

Exploring Universal Design Principles in the Built Environment: An Empirical Review

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Abstract

Universal Design (UD) involves surpassing basic standards and legal requirements to create buildings that are accessible and usable by people of all abilities. The goal of universal design and inclusion strategy is to accommodate as many individuals as possible, irrespective of their age, gender, physical characteristics, cultural background, talents, or disabilities. The aim of this study was to conduct an empirical review on existing literature about Universal Design in the built environment. The methodology employed for this study was systematic literature review. A systematic literature review (SLR) involves the identification, selection, and critical evaluation of research to address a clearly defined question. Seven articles were reviewed and analysed in a tabular form. This review of literature on universal design in the built environment revealed widespread deficiencies in accessibility measures. While awareness exists, implementation is inconsistent. Improving compliance requires rigorous enforcement of regulations, integrating Universal Design into architectural education, and fostering collaboration among stakeholders. Ongoing research and initiatives are essential to create truly accessible and inclusive environments for all.

Keywords: Accessibility, Architecture, Built Environment, Universal Design.

Introduction

Accessibility is not just a matter of convenience; it involves upholding equal rights, complying with legal standards, and promoting an inclusive environment, which covers both accessible infrastructure and effective information sharing (Singh & Bohora, 2023). Universal design (UD) involves surpassing basic standards and legal requirements to create buildings that are accessible and usable by people of all abilities. The goal of universal design and inclusion strategy is to accommodate as many individuals as possible, irrespective of their age, gender, physical characteristics, cultural background, talents, or disabilities. The idea includes a number of quality aspects (social, sensorial-cognitive, physical-spatial, and security and privacy) as well as a number of requirements for navigation, comprehension, environmental considerations, well-being, and social inclusion (Mosca & Capolongo, 2020).

The built environment, which includes physical structures and spaces like buildings, transportation systems, and public areas created by humans, significantly impacts

accessibility—the ease with which individuals can reach desired destinations. Accessibility is essential for ensuring that people of all ages and abilities can participate in daily activities. However, many urban planners lack a thorough understanding of accessibility challenges, particularly regarding individuals with disabilities (MacDonald, 2024). Research shows that specific aspects of the built environment, such as sidewalk design and street layout, greatly influence community mobility, especially for those with visual impairments (Seetharaman et al., 2024). Additionally, the built environment plays a crucial role in encouraging physical activity by improving access to recreational opportunities and active transportation options (Iamtrakul & Chayphong, 2024). Therefore, improving the built environment through informed urban planning can enhance accessibility, promoting inclusivity and community involvement for everyone (Levinson & Wu, 2024; MacDonald, 2024).

Barriers in the built environment are factors that impede individuals from engaging in physical activity and effectively navigating spaces. These barriers may include elements like poor accessibility, inadequate facility conditions, issues with relative priority, and limited resources (Cushley et al., 2023; Guidry-Grimes et al., 2020; Pedersen et al., 2022).

Creating a barrier free environment is paramount in ensuring that individuals of all abilities or (People with Disability) PWDs have equal access to the built environment.

Problem Statement

The built environment significantly impacts the quality of life, accessibility, and inclusivity for individuals of varying abilities, ages, and backgrounds. However, many existing structures and spaces are not designed to accommodate the diverse needs of all users, leading to exclusion and limited accessibility for people with disabilities, the elderly, and other marginalized groups (Kapsalis et al., 2024). Despite advancements in architectural design, the integration of Universal Design principles in the built environment remains inconsistent and underutilized (Zallio & Clarkson, 2021). This gap results in environments that are not fully inclusive, perpetuating barriers to participation and engagement in everyday activities.

The problem is compounded by a lack of empirical research that systematically explores how Universal Design principles are applied in practice, what challenges exist in their implementation, and the extent to which these principles enhance inclusivity and accessibility. Without a comprehensive understanding of the effectiveness of Universal Design in real-world settings, efforts to create truly inclusive environments remain fragmented and insufficient (Capp, 2017).

This study seeks to address this gap by conducting an empirical review of Universal Design principles in the built environment. The findings aim to provide actionable insights for architects, urban planners, and policymakers to improve the design and functionality of built environments for all users.

Aim and Objectives

The aim of this study is to conduct an empirical review exploring universal design principles in the built environment. The following are the objectives of this study:

1. To review and analyze existing literature on the application of Universal Design principles in the built environment
2. To highlight the seven principles of universal design and its relation to the built environment.
3. To analyse and synthesize findings from seven (7) existing research on Universal Design principles on accessibility and inclusivity in various built environments.
4. To provide comprehensive recommendations for improving the application of Universal Design principles in architectural and urban design of the built environment.

Literature Review

Universal design in the built environment refers to creating spaces that are accessible and usable by everyone, including individuals with disabilities, to minimize environmental barriers and improve overall usability (Latpate et al., 2021; Müller, 2023). This approach involves designing buildings and public areas to accommodate the diverse needs and conditions of the population, in accordance with global agreements such as the Convention on Rights for Persons with Disabilities and the 2030 Agenda for Sustainable Development (Froyen, 2023; Shkliar & Shushliakova, 2023). By implementing universal design principles, the architectural environment becomes not only physically accessible but also enhances social integration, comfort, and ergonomics for all users, starting from the initial development stages to avoid future costs (Watchorn et al., 2022).

Theoretical Framework – Universal Design Principles

This theory posits that environments should be inherently accessible and usable by everyone, regardless of their physical, cognitive, or sensory abilities. The theory emphasizes seven key principles; equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use that guide the design of inclusive spaces.

The paradigm of Universal Design constitutes an innovative approach oriented towards the development of environments and products characterized by accessibility and usability for all individuals, independent of age, ability, or specific circumstances.

Universal Design Principles

The 7 Principles of Universal Design, conceived in 1997, emanated from a collaborative endeavour involving architects, product designers, engineers, and researchers in environmental design. Championed by the late Ronald Mace at North Carolina State University (NCSU), these principles have been formulated to provide prescriptive guidance

in the conceptualization of environments, products, and communicative mediums (Centre for Excellence in Universal Design, 2024).

As underscored by the Center for Universal Design at NCSU, the primary intent of these principles is multifaceted, encompassing the evaluation of existing designs, facilitation of the design process, and enlightenment of both designers and consumers regarding the attributes conducive to enhanced usability in products and environments of universal applicability (Centre for Excellence in Universal Design, 2024).

Universally designed frameworks are regarded as a manifestation of human rights principles, acknowledging the inherent condition of human plurality and emphasizing the requirement for interdisciplinary knowledge, education, and proficiency in its application (Lid, 2023; Mosca & Capolongo, 2020).

Principle One: Equitable Use

Equitable Use is fundamental to Universal Design, focusing on creating products and environments that are valuable and accessible to individuals with varying abilities. The aim is to promote inclusivity without causing stigmatization, ensuring that everyone, regardless of physical or cognitive differences, can access and utilize the designed features (Yilmaz, 2024a).

Equitable use in universal design within the built environment ensures that all individuals, regardless of their abilities, ages, or backgrounds, can access and utilize products, environments, and facilities. This principle focuses on creating designs that promote fair and inclusive access for everyone, eliminating barriers and enabling equal participation. Equitable use involves features such as wheelchair ramps, clear signage, and adjustable countertops, which enhance accessibility and usability for diverse users.

Principle Two: Flexibility in Use

Flexibility in the built environment is essential for universal design, enabling spaces to adapt to a variety of needs and users. The progression of flexibility in residential construction has been influenced by economic and social factors, highlighting the importance of sustainably addressing contemporary living requirements (Maisel & Steinfeld, 2022; Topcu & Tural, 2018).

Universal design principles strive to create built environments that are accessible, visitable, and usable for everyone, stressing the need for flexibility to accommodate diverse users without sacrificing functionality or aesthetics (Radogna & Kalhofer, 2022). Incorporating flexibility into design strategies allows the built environment to better meet society's evolving needs while fostering inclusivity and user-centred solutions.

Principle Three: Simple and Intuitive Use

Simple and intuitive use involves designing products and spaces that are straightforward and easy to use (Kovac, 2023).

Simple and Intuitive Use within universal design pertains to the creation of products, environments, or systems that are easily comprehensible and navigable for a diverse array of users, regardless of age, capabilities, or background. This principle underscores the importance of crafting designs that are straightforward, clear, and demand little effort to grasp and utilize proficiently.

Principle Four: Perceptible Information

The design effectively conveys essential information to users, irrespective of environmental factors or the user's sensory capacities (University at Buffalo, 2024). Perceptible Information in universal design within the built environment involves ensuring that information is presented in a manner that can be easily detected and comprehended by all users, regardless of their sensory capabilities or the surrounding conditions. This entails creating elements that can be perceived through different senses like sight, hearing, touch, and sometimes even smell, to guarantee that users can access and understand crucial information effectively.

Principle Five: Tolerance for Error

Tolerance for error in universal design within the built environment entails designing spaces or products to accommodate and reduce the effects of mistakes or unintended actions by users (Christopherson, 2022). The principle aims to create environments that enable users to recover from errors easily, emphasizing safety, usability, and accessibility for all individuals.

Principle Six: Low Physical Effort

Low Physical Effort in universal design in the built environment involves creating spaces or products that require minimal physical exertion from users to interact with (University at Buffalo, 2024). This principle aims to reduce the effort needed to use environmental elements, making them accessible and usable for people of different abilities and ages. Examples include features like automatic doors, ergonomic furniture, and smooth surfaces that are easy to navigate, all contributing to improved accessibility and comfort for users.

Principle Seven: Size and Space for Approach and Use

The principle of Size and Space for Approach and Use emphasizes the importance of designs that provide ample dimensions and uncluttered areas to cater to a wide spectrum of users. This entails taking into account differences in body size, posture, and mobility to guarantee that all individuals can comfortably access and engage with the designed features (Yilmaz, 2024b).

This principle considers differences in body size, posture, and mobility to guarantee comfortable access and interaction with designed elements for all individuals. It highlights

the significance of creating accessible and user-friendly spaces that accommodate the needs of everyone, fostering inclusivity and autonomy within the built environment.

Methodology

The methodology employed for this study was a systematic literature review (SLR). A systematic literature review is a comprehensive approach to reviewing existing research, which involves the identification, selection, and critical evaluation of studies to address a clearly defined research question (Dewey & Drahota, 2016). This method ensures a rigorous and unbiased synthesis of the literature, allowing researchers to draw meaningful conclusions from the existing body of knowledge.

In this study, seven articles were selected for review, each differing in its focus on building typology and inclusive accessibility standards. These articles were chosen based on specific criteria, including relevance to Universal Design in the built environment, the diversity of perspectives on accessibility, and the rigor of the research methodologies employed. The selection process aimed to capture a wide range of insights into how Universal Design principles are applied across different types of buildings and settings.

Once selected, the articles were systematically analysed in tabular form, which allowed for a clear comparison of key findings, methodologies, and thematic focuses. This approach facilitated the identification of common themes, gaps in the research, and variations in the application of Universal Design principles. The tabular analysis provided a structured way to examine the extent to which each study addressed issues related to accessibility, usability, and inclusivity within the built environment.

Through this detailed analysis, the study was able to highlight the areas where accessibility measures are currently insufficient, as well as the opportunities for improving the implementation of Universal Design. The findings underscored the need for more consistent application of accessibility standards and the importance of integrating Universal Design concepts into architectural education and practice. Additionally, the review emphasized the value of ongoing research and collaboration among stakeholders to ensure that built environments are truly accessible and inclusive for all individuals, regardless of their abilities.

Limitation in Study Design

1. The choice of only seven articles may introduce bias, possibly excluding relevant studies.
2. A small number of articles might not cover the full range of building typologies or accessibility standards.
3. Differences in study methodologies could affect the consistency of findings.
4. The study relies on secondary data, potentially missing insights from primary research.

Findings

Accessibility poses a contemporary challenge in societies striving for barrier-free environments where all individuals, including people with disabilities (PWD) and older adults, have equal rights to access. Unfortunately, many current environments are inadequately constructed and remain inaccessible to these populations (Yakob et al., 2022). Therefore, the concept of universal design has been introduced into the field of design to ensure that the needs, desires, and objectives of all individuals are met without isolating any group or imposing access restrictions (Babatunde et al., 2022). Universal Design (UD) is a design concept aimed at providing equal benefits and inclusivity for individuals of all physical abilities, genders, ages, and diverse characteristics (Phaholthep et al., 2017). Residential spaces should be accessible to all individuals without any barriers. Users should be able to navigate these spaces independently, without relying on assistance from others. This principle applies to everyone, including wheelchair users, the visually impaired and blind, individuals with various disabilities, the elderly, children, as well as individuals of varying heights (Al Hindwan & Erçin, 2023). In an academic setting, it is crucial to create an environment without barriers, allowing all students to fully experience and benefit from all aspects of education (Sholanke et al., 2020). Accessibility and social inclusion are increasingly important issues in public buildings like museums. Museums serve to provide public access to a wide array of objects for leisure, entertainment, and educational purposes. Given that museums depend on public patronage for their existence, the importance of inclusive and accessible design cannot be overstated (Ibem et al., 2017). Moreover, architects should ensure in their design proposals that suitable elements are not only provided but also implemented during construction, with a robust maintenance plan in place to ensure equal opportunities for all users (Babatunde et al., 2022). In the table below, the seven (7) journals relating to universal design were analysed for empirical review.

Table I: Analysis of Research Articles Relating to Universal Design

S/ N	Title of Article	Name of Author(s) and Year it was published	Aim and Objectives	Methodology	Results
1.	Compliance of High-rise Buildings Vertical Accessibility Components with Universal Design Strategies: A Case Study of Covenant University, Ota, Nigeria	Sholanke A. B., Adelowo I. E., Gbotosho J. O. (2020)	The objective of this research was to assess the extent to which Covenant University in Ota, Nigeria's high-rise buildings that house vertical accessibility elements adhere to universal design principles. The study aimed to pinpoint opportunities for additional enhancements that could boost social inclusion in learning settings.	The study examined two high-rise structures on the university campus and is a qualitative case study of a postsecondary school. To gather primary field data, a digital camera and an observation guide created specifically for the study were employed. Using text and image support, a descriptive technique was used to analyse and present the data.	The results showed that the vertical accessibility features offered by high-rise buildings include ramps, steps/staircases, and elevators. However, it was shown that these features all showed varying degrees of deviation from universal design principles.
2.	Assessment Of Design Principles In The Residential Buildings For Disabled Persons: A Case Study Of Social Housing In Northern Cyprus	Ibtihal Alwi Al Hindwan, Çilen Erçin. (2023)	In order to determine if social housing in Mağusa and Nicosia is suitable for handicapped people, this research examined the design principles of residential spaces for disabled people in Northern Cyprus.	The methodology blends quantitative and qualitative analysis. It comprises an overview of residential spaces and a qualitative literature assessment on design concepts for impaired access. Using a 1–5 scale for housing characteristics, accessibility, and demographics—1 being very poor, and 5 being very good—it used a structured questionnaire to collect quantitative data.	The results show that sidewalk accessibility and toilet design are an issue, which suggests that homeowners are not happy with the way their homes are designed. Universal design criteria for the disabled are also not met by the social homes in Famagosta and Nicosia. The living room and kitchen areas are often regarded favourably by the occupants notwithstanding these problems. All things considered, the study finds that Northern Cyprus residential designs, especially with regard to circulation areas and general quality, fall short of meeting the specific requirements of people with disabilities.
3.	An Appraisal of Universal Design Compliance of Museum Buildings in Southwest Nigeria.	Eziyi O. Ibem ¹ , Olatunji O. Oni, Ekemini Umoren and Jemima Ejiga. (2017)	The objective of this research was to investigate the degree to which Nigerian museum buildings and amenities adhere to universal design principles and increase user satisfaction.	Following the three universal design principles of approachability, accessibility, and usability, a case study research design was used to evaluate three museums located in southwest Nigeria.	According to the results, the three museums ranked below average in the accessibility and usability categories but quite well in the approachability category. Consequently, not all segments of society can easily access or utilize the amenities and services provided by the current museums.
4.	A Study of Universal Design Strategies in Selected Public Buildings in Lagos State	Oyeniya Babatunde Morenikeji, Taiye Alagbe, Ife Akande, Olabode Oyedele. (2022)	This study examined the universal design strategies employed in selected public buildings in the Lagos metropolis, aiming to evaluate how effectively these strategies are implemented based on users' perspectives.	This research is classified as qualitative due to the study's purpose. Consequently, the research philosophy adopted was interpretivist, and the approach was inductive. However, the analysis incorporated both qualitative and quantitative methods, utilizing content and descriptive analysis techniques.	The findings from the study revealed that accessibility, a core feature of universal design, is poorly managed in most of the facilities surveyed. A slight majority of respondents agreed that most facilities conform to universal design principles to some extent. Furthermore, the majority of users affirmed that, on average, the

					integration of universal design features within the facilities surveyed appears flexible and seamless. Additionally, these features are considered efficient and effective. However, the adequacy of universal design features, in terms of provision, is rated low by the majority of respondents in most of the surveyed facilities.
5.	Qualitative Assessment Of Usability And Accessibility Of Housing Design Elements For Disabled People	Hamizah Yakob, Syahzanani Afzan Mazlan, Yusfida Ayu Abdullah, Na'asah Nasrudin. (2022)	This paper aimed to assess the accessibility of six selected design elements - ramps, stairs, main entrances, lifts, handrails, and parking spaces, as well as the effectiveness of legislation and standards in PPR Pekan Batu, Kuala Lumpur.	Qualitative assessments were conducted for the study using content analysis of planning guidelines and site observations.	The results indicated that the effectiveness of legislation and standards significantly impacted the accessibility and usability of housing design elements for people with disabilities (PWDs). Three design elements—the stairs, parking space, and main entrance—had the lowest compliance scores, while ramps and handrails had the second-lowest scores. Conversely, the lift was the most compliant element regarding accessibility. These findings suggest that different types of disabilities necessitate varied housing accessibility requirements. This study contributes to enhancing accessible design elements for the disabled, leading to a better environment.
6.	Evidence-Based Research on Barriers and Physical Limitations in Hospital Public Zones Regarding the Universal Design Approach.	Charanya Phaholthep, Antika Sawadsri, and Thirawut Bunyasakseri. (2017)	The research objectives are: 1. Examining the physical environments and functional accessibility of the hospital's public areas for individuals with disabilities. 2. Identifying obstacles that create inaccessibility in the hospital's public areas for individuals with disabilities. 3. Developing design guidelines and recommendations for the design process of building and overall environment design in the hospital's public areas with consideration for individuals with disabilities.	This research employed an empirical approach to assess and evaluate the physical features through Post Occupancy Evaluation (POE), utilizing two evaluation methods: 1. Survey /observation (Cognitive walkthrough) and 2. Scenario access audit methods.	The research at NU Hospital revealed key accessibility challenges, primarily related to wayfinding and overcrowding in passageways, which hindered navigation for people with disabilities and functional limitations. Inanimate obstacles were not significant issues; instead, congested passageways posed the most substantial barrier. To address these issues, improvements such as enhanced disabled parking, more wheelchair ramps, improved patient drop-off areas, clear signage with symbols, accessible counters, and navigational aids were recommended. Design guidelines based on Preiser et al. (2009) were proposed to enhance accessibility. The study emphasizes the importance of inclusive building design that considers the needs of

					all users, highlighting that design changes benefiting people with disabilities can enhance usability for everyone.
7.	Architecture Challenges In Attaining Inclusive Education For People With Disabilities – Sharing Experience From Kosovo	Arta Basha-Jakupi, Gresa Morina, and Dukagjin Hasimja. (2023)	The study aimed to investigate the readiness of educational infrastructure in Kosovo to meet the accessibility needs of persons with disabilities (PWDs), focusing on building design adaptations to ensure adequate education, socialization, and a safe environment.	The study utilized descriptive research methods including surveys, observations, and a case study approach to investigate the topic comprehensively from multiple perspectives. Research was conducted across all educational levels: preschool, elementary school, high school, and higher education institutions.	Across all educational levels (preschool, elementary school, high school, university/college), similar physical barriers were found, with higher education facilities generally showing better accessibility for persons with disabilities (PWDs). It is essential for all educational facilities, especially at the preschool and elementary levels, to meet universal design standards to ensure a seamless educational experience and promote social inclusion. This study's recommendations aim to influence architectural practices and educational institutions in Kosovo based on observed barriers and two proposed scenarios.

Summary of Findings

Universal Design (UD) aims to create environments that are accessible and usable by people of all abilities, transcending basic legal requirements. This literature review explores various studies focused on the application of Universal Design principles in different building typologies across various geographical contexts, highlighting both the achievements and the shortcomings in implementing these principles.

1. Compliance of High-Rise Buildings’ Vertical Accessibility Components with Universal Design Strategies: A Case Study of Covenant University, Ota, Nigeria (Sholanke et al., 2020)

This study evaluated the extent to which vertical accessibility elements in high-rise buildings at Covenant University, Nigeria, adhered to Universal Design principles. The objective was to identify potential improvements that could enhance social inclusion in educational environments. The methodology employed was a qualitative case study of two high-rise structures, utilizing field data collected through digital photography and observation guides. The analysis, presented descriptively with text and images, revealed that while the high-rise buildings featured accessibility elements such as ramps, staircases, and elevators, these elements showed varying degrees of deviation from Universal Design principles. This inconsistency in compliance underscores the need for more stringent adherence to Universal Design standards in educational institutions to foster inclusivity.

2. Assessment of Design Principles in Residential Buildings for Disabled Persons: A Case Study of Social Housing in Northern Cyprus (Al Hindwan & Erçin, 2023)

Al Hindwan and Erçin's (2023) research focused on the suitability of social housing for disabled individuals in Northern Cyprus, specifically in Mağusa and Nicosia. The study combined qualitative and quantitative methodologies, including a literature review on impaired access design concepts and a structured questionnaire using a 1-5 scale to assess housing characteristics, accessibility, and demographic factors. The findings indicated significant issues with sidewalk accessibility and toilet design, reflecting homeowners' dissatisfaction with their living spaces. Despite these shortcomings, some areas, such as living rooms and kitchens, were rated positively. Overall, the study concluded that the design of social housing in Northern Cyprus, particularly regarding circulation areas and general quality, fails to meet the specific needs of people with disabilities.

3. An Appraisal of Universal Design Compliance in Museum Buildings in Southwest Nigeria (Ibem et al., 2017)

Ibem et al. (2017) conducted a study to assess the compliance of museum buildings in Southwest Nigeria with Universal Design principles. The research utilized a case study design, evaluating three museums based on the principles of approachability, accessibility, and usability. The results indicated that while the museums performed relatively well in terms of approachability, they ranked below average in accessibility and usability. This discrepancy highlights the challenges in ensuring that all segments of society can fully utilize museum amenities, emphasizing the need for improvements in the application of Universal Design principles in public cultural institutions.

4. A Study of Universal Design Strategies in Selected Public Buildings in Lagos State (Morenikeji et al., 2022)

This study examined the implementation of Universal Design strategies in public buildings within Lagos State, Nigeria. The research adopted a qualitative approach, underpinned by an interpretivist philosophy and an inductive method. Both qualitative and quantitative data were analyzed using content and descriptive analysis techniques. The findings revealed that accessibility, a core feature of Universal Design, was poorly managed in many of the facilities surveyed. While a slight majority of respondents acknowledged some level of compliance with Universal Design principles, the overall adequacy of these features was rated low. The study underscored the importance of not only implementing but also effectively managing Universal Design features to ensure they meet the needs of all users.

5. Qualitative Assessment of Usability and Accessibility of Housing Design Elements for Disabled People (Yakob et al., 2022)

Yakob et al. (2022) focused on evaluating the accessibility of specific housing design elements for people with disabilities (PWDs) in PPR Pekan Batu, Kuala Lumpur. The study

employed qualitative assessments through content analysis of planning guidelines and site observations. The results highlighted significant shortcomings in the accessibility of design elements such as stairs, parking spaces, and main entrances, which had the lowest compliance scores. Conversely, lifts were found to be the most compliant element. These findings suggest that varying types of disabilities require different housing accessibility solutions. The study's contributions are crucial for enhancing accessible design elements, leading to better living environments for PWDs.

6. Evidence-Based Research on Barriers and Physical Limitations in Hospital Public Zones Regarding the Universal Design Approach (Phaholthep et al., 2017)

Phaholthep et al. (2017) conducted research on the barriers and physical limitations in hospital public zones concerning Universal Design principles. The study used an empirical approach, including Post Occupancy Evaluation (POE) through surveys, observations, and scenario access audits. The research at NU Hospital revealed significant accessibility challenges, particularly with wayfinding and congested passageways, which impeded navigation for individuals with disabilities. The study recommended several design improvements, such as better signage, accessible counters, and enhanced disabled parking. These findings underline the importance of inclusive design in healthcare facilities, which can significantly improve the usability of spaces for all users, including those with disabilities.

7. Architecture Challenges in Attaining Inclusive Education for People with Disabilities – Sharing Experience from Kosovo (Basha-Jakupi et al., 2023)

This study explored the readiness of educational infrastructure in Kosovo to meet the accessibility needs of people with disabilities (PWDs), focusing on building design adaptations. The research employed descriptive methods, including surveys, observations, and case studies across all educational levels, from preschool to higher education. The findings revealed common physical barriers at all educational levels, with higher education facilities showing relatively better accessibility. The study emphasized the need for all educational facilities, particularly at the preschool and elementary levels, to meet Universal Design standards. The recommendations aimed to influence architectural practices and educational policies in Kosovo to promote inclusive education and social inclusion for PWDs.

Conclusion

The literature reviewed highlights a widespread recognition of the importance of Universal Design in creating accessible and inclusive environments. However, it also reveals significant gaps in the consistent implementation of these principles across different contexts. Studies from Nigeria, Northern Cyprus, Malaysia, Thailand, and Kosovo demonstrate varying levels of compliance with Universal Design standards, with common

challenges including inadequate accessibility features, inconsistent application of design principles, and a lack of rigorous enforcement of existing regulations.

To address these issues, there is a clear need for stronger integration of Universal Design into architectural education and practice, more stringent enforcement of accessibility standards, and enhanced collaboration among stakeholders. Furthermore, ongoing research and initiatives are essential to continually refine and expand the application of Universal Design principles, ensuring that built environments are truly inclusive and accessible to all members of society, regardless of their abilities.

To improve compliance and enhance the adoption of Universal Design, several methods can be considered. First, rigorous enforcement of existing regulations and standards is essential to ensure that new construction and renovations adhere to Universal Design principles. Second, integrating Universal Design principles into architectural education and professional training programs can cultivate a mindset of inclusivity among future designers. Additionally, fostering collaboration between architects, engineers, disability advocates, and policymakers can promote innovative design solutions that prioritize accessibility without compromising aesthetics or functionality.

Moving forward, ongoing research and practical initiatives are crucial to advancing Universal Design in the built environment. By addressing these challenges and implementing effective strategies, we can create environments that are truly accessible and inclusive for all individuals, regardless of ability.

Recommendations

1. Enforcement of existing regulations and standards to ensure that new constructions and renovations comply with Universal Design principles.
2. Inclusion of Universal Design principles in architectural education and professional training programs to foster an inclusive mindset among future designers.
3. Encouragement of collaboration among architects, engineers, disability advocates, and policymakers to develop innovative design solutions that balance accessibility with aesthetics and functionality.
4. Support of ongoing research and practical initiatives to continually refine and expand the application of Universal Design principles.
5. Standardization of the application of Universal Design principles across different contexts and regions to ensure consistent implementation.
6. Enhancement of accessibility features in new and existing buildings to meet Universal Design standards effectively.
7. Investment and promotion of innovative approaches to Universal Design that address common challenges and improve overall compliance.

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