar (37.5% for males vs. 18.75% for females). A significantly higher percentage of female participants (56.25%) share the laundry responsibilities compared to male participants (12.5%). In total the laundry only by participants is about ¼ or 25%. Mother role is significant as she handles 55% and 20% of laundry chore is shared with others as reported by participants.

4.2.3. Awareness of Sustainable Garment Care

In light of the mentioned emotions and keywords, we can conclude that there is an evident awareness regarding the importance of sustainability presenting in Table 4.4. Within this context, we can classify individuals into three distinct categories.

- Aware and Practicing: These individuals do not only know about sustainable garment care but also follow practices like washing at lower temperatures, air-drying, etc.
- Aware but Not Practicing: These individuals are aware of sustainable garment care, but they don't follow the practices due to reasons like lack of detailed knowledge or lack of personal control over the task.Unaware: These individuals are either not aware or have limited knowledge about sustainable garment care.

Table 4.4.
Awareness percentage about sustainable garment care of participants

Category	Total
Participants who are aware of sustainable garment care but don't actively practice it	10 (42%)
Both male and female are aware of and practice sustainable garment care	7 (29%)
Individuals who are unaware/limited knowledge of sustainable garment care.	7 (29%)

- Awareness Levels: The level of awareness about sustainable garment care varies. 7 participants have limited knowledge (29%), similarly 7 out of 24 or 29% others have a good level of understanding and practice of caring. Individuals who have only recently become aware or have heard of it, but don't have detailed knowledge interestingly as same as who are aware but not practice it.

- Source of Information: Some people became aware of sustainable clothing care through specific sources like stores, online content (Instagram, videos), or educational events (university seminars), there is no specific mention of any AR tools to understand and gained knowledge of sustainability.
- Gender difference: Coming to gender factors for the sustainable garment care 4 out of 16 as total size of females are aware and practicing sustainable garment care which 25% percent, half of participants around 7 people are aware but not practicing, and 25% (4 out of 16) are not aware at all. This shows the overall simple statistics of how females care about the sustainability of their garment. In the same numerical, male participants reported that half of total males (4 out of 8) are aware and practicing sustainable garment care, 30% (3 out of 8) are aware but not practicing, and the rest 20 % are not aware in any sense. As we should regard that the ratios within each gender group is different as the number of participants is quite small, hence it is not reasonable to draw concrete conclusions as a statement. But the overall pattern shows that while significant levels of awareness are reported about sustainable garment care among these participants, there's a gap when it comes to putting the knowledge into practice or intention to care in a sustainable way.

4.2.4. Familiarity with Laundry Symbols

The overall pattern of interview transcriptions shows that while most participants have some basic knowledge of common laundry symbols, there is a general lack of comprehensive understanding of all symbols. None of the participants demonstrated high familiarity with laundry symbols, which means they couldn't

recognize all symbols of how to care for clothes with cotton fabrics. The most recognized symbols are 'washing at 30 degrees' and 'ironing at low temperature', indicating that these are either the most intuitive or the most commonly used in their clothing items. If we categorize participants to familiarity levels regardless of gender type:

- Partially familiar: 18 individuals (75%) of participants recognize more than one symbol like '30-degree wash' and 'low-temperature ironing', but they're unsure about the rest of the symbols when the label of clothes was shown during experiments.
- Limited familiarity: 4 individuals (17%) of participants who only recognize limited symbols, like '30-degree wash', and “don't know many of the complex symbols” as uncommon symbols.
- High familiarity: 2 individuals (8%) recognize a wider range of symbols including '30-degree wash', 'low-temperature ironing', 'do not tumble dry', 'do not iron', and 'avoid bleaching' as they fall in the category.

Regarding overall data of participants and what they mentioned in transcriptions around 75% of participants hold a partial familiarity with laundry symbols. In contrast, 17% of participants showed limited knowledge of common laundry symbols. The last group, comprising 8% (2 out of 24) of participants demonstrated a high degree of familiarity with laundry symbols. This data may indicate that the symbols learning is not sufficient only by clothes’ tags and people should be more aware of them.

When comparing gender types, 63% of males are partially familiar (5 out of 8) total men, and around 25% or 2 out of total have limited familiarity. In addition,

high familiarity is only 1 individual out of the total size of men. On the female side, the partial knowledge of care is quite high and is 75% or 13 out of 16 total women, limited familiarity is around 12%, and high degree of familiarity is 6% which means only 1 out of 16 of total women participants. The percentage of males who have limited familiarity with laundry symbols is slightly higher than females if we compare these two gender types, however, the gender groups are relatively similar in partial levels, but we should regard that females are overpopulated here compared to total males. Interestingly only one male and female reported the level of familiarity as high degree.

Table 4.5.
Familiarity degree of laundry symbols across gender types

Gender Type	Partial Familiarity	Limited Familiarity	High Familiarity	Total
Male	5 (63%)	2 (25%)	1 (13%)	8 (100%)
Female	13 (75%)	2 (12%)	1 (6%)	16 (100%)

4.2.5. Familiarity with Augmented Reality

The last part of the pre-experiment dimension is to understand how participants know about Augmented Reality (AR) as technology or usage in daily life. Before the experiment, the individuals were asked to answer to "what extent they know and how they have used AR before". Here is the summary of responses to these parts scratched from the interviews as quantified in table 4.6:

- No Familiarity or ad-hoc use without knowing it: 17% (4 out of 24) of participants have never heard of AR, while 24% (6 out of 24) have

unknowingly interacted with AR through social media filters but aren't aware it is a form of AR technology.

- Partial Familiarity: Participants in this category have used AR in some form, and know it via social media filters, games, or specific apps, but their usage is not regular or extensive. The total number of partial familiarities is 34% (8 out of 24) individuals.
- High Familiarity: Participants who regularly use AR technology, have a good understanding of AR and can cite specific applications where they have used it. 6 participants equivalent to 25% are fully familiar with AR as technology.

This pattern reveals that while a large proportion of the participants have had some level of exposure to AR, many are still not fully aware of its potential and capabilities. For example, some participants who have used Instagram or Snapchat filters didn't know that these are examples of AR. At the same time, a small proportion of participants demonstrated high familiarity with AR, citing specific applications like Google's AR services or furniture placement app, or sky gazing applications. Coming to gender type familiarity here is the summary of it:

Table 4.6.
Familiarity of AR as pre-experiment dimension across genders

Familiarity of AR as pre-experiment dimension	Men	Women
No familiar with AR	1	3
Unfamiliar with the AR technology, but has used AR as filters	1	5
Somehow familiar with AR	3	5
Familiar with AR	3	3

From the pre-experiment analysis, it can be noted that most participants have some familiarity with AR, whether they recognize it as technology or not or at least know how to use it. Female participants seem to have a higher use of AR without knowing it, but the overall rate of familiarity as technology is quite low. There is no need to fully know of it as a tool but use of it matters. The total analysis of the pre-experiment shows the overall combination of gender and preference for the dimensions and status quo of participants regarding the questions of the thesis. In the following chapter these findings will be discussed and compared with post-experiment.

Post-experiment Dimensions

4.2.6. Overall Experience

The participants' post-experiment was carried out after the explanation and instructions of use of AR and without any intervention, they were asked to explain

the feelings, positive or negative experiment and what did they learn or any feedback.

Table 4.7.
Overall experience related keywords mentioned by participants

Category - example adjectives	Frequency
Overall Experience - “deneyim”	31
New Knowledge- “yeni bilgi bilinçli”(conscious)	21
Changes in Behavior- “öğrendim” (I learnt)	14
Technology Appreciation- “harika, faydalı”(excellent, beneficial)	19
Sustainability Awareness- “dikkatli”(attentive, careful)	18

The participants generally point out the “specific learnings” from the AR scanning and watching the video like “the harmful effects of fabric softeners” or the benefits of “washing clothes in cold water” or the optimum way of drying as quoted by avatar animals. In terms of most repeated positive keywords, table 4.8 outlines the adjectives that participants told after AR experiment as follows:

Table 4.8.
Positive adjectives quoted by participants and frequencies

Positive Word	Frequency	English Equivalent
İlginç, ilgimi çekti	7	Interesting
Faydalı	4	Beneficial
Eğlenceli	3	Fun/Entertaining
Güzel	2	Beautiful
Bilgilendirici	2	Informative

If we evaluate overall experience of participants based on the categorical aspect:

- Informative or Educational: 17/24
- Enjoyable Experience: 10/24
- Increased Awareness: 9/24
- Engaging or Interactive: 5/24
- Potential for Improvement: 2/24

Informative and Educational: The majority of participants (17) found the experience to be highly informative and educational. They not only learned new things about sustainable garment care but also about related issues such as microplastics as they used phrases and adjectives to support this statement.

Engaging and Interactive: Participants (10) appreciated the interactive nature of the experiment, with some noting that the use of Augmented Reality (AR) made the learning experience more engaging. This suggests that innovative methods

of delivering information can enhance the learning experience and potentially make it more impactful.

Increased Awareness: 9 Participants reported an increase in their awareness regarding sustainable practices in clothing care. The washing style or wash in cold water, dry or optimum use of detergents as examples.

Potential for Improvement: Two participants have given feedback for potential improvements in the quality of content in AR and the tone of the speaker in the videos. To apply this in real context or future AR experiences, these areas for refinement can be improved.

Overall, the experience seems to have had a positive impact on the participants, both in terms of their knowledge and their awareness about sustainable garment care and eco-friendly practices. The use of AR and an interactive format seems to have contributed to the overall enjoyment and engagement of the participants, suggesting that this could be an effective way to communicate and educate about such topics in the future.

4.2.7. Standout Moment

Stand moments can be one part of keywords, phrases or sign stops that participants showed as curiosity, excitement, surprise, or something they haven't known or experienced before. Figure 4.5 shows the total stand moment during the AR experiences.

Raising Awareness (~90%): Nearly all of the participants commented positively on AR's capacity for raising awareness. They appreciated how AR can bring more attention to issues like clothing care and sustainability, creating a deeper understanding and appreciation of the tool using interactive content.

Behavior Change Intent (~83%): Approximately most of the participants explicitly stated or showed the intention as possible changes of their behavior, either in shopping habits, laundry practices, or both, based on the knowledge they gained from the AR and content experience.

Efficacy of AR in Education (~58%): More than half of the participants have shown that AR is a beneficial tool when it comes to learning, particularly about sustainable laundry practices. However, some gave feedback about the message's complexity and video tone as content structure.

Engaging and Memorable (~42%): Approximately two-fifths of participants highlighted AR's ability to create an engaging and memorable learning experience. They appreciated the interactive, immersive nature of AR which made the learning process more fun and enjoyable. They also noted that this way of learning made the information more memorable.

Potential for Behavioral Change (~12.5%): As one of less frequency exposures, the 13% of participants felt that AR had the potential to effect changes in behavior, particularly towards more sustainable practices. They believed that AR can be a powerful tool to illustrate the consequences of our actions and promote more environmentally friendly habits. This is different from the learning that I mentioned. The difference of theory and practice in applying them:

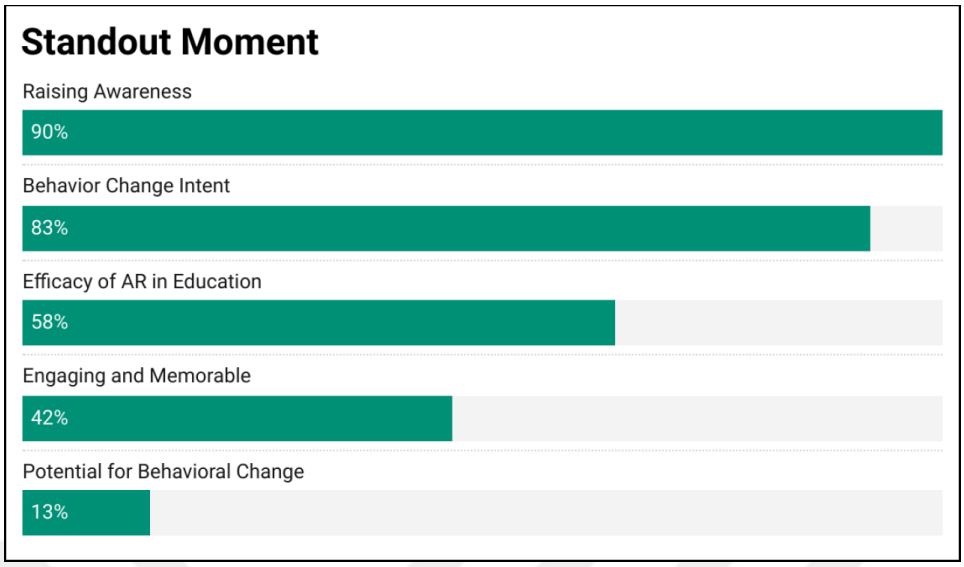

Figure 4.5.
The standout moment effect

4.2.8. Impact on Perception

Based on the participant responses provided, the overall perception of the AR experience and its impact on sustainable clothing care seems to be positive among participants. If we consider demographic combinations with the perception of participants in the post-experiment side:

Females and bachelor degrees: 10 out of 11 (90%) experienced an increase in awareness and intent to change behavior. Additionally, 3 out of 7 (43%) showed an understanding of specific environmental effects.

Male and bachelor degree: 5 out of 7 (80%) experienced an increase in awareness and intent to change behavior and 1 out of 3 who are bachelor students (33%) developed an understanding of specific environmental practices. This is the same with other levels like master's or high school diploma and most individuals confirm the positive effect and awareness after the post-experiment. Participants

across all levels of education and gender reported an increase in awareness about sustainable clothing care and the environment.

4.2.9. Opinion on the Use of AR (Sentiment Analysis)

Overall opinions on the use of Augmented Reality (AR) reveal a strong positive sentiment of participants as they feel awareness and learning or even engaging. According to table 4.9 as summarization of opinion on AR before and after using it, the most common keywords like the memorable and engaging nature of AR shows the enhanced learning experience and interactive learning. Participants were impressed with the use of AR to bring hidden topics to the fore, like clothing care labels and their importance for the caring environment and their own clothes or garments.

They viewed AR as a potential tool capable of fostering behavior change. However, some participants advised reduced jargon as an improvement. Looking at these responses on AR experiments in two phases, most individuals had a positive opinion of augmented reality (AR) after their experiences, while in pre-experiment it was neutral too. While some participants were not very familiar with AR at the start, the majority had at least some exposure to the technology, typically through social media filters.

Table 4.9.
Participants' familiarity status with AR technology before the experiment, and their opinion in the later stage.

Participant	Familiar with AR Before the Test	Opinion on AR After the Test
P1	AR filters on Instagram and Snapchat	AR should be used in sustainable laundry education, effective for learning.
P2	Familiarity of AR in games	Found AR immersive and engaging but requires awareness of the real environment.
P3	Social media filters but not known as technology	Appreciates AR in training, finds it effective and memorable.
P4	Applied AR filters on Instagram and Snapchat	Believes AR is useful when used correctly, contributing for sustainability.
P5	AR filters on Instagram but not-known as technology	Thinks AR is a sensible tool for education as people do not understand clothing labels
P6	AR filters on Meta apps but not known well	Comments that the AR project is creative and will help raising awareness through engagement.
P7	AR filters on Snapchat and Instagram	Has a positive opinion on AR in the experiment, finds it enhancing empathy and awareness
P8	AR features in Google and some food menus	Supports the use of AR in sustainable laundry education as we can recall later (memorable)
P9	Not familiar nor used AR	Appreciates the educational potential of AR
P10	Has not used AR before but would like to try it	Thinks AR is a good and interesting way to learn
P11	AR application as simulating stars positioning	Believes AR makes learning easier and more memorable
P12	Has no used AR at all	Believes that AR can help change consumer behaviors

P13	Google AR app for art and culture	Found AR effective for sustainable laundry education, but suggested reducing jargon
P14	Familiar with Google AR apps	Believes that AR, if used cautiously, and the jargon can be minimized to deliver effectiveness
P15	Has tried AR technology several times	Expects AR technology to be used more in education
P16	AR filters on social media as partial know it	Found the use of AR in laundry training engaging and informative
P17	Partial familiarity of AR	Supports the use of AR is engaging and informative
P18	AR filters on Instagram	Thinks the AR solution is good and prefers it to current methods
P19	Worn AR gadget and tried it	Comments that AR is a useful tool for raising awareness on topics like clothing care
P20	Heard AR as technology	Supports that AR can make learning easier and more engaging
P21	Tried AR a few times in the past	AR can make learning easier and more engaging
P22	Not familiar with AR applications or filters	Thinks as effective tool for creating awareness on topics like clothing care
P23	Has some experience with AR applications	AR can enhance learning effectiveness and help retain information longer
P24	Tried AR applications and used AR filters on social media	Technology of AR has the potential effect not only for art and entertainment but also for education

In order to summarize the Table 4.9 to know the shift or difference of pre and post opinions about AR and its effect, the positive sentiments can be analyzed through the most common keywords as depicted in Figure 4.6. This figure helps us to understand the emotional reactions during the experiment and can be an indicator of

their sentiment about the use of AR in the laundry handling training as our context of interview. The table shows the most important and related words/nouns or mainly adjectives with research goals and questions.

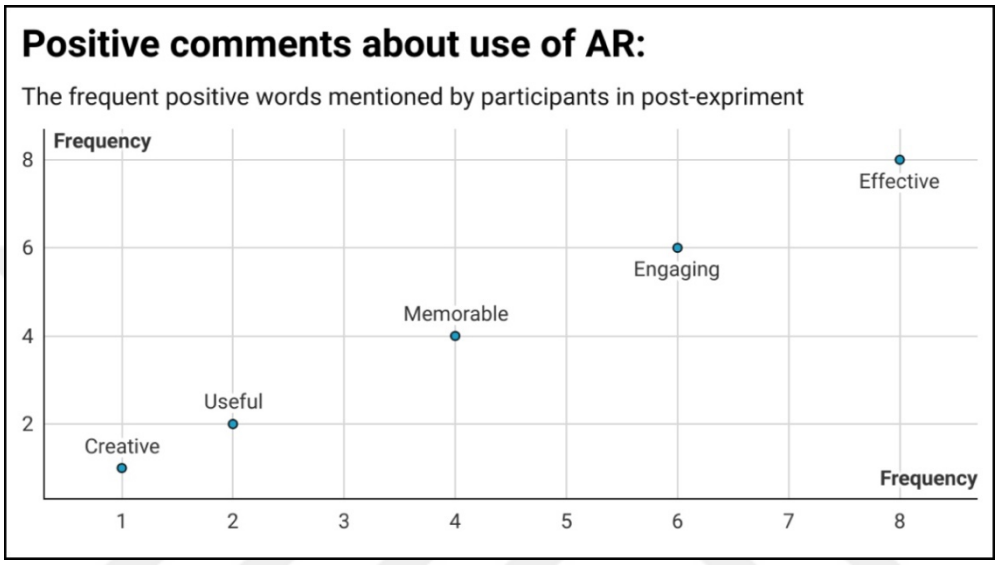

Figure 4.6.
The overall sentiment of participants about use of AR

Pre-Experience vs Post-experiment: As discussed in detail, around 70% of the total sample of study had already used AR in some capacity, largely through social media platforms. Other participants had more extensive experience, like using AR in games or educational applications such as Google's AR features. Although the partial knowledge is significant, the feeling and sense toward AR is not explicitly positive or negative before the experiment. While after use of AR or seeing the functionality, they found it to be effective, engaging, and beneficial for various aspects (around 83%), including education and sustainable practices. They also noted that AR could be useful in changing behavior (13%) towards more sustainable practices. Some participants gave feedback about AR content of AR, suggesting the

need to balance immersion with awareness of the real environment. The most common keywords like effective (8 occurrence) and engaging (6 occurrence) while useful mentioned (2 occurrence), then the video scenario and text should be revised to deliver the right messages of sustainability and then measure the feedback of respondents/users.

Positive sentiment: A vast majority, +83% (20 out of 24), of the responses were positive towards AR. They appreciated the immersive and engaging nature of AR and saw potential in various areas, notably in education and sustainability. Specific points of appreciation included the use of AR for sustainable laundry education, its potential to change consumer behavior, and its role in making complex topics more understandable.

Neutral sentiment: Around 12% (3 out of 24) of the respondents can be classified as having a neutral sentiment. These participants were generally positive about the potential uses of AR but expressed reservations or recommendations for improvement. This included the need for a better balance between immersion and awareness of the real environment, and suggestions to reduce technical wording or jargon.

Negative sentiment: A small fraction, about 5% (1), of participants seemed to express a negative sentiment. This included participants who were unfamiliar with AR and seemed to have remained skeptical or indifferent about its effectiveness or utility after the experiment.

In conclusion, the transcriptions collected from the participants have highlighted a shift in their perceptions and understanding of Augmented Reality (AR) from the pre-experience phase to the post-experiment stage. Analysis of data

suggests that being exposed to AR, coupled with right content, can impact on sentiment towards the learning via AR as technology and then applying sustainable practices. AR is considered as a tool for sustainable garment care and an interactive educational facilitator. In essence, the post and pre- experiments reveal how application of AR in training, when designed and presented correctly, can be a powerful tool not only as engaging, but also in fostering positive behavioral changes. As a qualitative data method, the numeric numbers are extracted through wordings, adjectives, and verbs which are translated from Turkish to English and it means that the statistics are just approximations. In Chapter 5, we will discuss the conclusion, potential avenues for future research, and the limitations encountered during this study.

CHAPTER V

CONCLUSION & FUTURE IMPLICATIONS

This chapter presents the insights gained regarding Generation Z's attitudes towards the fashion industry, their perceptions of sustainable garment care, and their evaluation of Augmented Reality (AR) as a tool for learning sustainable laundry tips. The analysis delves into the nuances and themes that emerged from the data, offering a deep understanding of Generation Z's perspectives and experiences. The chapter concludes with a discussion of the implications of these findings and their significance in the context of sustainable fashion and consumer behavior.

5.1. Main Findings

Nearly most participants experienced a positive sentiment toward the use of AR in the context of sustainable laundry education. As data in chapter 4 shows participants highlighted the engaging and interactive nature of AR, mentioning that it made learning easier and more memorable. AR can have broad potentials, noting that it could be effective in various educational contexts, change consumer behaviors, or increase awareness and empathy. Findings from the analysis expand the participants' understanding and appreciation of AR, showing them how it can be used beyond simple entertainment. Even those who were initially unfamiliar or skeptical about AR ended up recognizing its potential in educational contexts, particularly for communicating complex topics in an engaging manner. Additionally, there was a shared belief among participants about the wider potential of AR technology. Many suggested that AR could be a powerful tool not only in various educational contexts but also in transforming consumer behavior and promoting awareness and empathy around sustainability issues. These findings may contribute to the related literature

of Augmented Reality and training in fashion industry align with the studies of Johnson et al., (2010) and Lee (2012).

5.2. Future Research Suggestions

Considering the insights and lessons gained from this study, there are several potential areas for future research on the impact of AR on sustainable behaviors and the optimization of AR learning experiences. Here are some suggestions:

Content design: To persuade empathy among participants, the type of animal can be optimizing and select based on geolocations. For instance, in this study global endangered animals like Polar bear, and Panda were part of experiment setting while, in Türkiye these animals cannot be found. The researcher suggests to focus on endangered animal of Türkiye to trigger deeper empathy among participants.

Sample size: This research is done by interviewing 24 participants of Generation Z aged between 18-26 years old who visited Reflect Studio fashion brand at Akasya AVM. To expand the applicability of the research result, the researcher suggests that to conduct the experiment with a greater number of participants by designing an online setting to include higher amount of participant.

Inclusive research design: Additionally, future research can focus on designing inclusive AR experiences. This includes considering the needs of participants from different educational backgrounds, cultural contexts, and locations. By conducting studies with participants from diverse demographics, researchers can identify and address potential barriers to inclusivity in AR-based sustainability education.

Next theme for future research: The focus of this study was the beginning of garment use phase in shopping moment. It is recommended to design and conduct further studies to explore individuals' actual behavior in home setting to measure how learnings impacts actual behavior of participants.

5.3. Limitations of the Research

Design limit of endangered species as AR content: The AR application used in this research has included only a few select endangered species, potentially not offering a comprehensive representation of the breadth of diversity threatened in Türkiye. Addressing this limitation would require expanding the range of species represented in the AR application. This could entail significant resources, both in terms of gathering accurate data and in developing and testing the AR representations. According to Iucnredlist website (2023) and Sabah Daily (2021), if we could include the local species, this thesis could have included the AR representations of local endangered such as the Anatolian wild sheep, gazelles, and the bald ibis in Türkiye as suggested as protectable species. This may potentially increase the relevance of the information to the Turkish participants, and thus increase their empathy for being engaged in sustainable laundry habits. It would also give them a better understanding of the direct impact of their actions on their local environment.

Sample size and interview limitations: This study involved a relatively small sample size (24 participants) & age range (18-24 years old), which may not be representative of the broader population of Generation Z. The sample may also lack diversity in terms of, geographic location, education level, socioeconomic status, and

cultural background, which can limit the generalizability of the findings. Future studies should consider using a larger and more diverse sample.

Limitation of the experiment’s setup and duration: The assessment of participants' opinions and behavioral changes was conducted following a single exposure to the AR educational content in a physical in-store setting (a one-time experiment). However, this approach does not facilitate the measurement of long-term effects or account for potential changes in attitude or actual behavior over an extended period. To gain deeper insights into this matter, further research could be undertaken to explore how training via Augmented Reality might influence participants' actual behaviors in their home environments during laundry activities. Such research would offer valuable insights into the impact of AR-based training on participants' behaviors and attitudes.

5.4. Final Conclusion

In summary, the overall feedback accentuates the potential of AR as an innovative and effective tool for education or learning complex content. It is particularly promising for fields like sustainability, where complex concepts can be made more accessible and engaging through interactive and immersive experiences. Lifestyle and preference play a crucial role in understanding sustainability and choosing fashion vs eco-friendly products. In addition, the curated character of endangered animals makes a good impression on Generation Z which shows the intractability of AR as a tool for training. The digitalization and online shopping make it easy to embed the capabilities of virtual reality as one of the preferences and lifestyle of Generation Z in Türkiye. The importance of training for Generation Z is obvious as we will encounter the environment disaster specifically after the 2023

destructive earthquake and drought patterns in Türkiye. Besides, this research has shown that still there is a considerable gender inequality in doing laundry works at home as mainly women, specially mothers, in Turkish families are engaging with garments care than male members of families.

This research covers the small size of participants but the diversity and different perspectives of individuals have revealed the role of AR in training

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APPENDICES

Appendix A

Narratives of the Experiment

Story 1: Polar Bear

English:

"My name is Aurora, a polar bear from the Arctic region. I am here to tell you my home, where I love playing in the snow and swimming in the icy waters, is in danger unfortunately. And it is because of the fashion industry.

If you want to help me and my fellow polar bears, please take good care of your clothes. The washing and drying processes are harmful to the environment and contribute to climate change. Please wash at or below 30 degrees and do not bleach your clothes. In this way, you can save energy and prevent the colors from fading quickly. Whenever you need to wash your clothes, please choose an environmentally friendly detergent and use it sparingly. The microplastics produced during the washing process such as polyester, account for a significant portion of plastic pollution in the sea. So, it is important to wash your items inside out or use wash bags that prevent microplastics from getting into the water."

Turkish:

Selam ben Aurora, Kuzey Kutbu'nda yaşayan bir kutup ayısıyım. Karda oynamayı ve buzlu sularda yüzmeyi sevdiğim evimin, maalesef tehlikede olduğunu size söylemek için buradayım. Bu tehlikenin sebebi ise moda endüstrisi.

Bana ve diğer kutup ayısı arkadaşlarıma yardım etmek istiyorsanız, lütfen kıyafetlerinize iyi bakın. Yıkama ve kurutma işlemleri çevreye zarar verir ve iklim değişikliğine sebep olur. Bu yüzden lütfen çamaşırlarınızı 30 derece ve altında

yıkayın ve beyazlatıcı kullanmayın. Bu sayede enerji tasarrufu sağlayabilir ve renklerin hızla solmasını engelleyebilirsiniz. Çamaşırlarınızı yıkamanız gerektiğinde, lütfen çevre dostu bir deterjan seçin ve deterjanı az miktarda kullanın. Polyester gibi mikroplastikler, yıkama işlemi sırasında ortaya çıkar ve denizlerdeki plastik kirliliğinin önemli bir bölümünün oluşmasına sebep olur. Bu yüzden, eşyalarınızı ters çevirerek veya mikroplastiklerin suya karışmasını engelleyen yıkama torbalarına koyarak yıkayın. Teşekkürler.

Story 2: Fox

English:

My name is Luna and I'm a fox living in a forest. I love running and playing with my family and friends. Unfortunately, the fashion industry is affecting my life by using pesticides and other harmful chemicals in the production of cotton, which is the major material used in your clothes. If you want to help me and my family, please take good care of your clothes. So, your clothes last longer, you'll need fewer new items, and in the end, the fashion industry will harm our habitat less.

Lowering washing degrees and not using tumble drying are important choices to keep your garments in good condition. Please take your clothes out of the washing machine in a short time and hang them to dry to prevent clothes from wrinkling in the machine by doing so, you'll need ironing less often and it will reduce energy consumption."

Turkish:

"İsmim Luna. Ormanda yaşayan bir tilkiyim. Ailem ve arkadaşlarımla koşup oynamayı çok seviyorum. Ne yazık ki, giysilerinizin ana malzemelerinden olan pamuk, pamuğun üretiminde kullanılan böcek ilaçları ve diğer zararlı

kimyasallar nedeniyle hayatımızı etkiliyor. Bana ve aileme yardım etmek istiyorsanız, lütfen giysilerinize iyi bakın. Bu şekilde, giysileriniz daha uzun sürede eskir, daha az yeni kıyafet almanız gerekir ve böylece moda endüstrisi bizim yaşam alanımıza daha az zarar verir.

Giysilerinizin iyi durumda kalması için yapabileceğiniz şeylerden bazıları yıkama derecesini düşürmek ve kurutma makinesi kullanmamaktır. Lütfen giysilerinizi kısa programlarda yıkayın ve buruşmasını önlemek için asarak kurutun. Bu adımları uygularsanız, daha az ütü yaparsınız ve böylece enerji tüketiminiz de azalır."

Story 3: Panda

English:

"My name is Ailuropoda, and you can call me Ailu. and I am a panda living in the bamboo forests of China. I love eating bamboo and sleeping in the trees. Unfortunately, the fashion industry is affecting my life by using wood-based fibers like viscose and rayon, which come from trees that are being cut down at an alarming rate.

If you want to help me and my friends, please reduce the number of times you wash your clothes, you can save energy and prevent the colors from fading quickly. Please do not dry clean, or bleach your clothes as these cleaning methods are harmful to the durability of your garment. By taking these simple actions, you can help protect the environment and preserve the natural habitats of animals like me."

Turkish:

“Merhaba, Benim adım Ailuropoda ama siz bana Ailu da diyebilirsiniz. Ben Çin'in bambu ormanlarında yaşayan bir pandayım. Bambu yemeyi ve ağaçlarda uyumayı çok ama çok seviyorum. Maalesef, moda endüstrisi, endişe verici bir hızla kesilen ağaçlardan elde edilen viskoz ve rayon gibi ağaç bazlı liflerin kullanımı nedeniyle hayatımı etkiliyor.

Eğer bana ve arkadaşlarıma yardım etmek isterseniz, kıyafetlerinizi daha az yıkayarak enerji tasarrufu sağlayabilir ve renklerin hızlı solmasını önleyebilirsiniz.

Ayrıca lütfen, daha az kuru temizleme yapmaya calışın çünkü bu temizleme yöntemleri kıyafetlerinizin dayanıklılığına zarar veriyor.

Bu basit önlemleri alarak, çevreyi korumaya ve benim gibi hayvanların doğal yaşam alanlarının korunmasına da yardımcı olursunuz.”

Story 4: Grizzly Bear

English:

“As a Grizzly Bear living in the wild, I've seen many changes in my environment over the years. One of the biggest threats to my survival is the fashion industry. We need to be protected so that we can continue to grow in our natural habitats. There are various ways you can help preserve the population of Grizzly Bears. One easy way is to take care of your clothes sustainably. During washing, it is important to avoid using fabric softeners, as they can contain harmful chemicals. Instead, try using natural alternatives like white vinegar or baking soda to soften your clothes. By taking care of your clothes in a sustainable way, you can help to reduce the demand for leather and fur in the fashion industry, which in turn can help protect the Grizzly Bear population and other animals in the wild.”

Turkish:

"Vahşi doğada yaşayan bir bozayı olarak yıllar içinde çevremde birçok değişiklik gördüm. Hayatımı tehdit eden birçok tehlike ile karşılaştım. Bu tehditlerin en büyüğü de moda endüstrisi oldu. Neslimizin devam edebilmesi için doğal yaşam alanlarımızın korunması gerekiyor. Bunun için bize pek çok şekilde yardım edebilirsiniz. Mesela giysilerinize sürdürülebilir bir şekilde yani çok daha uzun süre kullanabileceğiniz şekilde bakabilirsiniz Giysilerinizin uzun ömürlü olması için de zararlı kimyasallar içerebilen yumuşatıcıları kullanmamayı tercih edebilirsiniz. Yumuşatıcı yerine beyaz sirke veya karbonat gibi doğal alternatif ürünleri kullanabilirsiniz. Böylece moda endüstrisinde deri ve kürk talebini azaltabilir, boz ayıların ve diğer vahşi hayvanların neslinin korunmasına yardımcı olabilirsiniz."

Appendix B

Interview Questions

Turkish Version:

Ön-deneyim

Merhabalar, Öncelikle katıldığınız için teşekkür ederiz. Bu araştırmanın amacı, 18-26 yaş arası genç yetişkinler için giysi bakımı eğitiminde Artırılmış Gerçeklik teknolojisinin kullanımını keşfetmektir. Deneyime başlamadan önce, seçim kriterlerini karşılayan kişilere odaklanmak için deney öncesi bir görüşme yapılması gerekmektedir. Görüşmeye ve deneye katılmadan önce onay formunu imzalamanız gerekmektedir. Verilerinizin yalnızca araştırma amacıyla kullanılacağından ve herhangi bir üçüncü tarafla paylaşılmayacağından emin olabilirsiniz. Tekrar vakit ayırdığınız için teşekkür ederim.

1- Demografik bilgiler:

Kaç yaşındasın?

Son eğitim durumun nedir?

Evli misin yoksa bekar mısın?

Kendinden kısaca bahseder misin? (Yaşam tarzın, Alışveriş için alışkanlık ve moda)

2-Sürdürülebilir kıyafet bakımı bilgi:

Evde çamaşır işleriyle kim ilgileniyor?

Sürdürülebilir kıyafet bakımı hakkında bir şeyler duydun mu?

Lütfen aşağıdaki resmi kontrol et ve işaretlerin anlamlarını aşina olduğun kadarıyla anlat.

3-Artırılmış Gerçeklik (AR) teknolojisine yönelik tutumlar:

Hiç AR ya Türkçe karşılığı olarak (Artırılmış Gerçeklik) uygulaması/AR filter denedin mi? Cevabın Evet ise, deneyimi biraz açıklar mısın. (örneğin nedir ve nasıl hissettiğini gibi ifadeler ile)?

Deney sonrası

1-Genel olarak deneyim ile alakalı ne düşünüyorsun?

2-Özellikle ilgini çeken veya öne çıkan belirli anlar ve deneyim unsurları var mı?

3-Bu deneyım, sürdürülebilir giyim ve bakım hakkında seni nasıl etkiliyor?

4-Sürdürülebilir çamaşır yıkama eğitiminde artırılmış gerçeklik kullanımı hakkındaki ne düşünüyorsun?

English Version

Pre-Experience

Hello, first of all, thank you for participating. The purpose of this research is to explore the use of Augmented Reality technology in clothing care education for young adults aged 18-26. Before starting the experience, a pre-experimental interview needs to be conducted to focus on individuals who meet the selection criteria. You will need to sign a consent form before participating in the interview and the experiment. Rest assured that your data will only be used for research purposes and will not be shared with any third parties. Thank you again for your time.

1- Demographic information:

How old are you?

What is your highest level of education?

What is your marital status?

Could you briefly describe yourself? (Your lifestyle, shopping habits, fashion preferences, etc.)

2- Knowledge of sustainable clothing care:

Who takes care of the laundry at home?

Have you heard anything about sustainable clothing care?

Please check the image below and explain the meanings of the symbols to the best of your knowledge.

3- Attitudes toward Augmented Reality (AR) technology:

Have you ever tried an AR application/AR filter? If your answer is yes, could you please explain the experience briefly? (For example, what it is and how it made you feel.)

Post-Experience:

1-What are your overall thoughts on the experience?

2-Are there any particular moments or aspects of the experience that stood out to you?

3-How does this experience affect your perception of sustainable clothing and care?

4-What are your thoughts on the use of augmented reality in sustainable laundry education?

Appendix C

Consent Form

Projenin Adı: Z Kuşağı için Çamaşır Yıkama: Sürdürülebilir Giysi Bakımı Eğitiminde Artırılmış Gerçekliğin (AR) Rolü

Proje yürütücüsünün adı ve iletişim bilgileri: Bahareh VahidianSadegh

Proje bütçesine katkı ile ve/veya diğer şekillerde projeyi destekleyen kuruluşlar: Bu çalışma, Özyeğin Üniversitesi Sosyal Bilimler Enstitüsü Lisansüstü Programları'na bağlı olan Tasarım, Teknoloji, Toplum Programı tarafından desteklenmektedir.

Projenin amacı: Yukarıdaki araştırma projesine katkı sağlamayı kabul ettiğiniz için teşekkür ederiz. Bu araştırma, artırılmış gerçeklikte çamaşır bakım sembollerini öğrenme deneyimini anlamak amacıyla hazırlanmıştır. Çamaşır (yıkama, kurutma ve ütüleme) sembolleri giysi etiketlerine basılmıştır ve önemli temizlik bilgileri sunmaktadır. Ancak, 60'tan fazla farklı sembol bulunmaktadır ve hepsini öğrenmek ve hatırlamak zordur. Bu araştırma, yeni bir teknoloji olan AR yani Arttırılmış Gerçeklik'in öğrenme deneyimini nasıl değiştirebileceğini keşfetmeyi amaçlamaktadır.

Süreç: Çalışma, ön test görüşmesi, test ve sonrasında görüşme olmak üzere 3 aşamadan oluşmaktadır. Ön test görüşmesinde, 12 soruya cevap vereceksiniz. Ardından, 4 hayvanın (Kutup Ayısı, Kızıl Ayı, Panda ve Tilki) görüntülerini 4 parça giysinin üzerinde tarayarak artırılmış gerçeklik içeriği ile deneyimleyeceksiniz. Testten sonra, deneyiminize ilişkin 4 soruya cevap vereceksiniz. Çalışmanın toplam süresi yaklaşık 15 dakikadır.

Gizlilik: Katılımınızla ilgili herhangi bir risk bulunmamaktadır. Görüşmeler kaydedilecek ve görüşmenin transkripti araştırmacı Bahareh VahidianSadegh

tarafından analiz edilecektir. Görüşme transkriptine erişim, araştırmacı, akademik meslektaşları ve araştırma sürecinin bir parçası olarak iş birliği yapabileceği diğer araştırmacılarla sınırlı olacaktır.

Gönüllü Katılım: Bu çalışmaya katılım gönüllüdür. Bu, çalışmanın herhangi bir noktasında deneyden ayrılmak veya yanıtlarınızı silme talebinde bulunma özgürlüğüne sahipsiniz. Bu kararı vermenizin kesinlikle mümkün olduğunu ve böyle bir karar sonucunda herhangi olumsuz bir sonuçla karşılaşmayacağınızı belirtmek isterim.

Yukarıda sözü geçen *Z Kuşağı için Çamaşır Yıkama: Sürdürülebilir Giysi Bakımı Eğitiminde Artırılmış Gerçeklik Rolünün Keşfi* isimli araştırma projesinin detaylarını okudum ve bu proje ile ilgili sorularım cevaplandı. Bu çalışmaya gönüllü olarak katılıyorum.

İsim Soyadı Tarih ve İmaza

English Version:

Title of the Project: Laundry Training for Generation Z: Exploring The role of Augmented Reality in Training Sustainable Garment Care

Name and contact information of primary investigator of the project: Bahareh VahidianSadegh[redacted]

Sources of funding or institutional support received for this study: This study is supported by Özyeğin University, Graduate School of Social Sciences.

Project Purpose: Thank you for agreeing to be interviewed as part of the above research project. This research is prepared to understand the youth (18-26 years old) experience of learning laundry care symbols in Augmented Reality. The

Laundry (washing, drying, and ironing) symbols are printed on the tags of clothes and offer important cleaning information however, there are more than 60 different symbols, and it is hard to learn and remember all of them. This research aims to explore how the new technology can change the learning experience.

Process: It is consisting of 3 phases, pre-test interview, test, and then post-test interview. In the pre-test interview, you will answer 12 questions. After that, you will experience the AR content by scanning images of 4 animals (a Polar Bear, Grizzly Bear, Panda, and Fox) on 4 pieces of clothes. After the test, you will answer 4 questions related to your experience. The total duration of the study takes approximately 15 minutes.

Privacy: There isn't any risk associated with your participation. Interviews will be recorded, and the transcript of the interview will be analyzed by Bahareh VahidianSadegh as the research investigator. Access to the interview transcript will be limited to the researcher, academic colleagues and researchers with whom she might collaborate as part of the research process.

Voluntary participation: Participation in this study is voluntary. It means at this point during the study, you are free to request to leave the experiment, and or delete your responses, which is entirely possible, and you will not face any negative consequences.

I hereby confirm that I have read relevant details of *Laundry Training for Generation Z: Exploring The role of Augmented Reality in Training Sustainable Garment Care* research study and all my questions (if any) were answered by the researcher. I consent to participate in this study voluntarily.

Name, Last Name Date and Signature

Appendix D

Ethical Committee Approval Document

ÖZYEĞİN ÜNİVERSİTESİ

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HUMAN RESEARCH ETHICS BOARD
MEETING MINUTE

MEETING NO	:	2023/06
MEETING DATE	:	10.04.2023
APPROVAL CODE	:	**2023/06/04**
MEETING ROOM	:	Özyeğin University
ATTENDEES	:	Prof. Dr. G. Canan Ergin Dr. Öğr. Üyesi Ceren Hayran Şanlı Dr. Öğr. Üyesi A. Nilay Şenol

HUMAN RESEARCH ETHICS BOARD APPLICATION FORM (FORM A)	
Project Name	Laundry Training for Generation Z: Exploring The role of Augmented Reality in Training Sustainable Garment Care
Project Manager	Bahareh VahidianSadegh
Project Manager's Contact Details	
Key Researchers	Bahareh VahidianSadegh
Project Purpose and Summary	The purpose of this study is to explore the use of Augmented Reality (AR) as a mediator for training sustainable garment care (washing, drying, and ironing) engagingly and memorably to Generation Z. There are around 60 distinct laundry indications that explain how items should be laundered. Due to this variation and lack of training, most individuals' laundry habits depend on their routines rather than the guidelines attached to their garments. This matter affects the durability of clothes, greenhouse gas emissions, and household water & energy consumption. To address this problem, a Mobile Augmented Reality experience is developed for 4 endangered animals (Polar bears, foxes, pandas, and Grizzly bears) which are affected directly or indirectly by the fashion industry. In these experiences, participants will learn how following proper laundry practices would preserve endangered animals' lives or habitats. The AR experience in this study is marker-based and non-interactive, built according to storytelling principles.

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Research Methodology	Because the purpose of this study is to examine Generation Z's experience of Augmented Reality-based laundry training, a qualitative approach is the most appropriate approach. Among various qualitative research methods, the Phenomenological research method will be used as it involves a deep exploration of participants' experiences, often through open-ended interviews. The plan is to recruit 24 participants through flyer announcements distributed in the Reflect Studio clothing brand brick-and-mortar store located on the third floor of Akasya shopping mall in Istanbul, Turkey. The reasons for focusing on the Turkish partner of WWF Market clothing brand [Reflect Studio] are 1) its sustainability-oriented business strategy and long history of eco-friendly activities, 2) its strong brand identity and brand story which attract many Generation Z consumers as loyal customers. The participants' eligibility criteria will be specified in the announcement. People who meet the eligibility criteria will be invited to participate in the experiment.
Ethics and Data Management Plan	It is important to note that the researcher does not have any personal association with the brand nor actively engage with this business. The business selection was based on the stated reasons in the research method section and the results of primary research on available sustainable fashion brands in Istanbul/Turkey. In the recruitment, experiment, and post-experiment phases, none of the participants personal data will be collected. Before starting the experiment, all participants will complete the consent form (**Gönüllü Katılım Onay Formu**). In the Augmented Reality experiment phase, the study will be conducted via an iPhone 13 mini and a Wireless Headset. Participants will scan an image with the phone and then watch and hear various animal stories in Augmented Reality. After the experiment, the interview will be conducted and the conversation with participants will be recorded [for data analysis purposes only] via an iPad mini5. The recordings will be transferred to the researcher's computer devices and the

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	recordings' files will be erased after transcription. Access to the interview transcript will be limited to the key researcher, the project manager and academic researchers with whom she might collaborate as part of the research process.
Participants	The sample is drawn from a population of Generation Z, ages between 18-26 years old, mixed gender, who had shopping experience or are interested in shopping clothes from sustainable fashion brands, and at least once have washed or ironed clothes by themselves. All participants should be fluent in Turkish, but Turkish is not necessarily their native language. Participants will be recruited through flyer announcements distributed in the WWF Market clothing brand brick-and-mortar store located on the third floor of Akasya shopping mall, Istanbul, Turkey. The participants' eligibility criteria will be specified in the announcement. People who met the eligibility criteria will be invited to participate in the experiment. Regarding the research plan, 24 participants needed to achieve data saturation.
Research Budget and Resources	

The Project "Laundry Training for Generation Z: Exploring The role of Augmented Reality in Training Sustainable Garment Care" managed by Bahareh VahidianSadegh, a student of the Design, Technology, and Society Master's Degree Program (Thesis) at Özyeğin University has been reviewed.

☒ Ethical Approval is granted
☐ Amendment required
☐ Ethical Approval is declined

Signatures:

Prof. Dr. G. Canan Ergin
Chair

Dr. Öğr. Üyesi Ceren Hayran Şanlı
Member

Dr. Öğr. Üyesi A. Nilay Şenol
Member

Appendix E

The Sample of Experimental Output of OpenAI

Turkish Feedback	English Translation
Farklı ve bilinçli bir deneyim	Different and conscious experience
Yumuşatıcıların zararlı olduğunu öğrendim	Learned about the harmfulness of fabric softeners
Deneyim olumlu yönde etkiliyor, gelecekte farkındalık oluşturacak	The experience is positively influencing, will create awareness in the future
Çamaşır yıkama eğitiminde AR kullanımı faydalı	The use of augmented reality in laundry education is beneficial
Güzel deneyim, mikroplastikleri ayıran bir torbanın olduğunu öğrendim	Pleasant experience, learned about bags that separate microplastics
Yumuşatıcı kullanmayı bıraktım, karbonat kullanıyorum	Stopped using fabric softeners, using baking soda
Hayvanların konuşması etkileyiciydi	The speaking animals made a deep impression
(Not directly expressed in this feedback)	(No direct opinion on AR expressed in this feedback)
Çok güzel bir deneyim oldu, unuttuğumuz birçok şeyi hatırladım	It was a very good experience, it reminded me of many things we forget
Kuru temizleme ve yumuşatıcıların zararları dikkatimi çekti	The harm of dry cleaning and fabric softeners caught my attention
Sürdürülebilirlik uygulanması gereken bir şey	Sustainability is something that needs to be implemented
Artırılmış gerçeklik çok güzel bir uygulama olmuş	Augmented reality has been a very good application
Bilmediğim şeyleri öğrenmiş oldum, kurutma makinesinin zararı gibi mesela	I learned things I didn't know, like the harm of using a dryer
Doğa ve hayvanlar üzerindeki etkisi ilgimi çekti	I was interested in the impact on nature and animals
Bu tarz giysi bakımlarına daha çok özen göstereceğim	I will pay more attention to this type of clothing care
Artırılmış gerçeklik çok mantıklı bir yöntem	Augmented reality is a very logical method

Appendix F

The Codebook

	Pre-expriment										Post-experiment			
	Age	Gender	Education	Marital Status	Lifestyle and Shopping Habits	Fashion Brand Preferences	Laundry Responsibilities	Awareness of Sustainable Garment Care	Familiarity with Laundry Symbols	Familiarity with Augmented Reality	Overall Experience	Standout Moment	Impact on Perception	Opinion on the Use of AR
P1	24	Male	Bachelor's degree	Single	Loves to travel, not much into shopping, but enjoys browsing through stores	Polo, Boss, Massimo Dutti	Mother (Male/Single)	Limited awareness, his mother pays more attention	Only familiar with a few, includes washing 30 degrees and the ironing in low tempreture symbols	He is not familiar with the term of Augmented Reality but he has used Instagram and Snapchat filters.	Found it a different experience, did not expect it to be informative and good	Gaining awareness about harmful aspects of fabric softeners	The experience positively impacted him and he believes that he will pay more attention to sustainable clothing care in his future life	Thinks AR should be used in sustainable laundry education, it can help the information stick in people's minds and would be beneficial for learning and easy to recall from their memory
P2	25	Female	Bachelor's degree	Married	Loyal to brands that suits her style. Restrictly prefers cotton & wool based garments. She also tires to shop from brands which cares about sustainablity as sustainablity of a business matters to her.	Zara, Mango, WWF	the participant (Female/Married)	Aware, pays attention to washing temperatures and product combinations, but admits to not being very diligent	Familiar with some symbols such as 'wash at 30 degrees', 'iron in low tempreture', also made educated guesses about other symbols but not fully certain	Has tired AR in games with her nephew and in an antique city exhibition with VR glasses	Found the experience enjoyable and informative, especially about microplastics	The interaction with animated animals explaining their extinctions, left a deep impression on her, reminded her of a social media campaign with a rabbit narrating its life	She stopped using fabric softeners a couple of months before due to health concerns, and was pleased to learn she was doing the right thing, intends to be more mindful of sustainable clothing care	Found AR immersive and engaging but also felt the need to continually remind herself of the real environment to avoid accidents
P3	26	Female	Bachelor's degree	Single	Prefers quality and texture over brands, enjoys hobbies like puzzles, drawing, listening to music, and exploring different places	Not brand-oriented, prefers quality and texture	Mother (Female/Single)	Aware but not deeply involved, knows about its importance	Knows some symbols but admits to not being fully aware of all	Used AR via social media filters but not regularly	Found the experience very beneficial, thinks everyone should have such experiences	Realized the impact of dry cleaning and fabric softeners on clothes and the environment	More committed to sustainable clothing and care, recognizes its impact on the environment	Appreciates the use of AR in the training, finds it effective and memorable, wishes to see such applications more often
P4	26	Female	Bachelor's degree	Single	Loves to dress up, pays attention to visual appearance, tries anything she finds attractive and suitable	Pull&Bear, Zara, and Beyoglu Butik	Sometimes her, sometimes her mother	Has heard about it, mostly from H&M sustainable outfits, but does not pay much attention due to lack of knowledge	Recognizes the '30-degree wash' and 'can be ironed' symbols, has no idea about the rest	Has used AR filters on Instagram and Snapchat. But not familiar with the Augmented Relaity term.	Found the experience very enlightening and enjoyable	Was surprised to learn about the harmful impact of tumble dryers	Promised to pay more attention to sustainable clothing and care, acknowledged her past mistakes in clothing waste	Believes AR is beneficial when used correctly, it can contribute both financially and environmentally
P5	26	Female	Bachelor's degree	Single	Prefers sporty chic fashion style	Zara, Mango, Bershka, Stradivarius	the participant (Female/Single)	Has heard of it but doesn't have detailed knowledge	Familiar with '30-degree wash', 'spin', 'do not tumble dry', and 'do not iron' symbols	Only has used AR filters on Instagram, But not familiar with the Augmented Relaity term.	Found the experience informative and impactful, learned things she didn't know before	Was shocked to learn about the harmful environmental impact of tumble dryers and that clothes should be washed inside out	Plans to be more careful about sustainable clothing and care, especially after realizing the impact on animals, found the information upsetting	Thinks AR is a very sensible tool for this kind of education as most people do not look at or understand clothing labels, believes it can become a habit over time
P6	25	Female	Master's degree	Single	Loves shopping, shops frequently, doesn't closely follow fashion, doesn't have a specific style	No specific brand preference, likes affordable and appealing clothing, prefers Turkish brands	Mother (Female/Single)	Has not heard much about sustainable clothing care, knows about a store named Nivogo that operates sustainably by cleaning and reselling clothes at a lower price	Knows '30-degree wash', unsure about the other symbols	Only has used Instagram filters, But not familiar with the Augmented Relaity term.	Realized her mistakes in clothing care, gained awareness of the need to shop and wash clothes more mindfully	Was struck by the information on careless shopping and frequent laundry habits	Intends to be more mindful in her shopping and laundry habits, no longer wants to shop without thinking, will pay more attention to how frequently she washes clothes	Thinks the project is creative and will help raise awareness, appreciates the initiative
P7	26	Female	Bachelor's Degree	Married	describes herself as someone who lives a work-centric lifestyle. She recently got married. She prefers buying less but high-quality items and using them for a longer duration instead of having a wide variety of options. She does not consider herself a fashion icon but she keeps herself updated with the latest trends.	Mudo - Timeless products; Mavi - Good for sporty and daily outfits; Mango - Colors suit her	the participant (Female/Married)	shows awareness about sustainable garment care, though she admits she hasn't taken any major steps in this direction apart from her careful washing habits. However, she is interested in learning more and has been following some related content on Instagram.	Limited knowledge about laundry symbols	is familiar with augmented reality, having used Instagram face filters as an example of simple AR technology. However, she doesn't use these features regularly.	overall experience with the experiment was positive. She felt that it increased her awareness and was informative.	she could use white vinegar in place of fabric softener, an easily applicable and sustainable alternative that she was eager to try.	The experiment positively impacted on the perception of sustainable garment care. She was already attempting to wash less and use shorter programs, and the experiment introduced the idea of using white vinegar, giving her another tool for sustainable washing.	a positive opinion on the use of AR in the experiment. She found it helped increase empathy and raised awareness more effectively,
P8	24	Male	Bachelor's Degree	Married	Doesn't shop frequently, prefers buying items that match his style	Mavi for pants, Network's sub-brands for tops, Plan 1 for sportswear	the participant (Male/Married)	Has heard of it but lacks detailed knowledge	Partial familiarity; doesn't know all the symbols	Has used AR features in Google and some food menus, but not extensively	Found the experience meaningful, appreciates the interactive nature of AR	Found the practical advice on sustainable clothing care useful, such as using vinegar or baking soda instead of softeners, and turning clothes inside out before washing	Believes small changes can lead to maximized sustainability efforts	Supports the use of AR in sustainable laundry education, finds it beneficial for understanding and learning
P9	24	Female	Bachelor's Degree	Single	Loves shopping, follows fashion trends, prefers a sporty smart casual style	Zara	Sometimes her, sometimes her mother	Not previously aware	Some familiarity, checks clothes labels, but doesn't know all symbols	Has not used AR before. Don't know anything	Found the experience enlightening, learned new things, felt a bit guilty for previous ignorance	Learning that vinegar can be used instead of fabric softeners, and realizing the environmental impact of drying machines	Motivated to use less fabric softener and to pay more attention to clothes labels	Appreciates the educational potential, hopes that everyone can learn and make the world a better place
P10	25	Female	Bachelor's Degree	Single	Doesn't love shopping but enjoys new clothes. Price-conscious in shopping. Recently showing interest in vegan and recyclable products.	Shops primarily at Inditex group brands (Zara, Pull&Bear, Stradivarius, Bershka)	the participant (Famale/Single)	Has some understanding and interest in sustainable and recyclable products	Knows some symbols, but not all	Has not used AR before but would like to try it	Enjoyed the experience, especially the element of animals seemingly talking to her. Found it helpful to be reminded of things she knew and learn new information	No particular standout moment, enjoyed all equally but found the first interaction appealing	Learned about washing clothes at lower temperatures, intends to apply this knowledge	Thinks it's a good and interesting way to learn, liked the concept of animals appearing to communicate with her
P11	22	Male	Bachelor's Student	Single	Enjoys dressing well, fashion and style is important. Prefers clothes that make him feel good and unique. Shops at Pull&Bear and Bershka because he finds their products stylish and well-fitting.	Pull&Bear and Bershka	Mother (Male/Single)	Recently became more conscious about sustainability. Understands the importance of taking better care of clothes to reduce their impact on nature and the environment.	Recognizes the symbols related to washing and ironing pace, but doesn't know the others.	Has used an AR application to observe stars in the sky, found it informative and engaging	Found the experience very beneficial and interesting	The element of giving life and character to animals stood out, helping him empathize with endangered species	Didn't know fabric softeners were harmful to the environment, will not forget to use natural alternatives	Believes this technology will make the learning experience easier and more memorable
P12	21	Male	Bachelor's Student	Single	Considers clothing to be an expression of comfort and style. Prefers sporty and casual styles in daily life. Pays attention to what fits him and the colors that suit him. Prefers popular brands like LesBenjamins and Pull&Bear, but values design and quality over brand.	LesBenjamins and Pull&Bear	the participant (Male/Single)	Sustainability is important to him. Recently, he started to show more interest in sustainable fashion and clothing care. Believes that by using and caring for clothes properly, they can last longer and cause less damage to the environment.	Recognizes some symbols but not all. Generally understands washing, ironing, drying, and dry cleaning symbols, but sometimes he doesn't remember what a new symbol means and needs to check it online.	Has no experience with AR and is a bit skeptical about the merger of the digital world with reality. Has not interacted with AR technology yet, but is curious to learn more about it.	Found the experience useful and interesting, but suggests improvements in the quality of visual elements in AR and the tone of the speaker in the videos.	Appreciates the transformation of symbols into animal stories.	Although he was already aware of the points mentioned in the video, he will try to be more sensitive to his laundry habits because they have serious consequences for our environment.	Believes that this technology can help change consumer behaviors and educate people to change their habits in a sustainable way after this experience.

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