



Malaysia Architectural
Journal

Journal homepage:
<https://majournal.my/index.php/maj>
e-ISSN : 2716-6139



MS 1184 : Awareness Among Designers and Allied Assistants of the Built Environment in Malaysia

Nur Halinda Halimi^{1*} and Yussuriani Ome Yusof¹

¹Architectural Branch, Public Works Department Malaysia

ARTICLE INFO

Article history:

Received: 30 April 2024
Received in revised form
Accepted: 15 October 2024
Available online: 23 June 2025

Keywords:

Universal Design; MS 1184

ABSTRACT

Buildings, products and physical environments that are accessible to individuals of all ages, abilities and circumstances are defined as universal design. In Malaysia, the Malaysian Standard document MS 1184 : 2014 – Universal design and accessibility in the built environment – Code of practice has been made the primary guideline for the designing and planning of the built environment to ensure inclusivity and barrier free for all. High awareness of universal design contributes to effective accessible built environment. However, awareness on universal design and the existence of MS 1184 : 2014 among designers and allied assistants in the field of built environment are still lacking. The objective of this study is to determine the general level of awareness on universal design and MS 1184 : 2014 document among designers and allied assistants in the field of built environment in the Klang Valley. The methodology adopted for this study is quantitative methodology via questionnaire survey. This study managed to attain 349 respondents from built environments designers and allied assistants around the Klang Valley. Results of the study indicates 187 respondents (55%) are aware on MS 1184 : 2014, while the rest are not in the know of the guideline. Findings of this study denote that there are still many designers and allied assistants in the field of built environment who are not aware on universal design and the MS 1184 : 2014 document. From the findings, the study suggests that more initiatives and proactive actions to increase the awareness among designers and allied assistants in the field of built environment in Malaysia. Further studies are recommended to identify what are the factors that contribute to this phenomenon.

1. Introduction

As the world's elderly and persons with disabilities (PwDs) population are growing by the year along with the advancement of medical technology, the demand and need for Universal Design (UD)

Corresponding author.

E-mail address: nhalinda@jkr.gov.my

and accessible built environment has increased significantly. The concept of UD in the built environment is implemented for the purpose of accessibility for all. A product or setting that can be used by everyone to the fullest extent possible without the need for modifications or specialized design is defined as universal design (Chuah & Bahauddin, 2022) [1]. Halimi *et al.*, 2022 [2] has highlighted that among the impacts of a barrier-free physical environment for PwDs are as follows; i. Accessibility; ii. Participation; iii. Functionality; and iv. Quality of life. Hence, the Malaysian Standard (MS) 1184 : Universal Design and Accessibility in the Built Environment - Code of Practice (MS 1184) is initiated to assist and guide when designing and developing the accessible built environment.

Universal Design or some perceive as Inclusive Design, has been emphasized deeply by the United Nations (UN) via their 2030 Agenda for Sustainable Development which are the 17 Sustainable Development Goals (SDGs). The SDGs has discussed much on Universal Design in targeting to have equal rights and barrier-free accessibility in the physical environment. Target 9.1 stresses on affordable and equitable access for all in terms of infrastructure, while Target 11.7 promotes to deliver safe and better barrier-free access to public spaces pertaining specifically for women, children, the elderly and PwDs. The UN has reported in their latest 79th General Assembly that surveillance of 1,365 cities worldwide illustrates that accessibility to public spaces are still low. The report revealed that less than 3 out of 10 people can easily travel to these spaces as opposed to developed cities in Australia, North America and Europe where 7 out of 10 individuals have no problems to enjoy the public spaces (UN, 2024) [3].

1.1 Universal Design

The idea of Universal Design (UD) began in the 20th century after World War II veterans returned home, prompting the government to act in response to the impairments and restricted movement these soldiers had to deal with as a result of their service. Ronald Mace, an American architect, created the idea of UD in 1985. He embraced and celebrated the use of the built environment by all people, regardless of age, size, or disability. According to (Aarhaug, 2019) [4], the United States, Scandinavia, and Japan are the countries where the term "universal design" is most commonly used. According to (Jones, 2014) [5], universal design architecture and rehabilitation practices are closely related since universal design is the process of creating a constructed environment that can be used by everyone. According to the UD concept, there are seven (7) principles to its design (Preiser & Smith, 2011) [6] :

- i. Equitable Use
The design shall be functional and to accommodate for everyone regardless of the type of disability.
- ii. Flexibility in use
The design allows for flexibility to accommodate various types of preferences and capabilities.
- iii. Simple and Intuitive Use
The design promotes easy utilisation and is straightforward for the user, without any complexity.
- iv. Perceptible Information
The design demonstrates basic information and suits all sorts of disabilities.
- v. Tolerance for Error
The design considers for minimal hazard and potential danger during act of activity.
- vi. Low Physical Effort
The design allows for minimal physical effort during utilisation and can be used in a neutral body state.
- vii. Size and Space for Approach Use

The design accommodates to multiple postures of the body (i.e., standing or sitting) and provides sufficient space when using assisted devices or accompanied assistance by another individual.

1.2 MS 1184: Universal Design and Accessibility in the Built Environment - Code of Practice (MS 1184)

A group of experts from the built environment, many associations for people with disabilities, and relevant government agencies for Malaysia created MS 1184: Universal Design and Accessibility in the Built Environment - Code of Practice as shown in Figure 1. The first revision of MS 1184: 2002, Code of Practice on Access for Disabled Persons to Public Buildings, and MS 1331: 2003, Code of Practice for Access of Disabled Persons Outside Buildings, are canceled and replaced by this Malaysian Standard. This Malaysian Standard provides guidance on requirements and best practices for creating a suitable and accessible built environment for building users, designers, architects, builders, engineers, building owners and managers, manufacturers, policy makers, and legislators. Numerous stakeholders in the built environment came to a consensus on this paper.

When creating a physical environment for individuals with a variety of disabilities, such as physical, visual, or hearing impairments, MS 1184 serves as the minimum standard and point of reference. By incorporating international standards into the local context, it promotes public health and safety (MS1184:2014 Universal Design and Accessibility in the Built Environment - Code of Practice. Amendment 1, 2017) [7]. This standard strives to satisfy the requirements of as many individuals as possible while upholding the principles of equality and inclusivity as outlined in Universal Design. It must be used on all newly constructed and renovated building projects. This guideline provides instructions on how to plan, build, and maintain the physical environment in a way that maximizes accessibility for everyone, including PwDs.

MS 1184 as shown on Figure 1 is now a mandatory legal document that must be followed while planning and establishing an inclusive environment for everyone. According to Law 1984 (revision 2022), all buildings must abide by MS 1183 and MS 1184. This bylaw must still be complied with by both newly constructed and existing buildings within three years of the directive.

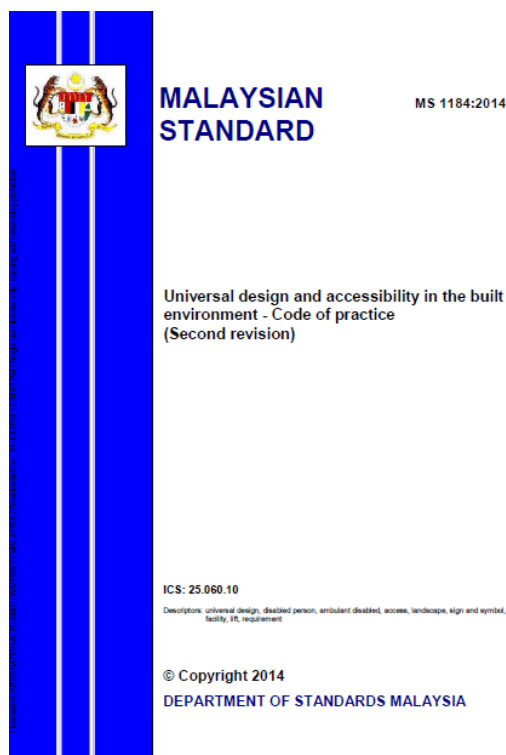


Fig. 1. MS 1184:2014 Universal Design and Accessibility in the Built Environment – Code of Practice

1.3 Problem Statement and Research Objective

Even as the MS 1184 has been a compulsory requirement to adhere in the development of the built environment, inaccessibility is still an issue. Although there are efforts made to make buildings more accessible, it seems to be more of afterthoughts than of planned and intentional actions. Study in this field should be prioritized because, despite some considerations, the principles in use may still be called into question due to gaps in awareness and application. Factors that contribute to low awareness and knowledge among professionals and the public are such as i. Lack of information; ii. Few professionals; iii. Limited stakeholder engagement; iv. Lack of political will; v. Ignorance; and vi. Inconsistence transport policies (Karani, 2020) [8].

Total implementation of UD in architectural design is still low and limited (Zallio & Clarkson, 2021) [9]. The authors presented that this is due to the reasons such as the wrong perception of UD among professionals, limited legislative issues and time-cost-efficiency doubts during the development process. Subsequent to lack of accessible built environment, some researchers have come up with the term “accessible tourism” as their advocacy in having equal rights to be able to travel barrier free just like normal abled-bodied people. Studied on accessible tourism highlights the need of awareness among the society in general that barrier free physical environment and universal design is essential for PwDs to enjoy leisure and travel (Devile & Kastenholz, 2018) [10].

From the problem statement above, therefore, the objective of this study is to investigate the general level of awareness and knowledge on UD and MS 1184 among designers and allied assistants in the field of built environment practicing in the Klang Valley. It is essential to look into how the societal issues of today might lead to chances for architectural design experts to get more knowledge about the expanded definition of UD.

2. Research Methodology

2.1 Quantitative Data Collection Methodology

Questionnaire Survey is described as a quantitative data collection method to measure numerically on trends, attitudes or opinions of a certain population (Creswell & Creswell, 2018) [11]. According to (Groat & Wang, 2013) [12], questionnaire surveys has the advantage to attain a diverse amount of information – from demographic background to people’s thoughts across a large population within a certain period of time. The authors also mentioned that questionnaire surveys are among the commonly used data collection methods in correlational research. Questionnaire surveys are generally cheaper and is not time consuming compared to qualitative data collection methods like observation and interviews. With the current era of digitalisation and minimal physical contact, questionnaire surveys are now conducted through online platforms. Hence, this process not only reduces usage of paper to save the environment, but data collection may also be done quicker than the conservative paper-ticking method.

Prior to dissemination of the questionnaire survey, a process of verification and confirmation is done. Experts from the related fields are referred and sought for advice and constructive comments as displayed in Table 1. Two experts who has ample experience in the field of Universal Design were approached. The questionnaire survey is to answer the research objective which is to review the current knowledge on universal design among designers in the built environment. The questionnaire survey used platforms such as emails, Facebook, Messenger, WhatsApp, and Telegram applications.

Table 1

List of Experts Involved in Verification of Questionnaire Survey

Expert	Designation
Expert 01	Senior Director, Cawangan Arkitek, Ibu Pejabat Jabatan Kerja Raya Malaysia
Expert 02	Deputy Director, Jabatan Perlaksanaan Projek dan Penyelenggaraan Bangunan, Dewan Bandaraya Kuala Lumpur

2.2 Quantitative Data Collection Methodology

The title of this questionnaire survey is “Survey on review of the knowledge among the designers and allied assistants in the built environment on universal design.” This questionnaire survey aims to review the knowledge among the professional designers and allied assistants in the built environment on universal design. The definition of designers in the built environment or the sample size population are professionals and technical assistants who are involved in designing the built environment. Though there are many disciplines and professionals who are involved in the built environment, the scope of the designers only covers the professionals and allied assistants, they are as follows:

- i. Architects
- ii. Engineers (civil, structure, mechanical and electrical)
- iii. Surveyors (quantity surveyors, building surveyors and land surveyors)
- iv. Interior designers

Without high awareness and adequate knowledge, other necessary actions may not be carried out for the benefit of people with disabilities. The questions in the questionnaire survey were derived from literature review from the secondary data collected and the pilot survey. The survey is divided into three sections. The first section generally describes in brief about the purpose of the study is about and presents the instructions to the respondents. The second section requires the respondents to fill in their particular details such as name, age, gender, and educational level. While the third section lists the questions to facilitate the data collection, which are questions regarding the existing knowledge on universal design. The questions in this part inquires the participant on the level of awareness and knowledge on UD and their perception on the level of awareness in the public. The Likert Scale was used in this survey for the questions, to measure the level of awareness and knowledge, while the other questions were yes or no answers. The questions in this part inquire designers on their experience in designing for PwDs and for any disabilities, and their familiarity with MS 1184 as the common guide to refer to or reference to any other documents when designing for the disabled. This part also queries the respondents on the extent the UD principles should be implemented in housing.

Figure 2 illustrates the flow of study after the problem statement and research question have been identified.

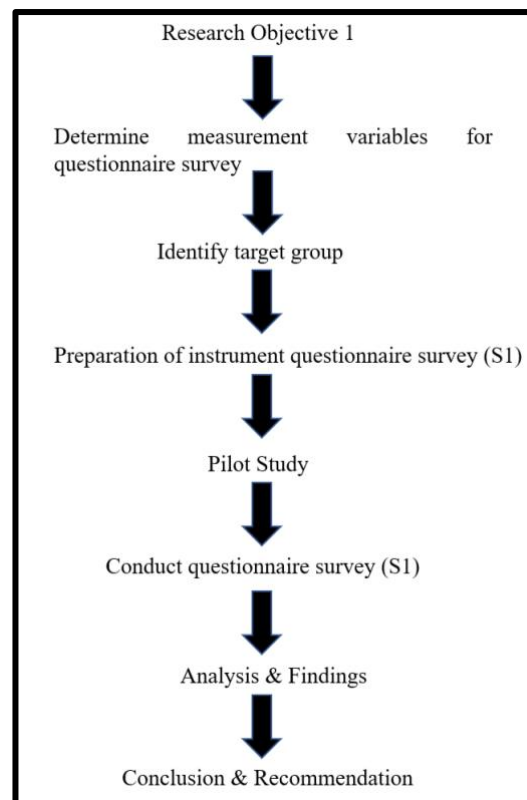


Fig. 2. Flow of Research Methodology

2.3 Ethical Conduct in Research

For this study, ethical approval from any party is not required. Therefore, the researcher took extra precautions to avoid any ethical misconduct. Declaration in questionnaire survey is voluntary and that all information will be kept anonymous and confidential.

2.4 Content Validation and Reliability of Methods

One of the most crucial steps in the study process is technique validation. In the early stages of instrument development, it is imperative to get expert opinion and input (Berk, 1990) [13]. The survey questionnaires are the method used in this study that has undergone validation. Survey questionnaires are frequently evaluated by practitioners and academic specialists in the relevant field (Elangovan & Sundaravel, 2021) [14]. Following survey validation, SPSS is used to assess questionnaire survey's reliability and credibility. The questionnaire survey has a Cronbach's Alpha of 0.890.

3. Results and Discussion

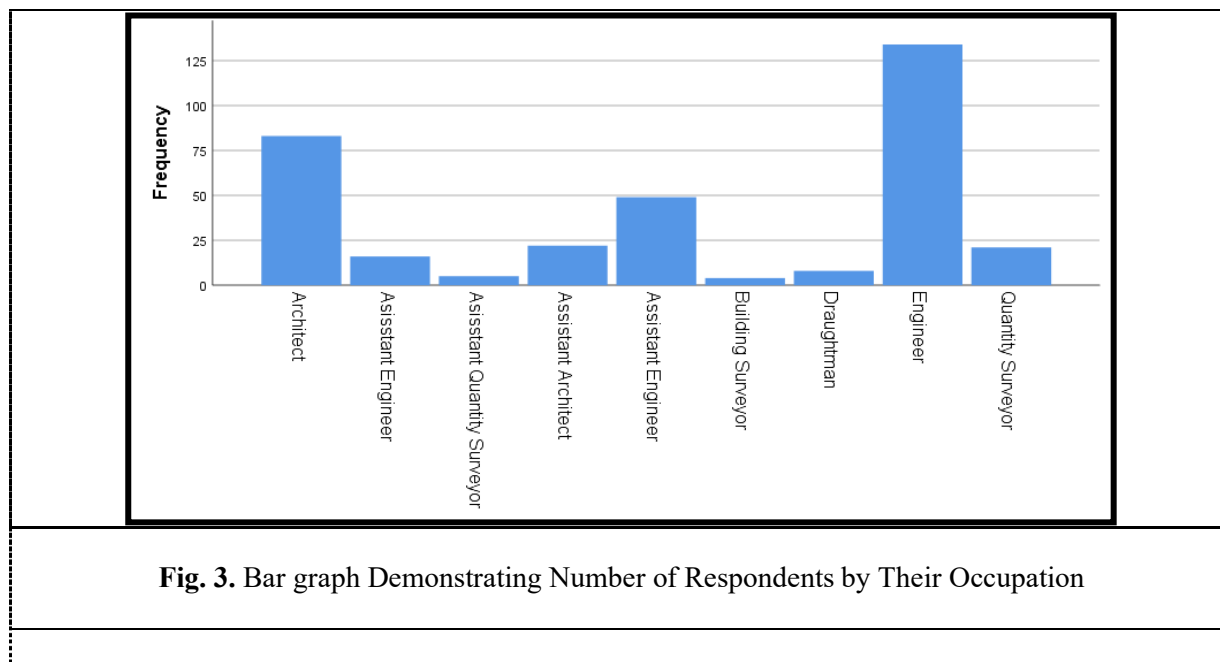
This questionnaire survey is entitled Survey on the Review of the Knowledge Among the Designers and Allied Assistants in the Built Environment on Universal Design. This questionnaire survey aims to review the current knowledge among the designers and allied assistants in the built environment on universal design and to answer the research objective. The hypothesis of this questionnaire survey is that awareness and knowledge among the designers are low, hence, the physical environment in the built environment for PwDs are still inadequate. The questionnaire survey was disseminated online through the Google Forms application to the target sample group. It is targeted at designers in the built environment who are living in Selangor and Kuala Lumpur. The definition of designers in the built environment or the sample size population are professionals and

technical assistants who are involved in designing the built environment, such as architects and engineers from the civil, structural, mechanical, electrical or any other disciplines that are associated, for instance interior designers and quantity surveyors. Sample population of designers are either practicing from both the private and public sector. The questionnaire survey was initiated through email and WhatsApp application and was sent to a potential of 593 respondents who were from multiple backgrounds practising in the built environment. In sum, 349 respondents participated in this survey. The percentage rate of participation among the respondents is 59%.

When data collection and feedbacks were received from the respondents, the compiled data through Google Forms are extracted into the Microsoft Excel software for screening in order to obtain the relevant data. This is also to avoid any misinterpretations when analysing. Later, the final data is inserted into IBM SPSS Statistics 25 for the process of analysis.

3.1 Part I - Respondents' Demographic Background

This part demonstrates the results on the demographic information which are gender, age, occupation and work experience. The engineer occupation contributes to the highest number of respondents which is 137 numbers while the architect occupation comes in next with a number of 85 respondents as shown in Figure 3. Whilst Figure 4 demonstrates the percentage of respondents according to their ethnicity. It shows that the majority of the respondents are of Malay ethnicity (93%), followed by Chinese (9%), Indian (3.2%) and others (2.9%). Figure 5 depicts that more than half of the respondents are females (205) and the rest are males (146). Furthermore, Table 2 elaborates on the breakdown of respondents according to their years of working experience. Most respondents have experiences within the range of 11 to 15 years (115), 16 to 20 years (79) and more than 20 years (71).



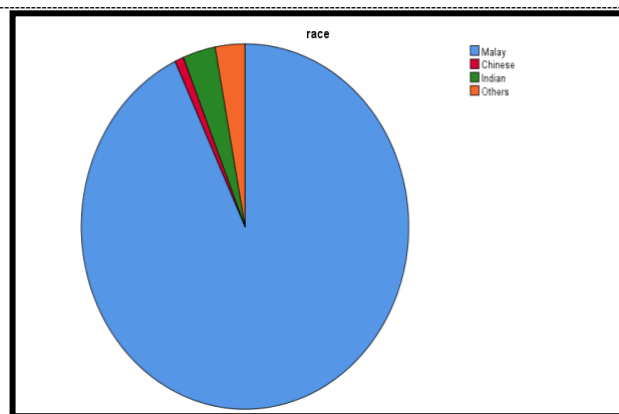


Fig. 4. Pie chart showing the statistics by race

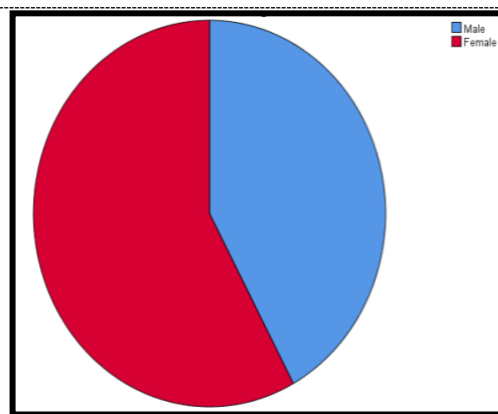


Fig. 5. Pie chart showing the numbers of genders

Table 2

Years of Experience among Respondents

Years of experience	Frequency (n)	Percent (%)
Less than five years	37	10.8
6-10 years	47	13.7
11-15 years	115	32.7
16-20 years	79	22.2
More than 20 years	71	20.5
Total	349	100

3.2 Part II and III - Reviewing Knowledge on Universal Design and MS 1184

This part elaborates on the existing knowledge on designing for children with PwDs in general. Despite the fact that MS 1184 is a compulsory requirement to adhere to for all public buildings according to the UBBL, there are still some who have not heard of it. MS 1184 is the main reference to look into when designing the built environment for PwDs. Table 3 portrays the existing knowledge on MS 1184 among the designers in the built environment. It shows that a total of 193 respondents (55%) do not know the guideline. Those in the engineering discipline (designer and assistant) contributes to the highest number of unawareness, which is 142 respondents. This is probably due to the fact that the architect initiates the design of the building, and is responsible to adapt any requirements that are opposed by the local authority and as stated in MS 1184.

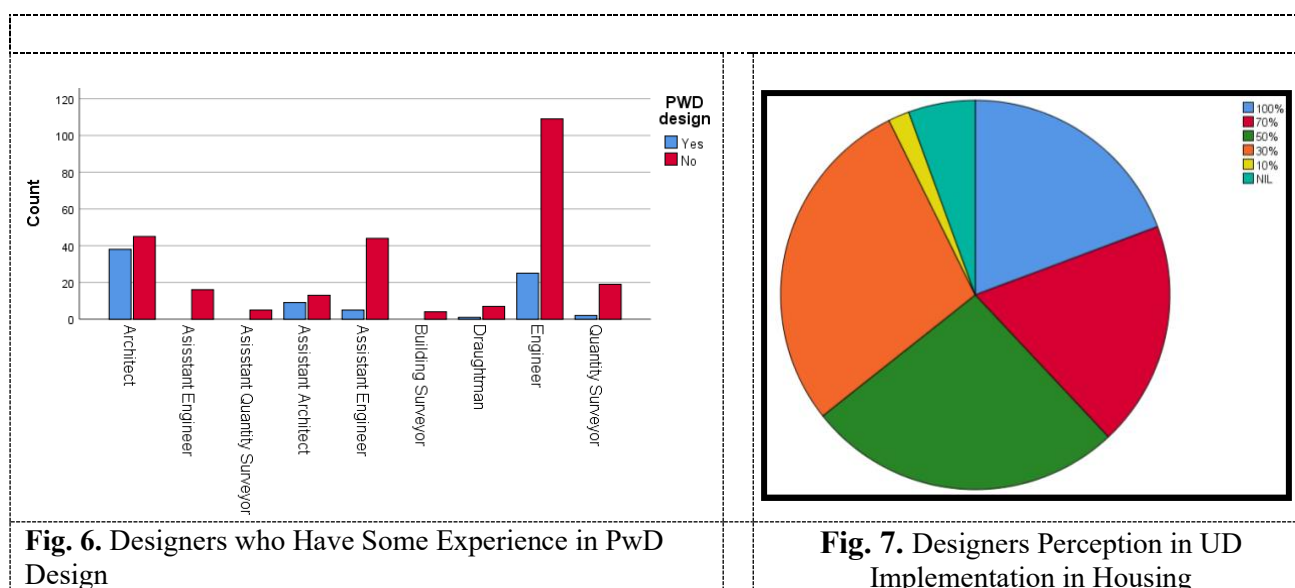
Table 3

Existing Knowledge among Designers Regarding MS 1184

Occupation	Yes	No
Architect	79	6
Engineer	49	88
Quantity Surveyor	4	17
Building Surveyor	2	2
Draughtman	1	7
Assistant Architect	14	9
Assistant Engineer	12	54
Assistant Quantity Surveyor	0	5
Total	161	188

Meanwhile, the bar chart in Figure 6 shows that the engineering discipline has the least professionals who are involved in any design for PwDs. This is probably due to the nature of involvement of the engineers who may only be designing public infrastructures such as roads and bridges which does not have inhabitants living in the structure. Other factors may include engineers would usually proceed with designs given by architects and complete it with technical engineering input to enable the building to work and function. Electrical engineers would furnish the design with fittings and advise on the capacity of electricity a building need. Mechanical engineers will assist in providing the mechanism for air and water needed.

The pie chart in Figure 7 demonstrates that 30%, i.e., most respondents prefer UD elements to be implemented in housing projects. This is to minimise any major adaptation for the PwD inhabiting the space. As Malaysia is also heading towards being old-population country in the future, the housing law enforcers and stakeholders should start advising the housing industry to provide the required infrastructure and facilities for the elderly population as well.



3.3 Recommendation and Future Studies

UD or designing for the disabled needs to be understood and be informed on its benefits to everyone (Fransolet, 2015) [15]. The current awareness and knowledge among the public and designers still needs further enhancement. Therefore, it is recommended that the knowledge of universal design begins from the household environment and moves on to the level of the national policy makers as shown in Figure 10. Some of the suggestions that are proposed are currently implemented and it would be beneficial to continue the effort. Starting at the household stage, parents and family members can start by instilling life values in their children. Parents and family members should encourage their children to mingle with children who are living with any sort of impairments; teach them the value of empathy and sympathy by assisting them to help their peers who are disabled. This is to prevent young children from forming feelings of discrimination at an early age.

Another phase of a child's life is the school environment. Teachers and staffs should help to educate children to respect and to avoid discriminating against children with disabilities. School administrations should not differentiate and segregate any child with physical disabilities from enrolling into mainstream classes. There are children with physical disabilities, but their intellectual abilities are not affected, and they can attend school just like other normal children. Therefore, the school and public policy should enforce that the school physical environment be accessible to

everyone. Currently, not all mainstream schools accept children with physical disabilities in their respective school. Lately, there are a few cases where children with cerebral palsy (CP) who have no intellectual impairments are facing issues in enrolling into public mainstream schools. Even when they are able to attend the school, physical barriers are a huge problem for these children. Figure 8 shows an example of a mother who has to accompany and carries her child around in school because of the inaccessibility of the physical environment. Significantly, a good practice is to arrange visits to people with special needs / specific condition centres and provide basic explanation on cerebral palsy or PwDs as shown in Figure 9. During these visits, activities involving both parties can be organised to build a barrier less bond and to help both parties to understand each other.



Fig. 8. Source : (*Cerebral Palsy Pupil Struggles with Discrimination*, n.d.) [16]

Fig. 9. Preschool Students Visiting CP Centre in Penang

In the higher education environment, students enrolling architecture are taught to make buildings fit and functional for humanity (Lifchez, 1987) [17]. Some architectural schools do teach the subject related to UD as an early exposure of how to design a built environment for PwDs. Legislative and PwD requirements were also impregnated in studio design projects to instil sensitivity when designing for PwDs and in practicing inclusivity. The physical environment of the campus itself can be made as a self-teaching environment. An accessible environment and facilities for PwDs should be provided adequately. This not only becomes as informal teaching platform to the students it also promotes inclusivity that ensures that anyone can pursue their higher education degree without any physical barrier. However, some say that the current syllabus in the higher education environment is still not enough to educate and promote awareness on UD (Ayşe Sirel & Osman Ümit Sirel, 2018) [18].

Architects, builders, and designers are the main stars in the succession of a physical development. In Malaysia, architects are the leaders of project developments as they are the primary professionals who oversee and ensure that all legislative requirements are fully complied. Therefore, high awareness amongst the cohorts is important, as a role model to educate the public on the significance of having an accessible physical environment. With the recent MS 1184 which has come to full effect as stated in UBBL 1984 (August 2022), it is with high hopes that better awareness and knowledge can be instilled in designers. Designers may design properties that enable the purchasers' flexibility to make adaptation and extensions in the future when necessary (Staples & Essex, 2016) [19]. Those flexibilities may include intervention of passive or active strategies such as modification of toilets or adding a stair-lift for the staircase. These types of projects can later be showcased or promoted to the public and to other designers as part of increasing the awareness on accessible built environment. Excellent examples can also be awarded with special recognitions as an incentive to the designers as well as encouragement to others. Currently, there are several seminars, conferences, symposiums, and other educating platforms to promote better awareness and knowledge on how to

design for PwDs. These events are mostly organised by universities, government agencies and professional institutions. Awareness may lead to empathy among designers. Empathetic modeling intervention helps to improve design-thinking and becomes a continuous training development among designers and architects (Hutton & Maguire, 2021) [20]. Furthermore, the awareness context can be extended to other professional designers from other disciplines as product design industry and furniture industry that involves ergonomics and anthropometric detailing for PwDs.

Special UD workshops or train the trainers are an example of how awareness on this issue can improve. Knowledge sharing sessions among allied professionals in the built environment can be conducted, such as a discourse between architects and interior designers on UD. Adding on, the Kulliyyah of Architecture and Environmental Design (KAED) of International Islamic University of Malaysia has established a unit called KAED Universal Design Unit or in short KUDU offering services and consultation on UD to its stakeholders (*KAED Universal Design Unit (KUDU)*, n.d.) [21]. Its primary goal is to educate and enhance awareness on the importance of creating built environment accessible for all. KUDU specializes in conducting access audit workshops, conducting access audit training module, giving out seminars and talk, organizing international conferences and national product design competitions, involve in the development of Malaysia Standards (MS) and PwDs building guidelines and other activities relating to UD.



Fig. 11. Example of workshop on UD between interior designers and architects

Despite the execution of the Persons with Disability Act and MS 1184 through the UBBL 1984, implementation and enforcement are still insufficient (Hussein & Yaacob, 2018) [22]. Better enforcement that ensures more implementation in the built environment projects may be another way to increase awareness amongst the designers and policy makers. Government agencies and representatives can initiate incentives or awards to the developers or designers who successfully comply to UD in their projects. This is one way to give more encouragement and motivations to developers and designers. Sales of the MS 1184 copy by the Standards Malaysia should be available to the public at a much affordable price. Currently it is sold at RM 345.00 per softcopy, which is not an affordable document for some.

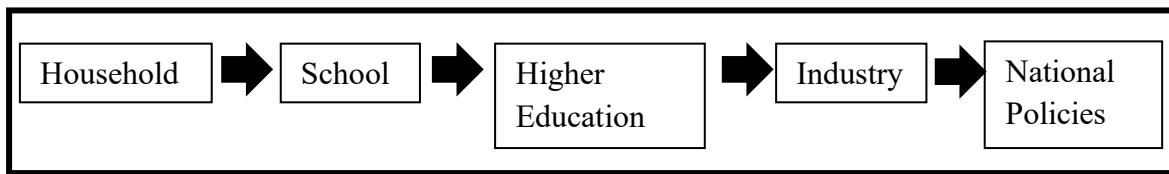


Fig. 10. Phases of Knowledge on PwDs that Should be Instilled

4. Conclusions

From this study, it is apparent that the knowledge and awareness on UD and MS 1184 is still lacking. Universal Design is not just for persons with disabilities. Temporary disabled individuals, pregnant women, the elderly, small children and many more benefits from the barrier free physical environment. This study has addressed and answered the research objectives and research questions that have been underlined as discussed above. This study has also introduced suggestions to improvise, enhance and enlighten the level of awareness among designers and allied assistants. With better awareness and knowledge on UD and MS 1184, the built environment will be more accessible and barrier-free for all. Proper training, educational exposure and knowledge sharing are some of the strategies to empower awareness and knowledge among designers and allied assistants.

In order to educate the public on UD, it is important for designers and allied assistants to portray the most accessible and barrier-free built environment for all. Through the illustration of the accessible built environment, awareness and empathy can be slowly instilled in the public society. Subsequent to this study, further study is recommended to identify the factors that contribute to the lack of awareness and knowledge among designers and allied assistants.

Acknowledgement

The authors would like to express their deepest gratitude towards the top management of Architectural Branch and Public Works Department Malaysia for their support and guidance. Heartiest thank you is also extended to all participants who volunteered and gave their precious time in this study.

References

- [1] Chuah, Y. Y., & Bahauddin, A. (2022). Universal design (UD) in indoor space: Symbiosis between disabled bodies and abled bodies. *ARTEKS : Jurnal Teknik Arsitektur*, 7(1), 43–52. <https://doi.org/10.30822/arteks.v7i1.1185>
- [2] Halimi, N. H., Mohd Nawawi, N., & Aripin, S. (2022). THE IMPACTS OF PHYSICAL ENVIRONMENT TOWARDS CHILDREN WITH CEREBRAL. *International Journal of Studies on Children, Women, Elderly and Disabled*, 15, 42–51.
- [3] UN. (2024). Progress towards the Sustainable Development Goals, Report of the Secretary-General. *Assembly*, 64782(May), 14.
- [4] Aarhaug, J. (2019). *Universal Design as a Way of Thinking About Mobility*. 75–86. https://doi.org/10.1007/978-3-319-99756-8_6
- [5] Jones, P. (2014). *Disability and Rehabilitation Situating universal design architecture: designing with whom?* <https://doi.org/10.3109/09638288.2014.944274>
- [6] Preiser, W. F. E., & Smith, K. H. (2011). *Universal Design Handbook* (Second Edi). The McGraw Hill Companies.
- [7] MS1184:2014 Universal Design and Accessibility in the Built Environment - Code of practice. Amendment 1, Department of Standards Malaysia (2017).
- [8] Karani, G. (2020). *Universal Design Awareness among Urban Planners and Its Impact on Public Transport Systems in Nairobi, Kenya*. 13(1), 1627–1633. <http://erepository.uonbi.ac.ke/handle/11295/155027>
- [9] Zallio, M., & Clarkson, P. J. (2021). Inclusion, diversity, equity and accessibility in the built environment: A study of architectural design practice. *Building and Environment*, 206. <https://doi.org/10.1016/j.buildenv.2021.108352>

- [10] Devile, E., & Kastenholz, E. (2018). Accessible tourism experiences: the voice of people with visual disabilities. *Journal of Policy Research in Tourism, Leisure and Events*, 10(3), 265–285. <https://doi.org/10.1080/19407963.2018.1470183>
- [11] Creswell, J. W., & Creswell, J. D. (2018). *Research Design Qualitative, Quantitative and Mixed Methods Approaches* (fifth edit).
- [12] Groat, L., & Wang, D. (2013). *Architectural Research Methods* (second edi). John Wiley and Sons Ltd.
- [13] Berk, R. A. (1990). Importance of Expert Judgment in Content-Related Validity Evidence. *Western Journal of Nursing Research*, 12(5), 659–671. <https://doi.org/10.1177/019394599001200507>
- [14] Elangovan, N., & Sundaravel, E. (2021). Method of preparing a document for survey instrument validation by experts. *MethodsX*, 8(April), 101326. <https://doi.org/10.1016/j.mex.2021.101326>
- [15] Fransolet, C. G. C. (2015). *Universal Design for Low-Cost Housing in South Africa : An Exploratory Study of Emerging Socio-Technical Issues*. [https://www.scoutsecuador.org/site/sites/default/files/%5Bbiblioteca%5D/5.1 Conservacion de alimentos y Recetas sencillas.pdf%0Ahttp://publicacions.lib.chalmers.se/records/fulltext/245180/245180.pdf%0Ahttps://hdl.handle.net/20.500.12380/245180%0Ahttp://dx](https://www.scoutsecuador.org/site/sites/default/files/%5Bbiblioteca%5D/5.1%20.500.12380/245180%0Ahttp://publicacions.lib.chalmers.se/records/fulltext/245180/245180.pdf%0Ahttps://hdl.handle.net/20.500.12380/245180%0Ahttp://dx)
- [16] *Cerebral palsy pupil struggles with discrimination*. (n.d.). Retrieved August 29, 2022, from <https://www.thesundaily.my/home/cerebral-palsy-pupil-struggles-with-discrimination-XA9244550>
- [17] Lifchez, R. (1987). *Rethinking Architecture: Design Students and Physically Disabled People*. [https://books.google.com.my/books?hl=en&lr=&id=trFeEAAQBAJ&oi=fnd&pg=PR9&dq=architect+role+in+designing+for+disabled&ots=8bMmUku2TQ&sig=Uyx44rL15ndhE1D6WsVmLUmPfCE&redir_esc=y#v=onepage&q=architect role in designing for disabled&f=false](https://books.google.com.my/books?hl=en&lr=&id=trFeEAAQBAJ&oi=fnd&pg=PR9&dq=architect+role+in+designing+for+disabled&ots=8bMmUku2TQ&sig=Uyx44rL15ndhE1D6WsVmLUmPfCE&redir_esc=y#v=onepage&q=architect%20role%20in%20designing%20for%20disabled&f=false)
- [18] Ayşe Sirel, & Osman Ümit Sirel. (2018). “Universal Design” Approach for the Participation of the Disabled in Urban Life. *Journal of Civil Engineering and Architecture*, 12(1), 11–21. <https://doi.org/10.17265/1934-7359/2018.01.002>
- [19] Staples, J., & Essex, S. (2016). Design, Disability and the Planning Challenge: The Reality of Living with Severely Disabled Children. *Planning Practice and Research*, 31(3), 327–346. <https://doi.org/10.1080/02697459.2016.1174974>
- [20] Hutton, K., & Maguire, M. (2021). How “Empathetic modelling” positively influences Architects’ empathy, informing their Inclusive Design-Thinking. *Ergonomics & Human Factors*, 2004.
- [21] *KAED Universal Design Unit (KUDU)*. (n.d.). https://kudu2013.blogspot.com/p/home_26.html
- [22] Hussein, H., & Yaacob, N. M. (2018). Malaysian Perspective on the Development of Accessible Design. *Asian Journal of Environment-Behaviour Studies*, 3(8), 147–156. <https://doi.org/10.21834/aje-bs.v3i8.287>