

Universal Design Principles as a Framework for Inclusive Architectural Practice: A Structured Approach to Architectural Decision Making

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Abstract

Universal Design (UD) has gained increasing attention in architectural practice because buildings are used by people with diverse physical, sensory, cognitive and functional capacities. However, the established principles of Universal Design are often presented as general guidance or applied through individual accessibility provisions, with limited direction on how they can inform coordinated architectural decisions. This study addresses this gap by developing a practice-oriented framework for translating Universal Design principles into inclusive architectural practice. A qualitative literature synthesis was adopted, drawing on peer reviewed journal articles, scholarly publications and relevant institutional materials addressing Universal Design, inclusive architecture, accessibility, circulation, environmental usability and related aspects of the built environment. The selected literature was purposively analysed through thematic synthesis to identify recurring user requirements, design requirements and architectural responses associated with the seven Universal Design principles. The findings indicate that Universal Design principles relate to recurring requirements concerning access, spatial organisation, circulation, environmental communication, safety, adaptability and physical effort. The analysis further shows that individual architectural decisions may respond to several Universal Design principles simultaneously, supporting an integrated approach rather than isolated accessibility provisions. Based on these relationships, the study proposes a framework structured around five components: User Need, Design Requirement, Universal Design Criterion, Architectural Response and Inclusive Performance. The framework provides architects, educators and other built environment professionals with a structured means of relating user requirements to design decisions and considering their expected contribution to inclusive building use. Its application has implications for architectural education, professional practice, design review and accessibility assessment. The study concludes that advancing Universal Design in architectural practice requires greater attention to the translation of established principles into coordinated design decisions. As a literature derived framework, its application across different building types and user contexts requires further empirical testing.

Keywords: *Universal Design; Inclusive Design; Architectural Practice; Accessibility; Circulation; Inclusive Performance*

1.0 Introduction

Universal Design (UD) has gained increasing attention in architectural practice because buildings are used by people with different ages, physical abilities, sensory capacities, levels of

mobility and patterns of use. Conventional architectural approaches have often treated accessibility as a specialised requirement addressed through ramps, lifts, accessible toilets and other provisions after major design decisions have been made. Universal Design adopts a broader approach by considering human diversity from the early stages of design and seeking environments that can be used by the widest range of people without the need for specialised adaptation (Olodeoku et al., 2024; Zallio et al., 2024). This places Universal Design within the wider pursuit of inclusive architectural practice, where access, usability, safety, independence and participation are considered as integral aspects of building design.

The challenge, however, is not the absence of established Universal Design principles but the difficulty of translating them into coordinated architectural decisions. The reviewed literature largely explains the seven principles, accessibility requirements and inclusive design strategies as related but often separate areas of knowledge. While these contributions provide theoretical and technical guidance, less attention is given to how the principles can be systematically related to specific user requirements, design requirements and architectural responses. In practice, this may result in Universal Design being treated as a checklist of accessibility features rather than as an approach that informs site planning, spatial organisation, circulation, entrances, environmental communication, building elements and facilities from the early stages of design. The central gap is therefore one of translation: how established Universal Design principles can be connected to actionable architectural decisions that support inclusive building use.

This study aims to develop a practice-oriented framework for translating Universal Design principles into architectural decisions for inclusive architectural practice. To achieve this aim, the study seeks to:

1. examine the theoretical and empirical literature on Universal Design and inclusive architectural practice;
2. identify recurring user and design requirements associated with the seven principles of Universal Design;
3. synthesize these requirements into applicable architectural responses; and
4. develop a framework linking user needs, design requirements, Universal Design criteria, architectural responses and inclusive performance.

The resulting framework is intended to provide architects, educators and other built environment professionals with a structured basis for incorporating Universal Design into architectural decision making rather than treating accessibility as a separate or corrective intervention. By organising established Universal Design principles in relation to user needs and architectural responses, the study seeks to strengthen the practical application of inclusive design within mainstream architectural practice.

2.0 Literature Review

2.1 Universal Design and Inclusive Architectural Practice

Universal Design (UD) emerged from the recognition that the built environment should accommodate differences in human ability rather than require users to adapt to restrictive spatial conditions. Its scope extends beyond permanent disabilities to include differences in age, physical capacity, sensory ability and temporary limitations (Lid, 2023; Mosca & Capolongo, 2020). This approach positions human diversity as a consideration from the early stages of architectural development rather than as a condition requiring specialised intervention after construction (Olodeoku et al., 2024).

Accessibility and Universal Design are related but not synonymous. Accessibility is primarily

concerned with removing barriers that restrict a person's ability to approach, enter, navigate and use a building safely and independently. Universal Design adopts a broader perspective by seeking environments that can accommodate a wider range of users through decisions made during the design process (Mohapatra et al., 2024; Zallio et al., 2024). Ramps, lifts, accessible toilets and other accessibility provisions may therefore form part of Universal Design, but their presence alone does not guarantee an inclusive environment.

Architectural decisions concerning site planning, entrances, spatial organisation, circulation, environmental communication and building facilities influence how different users experience and use buildings. Research identifies circulation, spatial arrangement, accessibility and wayfinding as important conditions for safe and independent movement within public environments (Iftikhar & Luximon, 2023; Abrantes et al., 2023). Universal Design therefore provides a basis for considering these requirements as connected aspects of architectural decision making rather than as isolated accessibility provisions.

2.2 Evolution and Scope of Universal Design

Universal Design developed in response to the limitations of approaches that addressed accessibility primarily through specialised adaptations. Its development reflects a shift towards environments that anticipate differences among users during the design process (Niemiec, 2026; Olodeoku et al., 2024). Rather than relying principally on modifications for particular user groups, the approach seeks to reduce barriers through environments that can accommodate diverse users as part of normal building use. The seven principles associated with Universal Design were developed through collaborative work involving architects, product designers, engineers and environmental design researchers and have subsequently provided a structured basis for evaluating and guiding design (Centre for Excellence in Universal Design, 2024). The principles can be applied in evaluating existing designs, guiding design processes and educating designers about characteristics that improve usability (Centre for Excellence in Universal Design, 2024). The scope of Universal Design extends beyond physical access. The literature associate's inclusive environments with independence, safety, dignity, participation and usability for people with different physical and sensory capacities (Pineo, 2022; Zallio et al., 2024). This broader scope is relevant to architectural practice because inclusion depends not only on whether users can enter a building, but also on whether they can understand, navigate and use its spaces and facilities.

2.3 The Seven Principles of Universal Design

The seven principles provide the principal theoretical basis for applying Universal Design to the built environment. Equitable Use requires environments to provide comparable opportunities for people with different abilities while avoiding unnecessary segregation or stigmatisation. Flexibility in Use accommodates differences in user preferences, abilities and methods of operation. Simple and Intuitive Use requires environments and controls to be understandable without unnecessary complexity (Centre for Excellence in Universal Design, 2024; Kovac, 2023). Perceptible Information requires essential information to be communicated through appropriate sensory channels, including visual, auditory and tactile means (University at Buffalo, 2024). Tolerance for Error seeks to minimise hazards and reduce the consequences of unintended actions (Christopherson, 2022). Low Physical Effort reduces unnecessary physical exertion through appropriate building elements, fittings and controls (University at Buffalo, 2024). Size and Space for Approach and Use requires adequate space for different body dimensions,

postures, mobility aids and patterns of use (Yilmaz, 2024).

The principles are not applied independently in architectural practice. A single design decision may respond to several principles at the same time. For example, a clearly organised circulation system can support equitable use, simple and intuitive use, perceptible information and tolerance for error. Similarly, adequate spatial clearances may support equitable use, flexibility and independent movement. This relationship indicates the need to consider the principles in relation to actual building requirements rather than as isolated design criteria.

2.4 Universal Design in the Built Environment

Universal Design operates across different scales of the built environment, from site access and building entry to spatial organisation, circulation and individual building elements. Site planning influences how users' approach and enter buildings, while spatial organisation determines relationships among functional areas and affects the ease with which users move between them. Circulation systems provide the physical connections between spaces through corridors, passageways, stairs, ramps, elevators and other movement systems (Alnaim et al., 2025; Nwankwo & Okafor, 2024). Effective circulation requires appropriate pathway widths, logical spatial sequences, accessible vertical connections and clear routes (Iftikhar & Luximon, 2023; Abrantes et al., 2023). In public buildings, emergency routes and exits also require clear organisation and adequate provision to support safe evacuation (Shi et al., 2021). Environmental communication is another important area of application. Signage, visual contrast, tactile information and auditory communication can assist users with different sensory capacities and improve orientation within buildings (University at Buffalo, 2024).

The application of Universal Design consequently extends from the broader organisation of the site and building to individual elements, controls, facilities and environmental information. These areas provide the architectural context within which the principles can be translated into specific design decisions. The literature therefore indicates that inclusive building performance depends on relationships among different components of the built environment rather than on the provision of individual accessibility features alone (Iftikhar & Luximon, 2023; Lid, 2023).

2.5 From Accessibility Measures to Inclusive Architectural Practice

A recurring limitation in conventional accessibility practice is the concentration on individual physical provisions. Ramps, elevators, accessible parking, wider doors, handrails and accessible toilets address important barriers, but they do not by themselves determine whether an environment is easy to understand, navigate or use independently. Universal Design broadens this approach by considering accessibility and usability during the design process rather than relying primarily on corrective interventions (Olodeoku et al., 2024; Mohapatra et al., 2024).

Circulation illustrates this distinction. An accessible route requires appropriate dimensions and gradients, but effective movement also depends on spatial organisation, visibility, logical sequences and wayfinding (Iftikhar & Luximon, 2023; Abrantes et al., 2023). Poorly organised circulation can produce confusion, congestion and safety problems, while clear routes and appropriate spatial relationships can support more efficient movement (Skiba & Züger, 2021; Danso et al., 2023). Inclusive architectural practice therefore requires attention to both physical access and functional usability. The relevant design consideration extends beyond whether an accessibility feature has been provided to whether the building enables diverse users to move, orient themselves, interact with facilities and participate independently. This broader position is consistent with literature that associates inclusive environments with equality, dignity and

participation (Pineo, 2022; Zallio et al., 2024).

2.6 Empirical Evidence Relevant to Universal Design Application

The empirical literature reviewed in this study provides evidence relevant to architectural requirements associated with Universal Design, although not all of the studies directly examine or evaluate Universal Design as a formal framework. The studies address related issues including access, circulation, spatial organisation, wayfinding, building usability and facilities for diverse users. Their relevance to this study lies in the way their findings inform architectural requirements that correspond with Universal Design principles.

Studies of accessibility in public and institutional environments have identified accessible routes, appropriate circulation arrangements and clear connections between spaces as important conditions for independent movement and use (Alnaim et al., 2025; Danso et al., 2023). Research on route planning and wayfinding similarly indicates that the availability, clarity and organisation of environmental information influence movement efficiency and users' ability to navigate complex environments (Abrantes et al., 2023; Iftikhar & Luximon, 2023).

The evidence also indicates that inclusive design extends beyond physical access to the usability of residential and public environments. Ismail et al. (2023) examined accessibility and age friendly housing and reported the importance of considering requirements beyond basic physical access. Mohapatra et al. (2024) similarly identified accessibility to public buildings as an issue involving social justice and equity, indicating that the usability of public environments should be considered in relation to the needs and experiences of people with mobility disabilities. Zallio et al. (2024) further position inclusion, diversity, equity and accessibility as related considerations within the built environment. Research on public facilities also shows that architectural decisions influence how users move through and interact with buildings. Studies of sports facilities have examined access provision and circulation as important aspects of accommodating users with disabilities and managing movement within large public environments (Danso et al., 2023; Nwankwo & Okafor, 2024). Strobel et al. (2025) further indicate the potential of technological applications to improve the accessibility of stadium experiences for people with limited mobility. These studies provide empirical evidence on specific architectural conditions that are relevant to inclusive building use, rather than direct empirical tests of Universal Design as a comprehensive design approach. Taken together, the empirical evidence provides support for architectural requirements associated with Universal Design, particularly in relation to access, movement, orientation, information, safety and spatial accommodation. However, the studies generally address particular building types, user groups or design issues rather than examining the relationships among Universal Design principles, user needs and architectural responses within a single framework. This limitation supports the need for the present synthesis and the proposed framework.

2.7 Gap in Existing Literature

The reviewed literature provides substantial knowledge on Universal Design principles, accessibility, circulation, spatial organisation, environmental communication and inclusive building use. Existing studies explain the seven principles and identify architectural measures that can improve access, usability, safety and independent movement (Centre for Excellence in Universal Design, 2024; Iftikhar & Luximon, 2023; Zallio et al., 2024). Empirical studies also provide evidence on the influence of circulation, access, wayfinding and spatial organisation on movement and building use (Abrantes et al., 2023; Alnaim et al., 2025; Danso et al., 2023).

The principal gap is the limited integration of these areas into a practical architectural decision framework. The literature frequently moves either from Universal Design principles to general recommendations or from specific accessibility requirements to individual design solutions. Less attention is given to organising the relationship among user needs, design requirements, Universal Design criteria, architectural responses and expected inclusive performance within a single decision structure. This study addresses this gap by synthesising the identified relationships into a practice-oriented framework for inclusive architectural practice. The proposed framework does not seek to replace the established principles of Universal Design or statutory accessibility requirements. Rather, it provides a structured means of relating them to architectural decisions so that inclusion can be considered as part of mainstream design development, evaluation and review.

3.0 Methodology

3.1 Research Approach

The study adopted a qualitative integrative literature review to examine how Universal Design principles can be translated into architectural decisions for inclusive building use. This approach was appropriate because the study brings together conceptual and empirical literature from different areas of the built environment to identify recurring relationships and develop a practice-oriented framework. The review focused on Universal Design, accessibility, inclusive architecture, building usability, circulation, wayfinding, environmental communication and safety. The review was guided by the four research objectives. The first addressed existing theoretical and empirical knowledge on Universal Design and inclusive architectural practice. The second focused on user and design requirements associated with the seven Universal Design principles. The third examined architectural responses to these requirements, while the fourth concerned the synthesis of the identified relationships into a framework for architectural decision making.

3.2 Literature Search and Data Sources

Literature was identified through searches of scholarly publications and relevant institutional sources using combinations of the following terms: *Universal Design, Universal Design principles, inclusive architecture, inclusive architectural practice, accessible built environment, architectural accessibility, building usability, wayfinding, circulation* and *inclusive design*. Related terms were combined where necessary to identify literature addressing user requirements, accessibility, architectural responses and inclusive building use.

The evidence base comprised peer reviewed journal articles, scholarly books and relevant institutional publications. Institutional sources were included where they provided foundational information on Universal Design principles or accessibility. The search was not restricted to a single building type because the study sought relationships that could inform architectural practice across different built environment contexts.

3.3 Selection Criteria and Data Organisation

Sources were purposively selected according to their relevance to the research objectives. Publications were retained where they provided substantive discussion or evidence relating to one or more of the following: Universal Design principles, user requirements, accessibility, usability, spatial organisation, circulation, wayfinding, environmental communication, safety, adaptability or architectural responses for diverse users.

Sources were excluded where Universal Design or accessibility was only incidental to the study, where the material provided insufficient information for thematic analysis, or where its subject matter had no meaningful architectural or built environment application. Where publications addressed substantially overlapping material, the source providing the most relevant theoretical, empirical or practice-based contribution was prioritised.

Relevant information was extracted from the selected sources and organised according to the issues addressed by each publication. Attention was given to the user requirement identified, the associated design requirement, the relevant Universal Design principle, the architectural response and the expected implication for inclusive building use.

3.4 Method of Data Analysis

The selected literature was analysed through thematic synthesis. The analysis involved identifying, grouping and comparing recurring themes across the selected sources. Initial themes included access and approach, spatial organisation, circulation, environmental communication, safety, physical effort, flexibility and spatial accommodation. The identified themes were then examined in relation to the seven Universal Design principles. User needs were analytically organised into corresponding design requirements, after which relevant Universal Design principles were treated as criteria for examining possible architectural responses. Architectural responses were grouped into major areas including site access, entrances, spatial organisation, circulation, environmental communication, building elements, facilities, safety and spatial dimensions. The synthesis also examined relationships that crossed individual Universal Design principles. Where one architectural response could address several principles, the relationship was retained rather than forcing a one to one classification. This process enabled the study to move beyond a descriptive review of individual sources to a structured synthesis of relationships relevant to architectural decision making.

3.5 Framework Development and Methodological Rigour

Methodological rigour was supported through alignment among the research objectives, literature selection criteria, data extraction, thematic synthesis and framework development. The seven Universal Design principles were treated as established criteria derived from the literature, while the relationships among User Need, Design Requirement, Universal Design Criterion, Architectural Response and Inclusive Performance were developed through thematic synthesis.

The proposed framework is therefore a literature derived analytical structure, not a validated predictive or assessment model. Within the framework, Inclusive Performance refers to the expected contribution of an architectural response to user and building outcomes, including independent movement, ease of understanding, safety, flexibility, reduced physical effort and equitable participation. These represent expected outcomes rather than measured performance or validated assessment scores. The framework is intended to complement, rather than replace, statutory accessibility requirements, building regulations and professional judgement. Its applicability and effectiveness across different building types, user groups and contexts require empirical testing.

3.6 Scope and Limitation

The study relies on published literature and does not include primary user surveys, interviews, case study observations or performance measurements. Consequently, the proposed framework provides an analytically grounded structure for architectural decision making rather than

empirical evidence of improved building performance. Inclusive Performance therefore refers to expected user and building outcomes, not validated performance indicators.

The framework should complement, rather than replace, statutory accessibility requirements, building regulations and professional judgement. Its applicability and effectiveness across different building types, user groups and contexts require further empirical testing.

4.0 Findings

The thematic synthesis produced three principal findings. First, the reviewed literature reveals recurring user and design requirements across different Universal Design principles. Second, these requirements converge around a limited number of architectural decision areas. Third, the relationship between Universal Design criteria and architectural responses is cross cutting, with individual responses often addressing more than one requirement. These findings provided the basis for the framework developed in Section 5.

4.1 Cross Cutting User and Design Requirements

The synthesis revealed six recurring requirements across the reviewed literature: equitable access, adaptable use, clear understanding and navigation, accessible information, safe use, and reduced physical demand with adequate spatial provision. These requirements cut across individual Universal Design principles rather than belonging exclusively to one principle.

Equitable access concerns the ability to approach, enter, occupy and use buildings without unnecessary segregation. Flexibility in use concerns variation in users, preferences and methods of interaction. Clear understanding and navigation relate to the legibility of spaces, routes and controls, while accessible information concerns the availability of environmental information through appropriate sensory channels. Safe use concerns the reduction of hazards and the consequences of unintended actions. Reduced physical demand and adequate spatial provision concern the effort, clearance, reach and movement requirements associated with different users.

The significance of these requirements is that they provide a more practical basis for architectural decision making than consideration of the seven principles in isolation. They represent the recurring human and functional conditions that architectural design must address.

4.2 Architectural Decision Areas

The synthesis grouped the architectural responses associated with these requirements into five interconnected decision areas: access and approach; spatial organisation and circulation; environmental communication; building elements and facilities; and safety and flexibility.

Access and approach concern the continuity of movement from the site to building entrances and major internal spaces. Spatial organisation and circulation concern the relationships, dimensions and movement paths that enable users to navigate buildings. Environmental communication concerns signage, wayfinding and other information systems. Building elements and facilities include doors, controls, fittings, sanitary facilities and other components that directly affect building use. Safety and adaptability concern hazard reduction, emergency movement and the capacity of spaces or elements to accommodate variations in use.

These areas operate across different scales of architectural design. A decision concerning a building entrance, for example, may affect access, circulation, physical effort and equitable use at the same time. The findings therefore point to architectural decision areas rather than isolated accessibility features as the more useful level for applying Universal Design.

4.3 Relationship between Universal Design Criteria and Architectural Responses

The synthesis indicates that the relationship between Universal Design criteria and architectural responses is many to many rather than one to one. A single Universal Design criterion may require responses across several architectural areas, while one architectural response may address several criteria simultaneously. For example, a well organised circulation system may support equitable access, intuitive navigation, perceptible information and safe movement. Similarly, adequate spatial clearances may contribute to equitable access, flexibility in use, clear understanding and navigation. Integrated entrances may address access, navigation and physical effort at the same time. This cross relationship is important to the proposed framework because it shifts the focus from matching one principle with one design feature to examining how architectural decisions respond to multiple user and design requirements. The synthesis consequently provides the basis for organising Universal Design criteria and architectural responses within a single decision structure in Section 5.

5.0 Proposed Framework For Inclusive Architectural Practice

The findings indicate that the application of Universal Design requires a clear relationship between user requirements and architectural decisions. Based on the thematic synthesis, this study proposes a framework that organises these relationships into five connected components: User Need, Design Requirement, Universal Design Criterion, Architectural Response and Inclusive Performance. The framework is intended to support architectural decision making from the identification of user needs through the selection of appropriate design responses and consideration of their expected contribution to inclusive building use. It does not introduce new Universal Design principles or replace existing accessibility standards. Rather, it provides a structured means of applying established principles within the architectural design process.

5.1 Framework Structure

The first component, User Need, identifies the requirements arising from differences in users' physical abilities, sensory capacities, mobility, preferences and patterns of building use. This establishes the human requirement that the design is expected to address.

The second component, Design Requirement, translates the identified user need into a requirement that can be considered within architectural decision making. Such requirements may relate to access, movement, orientation, operation, safety, physical effort, flexibility or spatial accommodation. The third component, Universal Design Criterion, identifies the relevant Universal Design principle or principles that provide the basis for addressing the requirement. The seven principles are therefore treated as criteria through which architectural requirements can be examined rather than as isolated design solutions.

The fourth component, Architectural Response, identifies the physical, spatial or technical decisions through which the design requirement can be addressed. These may involve site planning, entrances, spatial organisation, circulation, environmental communication, building elements, facilities, safety provisions or spatial dimensions.

The five components are connected but not necessarily linear. A single user need may generate several design requirements, while one architectural response may address several Universal Design criteria. The framework therefore supports an iterative design process in which architectural decisions can be reviewed against identified user needs and their expected contribution to inclusive building use. Within this framework, Inclusive Performance refers to the expected user and building outcomes associated with an architectural response, such as

independent movement, ease of understanding, safety, flexibility, reduced physical effort and equitable participation. It does not represent measured building performance or a validated assessment score. The framework is a literature derived analytical structure rather than a validated predictive or assessment model, and its performance across different building types and user contexts remains subject to empirical testing.

The five components are connected but not necessarily linear. A single user need may generate several design requirements, while one architectural response may address several Universal Design criteria. The framework therefore supports an iterative design process in which architectural decisions can be reviewed against identified user needs and expected inclusive performance. The framework represents a literature derived analytical structure rather than a validated predictive or assessment model. Its purpose is to organise established Universal Design principles in relation to architectural decision making, while its effectiveness across different building types and user contexts remains subject to empirical testing.

5.2 Universal Design Principles and Architectural Decision Matrix

Within the proposed framework, the seven established Universal Design principles are treated as criteria for examining architectural requirements and decisions. They provide the basis for determining whether a proposed architectural response addresses identified user needs in accordance with the established principles of Universal Design. The use of the term *criterion* in the framework therefore refers to the function performed by each Universal Design principle in the decision process and does not imply the creation of new principles or independent assessment standards. The matrix relates each Universal Design criterion to a corresponding user need, design requirement, architectural response and expected inclusive performance. The relationships are derived from the thematic synthesis of the reviewed literature and are intended to support architectural decision making rather than prescribe a fixed design solution. Since individual architectural responses may address more than one Universal Design principle, the relationships presented in the matrix should be understood as interconnected rather than strictly one to one. The relationships identified from the literature are organised in Table 1.

Table 1. Universal Design Principles and Architectural Decision Matrix

USER NEED	DESIGN REQUIREMENT	UNIVERSAL DESIGN CRITERION	ARCHITECTURAL RESPONSE	INCLUSIVE PERFORMANCE
Equal opportunity to access, occupy and participate	Comparable access to and use without unnecessary segregation	Equitable Use	Provide integrated routes, entrances, facilities and shared spaces	Equitable participation and dignity
Different abilities, preferences and methods of use	Accommodation of variation in use	Flexibility of Use	Provide adaptable in spaces, modes of use and adjustable elements	Wider usability and adaptability
Easy understanding, navigation and operation	Clear and predictable spatial and operational arrangements	Simple and Intuitive Use	Provide logical and clear sequences and intuitive controls	Independent use and easier navigation

Access to environmental information through different sensory capacities	Information that can be perceived through appropriate sensory channels	Perceptible Information	Provide visual, auditory and tactile information appropriate to setting	Improved orientation and understanding
Reduced exposure to hazards and consequences of mistakes	Safe movement and operation	Tolerance for Error	Minimise hazards, provide warnings and support movement recovery	and safer use and
Reduced physical demand during movement and operation	Minimised force and unnecessary physical exertion	Low Physical Effort	Reduce operating force, provide appropriate and accessible hardware	Reduced fatigue greater independence
Adequate accommodation for different body sizes, postures and mobility aids	Sufficient clearance and reach	Size and Space Approach Use	Provide adequate clearances, Independent spaces and reach ranges	Independent movement and use

Source: Author's synthesis of the reviewed literature.

The matrix should be read as an analytical and decision-making tool rather than as a rigid one to one classification system. A single architectural response may address several Universal Design criteria simultaneously. For example, circulation may support equitable use, simple and intuitive use, perceptible information and tolerance for error, while adequate spatial clearances may support equitable use, flexibility and independent movement.

5.3 Application of the Framework in Architectural Practice

The framework can be applied at different stages of architectural design, beginning with the identification of users and their relevant needs. These needs are then translated into design requirements and examined against the appropriate Universal Design criteria. The architect can subsequently identify the spatial, physical or technical response required and consider its expected contribution to inclusive building performance.

In briefing and concept development, the framework can assist in identifying inclusive requirements before major spatial and organisational decisions are established. During schematic and detailed design, it can support the review of circulation, spatial dimensions, building elements, environmental communication and facilities. During design review, it can provide a structured basis for examining whether identified user requirements have been adequately addressed alongside statutory accessibility and building requirements.

The framework is therefore intended to complement, rather than replace, accessibility standards, building regulations and professional judgement. Its principal value is in making the relationship between user requirements and architectural decisions more explicit throughout the design

process.

5.4 Visual Representation of the Framework

The framework can be represented as a connected decision structure in which User Need informs the Design Requirement, the requirement is examined through the relevant Universal Design Criterion, and an appropriate Architectural Response is developed and assessed in relation to expected Inclusive Performance.

The relationship should be understood as iterative rather than strictly linear. Evaluation of inclusive performance may reveal the need to reconsider the design requirement or architectural response. The visual framework therefore provides a basis for both initial design development and subsequent design review (Fig. 1).

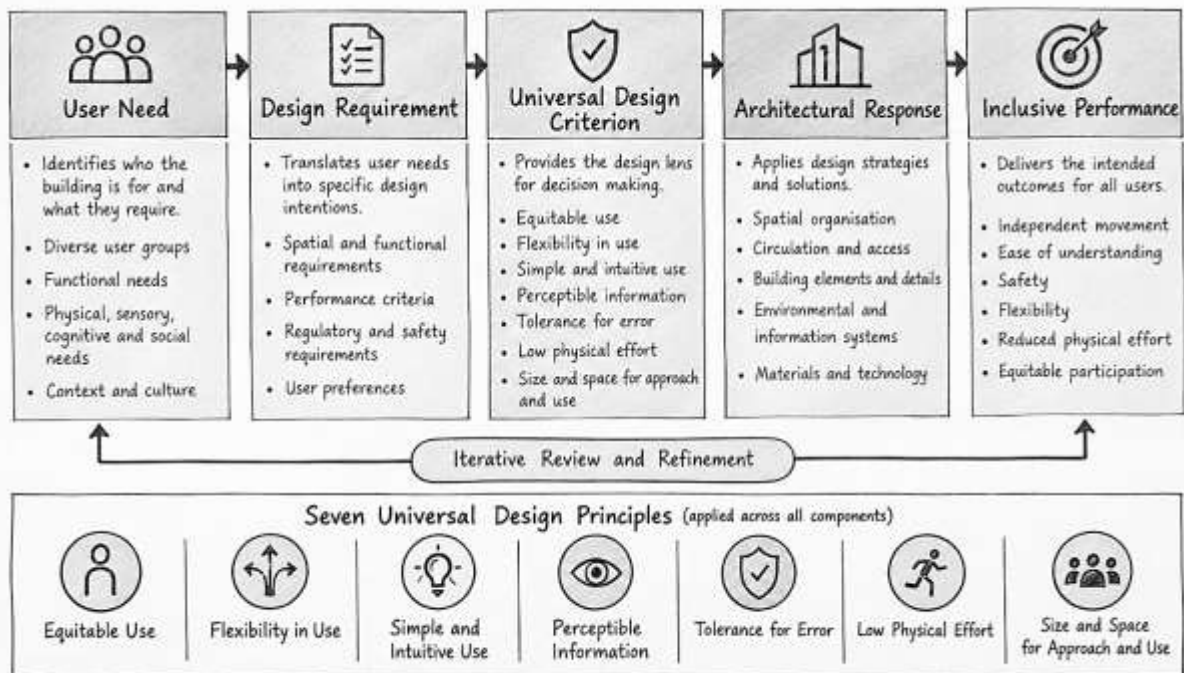


Figure 1: Proposed Framework for Inclusive Architectural Decision Making

Source: Author's synthesis of the reviewed literature.

6.0 Discussion

6.1 Universal Design as an Architectural Decision Framework

The findings support the position that Universal Design is most useful to architectural practice when its principles are related to actual design requirements and decisions. Existing literature provides a strong basis for understanding the seven principles and their relevance to inclusive environments (Centre for Excellence in Universal Design, 2024; Lid, 2023; Zallio et al., 2024). However, the findings of this study indicate that the practical application of these principles requires their consideration alongside user needs, spatial requirements and architectural responses. The proposed framework contributes to this application by organising these relationships into a decision structure. It positions Universal Design criteria within the design process rather than treating them solely as general principles or technical requirements. This allows architectural decisions concerning access, spatial organisation, circulation, environmental

communication and building elements to be considered in relation to identified user requirements. The findings also indicate that the principles should not be treated as mutually exclusive. A single architectural response may address several principles simultaneously. This is particularly evident in circulation and spatial organisation, where decisions concerning route clarity, dimensions, orientation and safety may affect equitable use, intuitive navigation, perceptible information and tolerance for error. Universal Design can therefore inform broader architectural quality rather than functioning only as a specialised accessibility requirement.

6.2 From Accessibility Provisions to Integrated Design Practice

The findings indicate that inclusive architectural practice requires more than the provision of individual accessibility features. Ramps, lifts, accessible toilets, handrails and related provisions address specific physical barriers, but their contribution to inclusive building use depends on how they relate to wider spatial and functional decisions (Mohapatra et al., 2024; Iftikhar & Luximon, 2023). The proposed framework shifts attention from isolated provisions to the relationship between user requirements and coordinated architectural responses. This enables considerations such as access, circulation, spatial organisation, environmental communication and building elements to be addressed as related aspects of the design process. The framework therefore supports the consideration of inclusion from briefing through design development rather than only at the stage of accessibility checking.

6.3 Implications for Architectural Education and Professional Practice

The framework has direct relevance to architectural education because it provides a structured way of teaching inclusive design as part of architectural decision making. Design studio exercises can require students to identify user needs, formulate design requirements, select relevant Universal Design criteria and justify their architectural responses. This approach connects Universal Design principles with the reasoning processes already used in architectural design. For professional practice, the framework can support project briefing and design development by providing a common structure for discussing inclusive requirements among architects, consultants and clients. Its use remains subject to project conditions, professional judgement and applicable accessibility and building regulations.

6.4 Implications for Design Evaluation and Professional Review

The framework also offers a basis for reviewing whether architectural decisions respond adequately to identified user requirements. Evaluation can examine the relationship between the requirement, the applicable Universal Design criterion, the proposed architectural response and the expected Inclusive Performance. This provides a broader review structure than checking individual accessibility provisions alone. However, the framework does not provide validated performance thresholds or replace statutory assessment procedures. Its use at this stage should therefore be regarded as decision support for design review rather than as a formal compliance or performance assessment tool. Empirical testing is required before the framework can support validated measures of Inclusive Performance.

7.0 Conclusion and Recommendations

The central contribution of this study is a translation mechanism that connects User Need, Design Requirement, Universal Design Criterion, Architectural Response and Inclusive Performance. The framework provides a structured means of relating established Universal

Design principles to architectural decisions rather than treating them as isolated accessibility provisions. It also recognises that a single architectural response may address several Universal Design principles simultaneously. The framework provides a basis for incorporating Universal Design into project briefing, design development and design review. Architects and design teams should identify user needs early, translate them into design requirements and assess proposed responses against relevant Universal Design criteria. Architectural education should similarly incorporate decision based Universal Design exercises that require students to justify design responses in relation to diverse user requirements. The framework should complement, rather than replace, statutory accessibility requirements, building regulations and professional judgement. It remains a literature derived analytical structure rather than a validated predictive or assessment model, and its Inclusive Performance component does not yet constitute a set of validated performance indicators. Further research should therefore test the framework across different building types and user contexts and develop measurable indicators for evaluating inclusive performance. Overall, the study provides a structured route for translating Universal Design principles into architectural decisions, offering a practical basis for more deliberate consideration of inclusion in architectural practice and education.

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