

**Modular Construction – Intergenerational Living with A Focus on Aging in Place, Theory
of Functionalism, and WELL Building Standards**

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Throughout recent years, an intersection between architecture, sustainability, and human-centered design has given opportunities for a more versatile home in the residential sector. An in-depth analysis of modular construction, functionalism, and WELL building standards will provide insight into the convergence of these concepts. Additionally, an introduction to the multi-residential concept will give the researcher a foundation for the three core concepts, and the aging in place approach will provide solutions that could be integrated within the design. The inclusion of these concepts will provide valuable knowledge across multiple fields of study that will pave the way for further research and consistent data to reinforce existing and new ideas.

This integrated approach is crucial for advancing the development of modular design, functionality, and health standards to create spaces that promote both practicality and wellbeing. Modular construction is an efficient and cost-effective way of building spaces that can accommodate various age groups, and aging in place provides solutions to achieve this. The theory of functionalism will be the framework to optimize the functions of a space, and WELL building standards will achieve the health and wellbeing goals within the built environment. Overall, the relationship between the occupant and the built environment will be evident throughout.

Modular Construction

Modular construction is the process in which the standardized components of a structure are built offsite in a factory setting, and later assembled onsite. This construction method has seen an increase in popularity in North America, with Wilson (2019) stating, "...the estimated overall market share for permanent modular construction in North America rose to about 3.27 percent, up from 3.18 percent in 2016" (p.4). Many countries have made great improvements and have implemented modular construction quicker, positioning them ahead of the United States in

terms of construction and versatility. This innovative form of construction has also addressed prominent issues such as affordable housing. Thompson (2019) states, “modular construction is not yet suitable for all market segments but has shown a great deal of promise in addressing the critical shortage of low-income housing solutions” (p. 96). The advantages of this process are highly evident and offer compelling reasons for a deeper analysis and exploration of these factors.

The benefit of modular construction provides a significant improvement in the building process, justifying its appeal within the industry. These benefits include quality, productivity, safety, schedule, scheduling, cost, value, and sustainability (Wilson, 2019). These have been consistent throughout the analysis of multiple sources, which highlights the consistency throughout this process. For example, a study shows that construction can speed up by as much as 50%, while cutting costs by 20% in the right environment (Bertram et al., 2019). According to Lawson et al. (2014), “superior quality achieved by the factor-based construction process and predelivery checks” (p.7). The objective of this is to showcase that there is an abundance of research on the benefits of modular construction through empirical evidence. Globally, the research is strong but is lacking in the U.S. As the adoption of modular construction continues to grow in the U.S, its anticipated benefits will become widely recognized.

The importance of understanding the benefits also applies to the challenges and barriers that modular construction faces. Common issues include misperceptions, confusion, and resistance. As Wilson (2019) states, “some argue that a cultural shift in the industry as a whole is needed before the full benefits of modular construction are realized on a broad scale” (p. 20). From the analysis of various sources, most of the issues stem from the misunderstanding of what modular construction consists of. This also relates to the construction industry, which has yet to

adapt to this form of construction. This has led to hindered development in this field. As mentioned, the cultural shift from traditional building will produce significant change that will cause a domino effect throughout the rest of the industry. Government regulations would also be helpful, but “financial and governmental regulatory structures are not conducive to modular construction” (Thompson, 2019, p. 96). This just shows that more exposure is needed in the field of modular construction and can be addressed. Regardless, the future of modular construction looks promising.

The evaluation of the attractors and deterrents of modular construction presented a basis for understanding the potential impact of this process. There are determinants that actively affect the outcome of these factors and is important to understand. There are seven factors that affect how well modular construction responds to the market (Bertram et al, 2019). These factors were found to be the most influential within the modular industry, showcasing two key factors: labor dynamics and demand volumes. These two factors work hand in hand with each other and could provide a possible explanation for why the US is struggling to adapt compared to other countries. Technology has been a significant contributor to the changes in labor dynamics, as robotics and artificial intelligence are taken over the manual work that use to be done by humans. While the demand exists, the lack of facilities and supply hinders the adaptability of this type of construction. (See Appendix A for additional information)

As technological advancements and the need for housing continues to grow, the use of modular construction is expected to expand throughout various sectors of the building industry. Wilson (2019) found that, “technologies such as robotics, sensors, cloud computing, and virtual reality are enabling project teams to pursue ever more ambitious and complex goals” (p. 37). These tools and strategies will increase productivity, durability, and versatility of residential

homes and will enhance the way we live and interact with our surroundings. This exposure will lead to new opportunities for further research to be conducted to better understand other factors such as the durability of modular construction against weather conditions. As mentioned previously, other countries have adapted to modular construction quicker than the U.S. All that is needed is initiative, and the results will become evident as the U.S continues to increase the adoption of modular construction.

Multi-Residential

In addition, this research paves the way for analyzing the occupants of the multi residential housing model. Specifically, intergenerational demographics will be the focus, given its relevance to the researcher's project. Intergenerational demographics relates to the relationship between age groups and individual members, highlighting the changes and needs of different generations which contribute to societal, economic, and cultural dynamics. Miller (2014) states, "demographic studies and trends indicate that multigenerational households are becoming increasingly common in the United States" (p. iii). This emphasizes the need for a more versatile home that can accommodate the various needs of different age groups. In addition, family structures have changed throughout the years and influence the way people interact with each other. Other factors such as traditions, values, culture, and upbringing are also important to take into consideration. Overall, this information will provide insight into the interactions between individuals and their environment and will lead to innovative solutions and strategies for versatile space layout designs.

The needs of different age groups are the foundation in understanding the relationship between people and their environment. There has been an increase in people wanting to live at home for as long as possible, shifting the design and construction of new buildings and the

renovation of existing ones. This shift has strengthened the need for more versatile and age-friendly environments that can accommodate the needs of residents. A questionnaire done by Katunsky et al. (2020) shows that, “the survey respondents said that as many as 91% of them wanted to stay in their current residences” (p.12). A key point to consider is this information pertains to the UK and not the U.S. Regardless, studies have shown that this is common around the world. The needs of the children will vary from those middle age and older, and so forth. Space is necessary for children to have, as it fosters their creativity and supports their energy and development. This continues to be prevalent throughout teenagers and young adults. Adults’ needs become more concrete, with factors such as marriage, family, and financial stability playing key roles in this change (Katunsky et al, 2020). Lastly, the older generation focuses less on space since they’re more concerned about their health. Overall, this brief overview will further help examine intergenerational living.

Intergenerational places an emphasis on the social aspect of different generations. This should not be confused with multigenerational, which reflects more on the interrelationship aspects. As Miller states, “the term intergenerational implies the involvement of members of two or more generations in activities that potentially can make them aware of different (generational) perspectives” (as cited in Villar, 2007). There are benefits associated with living amongst different age groups as intergenerational living is all about community. Dove (2020) states that, “... the benefits in living in a community (reducing loneliness, supporting neighbours and helping each other) often outweighs practicality or convenience” (p. 49). As mentioned, personal and social benefits are evident within intergenerational environments. Spaces such as communal gardens or the inclusion of community rooms are great examples of how buildings can promote social interaction amongst residents. The advantage of living in a space with different age groups

is the unique experience it offers and the sense of normalcy it provides. It is not easy for those getting older, so this is a way for them to feel young and helpful. Changes in family structures play a role in the way we interact with each other and will be discussed in understanding the dynamics in which social roles have evolved over time.

Family roles have become more open and versatile to accommodate the rapid change amongst generations. In addition, family roles and responsibilities have also changed to adapt to the world we live in. According to Georgas (2003),

Family types in North America and northern Europe have been changing with the increase of nuclear families and the decrease of extended families, and during the past 20 or more years, with the increase of unmarried families, divorced families, unmarried mothers, and homosexual families (p. 3)

The nuclear family consists of two generations, while extended families consists of at least three generations. This dynamic and diverse form of family structures has opened new ways of thinking and societal standards. Additionally, factors such as morals, politics, education, and religion are some examples of by-products that are either taught or learned throughout childhood. As an example, the culture in Mexico is very communal, while in America the culture is very individualistic. Even though the culture has changed, it continues to play a role in maintaining traditional family structures while also promoting change, with factors such as modernization and economics contributing to this change. Overall, family structures have an influence on the needs and wants of people, which can be analyzed and then used in designing spaces that are adequate for intergenerational living. This would reinforce the need for spaces that adhere to people's needs and will promote the idea of intergenerational living.

Aging in Place

Technological advancements and the growing population of the older generation has led to an increase in people wanting to age in place. This increase has led to a change in the way people see living, introducing new design layouts and features to new and existing homes to reinforce this notion. According to Drue Lawlor & Thomas (2008),

Aging in place, as it applies to interior and exterior design, is a philosophy as much as a concept that promotes independency and livability of all types of living environments no matter the age of the occupant or their level of abilities. (p. 5)

The focus of aging in place is to promote independence, wellbeing, comfort and adaptability for the occupants and the built environment. Comprehending this relationship is important, since there are elements put into place to achieve this. These elements include barrier-free design, adaptability, visitability, and accessibility (Drue Lawlor & Thomas, 2008). There are other factors to consider such psychological and mental challenges that the occupant might suffer. All these factors provide a unique opportunity for professionals from different disciplines and fields to work together and propose solutions to address this movement of aging in place.

As research has shown, the definition of old age varies amongst the public. There are many factors and different perspectives that people utilize to reinforce their understanding and definition of old age. It is a complex system that is very opinionated. For this reason, old age refers to a person being unable to comfortably independently perform daily living activities independently. These daily activities include the basic necessities that an individual requires, such as eating, drinking, and dressing (Drue Lawlor & Thomas, 2008). The importance of understanding old age gives a fundamental basis for further research on the needs and wants of

individuals at this stage. In addition, it provides a more stable framework for other professionals to work together on the challenges that the older generation face. As a person ages, their mental and physical skills decline. There are other factors that play a role in the way people age, such as diet, race, genetics, lifestyle, work environment, and more. The inclusion of this is to strengthen the idea that old age is a fluctuating term that has many individual elements that influence the way people live.

The way of life is constantly changing, and this is inevitable. Whether or not these changes are noticeable, they are changes that a person will have to live through. This includes examples such as housing, lifestyle, work, physical, and mental changes. These changes are influenced by a variety of factors and vary greatly from person to person. One key factor that influences change is family dynamics. As Silverstone & Horowitz (1992) found, “there is little question, however, that aging in place, or moving elsewhere, is heavily influenced by family considerations” (p. 27). This is certainly relatable in today’s world, since family dynamics still influence a person’s life. Values, character, morals, religion beliefs, and political beliefs are instilled in individuals from a young age. Relationships, financial status and education level are also key factors that promote change. In essence, the key takeaway is as the person changes, so will the built environment. Furthermore, this research leads to the introduction of design solutions and products that aid in the process of aging in place.

The solutions and products used to promote aging in place address different physical and mental challenges one could potentially face. As mentioned previously, the objective of aging in place is independence. These solutions and products are put in place just for that; to make life convenient and improve quality of life. For example, handrails and grab bars are very commonly used to address issues of instability and provide support. The implementation of these bars

decreases the chance of someone falling, making it a viable solution. The use of assistive technology that ranges from self-closing cabinet doors to voice command controls for temperature, sound, and lighting are also common. The realm of technology has led to significant improvements that reshape the way we live, work, and interact with one another and our built environment. When it comes to spatial design, wide door entryways with 18 inches of clear floor space, flush floor levels, furniture layouts, and open floor plans are just some of the ways architects and designers can design spaces that accommodate the needs of many. This promotes the relationship between the occupant and built environment, increasing the need for versatile spaces to address the needs of people. Additionally, bringing awareness to this topic and helping pass legislation that enhances the regulations of living standards is also very beneficial. The need for more universal designed homes is crucial for the growing older population and the desire to age in place, so the inclusion of products and design solutions is a significant step forward in promoting this notion.

Extensive research has been conducted on the topic of aging in place and has been implemented in real life scenarios. Consider the case of BeauSoleil, an 800 sq. ft house designed by Professor Geoff Gjertson's students at the University of Louisiana's Lafayette campus (Pierce, 2012). This is a unique project that involves the use of modular construction with a concentration on aging in place features. The objective of this project was to display Cajun culture throughout the home and address the needs of the state (affordable housing and accessibility). In relation to layout design, the students isolated the kitchen from the rest of the house to address cultural preferences. The inclusion of a transitional porch addressed the idea of entertainment, while the long and narrow structure of the house maximized natural lighting. When it comes to accessibility, frosted polycarbonate glass walls and doors are implemented to control daylighting.

Rainscreen sliding systems and metal roofings protect the home from water, while a dehumidification system limits the growth of mold. Lastly, user-friendly mechanical systems and electrical systems are put in place that makes it accessible for everyone (Pierce, 2012).

Finally, the students wanted to address the humid and hurricane prone southern climate that Louisiana faces. Roll down screen offers insect control and shade protection, while collected rainwater is used for landscape irrigation. The walls are built using structural insulated panels (SIPS), stabilizing the temperature while resisting winds up to 130 mph (Pierce, 2012). Also, wall steel shutters provide extra window shade and hurricane protection. Overall, these features and layout design provide a space that not only supports cultural preferences, but also focuses on the comfort and protection of the occupants. This model serves as a testament to the ingenuity and improvement of buildings, reinforcing the idea that any space can be made accessible. The concept of modular construction is significantly growing, and the features that come with aging in place will enhance the accessibility of such homes. The analysis of intergenerational living provides a great opportunity to understand the needs and wants of people, but a look into the functions of space will provide a better understanding of the built environment.

Theory of Functionalism

The functionality of a space is a crucial element that a designer takes into consideration when designing a space. Interior spaces can serve one or a multitude of functions, which the designer can determine and design for accordingly. This is where the theory of functionalism applied; the principle that prioritizes practicality and functionality. The scope of this theory will be analyzed through two areas, ergonomics and anthropometrics. These fields of studies are beneficial in understanding the relationship between the occupant and their surrounding environments. As Hosseini et al. (2015) states,

Put another way, buildings are not just objects, but transformations of space by means of objects. As a consequence, configuration is a fundamental relationship between form and space, which is appropriated in the processes, by which buildings are transformed from physical objects into social and culture objects (p. 74).

This remains highly applicable in the 21st century, where the needs and wants of people are constantly changing. This is due to many factors, which can include environmental, physical, psychological, just to name a few. Spatial organization is a key component when addressing these changes, allowing for a space to become more conducive and proactive. One way to achieve this is through the study and application of anthropometrics.

Anthropometrics refers to the measurements of the human body. Various research studies have indicated that certain body dimensions are more relevant for specific research purposes. The context of the study is important for determining which body characteristics are most relevant and can provide accurate and meaningful data. Biswas (2023) states that, “dynamic dimensions are usually more applicable for designing equipment, tools workstations, etc.” (p. 75). On the contrary, static dimensions, such as reach measurements, are effective in understanding essential movements within kitchen and lavatory functions. In another example, anthropometric characteristics such as eye height, sitting height, stature, shoulder breadth, elbow to elbow length, etc. were found to have significant relevance to classroom furniture (Salunke et al., 2015). These examples provide a conceptual framework that allows physical data to be analyzed which can then influence the products and space organization to best fit the needs of the occupant. Additionally, the appropriate application of anthropometric to design considerations would benefit risk reduction efforts, safer products, and improve spatial design (Kaewdok et al., 2020).

Another benefit of understanding anthropometrics is the ability to use it as a viable measure of wellbeing. This is due to the fact that standard of living has drastically changed over the years, and at one point, anthropometrics played a role in analyzing and influencing standard of living. One of these variables used to measure standard of living was height. As Harris (2021) found, “over the last 40 years, economic, social, demographic, and medical historians have explored the use of height data in historical studies in different ways” (p. 93). It is widely acknowledged that height correlates with better well-being. However, this has changed, as a variety of factors now play a role. This is emphasized by Harris (2021), stating, “in general, this brief survey suggests that height has retained its capacity to shed light on the welfare of past populations, with some possible caveats” (p. 113). This assertion highlights the change that has been seen with anthropometrics, but also remains a viable resource to study past generations and their wellbeing. Overall, the study of anthropometrics allows for the inclusion of ergonomics to also be influential and important in spatial organization.

Ergonomics is the scientific discipline concerned with understanding interactions between humans and other elements of a system. Singh (2014) states, “three main domains of expertise for investigating interactions between humans and socio-technical systems were identified – physical, cognitive and organizational ergonomics” (p. 42). These three domains provide a fundamental approach in the application of ergonomics in relation to systems. One of these approaches involves universal design, the creation of products and systems that are in place to be used by all ages. This is mentioned earlier in the research and highlights the importance of a flexible and inclusive design approach. There are seven principles of ergonomics that are recognized, which include equitable use, flexibility in use, simple and intuitive, perceptible information, tolerance for error, low physical effort, size and space for approach and use

(Jackson, 2013). Without these principles, health hazards increase significantly, which could include but not limited to use of excessive force, awkward positions, and static muscle loading (Singh et al. 2014). Additionally, understanding the functions of the space will highly influence the way ergonomics is applied, allowing the designer to understand the relationship between both.

The inclusion of ergonomics and anthropometrics allows for a deep analysis of the concept of functionalism, which in turn enhance the relationship between occupant and space. As mentioned previously, spatial organization is one of the ways a built environment can be versatile and adapt to the needs of the occupant. This is reinforced by Hosseini et al. (2015) who states, “Flexibility, as a helpful and effective method, has been utilized in different architecture spaces to reach functional efficiency,” (p. 70). These include options such as open floor plans, portable elements, and reconfigurable furniture elements. All of these play a role in spatial organization, allowing for a better understanding of the built environment. Overall, the inclusion of flexible components will provide the opportunity to create more inclusive and effective layouts that will be strengthened by further research.

WELL Building Standards

Throughout the course of this analysis, the themes presented gave a better understanding of the relationship between the occupant and built environment. This has given the opportunity for rapid growth and significant strides in the transformation within the building industry. Even though one of the byproducts of such transformation led to an improvement in the wellbeing of the occupants, there was a lack of standardized regulations that focused on the occupant’s wellbeing. This changed with the introduction of the first WELL Building Standards by the International Well Building Institute (IWBI). Supported by scientific research, these standards

focus solely on the health and wellbeing of building occupants. These standards can be applied to different project types and geographies, providing versatility in application. The consistent adjustments of the standards also show the commitment of IWBI to the occupants and their wellbeing. The implementation of WELL consists of several key components that work together and deliver effective functional spaces that improves wellbeing.

As mentioned previously, the WELL standards have undergone adjustments over the decades since their introduction. For the scope of the analysis, the WELL v2 will be used. There are ten concepts, which include air, water, nourishment, light, movement, thermal comfort, sound, materials, mind, and community (WELL, 2024). Under each concept, there are features that are either preconditions or optimizations. The preconditions are all universal and are fundamental and mandatory for a space to be WELL certified. Optimizations are optional but provide further enhancements for the wellbeing of the occupants. A notable feature is that project teams have the flexibility to choose which optimization(s) they wish to implement. As the official website states, “WELL v2 operates on a points-based system, with 110 points available in each project scorecard” (p. 1). The score that the project achieves then determines the certification achieved (Refer to Appendix B). In some optimizations, achieving points in one is dependent on achieving point in another part. Additionally, the spaces in which WELL standards will be applied are also considered since some concepts may be more effective than others. Considering this, the analysis of the water, light, sound, and community concept will be introduced, given its relevance to the researcher’s project.

The first concept to be introduced is water, a concept that covers the quality, distribution, and control of water within a building (WELL, 2024). There are three preconditions that must be met, which include water quality indicators, drinking water quality, and basic water management

(Chmiel, 2021c). Water is an essential component of life and serves multiple purposes such as basic hygiene, food preparation, cleaning, and more. The lack of quality water increases the chance of disease and death. Sobsey (2002) found that, “a large fraction of the World’s population around 1.1 billion people – does not have access to improved sources of water” (p. iii). Even with the technological advancements and improved water systems, this is still an ongoing issue due to many factors. This statistic emphasizes the need for better water quality, as scientific research indicates a significant improvement in wellbeing with quality water.

Consistent testing, regular maintenance, and proper water system installation are ways to control the quality of water. The use of smart technology on fixtures can increase water conservation and energy efficiency. These solutions and strategies can reduce waste, enhance wellbeing and ensure long-term sustainability of water resources.

The next concept focuses on light. Under this concept, emphasis on adequate natural and artificial lighting is crucial for promoting visual, mental, and overall wellbeing. To begin, “Light is an essential element for the life of all living beings, both in the performance of activities and for a human’s emotional and psychological well-being” (Espada et al, 2023. p. 102). This is further reinforced by the two preconditions under the concept of light, which include light exposure and visual lighting design (WELL, 2024). There are many ways to implement this within a built environment, with lighting design being a key element in maximizing lighting efficiency. Technological advancements also play a role in enhancing lighting fixtures and effects. Dimmers, LEDs, and motion sensors are a testament to this advancement and are widely used (Unnikrishnan, 2021). The advancements in technology have opened up new possibilities in lighting design, creating a better balance between occupants and their built environment. Overall,

the lighting concept serves as a fundamental element that creates a comfortable and productive environment.

The third concept examines sound. This area focuses on enhancing occupant health and wellbeing through appropriate acoustical design and optimizing auditory comfort. Sound is one of the five senses and plays a significant role in the way humans interact and perceive one another and their surroundings. The concept of sound relies on one precondition: sound mapping (WELL, 2024). This feature emphasizes a strategic acoustical plan and identifying noise sources that can negatively impact interior spaces. Inadequate levels of noise can lead to physical and mental issues, which include discomfort, impaired communication, and increased stress. Similar to lighting, placement plays a vital role in its efficiency. Sound blocking or absorbing materials are also commonly used in interior spaces to address noise issues (Chmiel, 2021b). These solutions are only as effective as the layout and placement of interior spaces. As WELL (2024) highlights, “to address noise, floor plans should be designed with intent and use in mind” (p. 1). The relation between placement and acoustical features is critically highlighted, and the optimizations chosen enhances the sound capabilities of an interior space. The thoughtful integration of acoustical features and layout not only ensures the wellbeing and comfort of the occupants but also supports the auditory qualities of an interior space.

Lastly, community is the last concept. As the concept suggests, the aim of is to promote an inclusive and engaged community while focusing on the needs and wants of the occupants (WELL, 2024). Throughout this research, an emphasis has been placed on the built environment and occupant. The integration of community separates these main topics and focuses on the relationships between occupants. There are several preconditions under this concept, which include health and well-being promotion, integrative design, emergency preparedness, and

occupant survey (Chmiel, 2021a). These four features focus on areas in teaching, collaboration, planning, and occupant feedback. These are crucial cornerstones in improving community involvement and promote the relationship between the occupants and the built environment. Research indicates that “enhancing community resilience is seen as critical as communities around the world face diverse and novel risks that are changing the nature of communities themselves” (Faulkner et al., 2018, p. 2). This resilience is built upon adaptation, and the sense of community plays a key role in this process.

There are many ways this can be done, from implementing surveys to learn about the occupants needs and wants to the display of key information such as evacuation plans and building map. Community is a complex system, with various factors taken into consideration when designing interior spaces. These factors include gender, culture, values, traditions, geography; just to name a few. Regardless, the common objective remains the same, promoting an inclusive and versatile environment. As WELL (2024) states, “Promoting community well-being must begin with supporting the fundamental factors that influence individual and collective health” (p. 1). This claim reinforces the idea that individual assessments of occupants are key to promoting and achieving collective wellbeing. In summary, the integration of community is essential, and ties all of the concepts mentioned together, creating a cohesive and dynamic environment.

In conclusion, these four concepts provide insight into the relationship between occupants and the built environment. The focus of WELL standards is primarily on occupants and wellbeing, with the built environment being an indirect factor that influences this. Each concept plays a significant role in the enhancement of individual and social aspects. This is displayed through the water, light, and sound concepts which are tailored for specific areas. Community is

different, with a broad range of factors influencing this concept. Thus, the other concepts merge together to contribute to the community concept. No concept is more important than another; all work together to promote occupant wellbeing within the built environment. The implementation of WELL standards will also benefit areas within modular construction, functionalism theory, intergenerational living and aging in place. Overall, the interconnected elements will lead to further research and development within different fields of study and open up new opportunities for designing interior spaces.

GROW Residence

The analyzing of several topics has led to the accumulation of valuable information that will be used throughout future designs of interior spaces. In reference to a recent precedent study, the GROW residence located in Calgary, Canada is a model example and highly relevant to the information within this research. A brief overview of this residence shows that, “GROW is a 20-unit, multi-residential housing project that cultivates a diverse inner-city community...0.6-acre rooftop urban farm” (Al Koshta, 2024, para. 1). Even though this structure was not built using modular construction, other factors truly captivate the essence of the future of housing such as the integration of intergenerational living, focus on occupant wellbeing, and aging in place. This structure is the epitome of the future and is a framework for new and innovative approaches in the way buildings are built and used.

Throughout this building, the units come in different sizes that can suit a range of ages and family sizes, supporting intergenerational living (Al Koshta, 2024). The versatility of these units also promotes aging in place, which reinforces the need for universally designed interior spaces. Additionally, a crucial element that is evident throughout the building is the socialscape, which is a term that was given to describe public areas that encourage spontaneous interaction

amongst the residents (Refer to Appendix C). This includes areas such as the communal gardens and the ramps where residents can walk and enjoy the natural environment (*GROW*, 2024). This is key in promoting health and wellbeing in a community setting. This is still a new concept that is slowly gaining traction in urban setting. Challenges arise from various areas, such as code regulations, limited spaces, and lack of natural landscape. As innovative ways of designing and technological advancements improve, an opportunity for a balance between urban and rural setting becomes plausible, and the GROW residences is a testament to this.

Conclusion

This literature aims to bring awareness of the ever-changing landscape of construction and reinforces the notion behind aging in place, intergenerational living, theory of functionalism and WELL building standards. These components engage in joint efforts in promoting advancements in the development of construction and wellbeing of the occupant. In the field of interior design, the improvement of spatial design is evident. Furthermore, the contribution of information impacts multiple disciplines, allowing for an integration of various fields. This integration allows for more comprehensive research to be done and strengthen the relationship between various fields of study. Some of these fields include construction, psychology, architecture, and engineering. Overall, research has provided substantial evidence, but further insights will emerge as conditions evolve over time.

Research has been comprehensive across most of the topics presented. A specific area of difficulty was finding information on the theory of functionalism. There was limited information pertaining to the influence of the theory of functionalism on design. External references broadened the scope of research and led to the discovery of ergonomics and anthropometrics. This discovery allowed for a better understanding of the term and provided a framework for the

relationship between function and occupant. This ties in with the rest of the concepts and provides a psychological approach towards designing. Additional research can be done on various factors such as weather, traditions, and upbringing which can enhance the topics on modular construction and intergenerational living. The analyzation of these factors will guide the researcher in different directions, addressing other issues or challenges that may have been overlooked. This would yield positive results in the U.S. market on modular construction, as the country lags behind the rest of the world on the adoption of this type of construction.

In conclusion, the integration of architecture, sustainability, and human-centered design provides promising opportunities for the development of adaptable and efficient housing solutions. Modular construction, functionalism, and WELL building standards are the concepts that provide a foundation for the design of residential homes. The inclusion of multi-residential concepts and aging in place strategies provide a deeper understanding of the foundation, which can then be incorporated into existing and future designs. The GROW residence offers a conceptual framework that serves as a guide to the innovative and versatile nature of multi-residential housing. Evolving societal needs contribute to the progressive nature of housing, thus solidifying the importance of continued research. Ultimately, the integration of these concepts not only holds significant potential in the development of multi-residential housing, but also serves as a universal framework for the future of the housing market.

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Appendix A

Seven Factors that attract modular construction



Source: McKinsey analysis

Appendix B

WELL Certification System

Total points achieved	WELL Certification		WELL Core Certification	
	Minimum points per concept	Level of certification	Minimum points per concept	Level of certification
40 pts	0	WELL Bronze	0	WELL Core Bronze
50 pts	1	WELL Silver	0	WELL Core Silver
60 pts	2	WELL Gold	0	WELL Core Gold
80 pts	3	WELL Platinum	0	WELL Core Platinum

Appendix C

Diagram that highlights the different areas within the residence

