

Importance of Universal Design Application in the Interior Architecture of Semi-public Space for Diverse Users: İsmet İnönü Boulevard Cafes

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ABSTRACT

This thesis aims to develop an easy-to-use checklist pertaining to the approach of Universal Design (UD) within the scope of interior architecture for semi-public spaces, such as cafes, in undeveloped cities. The study delves into the concept of UD, tracing its historical evolution and its application in interior architecture. It further explores user diversity and the implementation of UD principles in cafes.

The central question examines how UD can create universally accessible and inclusive spaces for all users, regardless of ability, background or age and how this affects their engagement in cafes in undeveloped cities. Additionally, it investigates the strategies that cafes in undeveloped cities employ to effectively implement universal design principles, even without access to professional interior architecture or regulatory frameworks, to achieve inclusivity in their spaces. The research methodology includes a comprehensive literature review, observational case studies and an in-depth analysis of UD implementations in seven local cafes along İsmet İnönü Boulevard in Famagusta, Northern Cyprus.

The findings reveal both the availability and shortcomings of UD in these cafes, impacting their accessibility, particularly for individuals of all ages, genders and those with disabilities. The study provides actionable recommendations in the form of a checklist and table to enhance accessibility and engagement. The case study of local cafes illustrates the practical application of UD principles and their impact on social engagement and business outcomes. The study concludes by emphasizing the critical role of UD in creating inviting and accessible semi-public spaces, particularly for local cafes in undeveloped cities that lack formal rules and regulations.

Keywords: Universal Design, User Diversity, Interior Architecture, Cafe,
Application of Universal Design.

ÖZ

Bu tez, az gelişmiş şehirlerdeki kafeler gibi yarı kamusal alanlarda iç mimarlık bağlamında Evrensel Tasarım (ET) yaklaşımına dair kolay kullanılabilir bir kontrol listesi oluşturmayı amaçlamaktadır. Çalışma, ET kavramına odaklanarak, ET'nin tarihsel gelişimini ve iç mimarlıkta uygulanışını detaylı bir şekilde incelemiştir. Ayrıca, kullanıcı çeşitliliği ve ET ilkelerinin kafelerde uygulanmasını tartışmaktadır.

Tezin ana sorusu, ET'nin farklı yeteneklere, geçmişlere veya yaşlara sahip tüm kullanıcılar için evrensel olarak erişilebilir ve kapsayıcı alanlar yaratma potansiyelinin, az gelişmiş şehirlerdeki kafe mekanlarındaki kullanım deneyimlerini nasıl etkilediğidir. Ayrıca, az gelişmiş şehirlerdeki kafelerin, profesyonel iç mimarlık hizmetlerine veya düzenlemelere erişimleri olmaksızın, kapsayıcı mekanlar oluşturmak için ET ilkelerini etkili bir şekilde uygulamak amacıyla hangi stratejileri benimsediklerini araştırmaktadır. Araştırma metodolojisi, kapsamlı bir literatür incelemesi, gözlemsel vaka çalışmaları ve Kuzey Kıbrıs, Mağusa'daki İsmet İnönü Bulvarı boyunca yer alan yedi yerel kafede ET uygulamalarının derinlemesine analizini içermektedir.

Çalışmanın bulguları, belirlenen kafelerde ET'nin mevcut durumu ve eksikliklerini, özellikle her yaştan ve cinsiyetten insanlar ile engelliler için erişilebilirliği etkileyen yönlerini ortaya koymaktadır. Elde edilen bulgulara dayanarak, çalışma, erişilebilirlik ve katılımı artırmak amacıyla kontrol listesi ve tablo şeklinde uygulanabilir öneriler sunmaktadır. Vaka çalışması olarak belirlenen yerel kafeler, ET ilkelerinin pratik uygulamasını ve bu uygulamaların sosyal etkileşim ve işletme sonuçları üzerindeki etkilerini göstermektedir. Çalışma, özellikle düzenleme ve kurallara sahip olmayan az gelişmiş şehirlerdeki yerel kafeler için davetkar ve

erişilebilir yarı kamusal alanlar yaratmada ET'nin önemli rolünü vurgulayarak sonuçlanmaktadır.

Anahtar kelimeler: Evrensel Tasarım, Kullanıcı çeşitliliği, İç Mimarlık, Kafe, Evrensel Tasarım Uygulaması.

DEDICATION

To My Family

AKNOWLEDGMENT

I want to sincerely thank my supervisor, Associate Professor Dr. zehra ongul, whose guidance, support and encouragement were invaluable to me throughout this journey. Your expertise and understanding made my academic journey smoother and more enlightening.

I express profound gratitude to my family. My mother's love, sacrifice, support and unwavering belief in me have been my greatest sources of strength. I am thankful to my husband for his love and reliability, which helped me stay focused and motivated during challenges. My sister and brother's encouragement has been invaluable. My father his guidance has been invaluable in shaping my journey.

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TABLE OF CONTENTS

ABSTRACT	iii
ÖZ	v
DEDICATION.....	vii
AKNOWLEDGMENT	viii
LIST OF TABLES.....	xii
LIST OF FIGURES	xiii
1 INTRODUCTION	1
1.1 Background.....	1
1.2 Structure of Thesis	3
1.3 Problem Definition	4
1.4 Aims and Objectives	5
1.5 Questions of Study.....	6
1.6 Methodology	6
1.7 Limitation.....	7
2 UNIVERSAL DESIGN	9
2.1 Definition of Universal Design.....	9
2.2 Evaluation of Universal Design.....	10
2.3 Principles of Universal Design	15
2.3.1 Equitable Use	16
2.3.2 Flexibility in Use.....	17
2.3.3 Simple and Intuitive Use.....	18
2.3.4 Perceptible Information.....	19
2.3.5 Tolerance for Error.....	20

2.3.6 Low Physical Effort	21
2.3.7 Size and Space for Approach and Use	22
2.4 Users Diversity	23
2.4.1 Disability	23
2.4.2 Age	33
2.4.3 Gender and Gender Identity	36
2.4.4 Cultural Diversity	40
3 INTERIOR	42
3.1 Semi-public Space	44
3.2 Cafe and Coffee Shop	45
3.3 Application of Universal Design in Interior of Cafe	47
4 CASE STUDY	68
4.1 Methodology of Case Study	68
4.2 Limitations of Case Study	72
4.3 Analysis of Cafes	73
4.4.1 To Go Coffee Time	76
4.4.2 Crunchy	80
4.4.3 Moto	83
4.4.4 Okka	86
4.4.5 Beckett	89
4.4.6 Pascucci	92
4.4.7 Coffeholic	95
4.5 Findings of Universal Design in Cafes	98
5 RECOMMENDATIONS AND CONCLUSION	100
5.1 Recommendations	100

5.2 Conclusion	102
REFERENCES	104

LIST OF TABLES

Table 1: Cafe To Go Coffee Time Observation Table.....	78
Table 2: Cafe Crunchy Observation Table.....	81
Table 3: Cafe Moto Observation Table.....	84
Table 4: Cafe Okka Observation Table.....	87
Table 5: Cafe Beckett Observation Table	90
Table 6: Cafe Pascucci Observation Table	93
Table 7: Cafe Caffeholic Observation Table	96
Table 8: Recommendation Table for Local Cafe	101

LIST OF FIGURES

Figure 1: Structure of Thesis.....	4
Figure 2: Theoretical Part Explanation (literature review)	4
Figure 3: Methodology.....	7
Figure 4: Case Study Map (Famagusta) (Google Map)	69
Figure 5: Map Strategic Location (Famagusta) (Google Map).....	70
Figure 6: Case Study Table Explanation.....	72
Figure 7: Accessibility and Inclusivity of Features in Cafes on İsmet İnönü Blv in Famagusta.	75
Figure 8: UD Consideration of More than 50%.....	99

Chapter 1

INTRODUCTION

This study investigates the application of universal design principles and design considerations in the interior of semi-public cafe spaces for a diverse range of users in Northern Cyprus. Given the existing research gap, the subsequent sections will delve into background information, research questions, aims, methodology and study limitations, providing a comprehensive overview.

1.1 Background

The design concept known as Universal Design (UD) strongly emphasizes accessibility and inclusivity. Its goal is to develop environments, product or procedures that are accessible to all people, irrespective of their status, ability or age (The Center for Universal Design, 1997; Persson, H, et al, 2015). This approach, which was pioneered by architect Ronald Mace in the 1980s, goes beyond traditional accessibility measures by proactively designing for inclusivity from the outset (Mace, et al, 1991).

UD developed from the accessibility movement and barrier-free ideas, incorporating aesthetics into 7 core principles. There is a growing interest in UD as life expectancy rises. (Watchorn et al., 2023). UD's main objective is to break down barriers and encourage inclusion right from the start of the design process, resulting in surroundings that engage a wide spectrum of people and allow everyone to fully engage in society (Persson, H, et al, 2015).

This approach requires the collaboration of designers, architects and policymakers. UD principles are applied across various disciplines and practical areas,

including retail and hospitality, with a focus on usability and inclusivity (Steinfeld & Maisel, 2012; Adewale et al., 2022; Zainurossalamia et al, 2022).

Users are a cornerstone of diversity, covering various dimensions such as disability, age, gender and culture. This approach focuses on recognizing and appreciating the distinctive qualities and life experiences that each person brings to the table. It makes sure everyone, regardless of their skills, age, gender or cultural origin, feels valued and accepted in society. Adopting diverse methods demonstrates the firm intention to promote equality and communal harmony. Academic research, community development and policy-making are all examples of this commitment. A more equitable and unified society can be facilitated by the progressive shift towards inclusion (American Psychological Association, 2019; World Health Organization, 2011).

The term “Semi-Pblic” term could be interpreted as a space that considers both social and ecological aspects. According to this viewpoint, the space is a complex social-ecological system in which many metabolisms interact at various scales. It highlights how crucial it is to work toward increasing chances for youth to interact with environment, particularly those who live in economically disadvantaged urban settings (Reed & Bohr, 2020). Semi-public spaces, such as cafes, depict a complex system of social-ecological interactions where several related metabolisms interact at various scales, fostering both social interactions and privacy (Reed & Bohr, 2020; Oldenburg, 1999).

Cafes serve as semi-public spaces because it acts as public areas that promote social contact while maintaining a feeling of privacy. it is places where people can meet, converse, work or only relax with a cup of coffee in a cozy environment. The

design and layout of a cafe can remarkably influence the social dynamics within it (Oldenburg, 1999).

UD in cafes is necessary as it ensures that these spaces are accessible and enjoyable for all individuals, despite their ability, age or gender. The legislation of Americans with Disabilities Act (ADA) sets minimum standards for accessibility in buildings and facilities. It provides guidelines on how spaces should be designed to accommodate individuals with disabilities (U.S. Access Board, 2010).

Implementing UD is not only ethically right but also making good business sense and from social aspect increase communication among individuals. Universally designed cafes are likely to draw more customers, which improves their success and reputation (Steinfeld & Maisel, 2012). Therefore, in this thesis, the need for UD in cafes is evaluated and a case study approach is proposed to further understand and evaluating implementation in these principles.

1.2 Structure of Thesis

Figure1 presents systematic five-step research employed in this study. This research structure provides a comprehensive approach to examining how Universal Design concepts are being applied in the interior architecture of cafes, thereby enhancing the semi-public space. The theoretical framework includes categories in figure2.

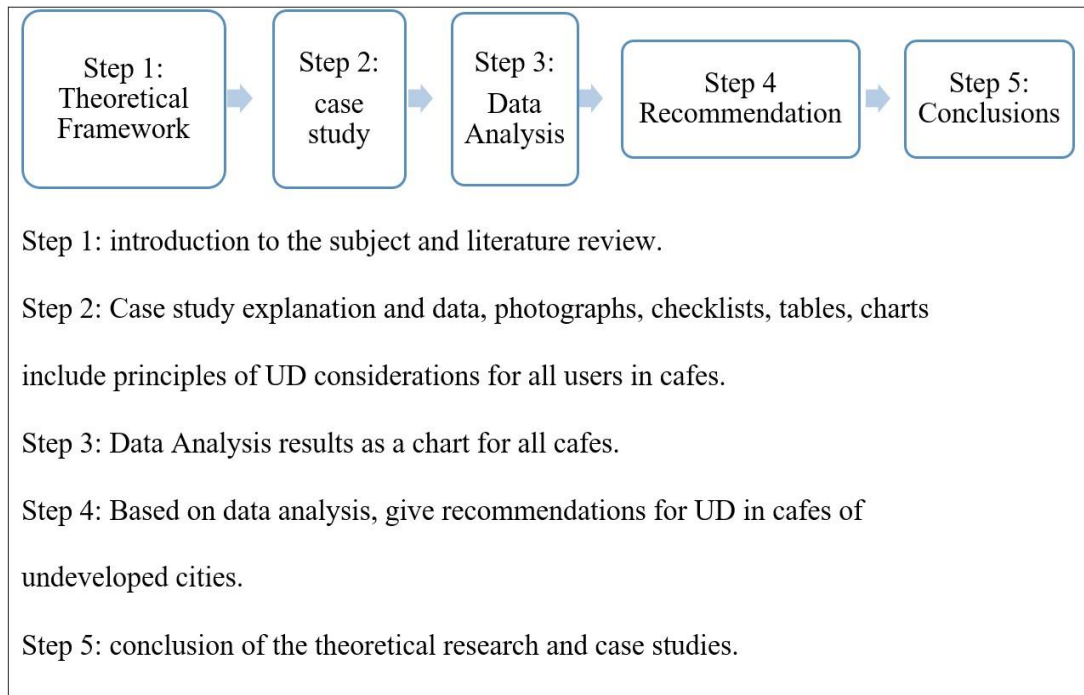


Figure 1: Structure of Thesis

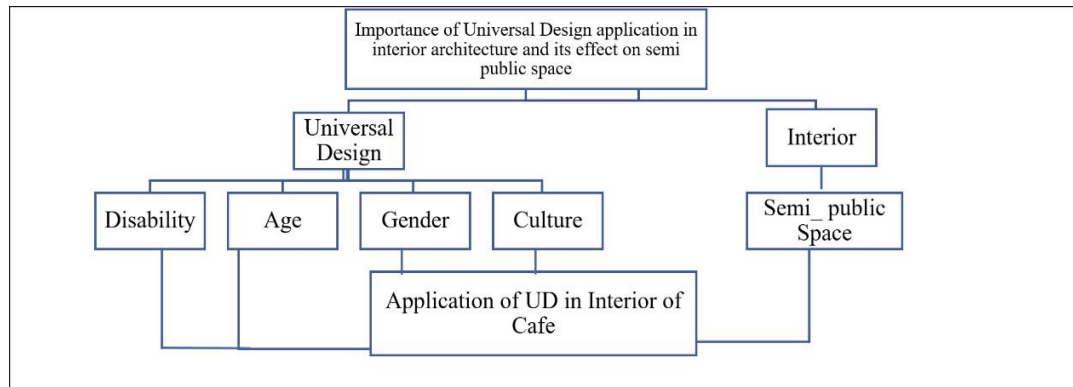


Figure 2: Theoretical Part Explanation (literature review)

1.3 Problem Definition

Cafes in undeveloped cities face unique challenges when it comes to creating inclusive spaces. While existing guidelines, such as the Americans with Disabilities Act (ADA), provide a foundation, recent studies reveal that two-thirds of disabled individuals encounter obstacles when dining out. This discrepancy highlights a gap between ADA compliance and customers' actual experiences (Smith, 2022).

In the interior spaces of semi-public cafes situated in undeveloped cities, a noticeable gap exists in the practical implementation of Universal Design (UD) principles. These cafes lack clear accessibility regulations, which presents significant challenges in ensuring equal access for all patrons. As a result, cafe owners in these areas may struggle to create inclusive spaces that cater to diverse patrons.

Universal Design (UD) aims to create environments that accommodate everyone. However, in undeveloped city cafes, UD principles are often overlooked or poorly implemented. Without clear guidelines, cafe interiors may inadvertently exclude certain user groups, hindering their participation. Individuals with disabilities encounter difficulties when navigating cafe spaces due to inadequate accessibility features. Age-related challenges and cultural differences further compound the issue. Additionally, the lack of gender-inclusive facilities can impact overall accessibility.

When cafes fail to prioritize UD, it affects social participation and inclusion. Patrons may avoid cafes altogether, leading to economic losses for cafe owners. Moreover, the absence of accessible spaces perpetuates inequality and limits community engagement.

1.4 Aims and Objectives

Cafes in undeveloped cities face unique challenges when it comes to creating inclusive spaces. The purpose of this thesis is to lead cafe owners in undeveloped cities toward implementing universal design (UD) considerations for all users. Understanding the principles of UD in shaping the interior architecture of cafes becomes crucial. By emphasizing UD, we can establish environments that welcome and accommodate diverse users, ultimately enhancing participation and economic outcomes.

One of the primary objectives of this investigation is to create a practical and understandable guide based on UD interior applications. This guide specifically targets cafe owners in undeveloped cities who may not have access to rules and regulation, professional interior architecture or design services. By providing straightforward tables for assessing and implementing UD principles, we aim to create more appropriate and accessible environments that satisfy the requirements of various user groups.

This research seeks to bridge the gap between theoretical UD principles and practical implementation, ensuring that cafes in undeveloped cities become inclusive spaces that cater to everyone.

1.5 Questions of Study

This thesis endeavors to answer questions related to the application of UD in cafes interior architecture. It specifically aims to respond to the following questions:

How do universal design principles impact the accessibility of cafes' interior architecture in undeveloped cities for diverse users?

What strategies can cafes in undeveloped cities employ to effectively implement universal design principles, even without access to professional interior architecture or regulations, in order to create more inclusive spaces?

1.6 Methodology

A qualitative method is used in this study to explore the implementation of UD principles considerations for all users in the semi-public space of cafes. It will start by a theoretical framework with a review of the literature and following by case studies of semi-public space of cafes as figure 3. A case study approach is observational investigation of cafes application of universal design. For the case study, schematic

sketch plan, photographs, checklists, tables and charts for different principles and different features of universal design are collected.

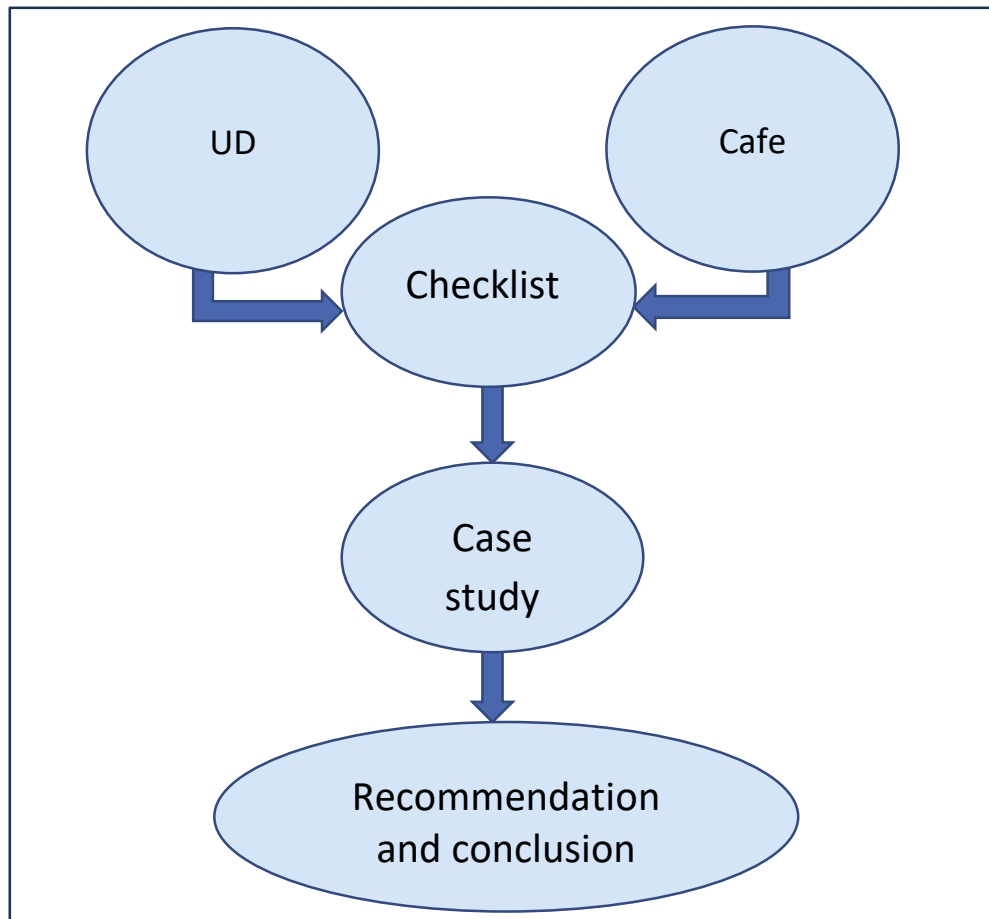


Figure 3: Methodology

1.7 Limitation

This research investigates universal design (UD) within semi-public interior spaces, with a specific focus on its application of UD for diverse users in accordance with the Americans with Disabilities Act (ADA) guidelines. However, certain aspects for diverse population that are not covered in detail by the ADA are explored through other relevant associations.

The application of UD in this study is limited to undeveloped cities do to the lack of rules and regulations. Undeveloped cities pose unique challenges for

implementing UD principles especially for local cafes that we focused on. Unlike more developed spaces and chain cafes, these cities and cafes often lack clear accessibility regulations and guidelines.

Our research aims to focus on local cafes interior architecture in undeveloped cities, proposing practical guidelines and a comprehensive checklist. By addressing these limitations, we strive to enhance inclusivity, promote equitable access and foster welcoming environments within undeveloped city cafes.

Chapter 2

UNIVERSAL DESIGN

This section of the thesis delves into the concept of universal design and its critical factors for design considerations. The chapter explores the definition, evaluation and principles of universal design, as well as the impact of user diversities. Through the theoretical investigation of UD principles and considering user diversity, we can develop a comprehensive approach for design consideration that benefits all users for undeveloped cities.

2.1 Definition of Universal Design

Inclusive design or design for all is another name for Universal Design (UD), emerges as a foundational philosophy aimed at avoid traditional design constraints. UD is an approach that creates equal accessibility for everybody. This approach highlighted by its application across diverse disciplines. Aim to create environments, products and systems accessible to individuals of varied abilities and backgrounds. In navigating the landscape of UD, the principles serve as a guiding light, offering a comprehensive framework for cultivating inclusive spaces. It is an inclusive and progressive design concept (The Center for UD 1997; Persson, H, et al, 2015). The idea of an architect in the 1980s goes beyond conventional accessibility measures and adopts a more proactive approach to design (Mace, et al 1991). Ronald Mace has invented UD term. It means creating all surroundings and products to be useable by everyone, regardless of ability, age or status. Adaptive and assistive technologies, the larger accessibility movement and earlier barrier-free ideals gave rise to UD. It also

attempts to include aesthetics into these fundamental factors. A growing number of people are becoming interested in UD as life expectancy increases and contemporary deficiencies (Watchorn et al., 2023). Eliminating obstacles and advancing inclusion from the beginning of the design process is the main principle for UD. It is a dramatic change towards creating environments engaging variety of individuals and allow everyone to fully participate in society, rather than just a checklist of accessible features. Embracing this philosophy necessitates a collaborative effort from designers, architects and policymakers to ensure that space becomes a social environment to inclusivity (Persson, H, et al, 2015).

This approach, influenced by seminal works and achievements across various disciplines, envisions spaces, products and systems can address the wide range of personal needs. It promotes use and inclusivity, creating a feeling of community and accessibility for all population (Steinfeld & Maisel, 2012; Adewale et al., 2022). Their comprehensive work on "UD: Creating Inclusive Environments" serves as a cornerstone in the field. Specifically, these principles have been strategically leverages in their evaluation different spaces (Adewale et al. 2022; Abdul Kadir, S., Jamaludin, M., & Awang, A. R, 2019).

UD principles find application in the practical area of retail and hospitality, as exemplified. Their exploration of how operational actions affect user happiness in restaurants and cafes bring UD concepts, emphasizing usability and inclusivity in hospitality spaces (Zainurossalamia et al, 2022).

2.2 Evaluation of Universal Design

The evolution of UD approach is deeply rooted in the historical background of societal attitudes towards disability and inclusivity. Although the late 20th century saw the formalization of UD ideas, its origins can be found in previous movements and

cultural changes. Historically, individuals with disabilities have often faced marginalization within their societies. They were frequently relegated to peripheral roles in public affairs. Pre-modern architectural and design periods did not inherently integrate accessibility and inclusivity concepts. However, cultures and communities have shown design elements that subtly cater to the varied needs of their members. The aftermath of World War II witnessed an increment in veteran population with disabilities, prompting a societal reevaluation of the space's capacity to accommodate diverse abilities. Advocating for equal privileges and access, the disability rights movement led the way simultaneously. These factors laid the groundwork for a fundamental change of approach in design philosophy. Ronald Mace, an architect and wheelchair user, emerged as a pioneering figure in the formulation of UD principles during the 1980s. Mace's experiences fueled his commitment to creating environments that could be accessed and enjoyed by everyone, regardless of physical ability. His seminal work, "UD: Barrier-Free Environments for Everyone," published in 1985, laid the foundation for the codification of UD principles to grow the approach for all (Mace, et al 1991; Preiser, W. F. E., & Smith, K. H. 2011).

The late 20th century also saw the introduction of legislation mandating accessibility standards. An important turning event in the history of UD was the passage of the Americans with Disabilities Act (ADA) in 1990. The ADA not only mandated accessibility standards but also embedded the principles of UD into the legal framework. The ADA served as a catalyst, compelling architects and designers to consider inclusivity as an integral aspect of their projects. This legislative milestone contributed greatly to the mainstream acceptance and merge of UD principles (Americans with Disabilities Act, of 1990).

The interdisciplinary nature of UD found expression in the collaboration between architect Edward Steinfeld and industrial designer Jordana Maisel. Their work, "UD: Creating Inclusive Environments," expanded the discourse, emphasizing the use of UD principles in interior architecture. Steinfeld and Maisel's contribution further propelled the concept into architectural practice, encouraging a more holistic approach to design that prioritizes inclusivity (Steinfeld & Maisel, 2012).

The 21st century saw a rise in global recognition of UD, with its principles being incorporated into building codes and design standards by various countries. International organizations, such as the World Health Organization (WHO), began to emphasize the importance of creating environments that promote health. These environments are intended to promote well-being for all, irrespective of ability. This century also marked the integration of UD principles into the digital realm (World Health Organization, 2011).

The importance of UD has gained significant attention in interior architecture, especially in spaces where social interaction is a key element. The historical growth of UD shows changes in the approach from the early initiatives of pioneers like Ronald L. Mace to the comprehensive approach integral to modern design practices. The essence of UD lies in creating environments that celebrate diversity and enable everyone to participate fully in society, a principle emphasized by researchers. This led to the establishment of a universal standard for health-promoting places. These standards offer valuable insights into the evaluation of spaces, as demonstrated by a case study. The case study underscores the need for environments that promote health. This aligns with the overarching Universal Design (UD) goal, which is to address each person's well-being (Trojanowska, 2021).

Furthermore, information in this area emphasizes on the practical application of UD principles, specifically in the hospitality sector, establishing a connection between consumer requirements and ADA regulations. This emphasizes the need for a nuanced approach that goes beyond mere compliance, resonating with the broader theme of inclusivity in design. To understand the broader implications of UD it is essential to explore its intersection with cafe and restaurant user's satisfaction (Reid, 2021). Research has been done on how operational actions affect user satisfaction, mediated by infrastructural elements, provides valuable insights. This

multidimensional perspective aligns with the principles of UD, which rotted in creating spaces that not only is accommodated but enhance user experience (Zainurossalamia et al, 2022). Moreover, lessons from good practice, as highlighted by the Centre for Excellence in UD, emphasize the need for comprehensive toolkits. These guide designers in incorporating UD principles effectively. The Centre's commitment to promoting excellence in UD across various domains reinforces the holistic nature of UD (Centre for Excellence in UD 2023).

Considering the advancement in technology the "Inclusive Designing: Joining Usability, Accessibility and Inclusion" explores the intersection of technology and inclusivity. This work not only underscores the adaptability of UD emphasizes the need for inclusive design principles in the fast changing digital landscape (Clarkson et al., 2014).

Universal Design (UD) history is marked by contributions of various associations and centers worldwide that have been instrumental in promoting and applying UD principles. Universal Design is a comprehensive approach that seeks to reduce obstacles to the environment and improve building use for everyone. It goes beyond basic requirements and laws to create environments that are accessible to all,

thereby reducing discrimination and promoting social participation. Several organizations have played pivotal roles in this regard.

As notable contributors are DO-IT in the United States funds by the National Science Foundation, which shares guidance and resources on UD applications. Accessible Japan provides insights into UD application in Japan, considering factors such as traditions, politics, culture, laws and resource distribution. European Institute for Design and Disability (EIDD) Design for All Europe advocates for the use of Design for all across corporate and administrative sectors. The Centre for Excellence in UD in Ireland emphasizes UD at all organizational levels. The UD Network of Canada is dedicated to promoting UD principles in Canada. The World Health Organization (WHO) advocates for accessibility and inclusivity in all aspects of public health. UNICEF has developed a Toolkit on Accessibility, providing practical recommendations on building elements that should comply with accessibility requirements (Burgstahler, 2009; EIDD - Design for All Europe, 2017; Centre for Excellence in UD, 2023; UD Network of Canada, 2008; WHO, 2023; UNICEF, 2021).

In relation to UD principles and standards, The Center for Universal Design at North Carolina State University established seven universal design principles, serving as guidelines for diverse design disciplines. Additionally, standards for Universal Design have been developed by the International Organization for Standardization

(ISO), the European Committee for Electrotechnical Standardization and the International Electrotechnical Commission. The RL Mace Universal Design Institute provides valuable resources and training. The Universal Design Handbook, published by the Institute for Human Centered Design, offers a comprehensive summary of principles, viewpoints and performance-based design standards and guidelines. The widely used American Disabilities Act (ADA) standards cover various elements, from

building entrances to restrooms, ensuring accessibility for individuals with disabilities (Center for Universal Design at North Carolina State University, 1997; ISO, 2023; Institute for Human Centered Design, 2022; ADA, 2010).

Interior architects play a multifaceted role in applying UD principles. Their aim is not only to comply with accessibility standards but also to actively contribute to equal socializing experiences for all individuals. This understanding is crucial for creating spaces that promote health and well-being while considering infrastructural elements that enhance customer satisfaction (Dudley, 2023; Takahashi et al., 2023).

2.3 Principles of Universal Design

A working group of architects, product designers, engineers and environmental design specialists created the Universal Design principles in 1997. At North Carolina State University (NCSU), this group was led by the late Ronald Mace (Connell et al., 1997). The concepts were created with the intention of providing as many individuals with access to surroundings and products as achievable. They have since become the internationally referenced definition for Universal Design (The Center for Universal Design, 1997).

This principle's origins can be found in the foundational work of Ronald Mace, a prominent figure in the UD movement. Mace's vision, articulated in his seminal work "UD: Barrier-Free Environments for Everyone" (1985), laid the groundwork for principles that transcend physical barriers. (Mace, et al 1991).

The concept of UD embraces a set of principles that guide the creation of environments and products accessible to diverse population. UD is not a set of rules, but rather a flexible approach that can be adapted to meet the needs of different users. The importance of incorporating UD principles in the design process has been highlighted to ensure that the space is accessible and usable by everyone (Duman, Ü.,

& Asilsoy, B. 2022). The lack of implementation of UD principles leads to the need for modification over the life span of a project (Izani et al., 2019). UD principles are crucial for creating inclusive spaces that cater approach for all. The notion of UD continues to be recognized and given proper weight in the nature of the design ethos of building and product creation (Izani et al., 2019).

Continuing from the first principle, Equitable Use, the subsequent principles of universal design build upon this foundation. These include flexibility in use, intuitive design, perceptible information, error tolerance, low physical effort and appropriate sizing. Together, these principles foster more inclusive and user-friendly designs. Our exploration will delve into the fundamental principles that guide the identification of design considerations for all users.

2.3.1 Equitable Use

Equitable Use refers to designing spaces that offer equal access and opportunities for everyone, irrespective of their abilities or situations. Equitable Use can be achieved through various design features, such as adjustable height workstations, lever door handles and automatic doors. Guidelines from the ADA Standards for Accessible Design provide comprehensive recommendations for achieving equitable use, ensuring that features such as seating arrangements, entrances and amenities are accessible to all individuals. This principle champions the creation of products and environments that transcend traditional notions of accessibility (Preiser and Ostroff 2001; U.S. Access Board, 2010).

This principle seeks to dismantle historical stigmatization by challenging past practices that marginalized individuals with disabilities. By doing so, the objective is to create spaces and products that go beyond mere functionality but also appeal to a broad market. It's commitment to considering all the user needs, preferences and

abilities of potential users during process of design. Designers follow this principle strive to eliminate barriers, cherishing a sense of belonging for all individuals. The prominence of Equitable Use is further emphasized through legislative acts such as the ADA of 1990, solidifying the legal mandate for designs that are accessible and inclusive. Moreover, Equitable Use is adaptable to cultural and societal shifts, aligning itself with evolving expectations for equal access to public spaces and products (The Center for UD, 1997).

This dynamic characteristic ensures that designs remain relevant and responsive to changing norms and societal attitudes. In the contemporary era, Equitable Use seamlessly extends into the digital realm, recognizing the significance of inclusive design in technology (Clarkson et al., 2014).

2.3.2 Flexibility in Use

The principle of Flexibility in Use underscores the significance of creating products, environments and systems that could be utilized by a diverse group of people. In other words, the design should be flexible enough to accommodate the needs of all users, despite their abilities, physical or cognitive. This principle is particularly important in the field of interior architecture, where it is essential to ensure that all users have equal access to spaces. The concept aligns with the principles of adaptability and user customization. Creating flexible spaces in the space has been emphasizing to cater diverse user needs and preferences. This principle acknowledges and celebrates human diversity, promoting adaptability to various user needs without sacrificing overall usability (Ostroff, Preiser, 2001).

Distinctive feature of Flexibility in Use lies in its capacity to enhance the functionality of designs, ensuring that it remain valuable to users across diverse situations and circumstances. Designs influenced by this principle are not rigid but

rather adjustable, allowing users to tailor their interactions based on personal comfort and requirements (The Center for UD, 1997). This adaptability is particularly crucial in promoting independence and user autonomy, contributing to a more inclusive experience. Moreover, Flexibility in Use extends beyond the immediate physical environment and combines technological improvements. In the digital realm, applications and interfaces that embody this principle offer customizable features, enabling users to personalize their interactions based on individual preferences (Clarkson et al., 2014). The principle recognizes that user needs may change over time and designs should be resilient to these fluctuations (The Center for UD, 1997).

2.3.3 Simple and Intuitive Use

The Simple and Intuitive Use highlights the significance of creating places and products that are simple to use and comprehend, regardless of the user's level of experience, knowledge or language skills. Applying this principle in semi-public environments involves clear signage, intuitive seating arrangements and

straightforward way-finding strategies. For instance, furniture should be arranged in a way that is easy to navigate without needing prior knowledge or experience. All users must be able to access necessary instructions for building features, regardless of their sensory abilities (Rick Hansen Foundation, 2017).

The Simple and Intuitive Use principle is essential to the effective application and visualization of interior design. It combines concise explanations of each subject with real-world application examples (Grimley and Smith, 2022). The center notes that the principle of Simple and Intuitive Use can be achieved through various design strategies, such as providing clear instructions, using simple and intuitive interfaces and minimizing the need for memorization (The Center for UD, 1997).

2.3.4 Perceptible Information

Perceptible Information refers to the creation of products and environments that can be understood by all users. This includes those with sensory impairments, without the need for special abilities or modifications. This principle is particularly important for, who may require alternative modes of communication to access information (Steinfeld & Maisel, 2012).

The principle of Perceptible Information can be achieved through various design features. It includes clear signage, clear instructions, contrasting colors, tactile surfaces, audio descriptions, using simple and intuitive interfaces, do minimize the risk of errors. Works such as "Inclusive Designing" focuses on designing Perceptible Information in social spaces with the use of tactile, audible and visual design considerations (The Center for UD, 1997; Preiser and Ostroff, 2001; Clarkson, 2014).

The architectural aspects of UD, is emphasizing the importance of perceptibility in creating inclusive spaces. The application of contrasting colors, signage and audible indicators enhances an environment. This ensures that information is not only available but also easily perceived by individuals with diverse sensory abilities (Nasar, J. L., & Evans-Cowley, J, 2007).

Ronald Mace, a pioneer in universal design, extended principles beyond physical barriers. As technology advanced, the focus on Perceptible Information emerged, allowing for creative solutions to cater to diverse sensory needs. Contemporary design leverages features like screen readers and haptic feedback to ensure digital platforms are accessible to individuals with visual or auditory impairments, aligning with universal design principles (Mace, et al 1991; Clarkson et al., 2014; Trojanowska, 2021).

2.3.5 Tolerance for Error

The principle of Tolerance for Error is a crucial part of Universal Design (UD). It ensures that the design of products, environments and systems is forgiving of mistakes. This reduces the risk of harm to users (Mace, et al 1991). The principle of Tolerance for Error can be achieved through various design features, such as slipresistant flooring, handrails and clear signage (Preiser and Ostroff, 2001). The center highlights that the principle of Tolerance for Error can be realized through different design strategies. These include providing clear instructions and using simple, intuitive interfaces. These strategies minimize the risk of errors, thereby enhancing the safety of the design (The Center for UD, 1997). Through including ergonomic and anthropometric consideration in the design of interior space or product, comfort and safety could be achieved (Panero, J., & Zelnik, M., 1979).

The Tolerance for Error principle ensures that design minimizes the impact of user mistakes. It promotes safety and usability, especially in semi-public spaces. By creating products and environments that reduce risks from unintentional actions, safety and user confidence are enhanced. This principle is crucial for children and individuals with cognitive or physical disabilities. Design features supporting Tolerance for Error include clear instructions, feedback mechanisms and fail-safe measures. (Steinfeld, Maisel's, 2012).

Progress in technology has provided opportunities for combining Tolerance for Error into various products and systems. Designing user interfaces, software and digital platforms with a high Tolerance for Error is necessary. This approach ensures that individuals of varying abilities can interact with technology without fear of severe consequences from unintentional mistakes (Clarkson et al., 2014).

2.3.6 Low Physical Effort

The principle of Low Physical Effort is about the creation of products and environments that can be utilized comfortably and effectively, with minimal fatigue. The guidelines can help designers achieve this principle with considering these, permit the user to reduce repetitive motions, minimize prolonged physical effort, employ appropriate operating forces and maintain a neutral body posture (The Center for UD, 1997).

Low Physical Effort emphasizes the importance of providing adequate space for the user to approach and use the product without any physical barriers. People with mobility impairments, may have difficulty in using products that require a lot of physical efforts. The user's range of motion and strength when designing products and environments should be under consideration (Preiser, Ostroff, 2001; Burgstahler, 2015).

Exploring the concept of Low Physical Effort, emphasizing ergonomic design to minimize the physical demands placed on users in social environments. This involves considerations such as accessible seating and user-friendly amenities (Clarkson et al., 2003).

In interior architecture, Low Physical Effort manifests in designs that facilitate easy navigation and use for individuals with diverse physical capabilities. This includes the design of ramps, elevators and accessible pathways that minimize physical strain, ensuring that spaces are welcoming and usable for everyone. Also considerations such as accessible seating, adjustable examination tables and other features that contribute to a Low Physical Effort experience for patients and healthcare professionals (Duman, Ü., & Asilsoy, B, 2022; Steinfeld & Maisel, 2012).

Progress in technology has provided opportunities to merge Low Physical Effort principles into various digital interfaces and products. User interfaces and digital platforms designed with Low Physical Effort in mind ensure that individuals with varying physical abilities can interact with technology comfortably and without undue physical strain (Clarkson et al., 2014).

2.3.7 Size and Space for Approach and Use

According to this principle providing sufficient space for the user to approach and use the product comfortably regardless of their body size, posture or mobility is essential. This principle is particularly important for people with mobility impairments, who may require more space to maneuver their assistive devices. Designing product and interior to be parallel to the size and space for approach the product and space need to be considered with anthropometric dimensions (Burgstahler, 2015; Preiser & Ostroff 2001; The Center for UD, 1997; Panero, J., & Zelnik, M., 1979).

Size and space considerations ensure that the space allows for approach, reach and use by individuals of varying abilities. Guidelines provided for optimizing size and space in social environments, ensuring that elements such as seating, counters and pathways are universally accessible. Interior architectural aspects of creating spaces with sufficient room for approach and use, covering factors such as corridor width and door sizes (Preiser, Ostroff, 2001; Steinfeld & Maisel, 2012).

Considerations for Size and Space for Approach and Use extend to adapting controls and interactive elements to accommodate diverse spatial requirements in the digital landscape. Size and Space for Approach and Use is about providing sufficient space for the user to approach and use the product comfortably, regardless of their abilities, limitations or special needs (Clarkson et al., 2014).

2.4 Users Diversity

User diversity is a concept that extends beyond the traditional understanding of disability. It recognizes that every individual is unique and that this uniqueness is a source of strength and potential. This diversity is not limited to physical, sensory, intellectual, mental health disabilities, but also includes other factors such as socioeconomic status, education, marital status and employment status (American Psychological Association, 2019).

In the concept of universal design in interior architecture, user diversity means designing spaces that are accessible, usable and welcoming to all people. It means considering the full spectrum of human diversity in the design process to ensure that everyone can participate fully and equally in social, civic and economic life (U.S. Access Board, 2010).

By applying the principles of universal design, architects and designers can create environments that meet the needs of the widest possible range of users. This not only benefits individuals with disabilities but also benefits other groups in society, such as older people, children and people with temporary impairments (World Health Organization, 2011).

User diversity is therefore a key factor in creating more equitable and inclusive societies. By recognizing and valuing the diversity of the population, environments that are more inclusive, accessible and sustainable for everyone can be create (United Nations, 2006).

2.4.1 Disability

Disability, as defined by the International Classification of Functioning, Disability and Health (ICF), manifests at three distinct levels. (A) the individual body or body part level, it encompasses malfunctions or losses in bodily function or structure

ranging from physical injuries to neurological conditions. (B) Considering the entire person, disability involves limitations in activities, hindering tasks like reading or driving for individuals with severe visual impairments. (C) Within a social context, disability relates to restrictions in participation across life domains due to societal and environmental factors. The disabilities social model emphasizes that disability isn't solely a result of physical conditions; societal interpretations play a significant role. To enable full participation, societal changes—such as improved accessibility and reduced discrimination—are essential. This model shifts the perspective from viewing disability as an individual problem to recognizing it as a societal issue, emphasizing adaptation of the environment to fit the person rather than vice versa (Warren, Manderson, & Ayton, 2014).

Disability, a multifaceted category encompassing motor, sensory, intellectual and mental health capabilities, demands thorough design considerations within the Universal Design (UD) framework. It transcends mere health issues, reflecting the interplay between an individual's bodily features and the societal context they inhabit. Rather than focusing solely on individual conditions, disability centers around availability and accessibility for all (World Health Organization, 2021).

The complexity of disability underscores the necessity of UD an approach that aims for maximum usability by all, without requiring specialized adaptations (Center for UD, 1997). UD should be a collective endeavor, prioritizing social sustainability over individual consumerism. It emphasizes interdependence and highlights the various forms of exclusion that result from inaccessible design (Hamraie, 2013).

Physical disabilities; encompass constraints on an individual's physical functionality and mobility, potentially extending to impairments that affect various aspects of daily life (Clute, 2013). Mobility impairments form a category within the

diversity of physical disabilities. These conditions include those that affect an individual's ability to move. This encompasses upper or lower limb loss or disability, manual dexterity and disability in coordination with different organs of the body (Accessibility.com, 2024; Disabled World, 2022). These impairments can seriously impact a person's ability to perform daily activities and participate fully in society. Discussions on access to transportation and various forms of communication are frequently framed by mobility. Mobility for individuals with impairments is also affected by the availability of appropriate assistance, such as walking sticks, wheelchairs, prosthetic limbs and, less directly, eyeglasses and hearing aids. It is also impacted by the availability of walkways or roadways that can be safely traversed by those using assistance devices, wheelchairs and other assistive devices, as well as companion animals (Warren, et al, 2014).

Mobility impairments; mentioning the needs of individuals with mobility impairments involves the implementation of UD principles, emphasizing the removal of physical barriers. Accessible entrances equipped with ramps or lifts, well-designed pathways and aisles and the installation of elevators or lifts for changes in elevation are paramount. Adaptable restrooms, featuring adequate space and grab bars, further contribute to the creation of universally accessible environments (U.S. Access Board, 2010; Nasar, J. L., & Evans-Cowley, J, 2007).

Amputations impairment; refer to the removal of a limb or part of a limb due to trauma, medical illness or surgery. On the other hand, limb differences include congenital conditions where a person is born with a missing or underdeveloped limb (Dillingham et al., 2002).

Amputations can be caused by a variety of factors. These include traumatic injuries, such as those from accidents or war-related incidents. it can also be due to

medical conditions like diabetes, peripheral arterial disease or severe infections. In some cases, amputations are surgically necessary to prevent the spread of diseases such as cancer or gangrene. Limb differences are often congenital, resulting from genetic factors, issues during fetal development or environmental factors affecting the mother during pregnancy (Ziegler-Graham et al., 2008).

The prevalence of limb loss and limb differences varies globally. In the United States, approximately 2 million people live with limb loss and about 185,000 amputations occur each year (Ziegler-Graham et al., 2008). Congenital limb differences are less common, occurring in about 1 in 1,900 live births (Dillingham et al., 2002).

These differences can greatly impact an individual's lifestyle, function and quality of life. It is essential because it promotes inclusivity and accessibility in all products and environment, encouraging a more accepting society and flexible independence for people with impairments (Hamraie, 2013; Sanger, 2020).

Considerations for individuals with amputations or limb differences extend to providing accessible seating options and customizable furniture that accommodates diverse body shapes and sizes. The integration of assistive technologies, such as automatic doors and voice-activated controls, enhances independence (Nasar, J. L., & Evans-Cowley, J. 2007; Ostroff & Preiser, 2001; Clarkson et al., 2014).

Sensory disabilities; are neurological disorders that impact how a person's brain processes sensory information. This can affect all or some senses of individuals, including smell, hearing, sight, touch, taste and also spatial awareness. Every day, senses are being used to understand the world around us. However, for someone with a sensory disability, this process is more challenging as their senses react differently.

This influences their abilities to engage with various environmental settings and carry out routine tasks, particularly when these settings are not constructed with accessibility or inclusivity in mind. There are three primary challenges faced by individuals with sensory impairments, namely, Sensory Modulation Disorder, Sensory-Based Motor Disorder and Sensory Discrimination Disorder. Sensory impairments can significantly hinder a person's ability to process auditory and visual data. These impairments are predominantly found in the elderly and can adversely affect their physical well-being and lifestyle. As a study conducted in 2009, 1 out of every 6 children is affected by a sensory impairment that obstructs their learning capabilities and everyday functioning. In the case of younger individuals, sensory impairments can disrupt a child's capacity to carry out daily tasks and can also impede their academic performance by creating a negative impact on their learning abilities. Sensory disabilities can be standalone or a part of another disability. Infections, wounds or genetics can potentially be the source of it. Sensory disabilities present a unique set of challenges for those who live with them. However, with understanding, accommodations and support, individuals with sensory disabilities can lead fulfilling lives (Jones, E. et al 2020).

Minimizing harsh lighting, loud noises and strong odors creates a welcoming environment for individuals with sensory challenges, tending inclusivity. Sensory considerations ensuring that environments are not only accessible but also engaging for all individuals, regardless of their sensory abilities (Lloyd-Esenkaya, T., et al 2020).

Visual impairment; is a condition that affects the sight ability. There are numerous potential causes for it, such as age, illness, accident or genetics. People with visual impairments may experience a range of difficulties, including difficulty reading, recognizing faces or navigating their environment (World Health Organization, 2023).

Vision, being the most prevalent of all senses, holds a pivotal role in every aspect and phase of an individual's life. In the absence of vision, individuals face challenges in learning, ambulation, reading and participation in academic and professional activities. Visual impairment is a condition that arises when an ocular disorder impacts the visual system and its associated functions. It is a universal phenomenon that anyone, given a sufficiently long lifespan, can encounter at least one ocular condition that necessitates proper medical attention (World Health Organization, 2023).

The phrase "visual impairment" denotes that an individual's visual challenges hinder their capacity to execute certain routine tasks, even when assisted by corrective eyewear such as glasses or contact lenses (Debrowski, A, 2023). Visual impairment is a common comorbidity in people with intellectual disability, with a prevalence rate of 30-40%. The review also found that visual impairment has a significant impact on the quality of life of people with intellectual disability, including their ability to participate in social activities and their overall well-being (Kiani, R., & Miller, H, 2018).

The needs of individuals with visual impairments involve implementing design elements that provide information beyond visual aspect. Tactile pathways, auditory cues at intersections and Braille signage contribute to navigation. Furthermore, adequate lighting that minimizes glare and provides clear contrasts, as well as the utilization of color contrasts for way-finding, are essential components in creating environments accessible to those with visual impairments (Norman, 2013; Nasar, J. L., & Evans-Cowley, J, 2007).

Hearing impairment; is a condition that hinders one's ability to hear, can stem from various causes such as genetics, disease, injury or aging. This impairment can pose challenges in hearing speech, engaging in conversations or participating in social

activities. Severe inborn hearing loss is noted in at least 1 out of every 1000 individuals within the general populace. The extent of hearing impairment is ascertained by audiometry, a diagnostic procedure that quantifies the sound intensity necessary for an individual to perceive a particular frequency. Decibels (dB) serve as the unit for measuring sound intensity and an individual with normal auditory function can discern sounds as faint as 0–20 dB. Hearing impairment is characterized as an average hearing loss in the better ear of 25 dB or more at frequencies of 1, 2 and 4 kHz. For those with hearing impairments, Universal Design (UD) emphasizes features that augment communication through alternative means. These include hearing loops, visual alarms and captioning on public displays (Kiani, R., & Miller, H, 2018; WHO, 2021).

Spaces designed with acoustic considerations, such as minimizing background noise and ensuring optimal sound distribution, contribute to a more inclusive auditory environment. Furthermore, the provision of sign language interpretation services accommodates diverse communication needs, ensuring that individuals with hearing disabilities can actively engage in social interactions (Reid, 2021).

Smelling impairment; is a condition that affects the ability to smell. It can be caused by a variety of factors, including genetics, disease, injury or aging. People with smelling impairments may experience a range of difficulties, including difficulty detecting odors, identifying smells or experiencing pleasure from smells. Olfactory dysfunction is a common condition, affecting up to 20% of the general population. The review found that olfactory dysfunction can have a significant impact on quality of life, including decreased enjoyment of food, decreased ability to detect danger signals (such as smoke or gas leaks) and decreased social interactions (Hummel et al. 2016). Smelling impairment can be divided into quantitative and qualitative. Quantitative disorders include a complete loss of the olfactory function (functional anosmia), which

affects 3.6 to 5.8% of the general population. Qualitative disorders, on the other hand, involve distortions in the perception of smell. These can include parosmia, where there is a change in the perception of odors or phantosmia, where a person perceives a smell that is not present. Parosmia is often associated with damage to the olfactory system, such as from a head injury or upper respiratory infection and affects approximately 12% of the general population. Phantosmia is less common and is usually associated with neurological disorders. Both types of qualitative disorders can highly impact a person's quality of life and may require treatment with medications or, in some cases, surgical intervention (Landis et al., 2004).

Touching impairment; also known as tactile impairment, is a condition where an individual has a reduced or absent ability to perceive or interpret tactile stimuli. This can be due to various reasons such as neurological disorders, injuries or diseases affecting the sensory system. Individuals with touching impairment may have difficulty performing tasks that require fine motor skills, recognizing objects by touch or sensing pain or temperature changes. Touching impairment can result from a variety of conditions, such as arthritis, brain tumors, carpal tunnel syndrome, Charcot-MarieTooth disease, chronic kidney failure and delirium. In the touching impairment, UD can provide significant benefits. For instance, designing interfaces with larger, more distinguishable elements can help those with tactile impairments. Similarly, incorporating alternative feedback mechanisms, such as auditory or visual cues, can compensate for the lack of tactile feedback. This can lead to improved quality of life and increased independence for these individuals (Sieberns, 2018; Pruett, 2017; Van Stralen, H., & Dijkerman, C. 2011).

Intellectual Disabilities (ID); are characterized by considerable restrictions in both cognitive capabilities and adaptive conduct. Cognitive capabilities include

abilities such as logical thinking, problem-solving, strategizing, abstract reasoning, judgment, scholastic learning and learning from experience. Adaptive conduct encompasses a variety of conceptual, social and practical skills that individuals utilize in their daily lives. As per the American Association on Intellectual and Developmental Disabilities (AAIDD), ID is defined by substantial limitations in cognitive capabilities and adaptive conduct that manifest before the individual reaches the age of 18 (Schalock et al., 2010; American Association on Intellectual and Developmental Disabilities, 2020).

The etiology of ID is diverse, with causes that can include genetic conditions like Down syndrome and prenatal influences such as maternal infections or alcohol use. Other factors include perinatal events like oxygen deprivation during birth and postnatal events such as traumatic brain injury or severe malnutrition. The prevalence of ID is estimated to be between 1% and 3% of the population globally, reflecting a substantial need for supportive services and interventions (Maulik et al., 2011;

American Association on Intellectual and Developmental Disabilities, 2020). Individuals with ID often require various levels of support in different areas of their lives, including education, employment, social interaction and daily living activities. The level of support needed can range from intermittent assistance for specific tasks to extensive, pervasive support for most aspects of daily life. Assessments of all group strengths and needs are essential for determining the appropriate level and type of support (Schalock et al., 2010).

ID in UD involves creating environments that support cognitive diversity and inclusivity. Spaces should facilitate ease of navigation, understanding, employing clear signage, simple way-finding systems and intuitive layouts. Additionally, providing alternative formats for information, such as visual aids or easy-to-read

materials, enhances accessibility for individuals with ID (Clarkson et al., 2014; Steinfeld & Maisel, 2012).

Mental health disabilities; also known as mental disorders, involve significant disturbances in thinking, emotional behavior or regulation. These conditions are typically linked with discomfort or hindrance in significant areas of functioning. There exists a wide array of mental disorders, which include, but are not limited to: Anxiety Disorders, Depression, Bipolar Disorder, Obsessive Compulsive Disorder and Schizophrenia. As data from 2019 shows, 1 out of every 8 individuals or 970 million people globally, were coping with a mental disorder, with anxiety and depressive disorders being the most prevalent (World Health Organization, 2021).

UD principles aim to promote psychological well-being through thoughtful environmental design. Spaces should incorporate natural elements, access to daylight and comfortable seating to contribute to a positive atmosphere. Creating quiet areas for relaxation and incorporating calming colors can positively impact individuals with Mental Health Disabilities (Steinfeld et al., 2012).

Temporary Disabilities; are conditions that impair an individual's ability to perform daily activities for a limited period. These are typically due to injuries or medical conditions that are expected to improve with time. These disabilities can range from fractures and surgeries to illnesses like concussions. The impact of temporary disabilities can be significant, affecting one's mobility, cognitive function or ability to engage in regular work or social activities (Centers for Disease Control and Prevention, 2024; Maleki, 2022)

Temporary Disabilities necessitate environments that can adapt to changing needs. UD in these cases involves providing temporary solutions, such as ramps or accessible seating with variety, to accommodate individuals with temporary

impairments. Additionally, clear communication of temporary adjustments through signage or digital platforms ensures awareness and inclusivity during periods of Temporary Disability (U.S. Access Board, 2010; Ostroff & Preiser, 2001).

The concept of Temporary Disability underscores the need for flexibility and adaptability in UD. For instance, an individual recovering from surgery might require certain accommodations in the space for a limited period. These could include ramps for easier mobility, adjustable lighting or furniture that can be easily moved or adjusted. By incorporating such features, interior architects can ensure that semipublic spaces cater to the needs of individuals with Temporary Disabilities (Römhild & Holleederer, 2023). This involves considering factors such as the layout of the space, the placement of furniture, the type of materials used and the use of technology (Steinfeld & Maisel, 2012).

2.4.2 Age

Age diversity is a crucial aspect of UD, which is the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people. This concept has also been defined by the ADA National Network (ADA, 2010).

In interior architecture of semi-public spaces, age diversity plays a significant role. The idea of "human diversity" encapsulates how unique each person is—not just in terms of appearance or ethnicity, but also in terms of age, ability and body type. The benefits of applying UD to specific structures and its goal of assessing those buildings' conformity with the UD concept have been highlighted (Khalil, Mohamed & Morghany, 2021).

The Design Center for Global Needs, situated within the School of Design at

San Francisco State University, disseminates the Seven Principles of Universal Design (UD), underscoring the significance of incorporating age diversity in the design process to foster more inclusive environments. By factoring in age diversity, designers are empowered to conceive spaces that are both accessible and inclusive, thereby advocating for equality and social inclusion (Khalil, Mohamed & Morghany, 2021; Gomes, 2010; ADA, 2010).

Elderly individuals; who may face unique challenges in navigating the space due to physical limitations or health conditions. Designing for elderly individuals involves creating spaces that support aging in place, allowing them to live independently and comfortably. Considerations include the provision of adequate lighting, non-slip flooring and easily reachable amenities. Additionally, seating with proper back support and accessible restroom features contribute to the well-being and autonomy of elderly individuals (Watchorn et al., 2023; Lawton & Nahemow, 1973; Steinfeld et al., 2012).

It is suggested that designers should consider the following factors when designing for the elderly such as visual acuity, hearing, motor skills and cognitive abilities. Also is recommended using large fonts, high contrast colors and simple navigation to make the interface more accessible to the elderly. In addition, the condition in which the product is being used should be considered, such as the lighting conditions and the user's posture (Wilson, 2014).

This involves blending creative technologies into the modification process to support independent living. For instance, advanced technologies can aid the elderly in living independently, particularly in terms of preventing falls and enhancing indoor accessibility. The shift from traditional assistive technology to smarter devices has given rise to the notion of robotic spaces. Universal Design (UD) elements for

semipublic environments often encompass features like step-free entrances, broader doorways and lever-style handles on doors and faucets. It also includes counters and work areas that are adjustable in height or multi-leveled, grab bars in bathrooms, drawers that are easy to access, ample storage areas in cabinets and sufficient lighting. These features can significantly improve the life quality of older adults, enabling them to retain their independence and continue residing in their own homes. The key requirements are minimal disruption to daily life and scalable technologies to adapt to the aging process. By taking into account the specific needs and constraints of this population group, spaces can be designed that not only accommodate them but also enhance their life quality (Watchorn et al., 2023; Ma et al., 2022; AgingCare, 2018).

Typically, older adults continue to engage in the same activities, behaviors and relationships as they did in their younger years. The internal framework, including personality, ideas, beliefs and the external framework, such as relationships and social roles, contribute to continuity, illustrating how individuals adapt to their circumstances and establish their objectives (Atchley, 1989). As people age, they endeavor to preserve the same activities, behaviors and relationships. Consequently, environments, products and services should be designed in a manner that enables them to sustain these behavioral patterns. The principles of Universal Design (UD) ensure that products and environments are flexible, adaptable and can be utilized by everyone to the maximum extent possible (Story, 1997).

Children; considering their developmental needs, UD focuses on creating environments that are safe and stimulating. This includes appropriately sized and adjustable furniture, clear wayfinding with visual cues and play areas designed for diverse abilities. Spaces should encourage exploration and learning while ensuring safety through features like rounded edges and non-toxic materials (Steinfeld &

Maisel, 2012).

Age-appropriate materials, child-friendly colors and simple navigation are important in designing and should be consider. Using interactive elements, such as games and quizzes, to engage children and make the product more enjoyable are helpful (UD Guidelines for Early Learning and Care Settings, 2021).

In the subject of age diversity, UD becomes particularly important. Children of different ages have different needs and abilities. For example, a product designed for a toddler would be different from one designed for a teenager. The toddler might need products that are safe, easy to hold and colorful, while the teenager might need products that are more complex, durable and stylish. The theory of UD can guide the design of products and environments that achieve the needs of individuals of all ages, ensuring inclusivity and accessibility (Mace, et al. 1991).

2.4.3 Gender and Gender Identity

UD acknowledges the importance of inclusivity regarding to gender and gender identity, recognizing the diverse needs and experiences of individuals. One specific consideration is for pregnant women, who may have unique requirements during various stages of pregnancy. Gender diversity refers to the differences between individuals based on gender identity, expression and biological sex. This concept has gained significant attention in recent years according to its impact on social, economic and political issues. Gender diversity has been shown to have a positive impact on organizational performance, employee satisfaction and innovation (Bovens, L., & Marcoci, A. 2023).

Designing for pregnant women; involves recognizing the temporary nature of their needs and providing appropriate accommodations. Considerations include the availability of seating in waiting areas, well-marked and easily accessible restroom facilities and thoughtful layouts that minimize the need for extended periods of

standing or walking. Providing clear signage and when applicable, designated parking spaces contribute to the comfort and well-being of pregnant women, ensuring their equitable access to various spaces (Nasar, J. L., & Evans-Cowley, J, 2007; U.S. Access Board, 2010).

For individuals who may need to breastfeed or express milk, providing dedicated and comfortable spaces ensures their ability to do so with privacy and dignity. UD principles can guide the creation of breastfeeding spaces that are accessible and welcoming, contributing to an inclusive environment (Clarkson et al., 2014; National Women's Law Center, 2021; Job Accommodation Network, 2010; Hamraie, 2013).

Gender inclusivity; emphasizes the disparities in rights, perceived competencies and societal expectations between men and women, as highlighted by the viewpoints on Gender and Development. It accentuates the necessity to integrate the interests and needs of all genders into policies and programs. When applied to pregnant women, these theories suggest that UD should accommodate the physical changes experienced during pregnancy. Additionally, it should also discuss the social and cultural aspects of pregnancy. This includes considering how spaces can be designed to support the health and well-being of pregnant women. It also involves promoting inclusivity and challenging societal norms and expectations around pregnancy. This approach recognizes pregnancy not as a deviation from the norm, but as a vital aspect of human diversity that deserves consideration in design processes (Ismailov & Chiu, 2022).

Gender inclusivity is a critical aspect of creating welcoming and comfortable spaces for all individuals. In cafes, this involves considering the different needs and preferences of various genders during the design process. For instance, the use of

neutral colors and designs can help create an environment that does not favor any particular gender. Providing gender-neutral restrooms is another important aspect of gender inclusivity, ensuring that all individuals, regardless of their gender identity, feel comfortable and accommodated. Moreover, it's important to consider intersectionality in gender inclusivity. Intersectionality pertains to the interlinked nature of social classifications such as ethnicity, socioeconomic status and gender, which can lead to intersecting systems of bias or disadvantage. A truly inclusive cafe can take these factors into account, ensuring that the space is not only gender-inclusive but also inclusive of other social categories. However, achieving gender inclusivity is not without its challenges. Societal norms and biases can often create hurdles in the path towards inclusivity. But these challenges present opportunities for innovation and progress. By striving for gender inclusivity spaces that are truly welcoming and accessible for everyone can be create (Szlavi & Guedes, 2023).

Gender-Inclusive Restrooms, also known as "all-gender," "gender-neutral," "mixed-sex," or "unisex" restrooms, are public restrooms that can be used by any person, regardless of their gender identity (American Psychological Association, 2019). They are a crucial part of promoting gender diversity and inclusivity in public spaces. The need for Gender-Inclusive Restrooms arises from the challenges and risks faced by transgender, non-binary and gender non-conforming individuals in gendersegregated restrooms. These individuals often report being "gender-policed" when using public restrooms with gender-designated signage (Detloff, 2006). According to the 2015 U.S. Transgender Survey, transgender individuals reported incidents of verbal harassment (12% of respondents), physical assault (1%) or sexual assault (1%) when accessing a restroom (James, S, et al 2016).

Gender-Inclusive Restrooms; aims to create safe and accessible spaces for all individuals. This approach allows individuals to make choices based on their needs, instead of forcing them to comply with the gender binary. This also provides advantages to other underrepresented groups, encompassing individuals with disabilities, the elderly and parents with young children (American Psychological Association, 2019).

Designing restrooms that are gender-inclusive contributes to creating an environment that accommodates individuals of all gender identities. This involves providing facilities that are accessible and welcoming to everyone, regardless of their gender expression. Considerations may include the design of single-stall, genderneutral restrooms and clear signage indicating their presence (Clarkson et al., 2014).

Public bathrooms separated by gender have been a topic of debate. Two main reasons for this separation are believed to be the resistance to women working and a desire to ‘protect’ women in public places (Sanders & Striker, 2016). The idea of Gender-Inclusive Restrooms challenges these old-fashioned views and supports a more welcoming and fair society. One big step towards this goal is the introduction of laws that require single-stall public bathrooms to be available for all genders, regardless of the city, state or municipality. (American Psychological Association, 2019).

Multi-gender restrooms are a relatively new concept that has emerged in response to the need for more inclusive and equitable facilities. These restrooms are designed to be used by people of all genders, including those who identify as nonbinary or gender non-conforming. Research has shown that multi-gender restrooms can reduce waiting times for women. Furthermore, Gender-neutral restrooms make women

and minorities feel safer and more included. A comprehensive view of the benefits and challenges associated with multi-gender restrooms, as well as the legal and societal implications of their implementation. They highlight the importance of inclusive restroom policies in promoting equality and reducing discrimination (Sanchez, D., & Chaney, K., 2017; Bovens, L., & Marcoci, A. 2023).

2.4.4 Cultural Diversity

Cultural diversity, as the term suggests, refers to the variety of human societies or cultures in a specific region or in the world. It implies a respect for the differences and variety in the human experience. This diversity encompasses a multitude of aspects, including race, ethnicity and language. Different cultures have unique traditions and customs that can be reflected in the cafe's design, menu and practices. A cafe that caters to these diverse needs can attract a wider customer base. The cafe can serve as a social hub that reflects the social norms of the local culture (Hakim and Amir, 2022). Different cultures have different aesthetic preferences which can be incorporated into the cafe's design. Modern cafes and restaurants are becoming multifunctional spaces, serving different purposes at different times of the day. This adaptability can cater to the diverse needs of a culturally diverse community (Desai, 2011, 2011; Norman, D. A, 2013).

Fundamentally, considering cultural diversity in the UD of cafes can create a more inclusive, adaptable and vibrant space that caters to the needs of a diverse community (Hakim and Amir, 2022; Connell et al., 2011; Desai, 2011). This aligns with the global trend towards increasing interconnectedness and the need for common ground to promote dialogue, peace and a more humane world. However, there is always tension between universal ethics and local values and norms. Therefore, it is crucial to strike a balance between maintaining the unique characteristics of each

culture and creating a universally accessible and welcoming environment. Language is emphasized in cultural diversity due to its role in expressing and transmitting cultural aspects. This is particularly evident in social spaces like cafes (Mante, Y, 2014; Oluwaseun, 2023).

Language; mirrors the varied ways in which individuals perceive and engage with their surroundings (Galante, 2016). In the context of Universal Design (UD), the diversity of language is crucial as it guarantees that services and product are usable and accessible by the widest audience, eliminating the need for modifications or specialized design (Al-Azawei, Serenelli, Lundqvist, 2016)

In cultural diversity within UD, cafes and restaurants can be seen as spaces that accommodate a wide range of people, regardless of their cultural background or physical abilities. For instance, the design of a cafe can be universally accessible, providing both physical access and sensory access, menus in multiple languages or braille, clear signage (Hakim and Amir, 2022). Moreover, cafes often reflect the cultural diversity of a community. They can serve as social-cultural entities where people from different cultures interact, share ideas and learn from each other. This cultural exchange can be facilitated by the UD of the cafe, which ensures that it is welcoming and accessible to all (Joson, 2022).

Language is a cornerstone of cultural identity and its consideration in UD is crucial for effective communication. Providing information in multiple languages ensures that language barriers do not hinder access to essential services or information. Multilingual signage, instructions and communication materials contribute to an inclusive environment, allowing individuals from diverse linguistic backgrounds to navigate and engage comfortably (Clarkson et al., 2014; Oluwaseun, 2023).

Chapter 3

INTERIOR

This chapter explores the captivating world of interior architecture within semi-public spaces. The concept of interior space is first examined, followed by an exploration of semi-public areas. Subtle distinctions between cafes and coffee shops are unraveled. Lastly, delve into UD principles applications and investigating the design consideration for cafe interiors.

The interior aspect of the space is a crucial component of architectural design, with a focus on crafting spaces that cater to the needs of individuals through a process of analytical thinking, investigation and creative solutions. It takes into account various factors such as the client's health, safety, wellbeing and the environmental footprint. The role of interior designers entails the creation of spaces that fulfill the requirements of their clients, taking into consideration elements such as health, safety, wellbeing and environmental impact (Aloudeh, Elmardi & Sheta, 2023).

Interior architecture is a comprehensive discipline that combines various elements to create functional and visually appealing indoor environments. These elements include spatial organization, color selection, lighting arrangement and sustainable practices. Strategic spatial planning is employed to enhance usability and flow in the design (Cho & Suh, 2023). The choice of color palettes is influenced by the desired emotional response and ambiance (Shorewala & Ardito, 2022). Lighting design plays a crucial role in determining visibility and creating the desired atmosphere

(Ozenen, 2023). Furthermore, sustainability is a key consideration in material selection and the implementation of eco-friendly practices, ensuring that designs are not only aesthetically appealing but also environmentally responsible (Kineber et al., 2023).

The arrangement of furniture and fixtures, which either hinders or facilitates movement, is a critical aspect of space planning in UD. This planning allows for easy navigation for all individuals, including those with mobility aids such as wheelchairs or walkers (Imrie & Hall, 2003). Lighting, both natural and artificial, plays a significant role in creating a welcoming atmosphere and ensuring visibility. The contrast created by different lighting sources is also an important consideration in UD (Boyce, 2014). The choice of materials impacts the acoustics, aesthetics and tactile experience of the space. Materials should be chosen with care to ensure they are durable, easy to maintain and contribute to a pleasant sensory (Máté, K. 2019; Marschallek, B. E., & Jacobsen, T. 2022).

In interior spaces, UD principles are significant in shaping communication dynamics (Steinfeld & Maisel, 2012). Accessible entrances, open floor plans and a diverse range of seating options create an environment that fosters communication among customers (Imrie & Hall, 2003). The removal of physical barriers ensures that individuals with mobility challenges can navigate freely, thereby promoting interactions with others (Harrison, A. 2014). A variety of seating options cater to different preferences and mobility requirements, enabling individuals to select spaces that align with their comfort levels (Danford, 2003). A fully inclusive design must incorporate sound-dampening materials to cater to those with hearing impairments, as well as lighting that accounts for a full range of visual abilities. The Centre for Excellence in UD has compiled evidence that demonstrates the significance of these

elements in creating an environment that supports both interaction and individual enjoyment, which is paramount to the cafe experience (Centre for Excellence in UD, 2023). In the interior space, UD principles actively shape the built environment to become a space where communication is not hindered by physical barriers, thereby promoting social inclusivity and interaction (Steinfeld & Maisel, 2012).

3.1 Semi-public Space

The concept of a semi-public space refers to the physical spaces that are designed to facilitate social interactions, yet also provide a degree of privacy or individuality. These environments are often public or communal spaces, such as cafes, restaurants, where people can gather and interact, but also have the option to engage in solitary activities. One aspect of the semi-public space is its impact on physical activity. Physical activity is influenced by the semi-public settings and understanding how people perceive their surroundings can shed additional light on this. This suggests that the design of a semi-public space can play a role in promoting healthier lifestyles (Wang et al., 2023; Reed, S., & Bohr, J, 2020).

These spaces require a nuanced application of design principles, striking a balance between privacy and openness. This balance is necessary to consider both individual comfort and social interaction. The design of semi-public spaces should acknowledge factors such as accessibility, inclusivity and adaptability to cater to a diverse range of users and activities. In these environments, the design and layout play a significant role in shaping the user experience. For instance, a semi-public space might include shared communal spaces within a residential building, such as a shared garden or rooftop terrace. These spaces are designed to encourage social interaction among residents, while also providing areas for individual relaxation and enjoyment (Suberi, 2022).

The semi-public space can play an important role in promoting social cohesion and equality. By designing spaces that encourage social interaction, urban planners and interior architects can help to create a sense of community and belonging among residents. At the same time, these spaces must be designed with consideration for the diverse needs and preferences of different individuals and groups, ensuring that all members of the community can enjoy and benefit from these spaces (Samuel & Watson, 2022).

3.2 Cafe and Coffee Shop

Cafes, historically known as coffeehouses, primarily serve a variety of coffee types. They emerged in the 16th century in Constantinople and spread to Italy, France, Germany and England in the 17th century. The first European coffee house was established in Vienna around the same time and the trend of enhancing coffee with cream and sweeteners emerged. The first British coffee house opened in the 17th century. By the 19th century, the daily newspaper and home post had replaced these functions. Late in the 20th and early in the 21st century, cafes started offering internet access, resulting in the creation of the so-called internet cafe (Cowan, 2004; Berry, 2005; Klein, 1999; Manzo, 2014).

From a cultural perspective, coffeehouses serve as social interaction hubs. They provide a place for patrons to gather, converse, read, write, entertain one another and pass the time. Coffee shops have been used for political discussions and selfimage, both formally and informally. They encourage openness and information exchange because the social space they provide is free and open (Manzo, 2014; Steigemann, 2017; Denison, 2021).

The social impact of cafes is substantial. The transformation from conventional to contemporary coffee shops entails comprehending the shift in the significance of a

coffee shop as a socio-cultural venue. This change is marked by the progression of basic facilities into public areas equipped with media and information sources like newspapers, television and internet networks. Although the terms cafes and coffee shops are often used synonymously, they possess distinct attributes. A cafe is recognized for its broad food menu and a relaxed, sit-down ambiance. Conversely, a coffee shop's main emphasis is on coffee, providing a variety of brewing techniques, espresso drinks and a selection of teas. The decision between a cafe and a coffee shop is dependent on an individual's preferences and situations. Both establishments have a significant impact on daily lives and shape dining and coffee culture. The future trends of cafes and coffee shops are likely to continue evolving to meet the everchanging preferences of consumers (Euromonitor International, 2022; Peluso, 2023; Pozos-Brewer, 2011; Desai, 2011).

Cafes have become societal cornerstones in developed countries around the globe. They provide a stimulating environment that fosters creativity and thought or simply a place for relaxation and socializing with friends. A study of the objectives and accomplishments of coffee shops can offer valuable directives for the efficient operation of future cafes (Desai, 2011).

UD in cafes is crucial for several reasons. It prioritizes accessibility and inclusivity, aiming to eliminate barriers, promote equal opportunities and create social integration (Hakim, M., & Amir, A. S., 2022). By incorporating features such as barrier-free entrances, spacious pathways and varied seating options, cafes become more accessible to people with disabilities, parents with strollers and elderly patrons. These elements enhance usability and comfort for all customers (Martino, G, 2023). Cafes serve as crucial hubs for fostering and preserving social relationships, augmenting a sense of wellness and cultivating a feeling of community belonging.

(Auckland Design Manual, 2022; Ostroff, 2001). The design of a cafe can highly impact the customer experience. A well-designed cafe can create a calming and soothing atmosphere (Joson, 2022).

Customers are drawn to specialty cafes that appreciate the connection between function and form. A universal design considers the flow of movement within the cafe. Managing the movement simultaneously while maintaining a visually compelling and comfortable environment can be challenging. This is reflected in the design of the cafe, which can convey the cafe's brand and values. Interior architects have demonstrated how reworking classic spaces can maintain their original value while becoming more directly connected to their new purpose and style (Desai, 2011; Martino, G, 2023).

Moreover, universal design considers sensory aspects like appropriate lighting and acoustics, making cafes more comfortable for patrons with visual or hearing impairments. Clear signage and intuitive layouts help all customers navigate the space easily, increase independence and confidence (Lalor, A, 2018). Overall, universal design not only improves customer experience but also attracts a broader clientele, benefiting the business economically (Preiser & Ostroff, 2001).

3.3 Application of Universal Design in Interior of Cafe

The application of UD principles in cafes can enhance their function, making them more inclusive and accessible to all diversity of patrons. Conversely, inclusive design offers a thorough examination of existing practices, highlighting innovative ideas for enhancement and advocating for broader adoption in the future (Clarkson et al, 2003). In cafes, UD ensures both physical accessibility and social inclusivity. By considering human diversity and accommodating all target groups, cafes can effectively apply universal design principles (Burgstahler, 2020).

Although universal design (UD) is widely recognized, evaluating it poses challenges due to limited evidence. Commonly, checklists are used to assess UD in public infrastructures, but some participants question their suitability. Despite this, most participants acknowledge the importance of UD evaluation, as it contributes to advocacy, professional growth and strengthens the evidence base (Watchorn et al., 2023). The ADA has established accessibility guidelines for newly built or modified facilities under the jurisdiction of state and local governments, as well as public accommodations and commercial facilities (Hamraie, 2013).

Accessibility; has gained significant prominence over the past ten years, particularly in the era of digital technology. It is taken into account, to varying degrees, in the majority of projects that create interactive systems. The primary objective of Universal Design (UD) is to enhance the accessibility of the interactive system for the broadest possible user base. However, there is minimal agreement on the interpretation and application of this concept, which could potentially result in reduced accessibility for the intended users. The absence of consensus is particularly noticeable in the context of international standardization (Persson, H. et al, 2015).

Accessibility is a comprehensive term that can have varying interpretations based on the design strategy employed during development. The absence of a universally agreed-upon definition could potentially obstruct the widespread adoption of accessibility, thereby possibly restricting its potential advantages (Persson, H. et al.2015). The design and accessibility of entrances and exits play a crucial role in the overall accessibility of the cafe (Martino, 2023). The layout and width of aisles and pathways can seriously impact the ease of navigation within the cafe (Thompson, 2022). The use of color and lighting can enhance visibility and contribute to the overall ambiance of the cafe. The choice of materials and textures can influence the cafe's

acoustics, safety and comfort. Each of these areas contributes to the overall accessibility and inclusivity of the cafe, promoting a higher quality of life for all users (Lazzari, 2020).

Entrance design; for accessibility extends beyond the provision of ramps for wheelchair users. It encompasses elements such as ground-level entrances, entrance width, door operability, handrail availability and clear signage. These factors ensure not only physical accessibility but also navigability for individuals with various disabilities (Agarwal, 2020).

The 2010 Standards for Accessible Design specify that emergency exits should be easily accessible and free from obstructions. They also require that alarms and signage be in place to guide individuals during an emergency (United States Department of Justice, 2010).

The Occupational Safety and Health Administration has established comprehensive guidelines for the planning and construction of emergency exit routes. It is mandatory for workplaces to have a minimum of two exit routes to ensure the swift evacuation of employees and other occupants in the event of an emergency. These exit routes should be positioned as far apart as feasible to account for potential blockages due to fire or smoke. The height of the exit route ceilings should be no less than 7 feet, 6 inches. The width of an exit access should be at least 28 inches at all points. In situations where there is only one exit access leading to an exit or exit discharge, the width of the exit and exit discharge should be at least equal to the width of the exit access (Lisa Chinn, 2018). Among three common categories, two parallel exits have been found to be the most efficient layout. However, it has been observed that if the separation between the two exits is either too large or too small, it is not conducive to evacuation (Zhou, m, et al, 2019).

Entry accessibility involves creating a welcoming entrance that is easily accessible to individuals with diverse abilities (U.S. Access Board, 2010). In addition, it is essential to have a level landing at the entrance to offer a secure area for individuals to wait, enter and exit the building. It is necessary to ensure sufficient clear space on both sides of doors. If the building entrance is secured and requires two-way communication for access, it is important to provide assistive listening and communication enhancement technologies. This includes text-to-text communication facilities for individuals with hearing impairments to interact with staff effectively (Burgstahler, 2020).

Ramps standards mandate a maximum slope ratio of 1:12 and a minimum width of 36 inches between handrails. They also require level landings for every 30inch rise, handrails on both sides if the rise is greater than 6 inches and slip-resistant surfaces. These measures facilitate safe and independent access for all individuals using mobility devices. Elevator accessibility also receives detailed attention in the standards. Requirements include appropriate dimensions to accommodate wheelchairs, reachable control buttons and a minimum clear opening for doors. Additionally, they include auditory and visual floor indicators and braille markings for individuals with visual impairments.

The designs of entrance landings should take into account the clearances required for door maneuvering and the landings associated with ramps. In instances where two-way communication systems are utilized for access to a facility or restricted areas, these systems must incorporate both visual and audible signals. This provision is crucial to cater to the needs of individuals with impairments related to hearing or vision. In terms of measurements, standards do not specify a standard width for doors, but a minimum clear width of 32 inches is recommended to allow for wheelchair

access. The height of door handles, pulls, latches, locks and other operating devices should be no higher than 48 inches and no lower than 15 inches above the floor (ADA, 2010; Andersson, J. E, 2014; Germanà, M. L., & Nicolini, E, 2022; American Society of Landscape Architects, 2022).

Elements of Universal Design in the realm of interior architecture encompass the incorporation of zero-step entrances and broader doorways. Zero-step entrances, which eliminate any steps and offer a smooth level entry points facilitate ease of access. This design feature is particularly advantageous for individuals who use wheelchairs, those with mobility challenges and people with strollers or wheeled luggage. The provision of wider doorways further enhances accessibility, especially for those utilizing wheelchairs or other aids for mobility (Center for Universal Design, 1997).

Design of aisles and pathways; emphasizes the significance of creating clear and wide pathways to cater to diverse mobility needs, according to Universal Design (UD). This ensures a welcoming environment for all, including wheelchair users and individuals with mobility and sensory challenges (U.S. Access Board, 2010; Burgstahler, 2020).

The design of aisles and pathways should be wide enough to accommodate individuals using mobility aids. The ADA Standards for Accessible Design recommends a minimum width of 36 inches for accessible routes, which includes aisles and pathways (ADA, 2010). This width is also sufficient for assistive dogs and their handlers to move freely in cafes (ADA, 2010; Steinfeld & Maisel, 2012).

In addition to width, the surface of aisles and pathways should be firm, stable and slip-resistant to prevent accidents. Changes in level along the path should be minimized and where unavoidable, ramps or lifts should be provided instead of stairs.

Furthermore, aisles and pathways should be free of protruding objects that could pose a hazard, especially for individuals with visual impairments (ADA, 2010).

Moreover, the design of aisles and pathways should also consider the need for resting areas, especially in long or steep routes. Seating or leaning rails can be provided at regular intervals to allow individuals to rest when needed (Burgstahler, 2020).

In the context of industrial aisles, it is recommended that the width be no less than 4 feet and should exceed the width of the largest equipment that needs to traverse through them by at least 3 feet (Lisa Chinn, 2018). In terms of height, the ADA requires a minimum clearance of 80 inches (2030 mm) for aisles, corridors, passageways and other circulation spaces (ADA.gov).

The Occupational Safety and Health Association (OSHA) advise that aisle space be marked permanently in passageways and aisles to promote safety. These marks, which delineate the aisle area, can take the shape of lines and be any color that is readily apparent (Lisa Chinn, 2018).

When considering the interior architecture of cafes, it's crucial to incorporate UD principles to ensure accessibility for all, including those who rely on assistive aids in any kind. Assistive dogs, visual aids, mobility aids, loop or hearing aids (Steinfeld & Maisel, 2012).

Service design; under Universal Design (UD) advocates for accessibility without the need for specialized adaptations. This includes not only the physical accessibility of service locations but also the accessibility of information, communication and technology related to the service (Burgstahler, S. 2009). Services should be provided in a way that respects and values diversity, considering cultural norms and practices and being sensitive to the needs of different age groups, genders and abilities (Feldman, 2023).

UD also involves providing information in multiple languages, ensuring that language barriers do not hinder communication and contributing to an inclusive cafe environment (Clarkson et al., 2014). The provision of multilingual information involves several specific considerations. These include providing information in multiple languages to cater to a diverse range of users and including written and spoken information, such as audio guides or announcements (Feldman, 2023).

The application of technology can further enhance the accessibility of cafes. For example, digital menus can be easily adjusted for font size or contrast, making them more readable for all customers. Considerations such as menus in braille or large print for visually impaired customers, hearing loop systems for those with hearing impairments (Center for UD, North Carolina State University, 1997; Nagpal, 2022).

Clear signage is essential for guiding customers and ensuring that important information is easily perceivable. Signage should be visually clear and consider tactile and auditory cues for individuals with visual impairments (Ostroff & Preiser, 2001). Signage should be easily identifiable and distinguishable from the rest of the environment, helping people locate entrances, exits and other important areas without needing to ask for directions or walk longer distances than necessary (Feldman, 2023).

Alarms play a crucial role in ensuring safety in cafes. They should be designed to be easily perceivable by all customers, regardless of their sensory abilities. This includes visual alarms for those with hearing impairments and auditory alarms for those with visual impairments (Department of Justice, 2010).

Cultural decor requires a deep understanding and respect for the cultures being represented. It is also important to avoid cultural appropriation, which involves using elements of a culture without permission or understanding. Instead, designers should strive for cultural appreciation, which involves learning about and respecting different

cultures and incorporating their elements in a way that honors and celebrates them (Feldman, 2023).

Color and light; play integral roles in creating an accessible and welcoming environment. They enhance the usability and aesthetic appeal of a space, thereby aligning with the principles of UD. Color can be strategically used to differentiate spaces, indicate changes in surface or height and provide visual cues for navigation. Contrasting colors can be particularly helpful in distinguishing doorways, stairs and signage, aiding individuals with visual impairments. High contrast between text and background can make information more readable for individuals with visual impairments. Moreover, color can influence mood and behavior, thereby enhancing the overall dining experience (Preiser, 2001; Gurney, 2010; Henry, S. L., Abou-Zahra, S., & Brewer, J. 2014).

Lighting, both natural and artificial, is crucial in improving visibility and reducing the risk of accidents. Natural light can create a welcoming atmosphere, but it's important to control glare. Artificial lighting should be adjustable to cater to various needs and activities. Task lighting can illuminate specific areas, like menus or pathways, while ambient lighting contributes to the overall atmosphere. Lighting control is a significant aspect of UD, ensuring that lighting systems are accessible and usable by all individuals, regardless of their abilities. Moreover, energy-saving lighting control systems can remarkably reduce energy consumption in buildings, contributing to sustainability and cost savings (Gurney, 2010; Sanger, 2020; Norman, 2013; Feldman, 2023; Byun, J., & Shin, T, 2018).

Consistent color-coding is a strategy used in UD to enhance the usability and accessibility of spaces. This involves using different colors to distinguish between

different sections or areas within a cafe. The use of consistent color-coding can be particularly beneficial for individuals with visual impairments or cognitive disabilities.

As this provides a clear visual cue that can help them navigate the space. It's also beneficial for all users, as it can improve the overall user experience by making the space more visually appealing and easier to navigate. Additionally, color-coding considers factors such as lighting, signage and tactile features to help identify entrances and other important areas. In addition, it is recommended to use not just varied colors, but also a mix of different shapes and positions different line types and color patterns. This approach ensures that information is effectively communicated to all users, including those who may have difficulty distinguishing color differences. (Lid, 2014; Preiser 2001).

Materials and textures; are integral to UD, effecting how individuals perceive and interact with their environment. They can greatly enhance the sensory experience, contributing to the overall experience. Different materials and textures can evoke various sensory responses. For instance, smooth surfaces such as glass or polished stone can convey a sense of modernity and cleanliness. In contrast, rough textures like brick or untreated wood can impart a sense of warmth and coziness. These sensory responses can affect an individual's comfort and well-being in a space (Steinfeld & Maisel, 2012; Lloyd-Esenkaya, T., et al 2020; Sanger, 2020).

In addition to visual aesthetics, materials and textures also contribute to tactile experiences. Tactile experiences are particularly important for individuals with visual impairments. Textures can provide cues about spatial orientation, hazard warnings even information about different areas within a space. For example, a change in floor texture can indicate the entrance to a new room or a step ahead (Lloyd-Esenkaya, T., et al 2020).

Moreover, materials and textures can influence acoustic experiences. Hard surfaces can cause sound to bounce and create echoes, while soft materials can absorb sound and reduce noise levels. This can be particularly important in spaces like classrooms or offices, where noise control is crucial. Acoustic considerations involve managing noise levels to create a comfortable acoustic environment. This can be achieved through the use of sound-absorbing materials and the careful design of spaces to minimize noise transmission. For instance, spaces intended for quiet activities can be located away from noisy areas. Additionally, the use of white noise or sound masking can help to cover up background noise and create a more comfortable acoustic environment (Sanger, 2020; Xiao & Aletta, 2016).

Non-slip materials are essential in cafe shops to prevent accidents and injuries from slips and falls. These materials are particularly important in areas that are prone to getting wet or greasy, such as the kitchen and the area around the beverage counter. Flooring should be impervious to moisture and easy to clean and maintain. The use of non-slip materials is not only a safety measure but also a requirement under various safety regulations. Contrasting materials help in visually distinguishing different areas within the cafe. They can be used to create a pathway and provide a visual marker for customers. This is particularly beneficial for individuals with visual impairments as it helps them navigate the space more easily. Contrasting materials can also be used to highlight potential hazards, such as steps or ramps, thereby reducing the risk of accidents (Auckland Design Manual, 2022; ADA.gov, 2010).

Tactile markers also known as Tactile Walking Surface Indicators (TWSI), are a crucial component of accessible design. They are designed to provide tactile feedback, which can be felt through footwear, to assist individuals, particularly those with visual impairments, in navigating public spaces. These markers often take the

form of raised or textured surfaces on the ground, which can be detected using a cane or through the sense of touch. In wayfinding, tactile markers serve two main purposes, Directional Guidance and Spatial Mapping. The tactile indicators guide users along appropriate circulation paths and routes in spaces like transit platforms, parks, plazas, airports and more. The tactile network provides a non-visual understanding of the configuration of space, interactions and decision points, enabling the visually impaired to build a mental map. There are multiple options available when specifying tactile way-finding solutions: Surface Applied Way-finding Tiles, Cast-In-Place Wayfinding Tiles, Metal Tactile Tiles, Individual Embedded Bars and Photo Luminescent Way-finding Strips. Each type has its unique construction and application, making them suitable for different environments and requirements. Well-executed tactile wayfinding enables visually impaired individuals to navigate safely and independently within environments by providing physical directional prompts detectable through touch. Thoughtfully implemented tactile way-finding confers several advantages for enhancing accessibility: Promotes independent mobility, allows intuitive navigation of unfamiliar public spaces, builds user confidence in exploring new environments, provides consistent navigational cues across different locations and building typologies, alerts to key decision points like intersections through complementary hazard indicators, meets legal obligations for implementing accessibility solutions in public realms and creates inclusive, barrier-free spaces that accommodate users of diverse abilities (Prandi, et al, 2023; Mizukami, et al, 2002; Cao, 2020; Guest Post, 2024; Lemelson Center, 2012).

Restroom considerations; should include clear signage, including the international symbol of accessibility, to indicate the location of restrooms. The path to

the restroom should be free of obstacles and have a firm, stable and slip-resistant surface (Nasar, J. L., & Evans-Cowley, J, 2007; ADA, 2010).

The interior of the restroom should be spacious enough to accommodate individuals using mobility aids such as wheelchairs. This includes sufficient turning space and an accessible stall with grab bars. The door should be easy to open, with handles operable with a closed fist. Fixtures within the restroom, such as sinks and hand dryers, should be at a height accessible to all users. Faucets should be designed in such a way that they can be operated using a single hand, without necessitating a firm grip, pinching or wrist twisting. Soap dispensers and other amenities should also be within easy reach (ADA, 2010).

Moreover, restrooms should cater to the needs of individuals with sensory impairments. For instance, visual cues can be used to indicate the occupied status of stalls for individuals with hearing impairments. On the other hand, tactile signs can be provided for individuals with visual impairments (Burgstahler, 2020).

Restrooms counters should be situated along an accessible path. The restroom door needs to be sufficiently wide to accommodate a wheelchair, implying a minimum width of 42 inches. The area allocated for the toilet should be at least 60 inches wide. Furthermore, the center of the toilet should be positioned 16 to 18 inches from the side wall (Auckland Design Manual).

By following the principles of various guidelines and considering the needs of all users, designers can create safe, accessible and inclusive environments (Keller, 2021). Gender-inclusive restrooms, also known as gender-neutral or unisex restrooms, cater to a wide range of users. This includes the transgender community, people with disabilities, older adults and parents with young children (American Psychological

Association, 2019). They can be implemented in two main ways: single-occupancy restrooms and non-gendered group restrooms (Bovens & Marcoci, 2023).

Single-occupancy restrooms provide a safe, private space for all users. They are designed to be accessible, featuring specific elements such as grab bars and sufficient space for wheelchair users to turn around. In contrast, non-gendered restrooms position all amenities in a communal area, with partitions extending from the floor to the ceiling and doors of full height to guarantee privacy. Shared sinks can be situated outside the partitioned compartments or each compartment can be equipped with its own sink. This design is considered highly inclusive as it reduces wait times and provides a private toilet for anyone, regardless of their gender identity (Bovens & Marcoci, 2023).

The implementation of gender-inclusive restrooms aligns with the principles of UD, promoting inclusivity and diversity. Research-based models indicate that the implementation of gender-neutral restrooms can lead to a decrease in average waiting times, thereby improving the customer experience in public spaces such as cafes. This presents businesses with the potential to decrease the number of facilities and consequently reduce costs by transitioning all restrooms to be gender-neutral, without causing an increase in waiting times. These findings can be utilized to reshape the discourse surrounding gender-neutral restrooms, making them more appealing to a broader audience and eliminating the typical restroom queues. Enhanced designs and behavioral tactics can be employed to counter any resistance. Various strategies can be implemented to address concerns that gender-neutral restrooms may be unsafe, cause discomfort or be unhygienic (Bovens & Marcoci, 2023).

Handrails The American Disabilities Act (ADA) provides specific guidelines for restroom designs. For example, it is suggested that the support bar on the wall next

to the toilet should have a minimum length of 42 inches, starting within 12 inches of the back wall and extending at least 54 inches from it. The support bar on the back wall should be at least 36 inches long and extend from the centerline of the toilet a minimum of 12 inches on one side and a minimum of 24 inches on the other side. The height of the compliant support bar in ADA is between 33 and 36 inches above the finished floor. The grab bars should be installed with a 1.5-inch allowance between the bar and the wall to allow ample space for the user's hands to wrap around it. The bar should be 1-1/4" to 1-1/2" wide (Sanath et al., 2016). Several studies highlight the importance of properly installed grab bars and handrails near toilets. These installations are emphasized as they can reduce the risk of falls and injuries in the restroom (Grant, 2023).

Doorways and handles door entrances should ensure a minimum clear width of 32 inches. Doorways with swinging doors should have their clear apertures measured with the door open at a 90-degree angle, measured from the door's face to the stop. Lever-type handles are preferred over knobs as they do not require gripping or twisting, making them more accessible for individuals with disabilities. Similar to door handles, lever-type handles on faucets are more accessible as they do not require gripping or twisting. This design is particularly beneficial for individuals with limited hand strength or dexterity (United States Access Board, 2010).

Lever-type door handles and faucets are recommended due to their ease of use. They should be mounted for easy reach, between 900–1,200 mm above the finished floor level. This design consideration allows for a wider range of individuals, including those with disabilities or temporary impairments, to comfortably and independently access the cafe (Elkink, 2015).

Automatic doors and faucets can greatly enhance the ease of use for individuals with mobility issues or those who have their hands full. Manual, handle-operated faucets have been found to be a source of bacterial infections, demonstrating the need for touchless, automatic designs. Similarly, door handle design can impact bacterial contamination levels, with certain designs being associated with higher contamination levels (Wojgani et al., 2012).

Sink and mirror height the ADA provides guidelines for accessible design, including specifications for sink height in restrooms. According to these guidelines, access to the sink must be at least 30" x 48" (760 x 1220 mm), ensuring that individuals, including those in wheelchairs, can comfortably use the sink (Franco, 2018). Accessible sink heights not only align with ethical and social justice considerations but can also broaden the customer base and enhance the reputation of the establishment (Dolph, 2021).

However, it's important to note that the implementation of accessibility norms, such as sink height, can sometimes conflict with daily routines or aesthetic considerations. For instance, a study found that while some accessibility norms were appreciated, others were seen as limiting activities or conflicting with views. This highlights the importance of considering the specific user needs when implementing UD principles (Brulé, 2022).

In the UD, the placement and height of mirrors should be carefully considered. Lowered mirrors, in particular, are an essential element in the consideration of UD. They ensure that all individuals, regardless of their height or whether they are standing or using a wheelchair, can use the mirrors effectively. This is particularly important in restrooms, where mirrors are often used. The bottom edge of the mirror should be no higher than 40 inches (1000 mm) above the floor. This allows a clear line of sight for

a person in a wheelchair. Additionally, the mirror should be mounted with the top edge at a minimum of 74 inches (1850 mm) above the floor to accommodate standing users (Rossetti, 2009).

Furniture selection; is integral to Universal Design (UD). Sturdy, comfortable and easily movable furniture accommodates different user needs, contributing to the overall accessibility and comfort of the coffee shop (U.S. Access Board, 2010).

Furniture should be adaptable and multi-functional to cater to a diverse range of users. This includes considerations such as adjustable heights for tables and chairs, flexible seating options and furniture that can be easily moved or rearranged. For instance, adjustable-height tables can assist wheelchairs user or who are small or large in stature. This flexibility allows for the accommodation of a diverse range of users and promotes inclusivity (Panero, J., & Zelnik, M. 1979).

The placement and arrangement of furniture should facilitate clear and accessible pathways. This includes considerations such as the width of aisles and corridors and the provision of clear signage. For instance, aisles should be wide enough to accommodate individuals using mobility aids such as wheelchairs or walkers (ADA, 2010).

Moreover, furniture should be designed with safety in mind. This includes considerations such as stability to prevent tipping, rounded corners to prevent injuries and the use of non-toxic materials. For example, dressers and bookshelves should be anchored to the floor and walls to keep them from tipping on top of climbing children (The Center for Universal Design 1997; Grimley, C., & Smith, K. H, 2022).

The ADA provides guidelines for accessible design, including specifications for furniture and fixtures in public spaces, such as cafes. These guidelines include providing wheelchair-accessible seating areas with clear floor space, ensuring

accessible table heights and offering a mix of seating options to accommodate individuals with varying needs. Adaptive seating refers to seating options that can be adjusted or modified to meet the specific needs of an individual. This could include chairs with adjustable heights, seats with removable armrests and tables with adjustable heights. Variety seating, on the other hand, refers to providing a range of seating options to cater to different needs and preferences. This could include a mix of booths, bar stools, armchairs and standard chairs and tables. Such diversity in furniture design not only promotes inclusivity but also improves the quality of life for all users by making everyday tasks more manageable (Burgstahler, S., 2009; Connell, B. R, et al 1997). An accessible table must have a surface height of no less than 28 inches above the floor and no more than 34 inches, according to the Americans with Disabilities Act. There must be a minimum of 27 inches of space between the floor and the table's underside for knee clearance. Every accessible table has an accessible path and every accessible seating arrangement has a clear space on the floor measuring thirty by forty-eight inches. There is 19 inches of unobstructed floor space behind the table to allow room for knees and legs (ADA, 2010; Agarwal, 2020).

Countertops in cafes, for instance, need to be designed with accessibility in mind. Guidelines such as the ADA suggest that most compliant countertops should be no more than 36 inches from the floor, with some allowances for slightly higher or lower counters depending on the specific circumstances also requires minimum unobstructed areas in front of different counter types (ADA, 2010).

Service tables in cafes are an essential component of the dining experience. They serve as the primary interface between the customer and the service staff, facilitating the exchange of food, beverages and payment. The design and layout of service tables can influence the efficiency of service delivery and the overall customer

experience (Bichler, Pikkemaat, & Peters, 2020). From a functional perspective, service tables should be designed to accommodate all the necessary items for service, including plates, glasses, cutlery, napkins and condiments. The size and shape of the table should allow for comfortable seating and easy access for both customers and staff. The surface of the table should be durable and easy to clean and the height should be appropriate for the average sitting position (Dolph, 2021).

In terms of aesthetics, the design of the service table should align with the overall interior design theme of the cafe. The choice of materials, colors and finishes can contribute to the ambiance of the space and enhance the dining experience. Furthermore, the placement of service tables in the cafe should facilitate smooth traffic flow and provide sufficient space for customers and staff to move around comfortably. This is particularly important in busy cafes where efficient service delivery is crucial (Duman & Asilsoy, 2022).

The design and layout of service tables in cafes play a vital role in service delivery and customer satisfaction. By considering both functional and aesthetic aspects, interior designers can create a more efficient and enjoyable dining environment (Celadyn, 2018).

Storage Space in Universal Design Storage space is a crucial aspect of interior architecture, especially when considering Universal Design. The design of storage spaces should be inclusive, considering the needs of all individuals, including those with disabilities (Steinfeld & Maisel, 2012).

Mobility scooter storage for larger establishments, it is also beneficial to have a communal hub for the compliant storage and charging of mobility scooters. Standard unit sizes can accommodate from 2 to 16 scooters, with configurable access systems, finishes, roof types and wall panels (Wang, Loschiavo & Teel, 2021).

Inclusive storage design Inclusive storage design considers various factors such as the height of storage units, the ease of opening/closing, visibility of stored items and safety. For instance, storage units should be designed so that they are easily reachable by both wheelchair users and standing persons (Imrie & Hall, 2001).

In semi-public spaces like cafes, the effect of inclusive storage design is significant. It can enhance the usability of the space for all individuals, regardless of their physical abilities. A more welcoming and inclusive environment, which is a key aspect of social sustainability, can be contributed to by this feature (Carmona, m, et al, 2010).

Typically feature a powered, height-adjustable changing table that is at least 70 inches long and 30 inches wide, with a safety side rail that locks in place. Additional features may include a hoist to assist individuals who cannot move themselves from their wheelchair onto the changing table or commode and a personal shower head for cleaning up. The optimal location for these stations is inside a single-use restroom, also known as a companion care, assisted care or family restroom. This allows caregivers of any gender to assist their loved ones. If a family restroom is not available, the changing table can be placed in either the men's or women's room, provided privacy is ensured. Installing such a station can expand a business's customer base to include individuals with medical needs and disabilities, demonstrating a commitment to inclusion and welcoming everyone, regardless of their medical conditions (ChangingSpacesUSA; Bagagli, B. P., et al, 2021; Patatoukas, P. N. 2012; Homburg, C, et al, 2012).

For larger establishments, it is also beneficial to have a communal hub for the compliant storage and charging of mobility scooters. Standard unit sizes can

accommodate from 2 to 16 scooters, with configurable access systems, finishes, roof types and wall panels (Wang, Loschiavo & Teel, 2021).

The layout; should be flexible and adaptable, allowing for changes in the use of space over time. This adaptability, achieved through modular furniture, movable partitions and flexible layouts, ensures that the space can evolve with the changing needs and preferences of the users, thereby promoting long-term usability and satisfaction. Different types of spaces, such as quiet areas for focused work, collaborative spaces for group activities and comfortable areas for relaxation, should be considered in the layout. These spaces should be clearly defined and easily identifiable, helping users understand the intended use of each area (Feldman, 2023). easy-to-navigate layouts for individuals with mobility issues are essential (Center for UD, North Carolina State University, 1997; Nagpal, 2022).

Adequate spacing between furniture is essential to create environments usable by all people, especially in cases where customers need to navigate the space comfortably and safely (Preiser, 2001). The importance of adequate spacing lies in its impact on ease of movement, safety and comfort. It allows customers, including those using wheelchairs or other mobility aids, to move freely within the cafe. It also facilitates the movement of staff carrying food and drinks, prevents accidents caused by bumping into furniture or other customers and contributes to a comfortable and enjoyable dining experience, allowing customers to dine without feeling cramped (Steinfeld, 2010).

The CAPT for inside the cafe should be a minimum of 1200mm for short segments and 1500mm for longer segments. There should be enough space between seating options to help conversation flow without crowding a room. A general guideline suggests providing between 3.5' and 10' between seating options. Furniture

should be arranged in a way that does not obstruct the accessible route. For example, chairs and tables should not block the path to the restrooms or exits (ADA, 2010; Gremmen, m, et al., 2016).

Chapter 4

CASE STUDY

In this chapter, we delve into the case study methodology, limitations, analysis and findings. We begin by explaining of case studies and introducing an observational checklist includes UD principles and user diversity considerations. In the checklist's fundamental components are discussed. Subsequently, seven case studies, considering Universal Design (UD) principles for diverse users are being investigate. Moving forward, we analyze the case studies, followed by the findings. Finally, we offer recommendations for local cafes in undeveloped cities. These insights aim to enhance accessibility and inclusivity in the design of local cafes, benefiting both owners and users.

4.1 Methodology of Case Study

This investigation focuses on cafes along İsmet İnönü Blv in Famagusta, Northern Cyprus. This location was chosen strategically due to its proximity to the university, schools, shopping centers and hotels. Additionally, this Blv connects the historical place of the walled city to the Eastern Mediterranean University as can be observed in figure 5. It is a bustling thoroughfare that fosters social interaction among people of varying ages, genders and backgrounds. It provides a conducive environment for communication and leisure, attracting both residents and tourists. The study specifically focuses on local cafes, without any branches in Famagusta, particularly along İsmet İnönü Blv. As illustrated in Figure 4, seven cafes on this boulevard have been identified.



Figure 4: Case Study Map (Famagusta) (Google Map)

The methodology for this study involves an observational approach and analyzes the application of UD principles in the interior design of these cafes for diverse users. Data is collected through photography and observational notes, providing a visual record of the physical environment and documenting the observations. A checklist based on UD principles application in interior of cafes for diverse user guides the observation and analysis which include the information and data of case study observations.

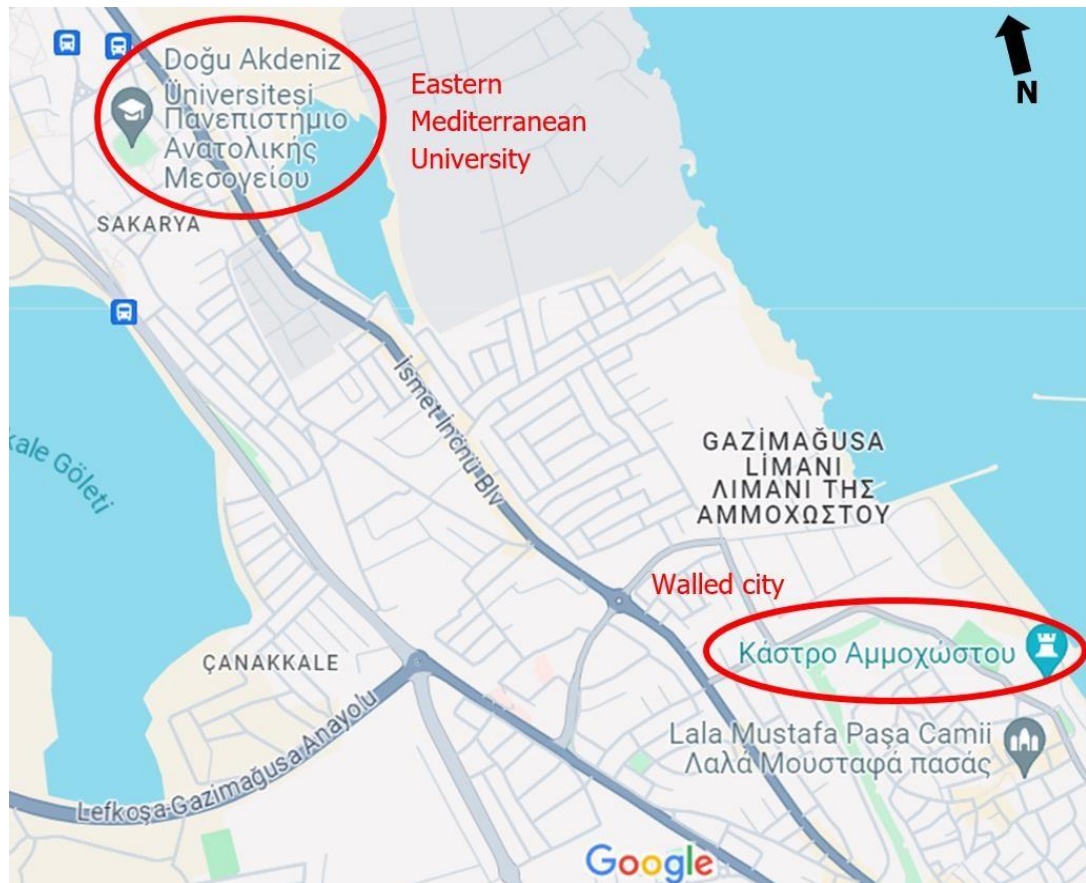


Figure 5: Map Strategic Location (Famagusta) (Google Map)

The checklist is a comprehensive template used for evaluating the application of UD principles in the interior architecture of cafes, located on İsmet İnönü Blv in Famagusta. The template is divided into various sections, each capturing specific aspects of the cafe's design and accessibility features. The case study includes the cafe's name, the sketch plan, presented at a scale of approximately 1/100 which have three main areas (seating, service and restroom area). The seating area is marked in green, the service area in pink and the restroom in yellow. Each of these main parts is divided into two sections: Section A contains pictures of each area and Section B provides detailed information. Section B is further subdivided to provide comprehensive information about the cafe's compliance. The template serves as a practical tool for cafe owners or managers. It helps them ensure their establishments are universally accessible and comfortable for all customers.

This case study aims to enrich our understanding of the role and significance of local cafes in undeveloped cities in social life. It also highlights the importance of Universal Design in enhancing the overall cafe experience. It provides valuable insights into how interior architecture can shape customer experience, engagement and inclusivity. It underscores the unique site of individual cafes along İsmet İnönü Bly, highlighting their role as social hubs and the importance of Universal Design in shaping their semi-public space.

Figure 6 This checklist is a combination of the rules and design consideration of UD principles in interior related to cafes and the design consideration for diverse user applications. Each cafe is evaluated the application of UD principles through CAPT, accessibility and furniture for three main areas. CAPT include assistive aid accessibility, layout for seating area. CAPT and entry include assistive aid accessibility, ramp and elevator for service area. CAPT include assistive aid accessibility for restroom area. Accessibility includes signage for seating area and readable and brail menu, tactile auditory, Multilanguage and clear signage for service area also multi-gender restroom, signage, easy to use handles and handrails for restroom area. For furniture include table and chair variety for seating area, counter and service table for service area and sink and mirror and changing station for restroom area. The findings are reported in a comprehensive document detailing the observations and analysis for each cafe, including both strengths and areas for improvement in the application of UD principles.



Figure 6: Case Study Table Explanation

4.2 Limitations of Case Study

The study has eliminations regarding to the user diversity in case studies. Mental health and sensory impairments, particularly those affecting smell and touch, were excluded in case study. The factors that is not accessible for observational case study. Children from the user diversity were also excluded from the case studies due to the focus on physical factors. Discussion on employee training and implementing new designs and technologies has been eliminated.

The numbers of cafes in case study are also other factor that is included. From 20 cafes with access to main road only 8 local cafes with no branch in Famagusta are being investigated. The case study process for cafes may encounter challenges. These include access to certain cafes due to renovation and construction. The cafes chosen

from the undeveloped city of Famagusta in Cyprus, provide a valuable snapshot of diverse cafe environments.

While time constraints naturally bound the extent of case study and analysis, it also focuses the study, allowing for a more in-depth exploration within the given scope. This ensures a concentrated and detailed examination of the subject matter.

The application of Universal Design in cafes considerations for alarm systems, safety, color, light and material were put aside. Despite these limitations, the study provides valuable insights into the application of UD in interior architecture and its capacity to effect positive change in semi-public spaces.

Specific measurements were not included in case studies due to business constraints and observational method that has been employed, although the photographs are available of each specific details. These exclusions helped to narrow the focus of the research, but it also highlights potential subjects for future exploration in this field, underscoring the multifaceted nature of UD and its application in interior architecture. In spite of these limitations, the study offers insightful information about the use of UD in interior architecture and its capacity to effect positive change in semipublic spaces.

4.3 Analysis of Cafes

In the seating areas only cafe Time and cafe Pascucci (28.57%) have designed their seating areas with clear paths for movement and navigable layouts. These considerations are especially beneficial for individuals using assistive aids. The remaining cafes (71.42%) present potential obstacles for peoples with physical, sensory or temporary disabilities, as well as the elderly and children, due to obstructions or level differences. None of the cafes (0%) provide signage, making it challenging for customers, particularly those with sensory disabilities. All cafes except

cafe Moto (14.28%) offer a variety of table and seating options, catering to a wide array of customers, including children, the elderly and individuals with different needs.

In the service areas, cafe Time and cafe Pascucci (28.57%) provide accessible entries, a crucial feature for individuals with physical disabilities. The rest of the cafes (71.42%) pose potential difficulties for those with physical, sensory, temporary disabilities, different age categories and pregnant women. None of the cafes that require ramps (0%) provide them, except Coffeeholic that there is ramp available but it is not usable due to furniture closing the path. This gap impacting individuals with mobility impairments who need assistive aids accessibility. Additionally, none of the multi-floor cafes that require elevators (0%) provide them, affecting those who cannot use stairs or individuals with difficulty to use stairs like temporary disability elderly. None of the cafes (0%) offer Braille menus, presenting a significant barrier for visually impaired customers. However, Coffeeholic, Moto, Crunchy cafes (42.85%) provide readable menus, which cater to visually impaired individuals and those with literacy challenges. None of the cafes (0%) have signage in the service areas, complicating navigation for all customers, particularly those with sensory disabilities and non-native speakers. Cafe Pascucci and Crunchy (28.57%) have counters at accessible heights, facilitating service for individuals with physical disabilities, temporary disabilities and different age groups. The remaining cafes (71.42%) cannot be used for some individuals with physical disability. All the cafes except Time, Okka cafes (71.42%) did not provide service tables.

The restrooms in the cafes were another area of investigation. Pascucci, Coffeeholic, Okka cafe (42.85%) have restrooms designed with assistive aid accessibility, essential for individuals with physical disabilities. However, only Cafe Time (14.28%) offers multigender restrooms that could help the usage of changing

station for women and men which were not available in these case studies. None of the cafes (0%) have handrails and changing stations in the restroom. Also, the sink and mirror height are accessible for all in Pascucci, Beckett and Crunchy cafe (42.85%). Time, Crunchy, Okka and Pascucci cafe (57.14%) provide signage for restrooms, aiding navigation for all customers, especially those with sensory disabilities. Also Time, Crunchy, coffeeholic and Okka cafes (57.14%) have restrooms with easy-to-use handles, important for individuals with limited hand dexterity.

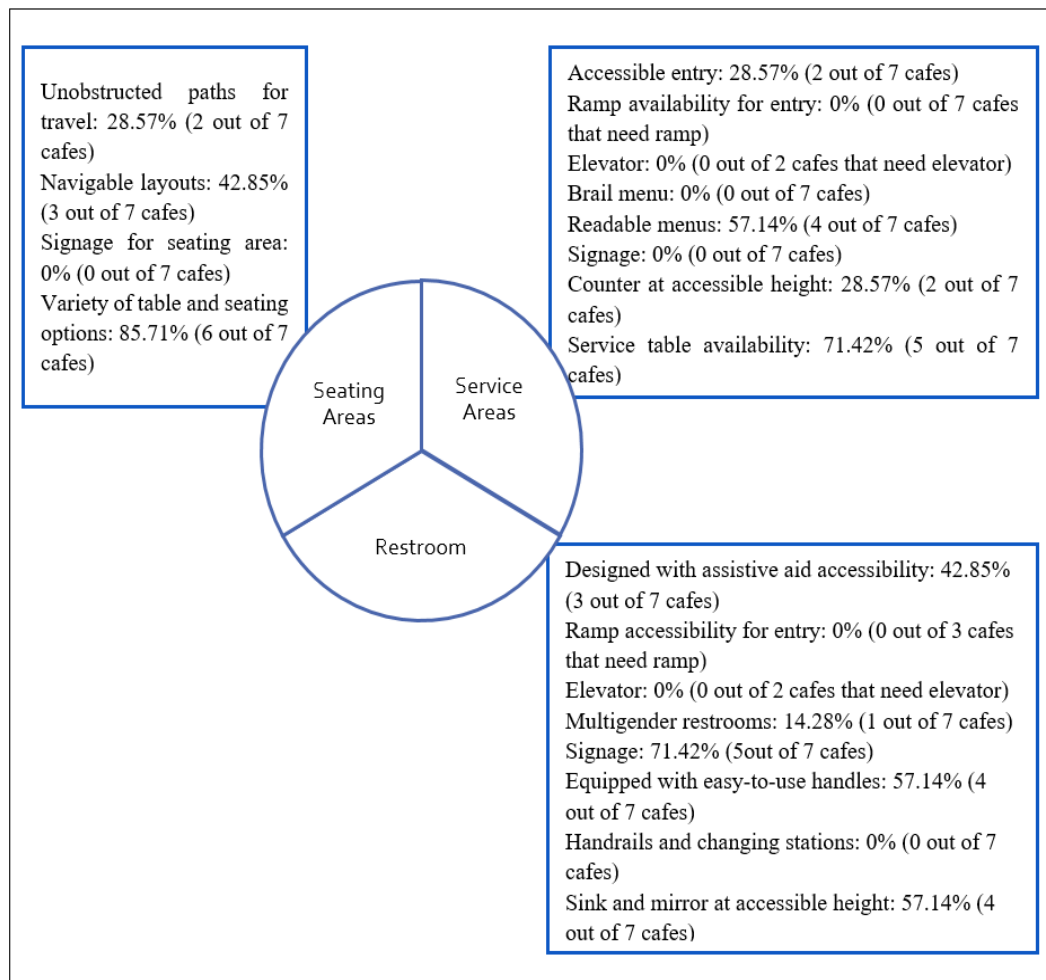


Figure 7: Accessibility and Inclusivity of Features in Cafes on İsmet İnönü Blv in Famagusta.

The study effectively highlights the significant role of interior design in shaping customer interactions and inclusivity within these communal hubs. However,

the findings reveal a considerable gap in the implementation of UD principles as can be observed in figure 7. The study reveals that only a quarter of the cafes have designed their seating and service areas with clear paths for movement and accessible entries, respectively. This lack of consideration for individuals using assistive aids and those with physical, sensory or temporary disabilities is a significant shortcoming. The absence of signage in all cafes further complicates navigation for customers, particularly those with sensory disabilities and non-native speakers.

In terms of restroom facilities, while half of the cafes have restrooms designed with assistive aid accessibility, the lack of handrails, changing stations and multigender restrooms in most cases is a notable deficiency. These findings underscore the urgent need for more inclusive design strategies that cater to a diverse range of customers.

In terms of the study's evaluation, it focuses on the social function and businesses. The study successfully identifies key areas of improvement and potential impact on diverse groups, thereby reinforcing the importance of integrating UD principles into interior architecture.

Starting with the first cafe, Go Coffee Time, we'll examine its interior in the three main areas of seating serving and restroom. As we continue our journey, we'll delve into other cafes, capturing the unique characteristics of each.

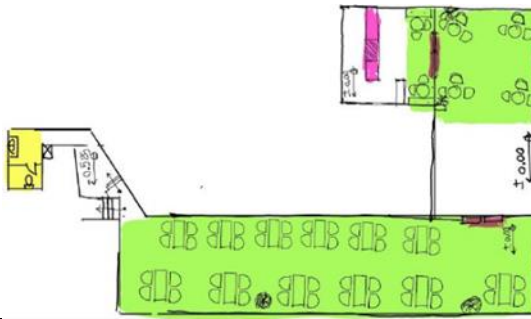
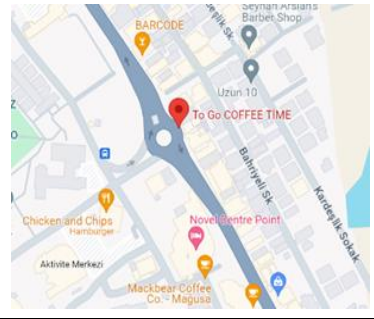
4.4.1 To Go Coffee Time

Cafe Time is a single-floor establishment, as depicted in the schematic plan Table 1. All three main areas are located on the ground floor. It's designed with a continuous accessible path of travel. This includes assistive aid accessibility features such as an automatic door and a navigable layout. In cafe there is no signage but the variety of seating and table options are available.

The service area is equipped with an automatic door, ensuring an unobstructed path for all patrons and as this area is in ground floor there is no need for ramp and elevator. The menu is displayed on a black background at a height above eye level, but there is no braille version available and signage is absent. The service area includes a counter and a service table, but there are no adjustable or short-height options available.

The restroom facilities in in ground floor but to access it there are few stepdown, no ramp is available and the pathway is narrow. The restroom itself does not provide an easy-to-navigate path or sufficient space for rotation. The restroom is unisex with signage indicating its location. Although the restroom is equipped with easy-to-use handles there are no handrails in the restroom. The sink does not provide adequate clearance underneath for all users and it lacks handrails and a changing station.

Table 1: Cafe To Go Coffee Time Observation Table

Cafe Name	Plan	Location	Address	
To go coffee time			Northern Cyprus, ismet inönü Bİv, 4WR7+XQG, Gazimağusa 99450	
Function	Pictures			
Seating				
CAPT		Accessibility	Furniture	
Assistive aid Accessibility	Layout	Signage	Variety of Table options	Variety of Seat options
√ *	√	X	√	√

* with Automatic Door

Table 1: Cafe To Go Coffee Time Observation Table (continued)

Service										
CAPT And Entry			Accessibility						Furniture	
Assistive aid Accessibility	Ramp	Elevator	Menu		Signage				Counter	Service table
			Brail	Readable	Tactile	Auditory	Multilanguage	Clear		
√ *	-	-	X	X **	X	X	X	X	X ***	X
Restroom										
CAPT			Accessibility				Furniture			
Assistive aid Accessibility	Ramp	Elevator	Multi gender	Signage	Easy to use Handles	Handrails	Sink&Mirror	Changing Station		
X	X	-	√	√	√	X	X *****	X		

* with Automatic Door

** Dark Background

*** Not available in Short hight

***** Not Enogh space Under the sink

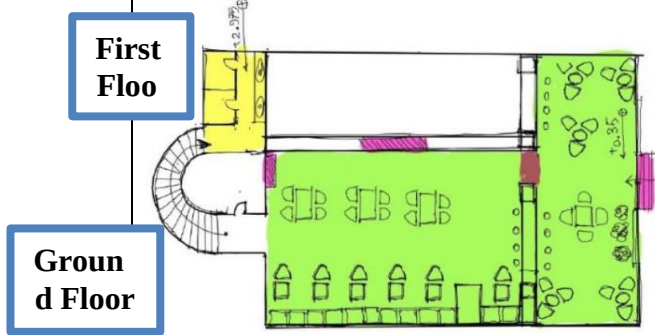
4.4.2 Crunchy

Cafe Crunchy is a two-floor cafe (grand floor and first floor) as show in the schematic plan Table 2, the seating area with the narrow pathways, complex layout and lacks clear signage. Despite these challenges, the cafe offers a variety of seating and table options.

The service area can be reached in ground floor but with few steps. However, there are no ramps or elevators to facilitate easy access. The menu is available only in a written format and there is no brail and signage. The cafe does provide a service table and a counter of appropriate height.

The restroom facilities are located on the first floor. There are 16 step up and lack of ramps and elevators, particularly for those who rely on assistive devices. The restroom itself does not offer an easy-to-navigate path or sufficient space for rotation. Separate facilities are provided for men and women and visual signage is present. The restroom is equipped with easy-to-use handles, but lacks handrails. The sink and mirror height are accessible for all, with enough space underneath, but there is no changing station available.

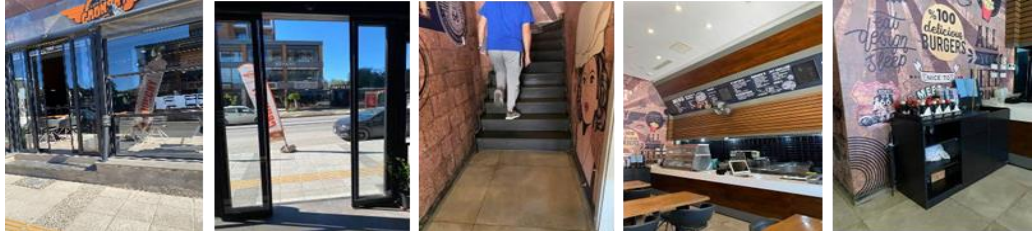
Table 2: Cafe Crunchy Observation Table

Cafe Name	Plan	Location	Address	
Crunchy	First Floor Ground Floor 		4WR7+MXV, Gazimağusa 99450	
Function	Pictures			
Seating				
CAPT		Accessibility	Furniture	
Assistive aid Accessibility	Layout	Signage	Variety of Table options	Variety of Seat options
X *	X **	X	√	√

* Narroow pathway

** Not easy to navigate or pass

Table 2: Cafe Crunchy Observation Table (continued)

Service										
CAPT And Entry			Accessibility						Furniture	
Assistive aid Accessibility	Ramp	Elevator	Menu		Signage				Counter	Service table
			Brail	Readable	Tactile	Auditory	Multilanguage	Clear		
X	X	X	X	√	X	X	X	X	√	√
Restroom										
CAPT			Accessibility				Furniture			
Assistive aid Accessibility	Ramp	Elevator	Multi gender	Signage	Easy to use Handles	Handrails	Sink&Mirror	Changing Station		
X *	X	X	X	√	√	X	√	X		

* Stairs with no elevator

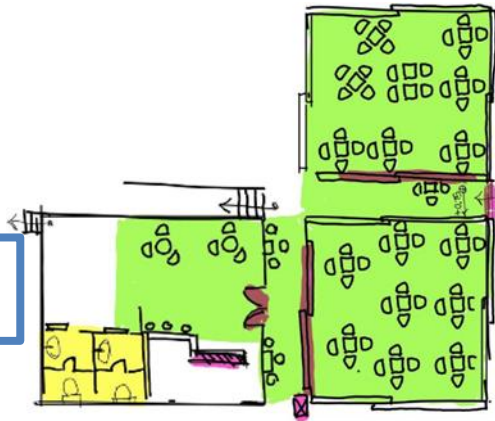
4.4.3 Moto

Cafe Moto, is situated on ground floor evident from the schematic plan Table 3. The layout was challenging to navigate due to absence of clear pathways and the narrow gaps between furniture. Furthermore, no signage, no different categories of seating and table options are available.

The entrance to the service area is accessible via steps, but there is no ramp or unobstructed path for those using assistive aids. The menu is provided in a written format, with no braille version and there is no signage available. The counter and service table are available but do not offer a short height option for counter.

The restroom lacks sufficient space for easy maneuvering or movement for those utilizing assistive aids. As it is located on the ground floor, there's no need for a ramp or elevator. The restroom facilities are accessible to both men and women, but there is no signage. The restroom lacks easy-to-use handles and handrails. The sink and mirror are not at an appropriate height and there is no changing station.

Table 3: Cafe Moto Observation Table

Cafe Name	Plan	Location	Address	
Moto	Ground Floor 		Famagusta 99450	
Function	Pictures			
Seating				
CAPT		Accessibility	Furniture	
Assistive aid Accessibility	Layout	Signage	Variety of Table options	Variety of Seat options
X *	X **	X	X	X

* Narrow CAPT

** Not easy to navigate or pass

Table 3: Cafe Moto Observation Table (continued)

Service										
CAPT And Entry			Accessibility						Furniture	
Assistive aid Accessibility	Ramp	Elevator	Menu		Signage				Counter	Service table
			Brail	Readable	Tactile	Auditory	Multilanguage	Clear		
X *	X	-	X	√	X	X	X	X	X **	√
Restroom										
CAPT			Accessibility				Furniture			
Assistive aid Accessibility	Ramp	Elevator	Multi gender	Signage	Easy to use Handles	Handrails	Sink&Mirror	Changing Station		
X	-	-	X	X	X	X	X	X		

* Steps in enetry

** Not available in Short hight

4.4.4 Okka

Cafe Okka is a one floor cafe It can be observed in the schematic plan Table 5. Cafe is located on the ground floor. The seating area has level differences, with no ramp available. The narrow gaps between furniture, makes the navigation difficult due to the lack of clear pathways and the presence of furniture in the way. No signage is available but the cafe offers a variety of table options and seating arrangements.

The entrance includes steps and no ramps are present although the back door is available for assistive aid users but with level difference. The menu is not easily readable due to the small font size; there is no braille version available. There is no service table and the counter height is not adjustable or at an accessible height, cafe also lack signage.

The restroom facilities are accessible to all and include separate restrooms for women and men, with signage indicating their locations. These restrooms are equipped with easy-to-use handles. However, no handrails available, the sink and mirror are not at accessible heights for all and no changing station.

Table 4: Cafe Okka Observation Table

Cafe Name	Plan	Location	Address	
Okka	Ground Floor		İsmet İnönü Blv, Gazimağusa 99450	
Function	Pictures			
Seating				
CAPT		Accessibility	Furniture	
Assistive aid Accessibility	Layout	Signage	Variety of Table options	Variety of Seat options
X *	X **	X	√	√

* Level difference, steps, low distance between furnitures

** Not easy to navigate or pass

Table 4: Cafe Okka Observation Table (continued)

Service										
CAPT And Entry			Accessibility						Furniture	
Assistive aid Accessibility	Ramp	Elevator	Menu		Signage				Counter	Service table
			Brail	Readable	Tactile	Auditory	Multilanguage	Clear		
X *	X **	-	X	X ***	X	X	X	X	X ****	X
Restroom										
CAPT			Accessibility				Furniture			
Assistive aid Accessibility	Ramp	Elevator	Multi gender	Signage	Easy to use Handles	Handrails	Sink&Mirror	Changing Station		
√	-	-	X	√	√	X	√	X		

* Steps in entrance

** Back door available with level difference

*** Small written wall menu

**** Not available in Short hight

4.4.5 Beckett

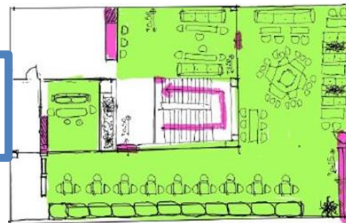
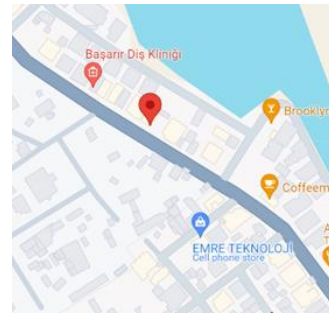
Cafe Becket is a three-floor establishment, as shown in the schematic plan

Table 5. The seating area which is consist of ground and first floor of the cafe includes 20 steps up with no ramp and has limited space between furniture, with no clear pathways or signage for navigation. However, the cafe offers a variety of table and seat options.

The entrance of the cafe is narrow and includes level difference. There are no ramps or elevators available for assistive aid accessibility. The menu is provided in a paper format, with no braille accessibility and there is no signage for navigation within the cafe. The service area of the cafe features a counter that is not at a short height or adjustable and a service table that is located close to steps.

Restroom is located in basement 16 step-down and there are no ramps or elevators available for assistive aid accessibility to the restroom. Additionally, the space in the restroom and its hallway is limited for movement and rotation. The restroom is accessible to both men and women. It does not have signage, easy-to-use handles and handrails. The sink and mirror in the restroom are at an accessible height for all. However, the restroom does not include a changing station.

Table 5: Cafe Beckett Observation Table

Cafe Name	Plan	Location	Address	
Beckett	Ground Floor  Basemen  First Floor		Northern Cyprus, İsmet İnönü Blv 186, Gazimağusa 5600	
Function	Pictures			
Seating				
CAPT		Accessibility	Furniture	
Assistive aid Accessibility	Layout	Signage	Variety of Table options	Variety of Seat options
X *	X **	X	√	√

* Level difference, steps

** Not easy to navigate or pass

Table 5: Cafe Beckett Observation Table (continued)

Service										
CAPT And Entry			Accessibility						Furniture	
Assistive aid Accessibility	Ramp	Elevator	Menu		Signage				Counter	Service table
			Brail	Readable	Tactile	Auditory	Multilanguage	Clear		
X *	X	X	X	√	X	X	X	X	X **	√ ***
Restroom										
CAPT			Accessibility				Furniture			
Assistive aid Accessibility	Ramp	Elevator	Multi gender	Signage	Easy to use Handles	Handrails	Sink&Mirror		Changing Station	
X	X	X	X	X	X	X	√		X	

* Narrow door steps in entrance

** Not in Short hight

*** Close to steps

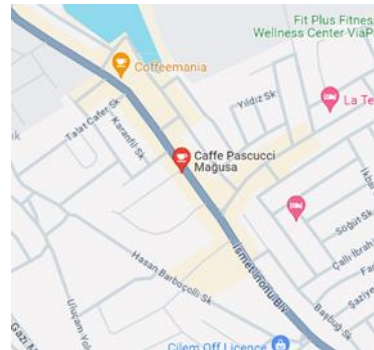
4.4.6 Pascucci

Cafe pascucci, is in a ground floor evident from the schematic plan in Table 7. Seating area designed with a clear and navigable path of movement. Despite the absence of any form of signage, the cafe offers a variety of table and seating options.

The service area of Cafe Pascucci is initially accessed via stairs up no ramp or elevator present. However, a back door is available for assistive aid accessibility. The menu is presented in an accessible font, but no other accessibility features like brail are provided. The cafe lacks signage. The counter top and service table is of an accessible height for all.

The restrooms in Cafe Pascucci are accessible for individuals with assistive aids, providing a path of travel and sufficient space for rotation and movement. Separate restrooms are available for men and women. Signage is available and restroom is equipped with easy-to-use handles. However, there are no signage, handrails or changing stations present.

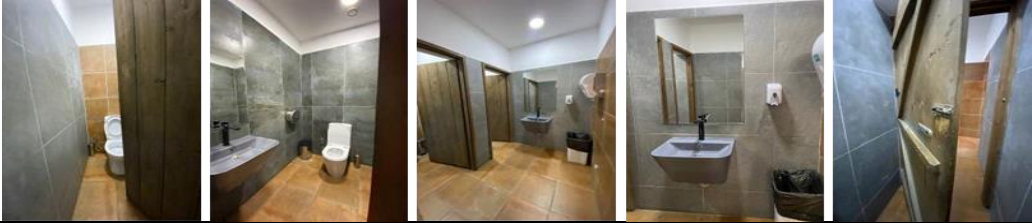
Table 6 : Cafe Pascucci Observation Table

Cafe Name	Plan	Location	Address	
Pascucci			Northern Cyprus, ismet inönü Bİv No: 95, Gazimağusa 5000	
Function	Pictures			
Seating				
CAPT		Accessibility	Furniture	
Assistive aid Accessibility	Layout	Signage	Variety of Table options	Variety of Seat options
√	√	X	√	√

* Naroow CAPT

** Not easy to navigate or pass

Table 6: Cafe Pascucci Observation Table (continued)

Service										
CAPT And Entry			Accessibility						Furniture	
Assistive aid Accessibility	Ramp	Elevator	Menu		Signage				Counter	Service table
			Brail	Readable	Tactile	Auditory	Multilanguage	Clear		
√	X *	-	X	X **	X	X	X	X	√	√
Restroom										
CAPT			Accessibility				Furniture			
Assistive aid Accessibility	Ramp	Elevator	Multi gender	Signage	Easy to use Handles	Handrails	Sink&Mirror	Changing Station		
√	-	-	X	√	X	X	√	X		

* Back door available with level difference

** Small

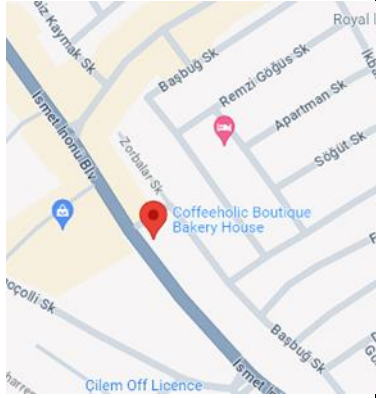
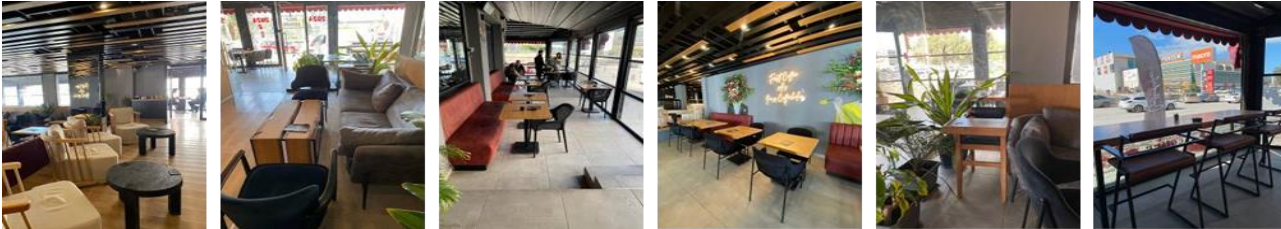
4.4.7 Coffeholic

Cafe coffeholic is in a ground floor It can be observed in Table 7. Cafe is located on the ground floor. The seating area layout is clear, but the continuous path for movement presents a level difference with steps, posing a challenge for transit with assistive aids. Signage is not present in the area although, variety of seating and table options within is provided.

The service area is accessible via a ramp at the entrance. However, due to furniture placement, the ramp is not accessible. The entrance consists of two doors, one of which is always closed, limiting the path of travel for individuals with assistive aids. Upon entry, while a clear menu is available, it is only in written format and no brail feature. There is no signage for the service area. A wide countertop for ordering greets visitors however; this counter is not available at a short height. A service table is present but is located close to stairs.

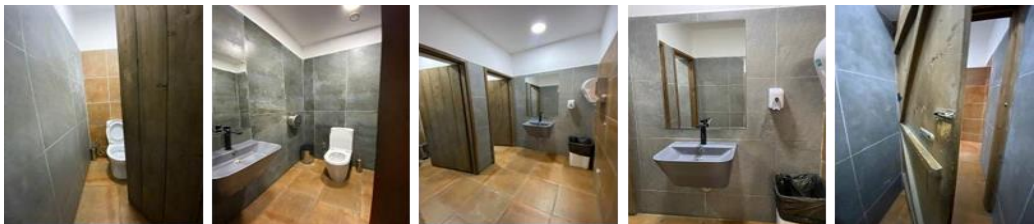
The restrooms in cafe are accessible via a two-sided door and provide sufficient space for movement and rotation. Separate restrooms are available for men and women. However, there is no signage, although easy-to-use handles are present. The service area lacks handrails. Additionally, the space under the sink is not sufficient for easy accessibility and there is no changing station.

Table 7: Cafe Caffeholic Observation Table

Cafe Name	Plan	Location	Address	
Caffeholic	 Ground Floor		Northern Cyprus, ismet inönü Bİv No: 64, Gazimagusa 5000	
Function	Pictures			
Seating				
CAPT		Accessibility	Furniture	
Assistive aid Accessibility	Layout	Signage	Variety of Table options	Variety of Seat options
X*	√	X	√	√

* Level difference, steps

Table 7: Cafe Caffeholic Observation Table (continued)

Service										
CAPT And Entry			Accessibility						Furniture	
Assistive aid Accessibility	Ramp	Elevator	Menu		Signage				Counter	Service table
			Brail	Readable	Tactile	Auditory	Multilanguage	Clear		
X *	X **	-	X	√	X	X	X	X	X ***	√ ****
Restroom										
CAPT			Accessibility				Furniture			
Assistive aid Accessibility	Ramp	Elevator	Multi gender	Signage	Easy to use Handles	Handrails	Sink&Mirror	Changing Station		
√	-	-	X	X	√	X	X *****	X		

* Narrow door Steps in entrance ** No CAPT *** Not available in

4.5 Findings of Universal Design in Cafes

The research findings emphasize the crucial role of Universal Design (UD) in interior architecture, particularly within semi-public spaces like cafes in undeveloped cities. To answer the central research question revolves around how UD can create universally accessible and inclusive environments for diverse users this study investigates the design considerations. The study reveals both the presence and limitations of UD in local cafes along İsmet İnönü Boulevard in Famagusta, Northern Cyprus. While some aspects align with UD principles, others fall short, impacting overall accessibility. These shortcomings affect individuals of all ages, genders and abilities, underscoring the need for consistent and comprehensive UD practices in cafes. These lacks in application of UD are the key issue in undeveloped cities.

Actionable recommendations are provided to enhance accessibility and engagement in cafes, addressing specific design elements such as seating arrangements, layout and signage that can create more inclusive spaces. These practical steps aim to bridge the gap between existing design practices and the universal accessibility in undeveloped cities. Despite the absence of formal regulations in, local cafes play a pivotal role in creating inviting and accessible semi-public spaces within undeveloped cities. The case study demonstrates the practical application of UD principles and their impact on social engagement and business outcomes.

In summary, this research contributes valuable insights, emphasizing the importance of UD in fostering inclusivity and accessibility, even in contexts where professional interior architecture expertise and regulations may be lacking.

Additionally, the study deepens our understanding of local cafes' societal role and UD's influence on customer interactions, inclusivity and community involvement. By scrutinizing the accessibility of seven cafes, particularly focusing on seating areas,

service spaces and restrooms, the study highlights the necessity of integrating UD principles into interior architecture in undeveloped cities.

The investigation of seven case studies reveals the percentage of UD implementation and areas for improvement. The cafe interior is divided into three main parts: seating rooms, service areas and restrooms. The accessibility percentages range from 0% to 85.71%, providing a visual representation of the current state of Universal Design along İsmet İnönü Boulevard. The seating and service area has the lowest availability.

Figure 8 illustrates the availability of design considerations at 50% or more for the three main areas. Overall, this research underscores the need for continued efforts to enhance accessibility and inclusivity through UD principles in interior architecture of undeveloped cities.

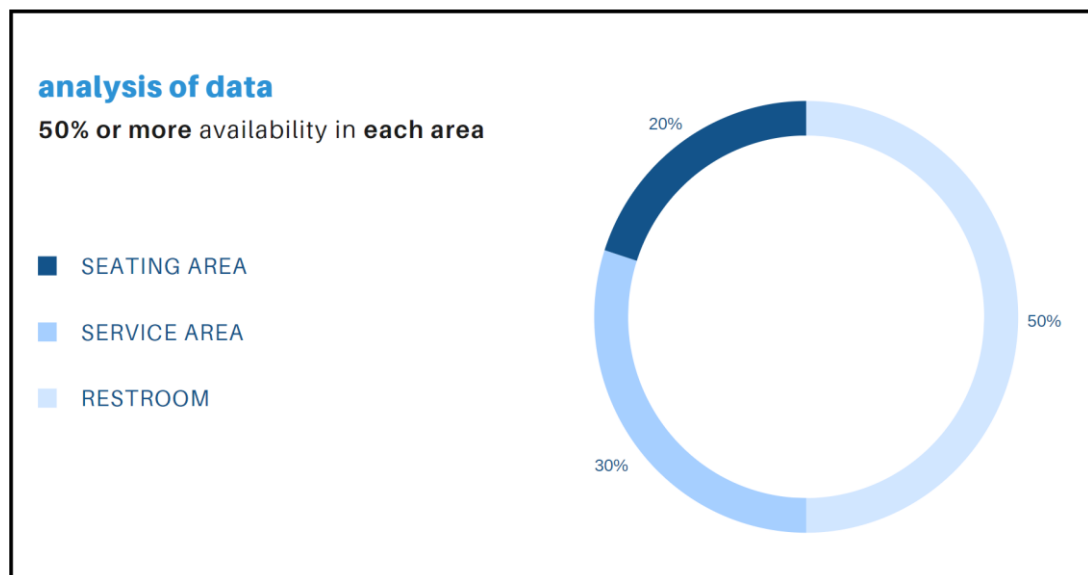


Figure 8: UD Consideration of More than 50%

Chapter 5

RECOMMENDATIONS AND CONCLUSION

In this chapter, building upon the analysis and findings from the previous section, the study introduces an additional table. This table complements the examined checklist for cafe owners in undeveloped cities, aiming to enhance inclusivity and accessibility for users. Moreover, by implementing these recommendations, business owners can also boost customer engagement. The combined efforts of improved accessibility and increased engagement contribute to creating more welcoming and thriving cafe spaces.

5.1 Recommendations

The table 9 serves as an additional suggestion in this study guide for the implementation of UD within cafes in undeveloped cities. It underscores the significance of assistive aids, layout and accessibility and suitable furniture across various areas of a cafe. These recommendations are helping to design more inclusive environment that accommodates a diverse user, including those with different ability age and gender for undeveloped cities. Attention to these aspects can enhance service provision, improve patron experience and promote inclusivity and accessibility. Such an approach not only benefits the patrons but also potentially expands the cafe's customer base, thereby positively impacting its business. The implementation of these recommendations additional to the checklist represents a significant stride towards the creation of a universally accessible semi-public space.

Table 8: Recommendation Table for Local Cafe

Design Feature	Seating Area	Service Area	Restroom
Assistive Aids	Hearing loop systems for those with hearing impairments	Ramps and elevators for wheelchair accessibility	Grab bars and handrails
Layout/Accessibility	For shorter segments, there should be at least 1200mm of clear pathway and for longer ones, 1500mm.	Braille and large print menus, clear and easy-to-read, tactile and auditory signage	Multigender restrooms, clear, auditory and tactile signage, easy-to-use handles.
Furniture	Variety of table and seat options	Lowered counters and service tables	Accessible sink and mirror, changing station

The application of UD principles can lead to creative solutions to design challenges, creating flexible spaces that cater to all customers' needs. Further research and practice in this field can ensure that cafes and similar establishments are not only accessible but also profitable, makes them welcome to all.

The application of UD principles can increase the customer. By creating an environment that is accessible and comfortable for all, cafes can ensure that customers have a positive experience. Businesses also have a social responsibility to be inclusive. By applying UD principles, cafes demonstrate their commitment to equality and social justice. This can enhance their reputation and appeal to socially conscious consumers.

In addition to the recommendations provided for further studies, it is also crucial to consider the sensory experiences within the cafe environment. Factors such as lighting, acoustics and temperature can influence the comfort and accessibility of the space for all users. Moreover, the use of technology can further enhance the UD of cafes. For example, incorporating assistive technologies such as hearing loop systems can greatly benefit individuals with hearing impairments.

Subsequent investigations may concentrate on assessing these suggestions' efficacy in practical environments. This could involve conducting surveys or interviews with cafe patrons and staff after the implementation of the recommended

changes. The feedback obtained can provide valuable insights into the practical benefits and potential areas for improvement in the UD of cafes.

5.2 Conclusion

This thesis aimed to investigate the application of Universal Design (UD) principles in the interior architecture of local cafes in undeveloped cities. The study sought to identify gaps in the application of UD principles that could increase social engagement in semi-public spaces of undeveloped cities.

This research highlights the availability and identifies gaps in the accessibility of Universal Design across the cafes in undeveloped cities. This analysis covers three main areas: seating, service and restroom. Emphasizing the importance of incorporating UD principles in interior architecture creates inclusive semi-public spaces. Ensuring accessibility for all, including individuals with physical, sensory or temporary disabilities, the elderly, children and pregnant women, attracting a more diverse range of customers, enhances the brand's image and fostering customer loyalty.

The findings from case study underscore the importance of bringing UD principles into interior architecture to create more inclusive spaces. While some cafes have made efforts to incorporate UD principles into their design, there are still significant gaps. That brings the key issue of accessibility for diverse user in undeveloped cities due to lack of UD applications.

While only a minority of cafes have effectively implemented these principles, clear paths for movement, navigable layouts and diverse seating options are essential for inclusivity. Challenges remain, such as lack of signage, ramps and elevators. Braille menus are absent, hindering visually impaired customers. Service areas need improvement, especially in terms of accessible counters and service tables.

To effectively implement universal design principles, cafes can prioritize sensory considerations by using materials intentionally to create contrast and emphasize key features. In seating areas, clear paths and diverse seating options should be emphasized, along with proper signage. Addressing ramps, elevators, readable menus and counters at accessible heights in service areas is crucial. Additionally, restrooms should be designed for assistive aid accessibility, considering multigender options and providing handrails and changing stations.

In conclusion, even without professional guidance, cafes in undeveloped cities can enhance inclusivity by adopting these principles. Recommendations include a checklist and table for cafe owners and designers. By this recommendation, cafes can create more welcoming environments for cafes in undeveloped cities, ensuring that everyone regardless of ability can enjoy their coffee and company. Future research in this field can ensure that cafes and similar establishments are not only accessible but also profitable, making them welcoming to all.

The contribution of thesis is to the cafe owners in undeveloped cities with no access to rules and regulation to achieve UD interior with the recommended checklist and increase the accessibility and economically benefits for their business. With the aging population, the number of individuals with physical disabilities or mobility issues is increasing. Businesses that proactively make their premises accessible are being better positioned to cater to this growing demographic.

REFERENCES

- Abdul Kadir, S., Jamaludin, M., & Awang, A. R. (2019). Accessibility adaptation in heritage boutique hotels: A review on literature. *Environment-Behaviour Proceedings Journal*, 4(10), 1-8. <https://doi.org/10.21834/e-bpj.v4i10.1633>
- Access Tile. (2021). Detectable Wayfinding, Tactile Warning Systems, Compliant ADA Tiles. Retrieved from <https://accesstile.com/wayfinding/>
- Accessibility.com. (2024). Mobility and Physical Disabilities. <https://www.accessibility.com/disabilities/mobility-physical>
- ADA Americans with Disabilities Act of 1990, 42 U.S.C. 12101 et seq. (1990). <https://www.ada.gov/law-and-regs/ada/>
- Adewale, B. A., Jegede, F. O., & Sogbetun, O. T. (2022). Evaluation of the Effectiveness of Perceptible Principle of Universal Design in Shopping Malls in Southwest Nigeria. <https://www.proquest.com/docview/2716585659?sourcetype=Scholarly%20Journals>
- Agarwal, A. (2020). School accessibility and Universal Design in school infrastructure. Global Education Monitoring Report Team. <https://unesdoc.unesco.org/ark:/48223/pf0000373656/PDF/373656eng.pdf.multi>

Aimi, H, (2012). Universal Design and the Museum: Sensory Features, Lemelson Center. <https://invention.si.edu/universal-design-and-museum-sensory-features>

Akbar M. (n.d). Inclusive population diversity: A guide for psychologists. American Psychological Association. <https://www.apa.org/about/apa/equity-diversity-inclusion/language-guidelines>

Al-Azawei, A., Parslow, P., & Lundqvist, K. (2017). The Effect of Universal Design for Learning (UDL) Application on E-learning Acceptance: A Structural Equation Model. *International Review of Research in Open and Distributed Learning*, 18(6). <https://files.eric.ed.gov/fulltext/EJ1155806.pdf>

Al-Azawei, A., Serenelli, F., & Lundqvist, K. (2016). Universal Design for Learning (UDL): A Content Analysis of Peer-Reviewed Journal Papers from 2012 to 2015. *Journal of the Scholarship of Teaching and Learning*, 16(3), 39-56. <https://files.eric.ed.gov/fulltext/EJ1104867.pdf>

Aldred, M., Belan, A., Chen, J., Holt, S., Ramos, M., & Snow, D. (2024). Guest Post — European Accessibility Act: Working Toward Compliance and Beyond. *The Scholarly Kitchen*. <https://scholarlykitchen.sspnet.org/2024/01/16/guest-post-european-accessibility-act-working-toward-compliance-and-beyond/>

Almeqdad, Q. I., Alodat, A. M., Alquraan, M. F., Mohaidat, M. A., & Al-Makhzoomy, A. K. (2023). The effectiveness of Universal Design for learning: A systematic review of the literature and meta-analysis. <https://doaj.org/article/74039dd28afb44afa82dbb2e08a1db38>

Aloudeh, R., Elmardi, M., & Sheta, W. (2023). A Sustainable Approach to Improve the Interior Design of Existing Space: The Case of the BUiD Main Lobby. In K. Al Marri et al. (Eds.), BUiD Doctoral Research Conference 2022 (Lecture Notes in Civil Engineering, Vol. 320). https://www.academia.edu/110843494/A_Sustainable_Approach_to_Improve_the_Interior_Design_of_Existing_Space_The_Case_of_the_BUiD_Main_Lobby

American Association on Intellectual and Developmental Disabilities (AAIDD). (2020). Intellectual Disability: Definition, Classification and Systems of Supports (12th ed.). AAIDD. <https://www.aaidd.org/intellectual-disability>

American Psychological Association. (2019). Universal Design All-Gender Restrooms. Retrieved from <https://www.apa.org/topics/lgbtq/all-gender-restrooms>.

American Society of Landscape Architects. (2022). Research Report Series. https://www.asla.org/uploadedFiles/CMS/Practice/Research_Reports/ASLA_Research_Accessibility_2022.pdf

Americans with Disabilities Act Standards for Accessible Design. (2010). Retrieved from https://www.ada.gov/2010ADASTandards_index.htm

Andersson, J. E. (2014). Usefulness in architecture accessibility, inclusion and usability as spatial sensory experiences. Universal Design 2014: Three Days of

Creativity and Diversity, 356-366.
<https://ebooks.iospress.nl/pdf/doi/10.3233/978-1-61499-403-9-356>

ASI Signage. (n.d.). Universal Design Principles and Architectural Signage.
<https://asisignage.com/home/aia-courses/>

Atchley, R.C. (1989). A continuity theory of normal aging. *The Gerontologist*, 29(2), 183-190. <https://psycnet.apa.org/record/1989-35979-001>

Auckland Design Manual. (2022) Universal Design Cafe and Restaurant Guidelines.
https://content.aucklanddesignmanual.co.nz/design-subjects/universal_design/Documents/cafe-restaurant-guidelines.pdf

Bagagli, B. P., Chaves, T. V., & Zoppi Fontana, M. G. (2021). Trans women and public restrooms: The legal discourse and its violence. *Frontiers in Sociology*, 6, Article 652777.
<https://www.frontiersin.org/articles/10.3389/fsoc.2021.652777/full>

Berry, H. (2005). The Coffee House: A Cultural History. *The English Historical Review*, Volume 120, Issue 489, December 2005, Pages 1447–1448.
<https://academic.oup.com/ehr/article-abstract/120/489/1447/526794>

Bichler, B.F., Pikkemaat, B. & Peters, M. (2020). Exploring the role of service quality, atmosphere and food for revisits in restaurants by using a e-mystery guest approach. *Journal of Hospitality and Tourism Insights*.

<https://pdfs.semanticscholar.org/cbdd/818b905831e32e386f71410f41d4a29e04ca.pdf>

Bovens, L., & Marcoci, A. (2023). The gender-neutral bathroom: a new frame and some nudges. *Behavioural Public Policy*, 7(1), 1-24.

<https://www.cambridge.org/core/journals/behavioural-public-policy/article/abs/genderneutral-bathroom-a-new-frame-and-some-nudges/C6CDCA42BAEBCE684B243EB9773A771C>

Boyce, P. (2014). *Human Factors in Lighting*. CRC Press.
<https://doi.org/10.1201/b16707>

Brulé, E. (2022). The good, the ideal and the accessible home: Perceptions of accessibility norms in domestic environments.
<https://journals.openedition.org/alterjdr/1175?lang=en>

Bryman, A. (2016). *Social Research Methods*. Oxford University Press.

Building Construction Authority. (n.d). *Accessibility & Universal Design*. Retrieved from Building and Construction Authority website.
<https://www1.bca.gov.sg/buildsg/universal-design>

Burgstahler, S. (2009). *Universal Design: Process, Principles and Applications*. DO-IT, University of Washington. Retrieved from DO-IT, University of Washington.
<https://www.washington.edu/doit/universal-design-process-principles-and-applications>

Burgstahler, S. (2015). Universal Design in higher education: From principles to practice. *Harvard Educational Review*, 85(3), 380-398.
<https://eric.ed.gov/?id=ED568813>

Burgstahler, S. E. (2020). UD in Higher Education: Promising Practices. University of Washington.
https://www.washington.edu/doit/sites/default/files/atoms/files/Universal%20Design%20in%20Higher%20Education_Promising%20Practices_0.pdf

Byun, J., & Shin, T. (2018). Design and Implementation of an Energy-Saving Lighting Control System Considering User Satisfaction. *IEEE Transactions on Consumer Electronics*, 64(1), 61-68. <https://doi.org/10.1109/TCE.2018.2812061>

Cao, L. (2020). Why We Should Integrate Tactile Surfaces into Architecture.
<https://www.archdaily.com/952355/why-we-should-integrate-tactile-surfaces-into-architecture>

Carmona, M., Heath, T., Oc, T., & Tiesdell, S. (2010). *Public Places, Urban Spaces: The Dimensions of Urban Design*. Routledge

Celadyn, M. (2018). Environmental Activation of Inner Space Components in Sustainable Interior Design. *Sustainability*, 10 (6), 1945.
<https://www.mdpi.com/2071-1050/10/6/1945>

Centers for Disease Control and Prevention. (2020). Mental Health and Disability.
Retrieved from

<https://www.cdc.gov/ncbddd/disabilityandhealth/features/mental-health-for-all.html>.

Centers for Disease Control and Prevention. (2024). Disability and Health Overview. Retrieved from <https://www.cdc.gov/ncbddd/disabilityandhealth/index.html>

Centre for Excellence in Universal Design (2023). Designing for Accessibility. <https://universaldesign.ie/>

Chaney, K. E., & Sanchez, D. T. (2018). Gender-inclusive bathrooms signal fairness across identity dimensions. *Social Psychological and Personality Science*, 9(2), 245–253. https://www.researchgate.net/publication/320916737_Gender-Inclusive_Bathrooms_Signal_Fairness_Across_Identity_Dimensions

ChangingSpacesUSA. (n.d.). Installing a Universal Changing Station In Your Business or Community. Retrieved from <https://www.changingspacescampaign.com/planning-a-universal-changing-station>

Cho, J., & Suh, J. (2023). Spatial Ability Performance in Interior Design and Architecture: Comparison of Static and Virtual Reality Modes. *Buildings*, 13(12), 3128. <https://www.mdpi.com/2075-5309/13/12/3128>

Clarkson, J., Coleman, R., Keates, S., & Lebbon, C. (2003). *Inclusive Design: Design for the Whole Population*. Springer-Verlag London.

- Clarkson, J., Coleman, R., Keates, S., & Lebbon, C. (Eds.). (2014). *Inclusive Designing: Joining Usability, Accessibility and Inclusion*. Springer
- Clute, M. A. (2013). Disability: Physical Disabilities. In *Encyclopedia of Social Work*. Eastern Washington University. Published online: 11 June 2013. <https://doi.org/10.1093/acrefore/9780199975839.013.543>
- Connell, B.R., Jones, M., Mace, R., Mueller, J., Mullick, A., Ostroff, E., Sanford, J., Steinfeld, E., Story, M., & Vanderheiden, G. (1997). *The Principles of Universal Design*. NC State University. <https://design.ncsu.edu/wp-content/uploads/2022/11/principles-of-universal-design.pdf>
- Cowan, B. (2004). The Rise of the Coffeehouse Reconsidered. *The Historical Journal*, 47, I (2004), pp. 21-46. <https://www.jstor.org/stable/4091544>
- Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. SAGE Publications.
- Danford, G. S. (2003). Universal Design People with Vision, Hearing and Mobility Impairments Evaluate a Model Building. *Generations: Journal of the American Society on Aging*, 27(1), 91-94. <https://www.jstor.org/stable/26555208>
- Debrowski, A. (2023). *Visual Impairment: What is Impaired Vision? All About Vision*. Retrieved from <https://www.allaboutvision.com/conditions/lowvision/visual-impairment/>

- Denison, M. (2021). Study of Effects of Lighting On Social Interactions Within Cafes. University of Calgary. <https://hdl.handle.net/11244/332427>
- Desai, A. (2011). The Function and Design of Cafes Throughout Time. Cornell University. Retrieved from <https://courses.cit.cornell.edu/dea150/files/2011%20files/Project%202.pdf>
- Detloff, M. (2006). Gender Please, Without the Gender Police. *Journal of Lesbian Studies*, 10(1-2), 87-105. doi:10.1300/J155v10n01_05. Retrieved from https://ia600704.us.archive.org/view_archive.php?archive=/24/items/wikipedia-scholarly-sources-corpus/10.1300.zip&file=10.1300%252FJ155v10n01_05.pdf
- Dillingham, T. R., Pezzin, L. E., & MacKenzie, E. J. (2002). Limb amputation and limb deficiency: Epidemiology and recent trends in the United States. *Southern Medical Journal*, 95(8), 875-883. https://www.researchgate.net/publication/11197919_Limb_Amputation_and_Limb_Deficiency_Epidemiology_and_Recent_Trends_in_the_United_States
- Dolph, E. (2021). The developing definition of universal design. *JACCES, journal of accessibility and design for all*, 11(2). <https://www.jacces.org/index.php/jacces/article/view/263/253>
- Dudley J. (2023). Insights into Universal Design in Japan. Accessible Japan. <https://www.accessible-japan.com/learning-about-universal-design-in-japan/>

- Duman, Ü., & Asilsoy, B. (2022). Developing an Evidence-Based Framework of Universal Design in the Context of Sustainable Urban Planning in Northern Nicosia. *Sustainability*, 14(20), 13377. <https://www.mdpi.com/2071-1050/14/20/13377>
- EIDD - Design for All Europe. (2017). Disseminating Design for All. EIDD - Design for All Europe. <https://adata.org/factsheet/quicktips-tax>
- Elkink, A. (2015). Accessibility hardware. <https://www.buildmagazine.org.nz/assets/Uploads/Build-150-40-Design-Right-Accessibility-Hardware2.pdf>
- Erdtman, E., Rassmus-Gröhn, K., & Hedvall, P. O. (2021). Universal Design as Guiding, Striving and Unifying: A Qualitative Study about how Universal Design is Understood, Practised and Realised in Contemporary Sweden. *Scandinavian Journal of Disability Research*, 23(1), 158–168.
- Euromonitor International. (2022). The Future of Coffee. <https://www.euromonitor.com/the-future-of-coffee/report>
- Feldman, A. (2023). A Universal Design approach to teaching multilingual students. *Times Higher Education*. <https://www.timeshighereducation.com/campus/universal-design-approach-teaching-multilingual-students>

- Franco, J. T. (2018). Design Accessible Bathrooms for All With This ADA Restroom Guide. <https://www.archdaily.com/897689/plan-and-design-accessible-bathrooms-for-all-with-this-ada-design-guide-for-washrooms>
- Galante, A. (2016). Linguistic and Cultural Diversity in Language Education through
- Germanà, M. L., & Nicolini, E. (2022). Towards a Sustainable Use of Architectural Heritage: How to Assess Accessibility and the User's Role. *Conservation of Architectural Heritage*, 213-225. https://link.springer.com/chapter/10.1007/978-3-030-74482-3_17
- Global Disability Innovation Hub. (2022). Global Disability Innovation Hub Retrieved from Retrieved from UCL website. <https://www.disabilityinnovation.com/>
- Google. (n.d.). [Map of İskele Belediyesi, Famagusta, Cyprus]. Retrieved July 21, 2024, from <https://www.google.com/maps/@35.1408446,33.8853687,14z?entry=ttu>
- Grant, S. (2023). Where Should Toilet Grab Bars Be Placed? (Several Choices). Retrieved from <https://www.grayingwithgrace.com/toilet-grab-bar-placement/>
- Gremmen, M. C., van den Berg, Y. H. M., Segers, E., & Cillessen, A. H. N. (2016). Considerations for classroom seating arrangements and the role of teacher characteristics and beliefs. *Social Psychology of Education: An International Journal*, 19(4), 749–774. <https://link.springer.com/article/10.1007/s11218-016-9353-y>

- Grimble, M. D., Danford, G. S., & Schoell, D. M. (2011). The Effectiveness of Universal Design: Case Study Demonstrations. IDeA Center, SUNY Buffalo. <https://idea.ap.buffalo.edu/wp-content/uploads/sites/110/2019/08/12.pdf>
- Grimley, C., & Smith, K. H. (2022). Universal Principles of Interior Design. Rockport Publishers.
- Gurney, J. (2010). Color and Light: A Guide for the Realist Painter. Andrews McMeel Publishing. <https://archive.org/details/colorlightguidef0000gurn>
- Hakim, M., & Amir, A. S. (2022). The Function of a Coffee Shop as a Social Cultural Entity. In Y. El-Samragy (Ed.), Trends and Innovations in Food Science. <https://www.intechopen.com/>
- Hamraie, A. (2013). Designing Collective Access: A Feminist Disability Theory of Universal Design. *Disability Studies Quarterly*, 33(4).
- Harrison, A. (2014). Design for the changing educational landscape: Space, place and the future of learning. Routledge. <https://archive.org/details/designforchangin0000harr>
- Henry, S. L., Abou-Zahra, S., & Brewer, J. (2014). The Role of Accessibility in a Universal Web. Proceedings of the 11th Web for All Conference on - W4A '14, Seoul, Republic of Korea, April 7-9, 2014. <https://dspace.mit.edu/bitstream/handle/1721.1/88013/slhenry-w4a2014-mit.pdf?sequence=1>

- Homburg, C., Klarmann, M., & Staritz, S. (2012). Customer Uncertainty Following Downsizing: The Effects of Extent of Downsizing and Open Communication. *Journal of Marketing*. <https://publikationen.bibliothek.kit.edu/1000030833>
- Hummel, T., Whitcroft, K. L., Andrews, P., Altundag, A., Cinghi, C., Costanzo, R. M., ... & Welge-Luessen, A. (2016). Position paper on olfactory dysfunction. *Rhinology*, 54(26), 1-30.
- Imrie, R., & Hall, P. (2003). *Inclusive design: Designing and developing accessible environments*. Taylor & Francis.
- Imrie, R., & Luck, R. (2014). Designing inclusive environments: Rehabilitating the body and the relevance of Universal Design. *Disability and Rehabilitation*, 36(16), 1315–1319. <https://www.tandfonline.com/doi/pdf/10.3109/09638288.2014.936191>
- Inclusive Design Research Center. (n.d). Inclusive Design Research Center. Retrieved from OCAD University website. <https://idrc.ocadu.ca/>
- Institute for Human- Centered Design. (2022). Institute for Human- Centered Design. Retrieved from Institute for Human- Centered Design website.
- International Code Council. (2018). **International Building Code**. Country Club Hills, IL <https://codes.iccsafe.org/content/IBC2018/preface>

Irvine, J. J., & York, D. E. (1995). Learning Styles and Culturally Diverse Students: A Literature Review. U.S. Department of Education (ERIC Document Reproduction Service No. ED382722). <https://eric.ed.gov/?id=ED382722>

Ismailov, M., & Chiu, T. K. F. (2022). Catering to Inclusion and Diversity with Universal Design for Learning in Asynchronous Online Education: A Self-Determination Theory Perspective. https://www.researchgate.net/publication/359083240_Catering_to_Inclusion_and_Diversity_With_Universal_Design_for_Learning_in_Asynchronous_Online_Education_A_Self-Determination_Theory_Perspective

Izani, A, Alkhalidi, A, Razak, A, (2019). Concept Awareness of Universal Design in Interior Design Program in the U.A.E. *Pertanika J. Soc. Sci. & Hum.*, 27(3). Retrieved from <http://www.pertanika.upm.edu.my/>

James, S. E., Herman, J. L., Rankin, S., Keisling, M., Mottet, L., & Anafi, M. (2016). The Report of the 2015 U.S. Transgender Survey. Washington, DC: National Center for Transgender Equality. <https://transequality.org/sites/default/files/docs/usts/USTS-Full-Report-Dec17.pdf>

Jones, E. K., Hanley, M., & Riby, D. M. (2020). Distraction, distress and diversity: Exploring the impact of sensory processing differences on learning and school life for pupils with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 72, Article 101515 <https://tripleadurham.co.uk/wp-content/uploads/2022/02/Jones-Hanley-Riby-2020.pdf>

Jorgensen, B., & Stedman, R. (2001). Sense of place as an attitude: Lakeshore owners attitudes toward their properties. *Journal of Environmental Psychology*, 21(3), 233-248.

https://www.researchgate.net/publication/222519190_Sense_of_Place_as_an_attitude_Lakeshore_owners_attitudes_toward_their_properties

Joson, J. (2022). Breathing New Life into Coffee Shop Culture: A Focus on Multi-Functional Cafe Spaces. Retrieved April 18, 2024, from ArchDaily. <https://www.archdaily.com/982585/breathing-new-life-into-coffee-shop-culture-a-focus-on-multi-functional-cafe-spaces>

Keller, S. E. (2021). Gender-Inclusive Bathrooms: How Pandemic-Inspired Design Imperatives and the Reasoning of Recent Federal Court Decisions Make Rejecting Sex-Separated Facilities More Possible. *Georgetown Journal of Gender and the Law*, 23(1). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4148839

Khalil, M. E., Mohamed, N. A., & Morghany, E. A. (2021). Towards inclusion and diversity in the light of Universal Design: three administrative buildings in Aswan city as case studies. *Journal of Engineering and Applied Science*, 68(15). <https://link.springer.com/content/pdf/10.1186/s44147-021-00020-0.pdf>

Kiani, R., & Miller, H. (2018). Sensory impairment and intellectual disability. *Advances in Psychiatric Treatment*, 16(3). <https://www.cambridge.org/core/journals/advances-in-psychiatric->

treatment/article/sensory-impairment-and-intellectual-
disability/BDD74DB4E7DAD1ED57EC2D461DFFD06D

Kineber, A. F., Massoud, M. M., Hamed, M. M., & Qaralleh, T. J. O. (2023). Exploring Sustainable Interior Design Implementation Barriers: A Partial Least Structural Equation Modeling Approach. *Sustainability*, 15(5), 4663. <https://www.mdpi.com/2071-1050/15/5/4663>

Klein, L. E. (1999). Coffeehouse Civility, 1660-1714: An Aspect of Post-Courtly Culture in England. *Huntington Library Quarterly*, 59(1), 30-51. <https://www.jstor.org/stable/3817904>

Lalor, A. (2018). Universal Design for Instruction and Learning: Where is the Evidence? Landmark College Institute for Research and Training. Retrieved from. <https://www.landmark.edu/research-training/blog/universal-design-for-instruction-and-learning-where-is-the-evidence>

Landis, B. N., Konnerth, C. G., & Hummel, T. (2004). A study on the frequency of olfactory dysfunction. *Laryngoscope*, 114(10), 1764-1769. <https://doi.org/10.1097/00005537-200410000-00017>

Lawton, M. P., & Nahemow, L. (1973). "Ecology and the Aging Process." In C. Eisdorfer & M. P. Lawton (Eds.), *The Psychology of Adult Development and Aging* (pp. 619-674). American Psychological Association. <https://psycnet.apa.org/record/2004-15428-020>

Lazzari, J. (2020). Expert-Approved Accessibility Guidelines for Restaurants, Cafes and Eateries. 3Play Media. <https://www.3playmedia.com/blog/accessibility-guidelines-restaurants/>

Levicky-Townley, C., Garabedian Stork, M., Zhang, J., & Weatherford, E. (2017). Exploring the Impact of Universal Design for Learning Supports in an Online Higher Education Course. *Journal of Applied Instructional Design*, 10(1). https://edtechbooks.org/jaid_10_1/exploring_the_impact

Lid, I. M. (2014). Universal Design and disability: An interdisciplinary perspective. *Disability and Rehabilitation*, 36(16), 1344-1349. http://thedigitalcommons.org/docs/lid_universal-design-and-disability-an%20interdisciplinary-perspective.pdf

Lisa Chinn (2018). OSHA Aisle Width Requirements. <https://legalbeagle.com/6513998-osha-aisle-requirements.html>

Lloyd-Esenkaya, T., Lloyd-Esenkaya, V., O'Neill, E., & Proulx, M. J. (2020). Multisensory inclusive design with sensory substitution. *Cognitive Research: Principles and Implications*, 5, Article 37. <https://cognitiveresearchjournal.springeropen.com/articles/10.1186/s41235-020-00240-7>

MACE, R.; HARDIE, G.; PLACE, J. (1991) Accessible environments toward Universal Design. North Carolina state university.

https://www.academia.edu/50957572/MACE_R_HARDIE_G_PLACE_J_Accessible_environments_toward_Universal_Design

Maisel, J. L., & Ranahan, M. (2022). Beyond Accessibility to Universal Design. Retrieved from WBDG - Whole Building Design Guide website. <https://wbdg.org/design-objectives/accessible/beyond-accessibility-universal-design>

Maleki, M. (2022). Time Is on Her Side: Temporary Disabilities Under the ADA. HR Daily Advisor. Retrieved from <https://hrdailyadvisor.blr.com/2022/08/23/time-is-on-her-side-temporary-disabilities-under-the-ada/>

Mante, Y. (2014). Cultural Diversity and Universal Ethics in a Global World (Digest Summary). <https://rpc.cfainstitute.org/en/research/cfa-digest/2014/01/cultural-diversity-and-universal-ethics-in-a-global-world-digest-summary>

Manzo, J. (2014). Machines, People and Social Interaction in “Third-Wave” Coffeehouses. *Journal of Arts and Humanities*, Vol. 3 No. 8. <https://www.theartsjournal.org/index.php/site/article/view/527/295>

Marschallek, B. E., & Jacobsen, T. (2022). Materials aesthetics: A replication and extension study of the conceptual structure. *PLoS ONE*, 17(11), e0277082. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0277082>

Martino, G. (2023). What is Universal Design? ArchDaily. Retrieved from. <https://www.archdaily.com/994337/what-is-universal-design>

- Máté, K. (2019). Using Materials for Sustainability in Interior Architecture and Design. *Journal of Interior Design*, 44(2), 37-56.
<https://meridian.allenpress.com/jgb/article/2/4/23/199982/Using-Materials-for-Sustainability-in-Interior>
- Maulik, P. K., Mascarenhas, M. N., Mathers, C. D., Dua, T., & Saxena, S. (2011). Prevalence of intellectual disability: A meta-analysis of population-based studies. *Research in Developmental Disabilities*, 32(2), 419-436.
<https://www.sciencedirect.com/science/article/abs/pii/S0891422210003082?via%3Dihub>
- Mizukami, N., Fujinami, K., Ohno, H., & Suzuki, H. (2002). Research on Utilization of Tactile Tiles and Behavior of Visually Impaired Persons on Railway Platforms. *QR of RTRI*, 43(2), 58-62. <https://doi.org/10.2219/rtriq.43.58>
- Nagpal, D. (2022). Universal Design: The need for assistive & accessible technology. Bootcamp. <https://bootcamp.uxdesign.cc/universal-design-the-need-for-assistive-accessible-technology-63090b452cc1>
- Nasar, J. L., & Evans-Cowley, J. (2007). Universal design and visitability: From accessibility to zoning. <https://archive.org/details/universaldesignv00nasa>
- National Research Council. (1994). Understanding and Promoting Language and Cultural Diversity in the Context of Education. Washington, DC: The National Academies Press. <https://nap.nationalacademies.org/read/9197/chapter/2>

Navaitienė, J., & Stasiūnaitienė, E. (2021). The Goal of the Universal Design for Learning: Development of All to Expert Learners. In A. Galkienė & O. Monkevičienė (Eds.), *Improving Inclusive Education through Universal Design for Learning, Inclusive Learning and Educational Equity*. <https://link.springer.com/book/10.1007/978-3-030-80658-3>

Norman, D. A. (2013). "The Design of Everyday Things." Basic Books.

Oldenburg, R. (1999). *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons and Other Hangouts at the Heart of a Community*. New York: Marlowe & Company.

Oluwaseun. (2023). Language and Identity: How Multilingualism Shapes Cultures. <https://medium.com/@zoeoluwaseun/language-and-identity-how-multilingualism-shapes-cultures-87bcee1a32cc>

Ozenen, G. (2023). Lighting Sources Used for Interior Design. *Architectural Interior Lighting*, 37-49. https://link.springer.com/chapter/10.1007/978-3-031-49695-0_5

Panero, J., & Zelnik, M. (1979) *Human Dimension and Interior Space: A Source Book of Design Reference Standards*. Clarkson Potter/Ten Speed

Patatoukas, P. N. (2012). Customer-Base Concentration: Implications for Firm Performance and Capital Markets. *The Accounting Review*, 87, 363-3921. <https://www.jstor.org/stable/23245608>

- Peluso, M. (2023). Navigating the Coffee Business Landscape: Challenges and Adaptation Strategies in a Changing World. Proceedings of the International Coffee Convention 2023. <https://www.mdpi.com/2504-3900/89/1/22>
- Persson, H., Åhman, H., Yngling, A. A., & Gulliksen, J. (2015). Universal design, inclusive design, accessible design, design for all: different concepts—one goal? On the concept of accessibility—historical, methodological and philosophical aspects. *Universal Access in the Information Society*, 14(4), 505-526. <https://link.springer.com/content/pdf/10.1007/s10209-014-0358-z.pdf>
- Portella, A. A. (2014). Built Environment. In A. C. Michalos (Ed.), *Encyclopedia of Quality of Life and Well-Being Research*. Springer.
- Pozos-Brewer, A. (2011). Coffee Shops: Exploring Urban Sociability and Social Class in the Intersection of Public and Private Space. Bryn Mawr College <https://scholarship.tricolib.brynmawr.edu/server/api/core/bitstreams/737dc7c8-ee19-4473-bd58-3661db7ae1b7/content>
- Prandi, C., Barricelli, B. R., Mirri, S., & Fogli, D. (2023). Accessible wayfinding and navigation: A systematic mapping study. *Universal Access in the Information Society*, 22, 185-212. <https://link.springer.com/content/pdf/10.1007/s10209-021-00843-x.pdf>
- Preiser, W. F. E., & Ostroff, E. (Eds.). (2001). *Universal Design handbook*. McGraw-Hill. <https://archive.org/details/universaldesignh0000unse>

Preiser, W. F. E., & Smith, K. H. (2011). The Evolution of Universal Design: A Win-Win Concept for All. In *Universal Design Handbook*, 2E (pp. 1.3-1.12). McGraw Hill Professional. Retrieved from. <https://rockymountainada.org/news/blog/evolution-universal-design-win-win-concept-all>

Preiser, W. F. E., & Smith, K. H. (2011). Universal Design. In *Universal Design Handbook*, 2E (pp. 1.1-1.2). McGraw Hill Professional. Retrieved from. <https://www.udinstitute.org/ud-history>

Pruett, S. (2017). An overview of Universal Design & its connection to disability. <https://stories.universaldesign.org/overview-of-universal-design-connection-to-disability-7382f9c09362>

Reed, S., & Bohr, J. (2020). The Influence of Local Built Environments on Social Wellbeing: a Community's Experience with Social Isolation, Social Loneliness and Social Belonging. *International Journal of Community Well-Being*. <https://link.springer.com/content/pdf/10.1007/s42413-020-00091-6.pdf>

Reid, R. F. (2021). Universal Design in the Restaurant Industry: Bridging the Gap Between ADA Guidelines and Customer Needs. A thesis presented to the Honors College of Middle Tennessee State University. <https://jewlscholar.mtsu.edu/server/api/core/bitstreams/2cf90785-8e4f-4031-b77b-c65168ac1025/content>

Rick Hansen Foundation. (2017). Universal Design 101. Retrieved December 9, 2023, from <https://www.rickhansen.com/accessibility-resources/universal-design-101>

Römhild, J., & Holleder, A. (2023). Disability-related services, health promotion, testing accommodations, social and academic integration and their effects on academic success of students with disabilities in higher education: a systematic review. *Disability and Rehabilitation*, 45(1), 15-29. https://www.researchgate.net/publication/369840772_Effects_of_disability-related_services_accommodations_and_integration_on_academic_success_of_students_with_disabilities_in_higher_education_A_scoping_review

Rossetti, R. (2009). A Universal Design Approach for the Hospitality Industry. https://www.udll.com/a/programs/handouts/2009-05-15_Hospitality-Design-Expo-Handout_Rosemarie-Rossetti-PhD.pdf

Samuel, F., & Watson, K. J. (2022). Social Value of the Built Environment. *Buildings and Cities*. <https://www.buildingsandcities.org/calls-for-papers/social-value-built-environment.html>

Sanath, A. A., Mahajan, H., Gonzalez, E., Sanford, J. A., & Fain, W. B. (2016). Analysis Of The Effect Of A Rear Wall Grab Bar Configuration On The Fall Risk Associated With Toilet Transfers In Older Adults With Mobility Impairment. Retrieved from. <https://www.resna.org/sites/default/files/conference/2016/jea/sanath.html>

Sanger, C. S. (2020). Inclusive Pedagogy and Universal Design Approaches for Diverse Learning Environments. In Diversity and Inclusion in Global Higher Education. https://link.springer.com/chapter/10.1007/978-981-15-1628-3_2

Sasson, I., Yehuda, I., & Miedijensky, S. (2022). Innovative learning spaces: class management and Universal Design for learning. *Learning Environments Research*, 25, 725–739. Retrieved <https://eric.ed.gov/?q=technology+in+the+classroom+&pg=704&id=EJ1349237>

Schalock, R. L., Borthwick-Duffy, S. A., Bradley, V. J., Buntinx, W. H. E., Coulter, D. L., Craig, E. M., ... & Yeager, M. H. (2010). *Intellectual Disability: Definition, Classification and Systems of Supports* (11th ed.). AAIDD. <https://eric.ed.gov/?id=ED509596>

Shorewala, A., & Ardito, A. (2022). The Psychological Impact of Color and Light in Interior Design on Teenagers. <https://www.jsr.org/hs/index.php/path/article/download/2188/926/11902>

Sieberns, A. (2018). *Universal Design and Human Rights: The UN Convention on the Rights of Persons with Disabilities (CRPD)*. German Institute for Human Rights. <https://library.ifla.org/id/eprint/2269/1/094-sieberns-en.pdf>

Steigemann, A. M. (2017). Social practices in a café: community through consumption? *Geographica Helvetica*, 72, 45-58. <https://gh.copernicus.org/articles/72/45/2017/gh-72-45-2017.pdf>

Steinfeld, E., & Maisel, J. L. (2012). " Universal Design: Creating Inclusive Environments." John Wiley & Sons.

Stephanidis, C. (Ed.). (2001). User Interfaces for All: Concepts, Methods and Tools. Lawrence Erlbaum Associates.

Story, M. F. (1998). Maximizing Usability: The Principles of Universal Design. *Assistive Technology: The Official Journal of RESNA*, 10(1), 4-12.
<https://www.tandfonline.com/doi/epdf/10.1080/10400435.1998.10131955?needAccess=true>

Story, M.F. (1997). The concept of Universal Design. In: M. J. Bednar (Ed.), *Barrier-free environments* (pp. 10-12).

Suberi, H. K. (2022). Research Analysis of Built Environment as a System: Implementing Research Through Design Methodology. *Frontiers in Built Environment*.
<https://www.frontiersin.org/articles/10.3389/fbuil.2021.649903/full>

Sydor, M., & Hitka, M. (2023). Chair Size Design Based on User Height. *Biomimetics*, 8(1), 57.
https://www.researchgate.net/publication/367978456_Chair_Size_Design_Based_on_User_Height

Szlavi, A., & Guedes, L. S. (2023). Gender Inclusive Design in Technology: Case Studies and Guidelines. springer, 14030.
https://link.springer.com/chapter/10.1007/978-3-031-35699-5_25

Takahashi, Y., Fakhoury, I. N., & McClain-Nhlapo, C. (2023). Japan and the World Bank: Advancing universal design in urban planning.
<https://blogs.worldbank.org/en/ppps/japan-and-world-bank-advancing-universal-design-urban-planning>

The Center for Universal Design. (1997). "The Principles of Universal Design." North Carolina State University. <https://design.ncsu.edu/research/center-for-universal-design/>

The University of Edinburgh. (2023). Promoting Universal Design in Teaching and Learning. <https://www.ed.ac.uk/information-services/learning-technology/accessibility/universal-design>

Thompson, V. (2022). Creating Accessibility in Cafés. Fresh Cup Magazine.
<https://freshcup.com/creating-accessibility-in-cafes/>

Trojanowska, M. (2021). "A universal standard for health-promoting places. Example of assessment – on the basis of a case study of Rahway River Park."
<https://pdfs.semanticscholar.org/2b7e/0088e4829b5802b7f14f2f24a5a3f3ec0d72.pdf>

Tufte, E. R. (2001). The Visual Display of Quantitative Information. Graphics Press.

U.S. Access Board, United States Department of Justice. (2010). "ADA Standards for Accessible Design.". Retrieved from <https://www.access-board.gov/ada/doj.html>

UNICEF. (2021). Accessibility Toolkit. Retrieved from UNICEF website. <https://accessibilitytoolkit.unicef.org/>

United Nations (2006). Convention on the rights of persons with disabilities and optional protocol. Retrieved from www.un.org/disabilities/documents/convention/convoptprot-e.pdf

Universal Design Guidelines for Early Learning and Care Settings (2021). Retrieved from <https://aim.gov.ie/app/uploads/2021/05/universal-design-guidelines-for-elc-settings-literature-review-2.pdf>

Universal Design Network of Canada. (2008). Promoting Universal Design Principles in Canada. <https://www.w3.org/TR/WCAG20/#guidelines>

Van Stralen, H., & Dijkerman, C. (2011). Central touch disorders. Scholarpedia. Retrieved from http://www.scholarpedia.org/article/Central_touch_disorders

Wang, J., Loschiavo, M., & Teel, J. (2021). Durable Medical Equipment: A Streamlined Approach. <https://www.aafp.org/pubs/fpm/issues/2021/0300/p15.pdf>

- Wang, Y., Steenbergen, B., van der Krabben, E., Kooij, H.-J., Raaphorst, K., & Hoekman, R. (2023). The Impact of the Built Environment and Social Environment on Physical Activity: A Scoping Review. *Int. J. Environ. Res. Public Health*, 20(12), 6189. <https://europepmc.org/article/MED/37372774>
- Warren, N., Manderson, L., & Ayton, D. (2014). Mobility Issues for People with Disabilities. In A. C. Michalos (Ed.), *Encyclopedia of Quality of Life and Well-Being Research*. Springer.
- Watchorn, V., Hitch, D., Tucker, R., Frawley, P., Aedy, K., & Grant, C. (2023). Evaluating Universal Design of built environments: an empirical study of stakeholder practice and perceptions. *Journal of Housing and the Built Environment*, 38(6), 1491-1510. <https://link.springer.com/article/10.1007/s10901-022-09981-x>
- Wilson, C. (2014). *Designing User Interfaces for an Aging Population: Towards Universal Design*. Springer International Publishing.
- Wojgani, H., Kehsa, C., Cloutman-Green, E., Gray, C., Gant, V., & Klein, N. (2012). Hospital Door Handle Design and Their Contamination with Bacteria: A Real Life Observational Study. Are We Pulling against Closed Doors? <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0040171&type=printable>
- World Design Congress. (1987). Resolution on Universal Design. World Design Congress. <https://wdo.org/about/people/board/thomas-garvey/>

World Health Organization (WHO). (2021). "World Report on Hearing."
<https://www.who.int/publications/i/item/9789240020481>

World Health Organization. "Age-Friendly Environments." Retrieved from
https://www.who.int/ageing/projects/age_friendly_environments/en/

World Health Organization. (2011). World report on disability.
<https://www.who.int/teams/noncommunicable-diseases/sensory-functions-disability-and-rehabilitation/world-report-on-disability>

World Health Organization. (2023). Blindness and vision impairment. World Health Organization. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>

Xiao, J., & Aletta, F. (2016). A soundscape approach to exploring design strategies for acoustic comfort in modern public libraries: A case study of the Library of Birmingham. *Noise Mapping*, 3, 264-273.
<https://www.degruyter.com/document/doi/10.1515/noise-2016-0018/html>

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods*. SAGE Publications.

Zainurossalamia, S., Martiyanti, D., Achmad, G. N., Lesmana, D., & Yudaruddin, R. (2022). Impact of operational activities on customer satisfaction in cafes and restaurants: A mediating role of infrastructural elements. *Innovative Marketing*, 18(4), 13-24. doi:10.21511/im.18(4).2022.02.

https://www.businessperspectives.org/images/pdf/applications/publishing/templates/article/assets/17156/IM_2022_04_Zainurossalamia.pdf

Zhou, M., Dong, H. R., Ioannou, P. A., Zhao, Y., & Wang, F. Y. (2019). Guided crowd evacuation: Approaches and challenges. *IEEE/CAA Journal of Automatica Sinica*, 6(5), 1081-1094. <https://www.ieee-jas.net/en/article/doi/10.1109/JAS.2019.1911672>

Ziegler-Graham, K., MacKenzie, E. J., Ephraim, P. L., Travison, T. G., & Brookmeyer, R. (2008). Estimating the prevalence of limb loss in the United States: 2005 to 2050. *Archives of Physical Medicine and Rehabilitation*, 89(3), 422-429. <https://pubmed.ncbi.nlm.nih.gov/18295618/>