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Universal design (UD) in indoor space: Symbiosis between disabled bodies and abled bodies

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ABSTRACT

Universal Design or 'Accessibility for All' is the design of a product or creation that meets the requirement and reaches the goals for people, regardless of either disabled-bodies or abled-bodies. Universal design means segregation of special which separate designs with the normal design said that the majority of users can use them without feeling out of place. It is identified that different kinds of designs would often make some of the special groups people feel different from others, the removal of which is essential in case of Universal Design. The major focus of this research is the spaces by applying principles of universal design (UD) and comfort in an indoor area, which take into account within a qualitative research method of case study evaluation. The aim of study is to determine symbiosis between able-bodies and disabled-body can coexist in an interior environment and its criteria required. The case studies used indicate how the materials, principles of UD and technology applied in indoor space can benefits all. This research gives a better understanding on how the spaces planning and its function to achieve a better level of symbiosis between abled-body and disabled-body in indoor space.

Introduction

Universal design is a concept which deep-rooted and established in the twentieth century, related to economic and social development in between human as well as disabled-people (Nishchyk and Chen 2018). According to the World Health Organization (WHO), the statistic showed that about 15% of the global population adapt in the form of disability, and the population is increasing from year to year (Kopeva, Ivanova, and Zaitseva 2018). The development of Universal Design which benefits the population in varying degrees of abilities was expanding and giving advances based on the demands and recognition for independent living over years. Designing of interiors with respect to safety concerns and aesthetics are important to develop a space that supports both abled-bodies and disabled-bodies (Hamraie 2017). A speech that can be accessed by any individual is the main focus of Universal design in current thesis to determine the symbiosis between disabled-bodies and abled-bodies. The problem identified from this study is lack of Universal Design in various indoor spaces and the insufficient in knowledge of such concepts and application in interior designing industry for abled-bodies and disabled-bodies.

Universal designing in indoor spaces play a vital role in developing and assisting architecture towards a clear pathway in identification of the movable space for the disabled-bodies and considering a plan that helps to access the outset and attempt the programming of interior spaces with various preferences and styles (Buratti et al. 2019). The insufficient of knowledge for

Universal design and applicability takes into consideration the inefficiencies of the interior designs and framework of architecture, where the utmost benefits for both abled-body and disabled-body are not achieved. There is also a lack of integration between the needs of these two groups of people that must be outlined in this study. This study highlighted that society has the responsibility to take action in taking care the disabled-body to help them overcome the obstacles and participate on an equal basis with abled-bodies.

The questions that can be identified with respect to the current research are as follow:

1. How can Universal Design apply in indoor scape?
2. How can integration be achieved between the abled-body and disabled-body of universal design for interior spaces?
3. What are the criteria required to create an indoor space for symbiosis between able-body and disabled-body?

The objective of the research can be identified as follows:

1. To identify the symbiosis between disabled-bodies and abled-bodies of Universal Design in indoor spaces.
2. To investigate how integration can be achieved between the abled-body and disabled-body of universal design for interior spaces.
3. To create an indoor space for symbiosis between the abled-body and disabled-body.

The consideration of Universal design in indoor spaces is to make sure the developed architectural designs are accessible for individuals with various level of disabilities and the design is helpful for an inclusive environment (Hartsoe and Barclay 2015). The creation of physical spaces with content and additional learning requires for the needs of integration between the abled-body as well as the disabled-body. The integration creates a retrospective buying set and program which benefit for all by reducing the inequality and create a democratic and active society. Universal design is to put in action or power in assisting architecture to be used by people with any level of impairments and disabilities independently. The creation of well-organized content and navigation in the architecture framework that are beneficial to disabled-bodies, especially who with vision problem, will help in creating an advance space and physically appealing to the people (Dalton et al. 2019). It is a big step for the rights of disabled-bodies to participate in public life.

To support the study, studies were conducted on 30 different articles, journals and website information. There are some important past researches carried on this particular topic are as follows; (1) Applying Universal Design concept in interior design to reinforce the Social dimension of Sustainability by Dr Inas Hosny Ibrahim Anous. Year of Publication: 2015 (Anous 2015); (2) A Review of Universal Design and Accessibility Legislation in Implementation Strategies Among Asian Countries by Abd Samad, Said, and Abdul Rahim (2018); (3) Bill & Melinda Gates Discovery Center | (SEGD 2018a). Available at: https://segd.org/bill-melinda-gates-discovery-center (Accessed: 30 April 2021); Hazelwood School | (Universal Design Case Studies 2016). Available at: https://universaldesigncasestudies.org/education/primary/hazelwood-school (Accessed: 30 April 2021); (5) The Senses—Design Beyond Vision Both a Feat and a Feast | (SEGD 2018b). Available at: https://segd.org/senses%E2%80%94design-beyond-vision-both-feat-and-feast (Accessed: 30 April 2021); (6) Universal Design and Disability: Assessing Faculty Beliefs, Knowledge, and Confidence in Universal Design for Instruction by Hartsoe and Barclay (2015).

These researchers present the main idea of the study and will be taken into consideration in developing a detailed framework and aligning it to the interior spaces with close alignment on the ergonomics of Universal Design. The research gap is about symbiosis between the able bodied and disabled body in Universal Design indoor scape.

Conceptual framework

Figure 1 is the conceptual framework in the study.

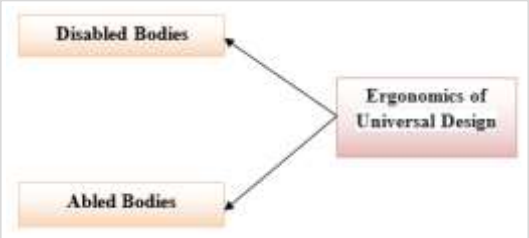

Figure 1. Conceptual framework

The conceptual framework presents the main idea of the study and take into consideration to develop a detailed framework and align it to the interior spaces with close alignment on the ergonomics of universal design.

Universal design and human abilities

Universal design is a design of a product or an environment that able to apply on all people to the utmost range with no need of adjustments and specialised-design. This philosophy develops a situation which the physical environment in services should teach people to use it in all aspects (Ryhl 2018). It helps to improve the quality of health spaces safety and the people welfare to the greatest level with the planners and designers reflecting on allowing the users to be accommodated with respect to their adaptations. It is intended to simplify the living of people as well as conducting communication and a built-in environment for as many people as possible within little cost (Evcil and Yalçın Usal 2019).

There are various types of accessible designs in indoor spaces that meet the requirements of use for people with disabilities as well as those without them (Lieberman 2017; Staniewska 2021). It focuses on a design that considers changes and does not address the full range possible disabilities of the people. However, the focus on usability of the people making it easier for each person to use it in an equitable manner. It takes into account a spectrum of human abilities such as hearing, speech, body functions and mobility which can vary with respect to age, gender or environment. Universal design develops considering human abilities in recognition.

Goal of universal designing

The aim of Universal designing is the planning of a physical environment which can be usable by a wide range of people irrespective of gender, age and disability status with reducing inequalities. Considering a Universal design means developing an environment that is accessible to individuals with disabilities with no special development in creating a physical space that is accessible to abled-bodies as well as disabled-bodies (Hartsoe and Barclay 2015). Universal design helps individuals with disabilities to become self-reliant to participate in the public and lead their life as normally as possible. Universal design can be applied at home public spaces or at office premises, especially in public indoor spaces, the focus of the study. The development of universal spaces was to provide a breakthrough to architecture that focuses on development of integration between disabled- and abled-bodies in an inclusive environment. In order to achieve a balance in the integration between both bodies and create a harmony and equal society.

Universal design helps in developing indoor spaces to be user-friendly and benefit the disabled individuals which include increasing accessibility of various spaces and chances in exploring environments independently (Buratti et al. 2019). It also offers them the equipment that is highly advanced and can be used for social integration. Universal design creates personalization such as combining chances of choice and expression of individual needs as well as creating awareness with respect to critical information. Most Universal designs help to reinforce cultural values as well as respecting the individual preferences with community and environmental context in any project (Tamari 2017). The indoor spaces will include options of easy-access for people with wheelchairs with sensory paths and hallways that can provide ease of directions to people with visual impairment. Thus, the disabled-bodies who with restricted mobility have the equal value as any other by doing something easy that everybody does.

Organisation of social space

Accessibility is an important term in social space especially in interior. This is an important issue in term of human rights for the disabled and also everyone. Accessibility is an important element in interior space from planning to design stage so it meets the goals for disabled-people and also abled-people. Organisation of social space in the interiors influences an idea where one can move freely without any risks and feelings of uncertainty. It is the removal of a marginalized and insecure feeling within any public space (Ayşe Sirel and Osman Ümit Sirel 2018). Organisation of social space for the able-bodied as well as for those that are impaired helps them feel empowered as well as feel confident in such an environment. Developing a balance of positionality is where different relationships can be experienced between the personality and body such that it helps to create consciousness to make activities go smoothly. The development of user-friendly indoor spaces for all ages, genders as well as people with disabilities which is a constructive use that can be made by emphasizing ergonomic

issues. The disabled-bodies feel welcome and have better experiences like others as organised spaces is thought to attract them.

Method

This research methodology follows qualitative research analysis methods where case studies data can be used in order to analyse the results so attained. With respect to the topic allotted, an identification in the removal of differences between the benefits offered to the abled-bodies and disabled-bodies through the analysis of three case studies with a narrative research idea. Case studies show how the use of materials, space function, and space planning being apply to connect disabled people and giving them a sense of belonging to space, which having same sense as able people. This qualitative research method was developed by John Creswell as a means of conducting a detailed study with the high involvement of actual experiences and real-life situations (Creswell et al. 2003). Taking into account the discoveries and considering the social phenomenon is the main focus of this research. By using the qualitative method, 30 literatures chosen are focus on the benefits of the principles of universal design to the people, space and design, and how the space planning design is beneficial to disabled. This method able to contribute for research which change rapidly and develop to a wholly integrated theory base and research agenda.

Case study

Case study 1: Bill and Melinda gates discovery centre

The Bill and Melinda Gates Discovery Centre is an exhibition in 15,000 square foot, which is an office space at the centre of Seattle. The purpose of the discovery Centre is to foster a collaborative working environment to educate the people regarding global issues such as disability (SEGD 2018a).

Figure 2. Bill and Melinda gates discovery centre
Source: (SEGD 2018a)

Case study 2: The Senses- design beyond both feat and feast

Ellen Lupton and Andrea Lipps have curated the Cooper Hewitt Smithsonian Design Museum, which is a remarkable example of development of a studio that goes beyond visual to deliver a uniquely accessible sensory feast for people with disabilities (SEGD 2018b).

Figure 3. The Senses- design beyond both feat and feast
Source: (SEGD 2018b)

Case study 3: Hazelwood School, UK

Hazelwood School is an extraordinary architectural idea which is an award-winning school with the most challenging set of constraints. The project was completed in 2007 with the designers having a perspective of innovative solutions, a design space for learning and experiencing for all kinds of children (Universal Design Case Studies 2016). This school was to remove the school for the children with disabilities and primary vision impairments and replace it with the school with a quite different population and both would meet the initial set of needs of constraints for both able-bodied and the disabled children.

Figure 4. The Hazelwood School, UK
Source: (Alan Dunlop Architect Limited 2016)

Result and discussion

Identification of Universal Design and its goals as well as the theoretical understanding and evaluations with the understanding of the interior spaces has been done. It is seen that the main issues of disability and removal of parity between the able bodied and the disabled persons are successfully solved. It is done through the development of such museums, schools and institutions that actively work towards development of a design and space where Universal Design is highly accessible and equitable to all types of users irrespective of the gender, physical, or visual impairments (Wilson 2017).

These help in the development of sustainability which in relation to its design. It is seen that the generality of the normal adult and able-bodied persons can walk among those that are facing disabilities with these unique designs. It is seen that the formulation of plans as per Hazelwood School, UK planning for better interior spaces that are accessible and comfortable to all. Universal design has developed an implementation in planning of housing and neighbourhood areas with the adaptation of private living spaces where Universal Design that is sustainable in wellbeing and offers a safe place to live.

A perfect example of this scenario was seen in the case study 3 of the Hazelwood School, UK, a school which removed the school for the children with disabilities and primary vision impairments and replace it with the school with a quite different population and both would meet the initial set of needs of constraints for both able-bodied and the disabled children. Small garden spaces suitable for children for outdoor teaching and learning, and easy navigation all across the school premises is the most effective character of this school.

Figure 5. Hazelwood School, UK sensory trail wall
Source: (Alan Dunlop Architect Limited 2016)

Moreover, ease of travel and orientation throughout the school premises was essential for the students. The idea of trail rail that also functioned as storage was conceived. As a result, the students had greater flexibility and independence as they travelled throughout the school. The trail rail wall is warm and tactile feel to provide signifiers or messages along the way to affirm the children's placement with the school. For the external wall, the curved timber walls help to deinstitutionalize the school's atmosphere while also lowering the visual scale. The scent and touch of the woods provide sensory stimulation. This indicates the importance of materials by applying the principles of Universal Design in the relationship between the disabled-bodies and surrounding to achieve the symbiosis. The school was designed to address extremely particular challenges while maintaining architectural integrity (Universal Design Case Studies 2016).

From this case study Hazelwood School, UK is a great example of meeting the expectations and needs of user that want to be treated the same as able bodied and enables user to practice mobility and orientation skills with improvement in confidence and self-esteem. The goal of the Hazelwood school design is to provide a safe and exciting environment for users. Hence, this case study is one of the good examples of Universal design that needed practices in indoor and outdoor space for able bodied and disabled person.

Figure 6. Bill and Melinda gates discovery center multi-user interactive floor display
Source: (SEGD 2018a)

Besides, the case study of The Bill and Melinda Gates Discovery Center is an exhibition in 15,000 square foot, which is an office space at the heart of Seattle. The discovery center's mission is to establish a collaborative working atmosphere in order to educate individuals about global concerns such as disability (SEGD 2018a). It considers the usage of digital and the provision of possibilities for visitors to contribute their voices, as well as displaying the designers in the construction of numerous programmes for the exploration center. It employs social media methods to produce a gigantic interactive content with animation floor map that gives intuitive touch screen tables in physical as well as for the guests to share strong stories of difficulty removals in greater detail. This case study applied the function of space as a medium to connect people, regardless ability by sharing their own experiences and interact comfortably with no pressure.

Figure 7. Bill and Melinda gates discovery center stay connected corner
Source: (SEGD 2018a)

The Stay Connected helps sustain the Gates Foundation as a global institution, and it features a large social media touch wall with interactive material from thought leaders and philanthropists across the world (SEGD 2018a). It is a fantastic story-telling complex about the use of technology that can be utilised by all individuals, regardless of disability, race, or gender, and is made equally available to all visitors who wish to offer their experiences and opinions in the museum. For enhanced appeal, the pictures and remarks are added to the gallery where they are shown, as well as shared as a speech.

As a result, the selected case study is the best demonstration for Universal Design created through this museum. A good interior design in creating experiences that connect people to place and make users feel like they belong in the space. The Bill and Melinda Gates Discovery Center successful creates a physical environment that can be used by a diverse variety of individuals regardless of gender, age, or disability status. The Bill and Melinda Gates Discovery Center with consideration on Universal design that develops an environment that is accessible to individuals with disabilities with no special development in creating a physical space that is reachable to abled-bodies as well as disabled-bodies (Hartsoe and Barclay 2015).

Furthermore, case study 2 of The Senses-Design Beyond Both Feat and Feast was showed. Ellen Lupton and Andrea Lipps have curated the Cooper Hewitt Smithsonian Design Museum, which is an outstanding example about development of a studio that goes beyond visual to deliver a uniquely accessible sensory feast for people with disabilities (SEGD 2018b). It goes for the idea design beyond vision where multi-sensory designs with the concept of showing a non-ocular centric interest was developed exploring the technology and multisensory experiences that benefits all people. This museum provides wide variations in athletics in objects with colours, light, images, textures and sound which can be experienced by people through all of their senses. By applying the ideal of space function and space planning in Universal Design, it able to create a warm and comfort atmosphere and encourage the disabled-people to interact with the surrounding.

Figure 8. Cooper Hewitt Smithsonia design museum
Source: (SEGD 2018b)

The Cooper Hewitt Smithsonian Design Museum provides a number of services for disabled people. They are providing better experiences for the visitors with limited mobility. The museum's main entrance is an accessible path where the front door has an access ramp and equipped with elevator to the main lobby. For example, museum with passenger elevator able to transport visitors between all the four floors of exhibitions. On a first-come, first-served basis, standard manual wheelchairs and portable stools are offered free of charge at coat check. All Cooper Hewitt's restrooms are wheelchair accessible. At the same time, people with vision problem, the museum visitor experience desk provided large-print labels and all exhibition videos with audio explanation (Hewitt 2018). Thus, the vision impaired people will have the same services as others and likely to come back. An interior environment for symbiosis between the abled-bodies and disabled-bodies is essential, and it should incorporate the principles of Universal design through space planning and experiences that are particularly intended for a varied and differently abled audience.

The sensory museum has been constructed with the museum team which takes account on both equitable experiences for those visiting the museum as well as design that is conducted with Braille implementations and descriptive tools of the senses. It can be seen as a most appropriate example of Universal design in New York. An accurate reflection of interior space needed fulfil the requirement of Universal design and creates experiences of symbiosis that connect people to space and make users especially the disabled the feeling of belongingness in the space.

Three case studies above showed a good example for the criteria required to create an indoor space for symbiosis between able bodies and disabled bodies. To create an indoor space for symbiosis between these two categories of individuals, an interior space provided intensive use for people with disabilities as well as other users with the aim of unifying the usage of interior space and space planning to be independently used by people with disabilities (Yılmaz Çakmak and Alkan Meşhur 2018). A space applied with the seven principles of Universal design to develops space that is usable to all people. An interior space has successfully implemented Universal design for both able bodied and disabled people, hence correlates to the three case studies that studied above. The development of projects and their justifications for Universal Design to reach a symbiosis between abled-bodies and disabled-bodies through the identifications of creative and innovative solutions. The case studies were used to study on the importance of social space and Universal Design implementation by using qualitative research analysis methods.

Conclusion

Universal design in interior spaces has played an important function in establishing an aiding architecture toward identifying moveable space for disabled-bodies and also abled-bodies. The principles of universal design can implement through the materials, space planning and space function in indoor space. These elements bring an important impact to all the user in interior space. The purpose of considering Universal design in interior spaces is to ensure that architectural designs are made that are accessible to people with disabilities and that the accessibility is beneficial to an inclusive environment. From the case study, the significance of Universal Designs was resulted in the development of an observation of interior spaces in architecture detailing the key components of Universal design. The

development of its ideas and objectives for the structuring of a social space. The purpose of project development and opinions on Universal Design is to create a symbiotic relationship between able-bodied and disabled identifications of creative and inventive solutions.

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Author(s) contribution

Chuah Ying Ying contributed to the research concepts preparation, methodologies, investigations, data analysis, visualization, articles drafting and revisions.

Azizi Bahauddin contribute to the research concepts preparation and literature reviews, data analysis, of article drafts preparation and validation.