UNIVERSITI PUTRA MALAYSIA

ASSESSING UNIVERSAL DESIGN PRINCIPLE APPLICATION ON CHILDREN PLAYGROUND AT LAKE TITIWANGSA PARK, KUALA LUMPUR

MARAL JAFARI

FRSB 2014 9

ASSESSING UNIVERSAL DESIGN PRINCIPLE APPLICATION ON CHILDREN PLAYGROUND AT LAKE TITIWANGSA PARK, KUALA LUMPUR

By

MARAL JAFARI

Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia, in fulfilment of the requirements for the degree of Master of Science

August 2014

COPYRIGHT

DEDICATION

In The Name of God I declare that the thesis is my original work accepts for quotation and citation, which have been duly acknowledge. I also declare that it has not been previously and not concurrently submitted for any other degree at Universiti Putra Malaysia or other institution.

MARAL JAFARI

Date: August 2014

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

ASSESSING UNIVERSAL DESIGN PRINCIPLE APPLICATION ON CHILDREN PLAYGROUND AT LAKE TITIWANGSA PARK, KUALA LUMPUR

By

MARAL JAFARI

August 2014

Chairman: Mohammad Yazah Bin Mat Raschid PHD
Faculty of Design and Architecture

The scope of this study includes all children with or without disability specific children with disability issues and the true concept of the Universal Design (UD) principle, as well as the value of playgrounds in the urban parks. The disabled children often face problems when utilising the public playgrounds participating in the activities and enjoying the areas due to the lack of sufficient equipment and space to supply their needs. The aim of this study is to examine the extent to which the children playground in Lake Titiwangsa Park, Kuala Lumpur has incorporated the UD principle and designed with ergonomic in the planning and designing the play equipment to support the all children with different disability ranging in age from 3 to 10. Physical site observations process such as the facilities measurement according to UD principle and ergonomic assessed with photographic documentation were conducted in Lake Titiwangsa Park playground apart from the semi-structured interview with the eleven experts in children playground design involve the landscape designers and policy makers. The data analysis techniques involved descriptive as well as the thematic analysis respectively for physical observation and semi structured interview. The results of this study demonstrate that despite the effort to incorporate the UD characteristics to support the all children with different ability in Lake Titiwangsa Park playground in, the integration of UD is found to be still lacking due to poor knowledge and understanding among designers and policy makers on UD principles and also their negative attitude sets towards the disabled children. The current thesis has not only assessed the physical playground equipment design in Lake Titiwangsa Park in relation to use of UD principle and ergonomic in supporting all children but also documented the comprehension of the UD amongst the designers and policy makers through their cognitions and experiences. The results of this thesis are however limited to the physical equipment, accessibility and the application of seven principles of the UD. Conclusively, this research finding could contributes to creating attentiveness and knowledge to designers and

policymakers to holistically incorporate the UD principles as way forward to enhance the development of the facilities for the disabled and abled in the future.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah.Master Sains

MENILAI PERMOHONAN REKABENTUK UNIVERSAL TAMAN PERMAINAN UNTUK KANAK KANAK DI TAMAN TASIK TITIWANGSA, KUALA LUMPUR

Oleh

MARAL JAFARI

August 2014

Pengerusi: Mohammad Yazah Bin Mat Raschid PHD
Fakulti Rekabentuk dan senibina

Skop kajian ini termasuk isu-isu tertentu kanak kanak hi dengan atau tanpa kecacatan , konsep sebenar prinsip Reka Bentuk Universal dan nilai reka bentuk taman permainan di taman-taman bandar. Kanak-kanak kurang upaya sering menghadapi masalah semasa menggunakan kemudahan taman permainan awam, terlibat di dalam aktiviti-aktiviti dan menikmati kawasan kerana kekurangan keperluan peralatan dan kawasan yang mencukupi untuk keperluan mereka. Tujuan kajian ini adalah untuk menilai sejauh mana taman permainan kanak-kanak di Tasik Titiwangsa Park, Kuala Lumpur menggabungkan ciri-ciri Reka Bentuk Universal di dalam perancangan dan reka bentuk peralatan permainan bagi menyokong kanak-kanak dengan atau tanpa kecacatan yang berumur 3 hingga 10 tahun. Proses pemerhatian fizikal tapak yang melibatkan pengukuran kemudahan dan pengambilan gambar telah dijalankan di Taman Tasik Titiwangsa selain daripada temu bual separa berstruktur dengan pakar di dalam reka bentuk kemudahan permainan kanak-kanak termasuk pereka arkitek landskap dan pembuat dasar. Teknik-teknik menganalisis data melibatkan kaedah analisis deskriptif dan juga tema masing-masing menurut turutan setiap kaedah.
Keputusan kajian ini menunjukkan bahawa walaupun terdapat usaha untuk menerapkan ciri-ciri reka bentuk Universal untuk menyokong kanak-kanak dengan atau tanpa kecacatan di Taman Tasik Titiwangsa, integrasi Reka Bentuk Universal didapati masih kurang di Malaysia kerana kekurangan pengetahuan dan kefahaman dalam di prinsip Reka Bentuk Universal di kalangan pereka dan pembuat dasar serta sikap mereka terhadap kanak-kanak kurang upaya. Tesis ini bukan sahaja menilai reka bentuk fizikal peralatan taman permainan di Titiwangsa Park berhubung dengan penggunaan prinsip Reka Bentuk Universal menyokong kanak-kanak kurang upaya tetapi juga mendokumenkan pemahaman rekabentuk universal di kalangan pereka dan pembuat dasar melalui pengalaman mereka. Hasil tesis ini bagaimanapun terhad kepada peralatan fizikal dan pengaplikasian empat prinsip reka bentuk sejagat . Kesimpulannya, hasil penyelidikan ini akan menyumbang ke arah mewujudkan perhatian dan pengetahuan untuk pereka dan pembuat polisi menggabungkan prinsip

UD secara holistic sebagai satu jalan ke hadapan dalam meningkatkan pembangunan kemudahan untuk orang kurang upaya di masa hadapan.

ACKNOWLEDGEMENTS

I praise God for all His support in my entire life, gave me the opportunity to embark on my masters studies until submitting thesis. I owe everything to Him. I am heartily thankful to my supervisor, Dr Mohammad Yazah Bin Mat Raschid, whose encouragements, guidance and support from the initial to the final level enabled me to develop an understanding of this subject. Moreover, I gratefully thank the worthy contribution of my committee members Dr Mohd Yazid Mohd Yunos during this study.

I am thankful that this research has been supported by Universiti Putra Malaysia (UPM) which without that I would not have been able to engage in this research. Furthermore, this research could not be completed without the support of the Dewan Bandarraya Kuala Lumpur and individuals that were interviewed (Mr Vijayakumar, Mrs Asia Abdul, Mrs Citi Azura, Mr Nik Adlin Bin Hussain, Mr Abd Razak Ahmad, Mr Aznan Bin Mohd Nor, Mr Mond Fadzil Bin Non, Mrs Ainul Farida Binti Ariffin, Mr Mohd Nur Ihsan Ishak, Mrs Mahsuri Hamdin) along the way.

I would also like to thanks my family especially may parents who have been supporting me in terms of providing morale and motivation to complete the thesis in time.

APPROVAL

I certify that an Examination Committee has met on 3 March 2014 to conduct the final examination of **Maral Jafari** on her **Master** thesis entitled "Assessing the Universal Design Quality of Playground for Physically Disabled Children in Lake Titiwangsa Park, Kuala Lumpur." in accordance with the Universities and University College Act 1971 and the constitution of the Universiti Putra Malaysia [P.U (A) 106] 15 March 1998. The Committee recommends that the student be awarded the degree of Master of Science.

Members of the Examination Committee were as follows:

Prof. Madya Lar. Dr. Noorizan bt Mohamed
Department of Landscape Architecture
Faculty of Design and architecture
Universiti Putra Malaysia
(Chairman)

Prof. Madya Dr. Kamariah binti Dola
Department of Landscape Architecture
Faculty of Design and architecture
Universiti Putra Malaysia
(Internal Examiner)

Prof. Madya Dr. Norsidah binti Ujang
Department of Landscape Architecture
Faculty of Design and architecture
Universiti Putra Malaysia
(Internal Examiner)

Assoc. Prof. Dr. Azilah binti Kasim
College of Art and Sciences
Faculty of Design and architecture
University
(External Examiner)

Professor and Deputy Dean
School of Graduate Studies
University Putra Malaysia

Date:

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted in partial as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Mohammad Yazah Bin Mat Raschid, PhD

Faculty of Design and Architecture
Universiti Putra Malaysia
(Chairman)

Dr Mohd Yazid Mohd Yunos, PhD

Faculty of Design and Architecture
Universiti Putra Malaysia
(Member)

Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

Declaration by Graduate Student

I hereby confirm that:

- this thesis is my original work;
- quotations, illustrations and citations have been duly referenced;
- this thesis has not been submitted previously or concurrently for any other degree at any other institutions;
- intellectual property from the thesis and copyright of thesis are fully-owned by Universiti Putra Malaysia, as according to the Universiti Putra Malaysia (Research) Rules 2012;
- written permission must be obtained from supervisor and the office of Deputy Vice-Chancellor (Research and Innovation) before thesis is published (in the form of written printed or in electronic form) including books, journals, modules, proceedings, popular writings, seminar papers, manuscripts, posters, reports, lecture notes, learning modules or any other materials as stated in the Universiti Putra Malaysia (Research) Rules 2012;
- There is no plagiarism or data falsification/fabrication in the thesis, and scholarly integrity is upheld as according to the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) and the Universiti Putra Malaysia (Research) Rules 2012. The thesis has undergone plagiarism detection software.

Signature: _____ Date: _____

Name and Matric No: _____

Declaration by Members of Supervisory Committee

This is to confirm that:

- The research conducted and the writing of this thesis was under our supervision;
- Supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature: _____
Name of
Chairman of
Supervisory
Committee: _____

Signature: _____
Name of
Member of
Supervisory
Committee: _____

Signature: _____
Name of
Member of
Supervisory
Committee: _____

Signature: _____
Name of
Member of
Supervisory
Committee: _____

TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

LISTS OF ABBREVIATIONS

Universal Design	**UD**
National Institute on Disability and Rehabilitation Research	**NIDRR**
Product Safety Commission	**CPSC**
Kuala Lumpur Structure Plan	**KLSP**
Malay abbreviation for 'Orang Kurang Upaya'	**OKU**
Union of the Physically Impaired Against	**UPIAS**
Dewan Bandaraya Kuala Lumpur	**DBKL**
Departments of Standards Malaysia	**DSM**
Malaysian Standards	**MS**
Draft International Standard	**DIS**
Accessibility Standards	**ASA**

CHAPTER 1

INTRODUCTION

1.1 Introduction

The first section of this chapter introduces the research background, statement of the problem, as well as the aim, objectives, and assumptions of this study. It also outlines the qualitative research approach employed within the case study methodology. Furthermore, the final section of this chapter elaborates on the scope, outcomes, and significance of the conducted research along with outlining the thesis structure.

1.2 Background of the Study

The concept of the Universal Design (UD) has changed the minimum standards for the building codes to incorporate products as well as building features, which to the greatest extent possible, can be used by everyone (Mace, 1997). Today, plans which follow the UD model; for objects and spaces used by the public, integrate elements that address as many needs as possible to accommodate the broadest spectrum of the users instead of the selected groups (Rodman, et al. 2010). Two public samples of the UD include the accessible picnic table and the common accessible ramp that are used in conjunction with the stairs. Together, they are usable by a majority of people irrespective of their abilities (Mace, 1997).

The UD influences the values that support national and regional planning significances and it can be added as a principle at any stages of planning system which create functional, inclusive, responsive, and sustainable towns (Scotia, 2013). According to Falvo (2007), the UD is defined as a concept that rose to popularity in the past era. It is also defined as creating products beneficial for many people and applied to specific requirements of the populations and those with varied preferences or learning styles. This concept applies to the design of physical environments, interfaces, and products. Parallel to this, Play and learning Adaptable Environment (1993) pinpointed that a community which is planned and designed to accommodate all of its citizens would celebrate the potential, quality of life, and diversity of abilities. Such a community also reaps social and financial benefits when the citizens can enter businesses, cross streets, attend games and concerts, or participate in outdoor recreations (Scotia, 2013).

The organizational model called UD combines the accessibility, adaptability, inclusivity, and freedom from barriers to allow all the degrees of sensory awareness,

all types of movements, and all levels of physical and intellectual functions (Play and learning Adaptable Environment, 1993). It needs to be underlined that the disability cannot be considered in isolation. Indeed, it cuts across all the aspects of a child's life having very different implications at various stages in a child's life cycle (United Nation Children's Fund, 2007). In addressing such a challenge, this study endeavours to make inclusive of the UD principles to support both stages of the child's life cycle. As Perry (2001) stated, "Play takes many forms, but the heart of the play is pleasure – an important component in learning".

Many specialists, however, agree on a working approximation of giving a minimum benchmark of 2.5 per cent of children aged 0-14 with self-evident moderate to severe levels of sensory, physical and intellectual impairments (United Nation Children's Fund, 2007). The world organization further stressed that underestimating the potential of children with severe or complex impairments is perhaps the greatest obstacle: experience has revealed that all the children can be helped to find the means to express meaningful choices and preferences. Consistent with this, Imrie and Hall, (2001) established that the policies, values, and practices of the individuals who are responsible in creating the built environment would also contribute to the people with disabilities excluding from the mainstream. Similarly, the ones who manage a public space or a public building can be seen as a noteworthy agent in providing the visitors with a conspicuous barrier-free environment. As a consequence, it is indispensable to take into account the risk of the playground injury which gives a rise to the number of inappropriate usage from the playground tools.

In all fairness, if it is possible for children to be encouraged to use the equipment appropriately through supervision, they will accordingly experience fewer injuries (Chelvakumar et al. 2010). On the other hand, children with disabilities are faced with many challenges affecting their future social lives and spiritual health, such as poor facilities into their peers play. The Playgrounds are old-style sites for the communications of the youth while the playground designs often times need different children to use the equipment and sit on the side-lines (Sharika et al. 2003).

A model was proposed by Ripat and Becker, (2012), exhibited in Figure 1.1, for having great playground experiences, play, and usability with active and overlapping concepts to encourage inclusivity. They mentioned that for studying the 'Playground' theme, it is essential to emphasize the significance of the playground and the person's experiences underline the developmental physical and social aspects. The outdoor play is considered as a key occupation of the children while the occupational therapists have a role in promoting the usable environments for all of the children.

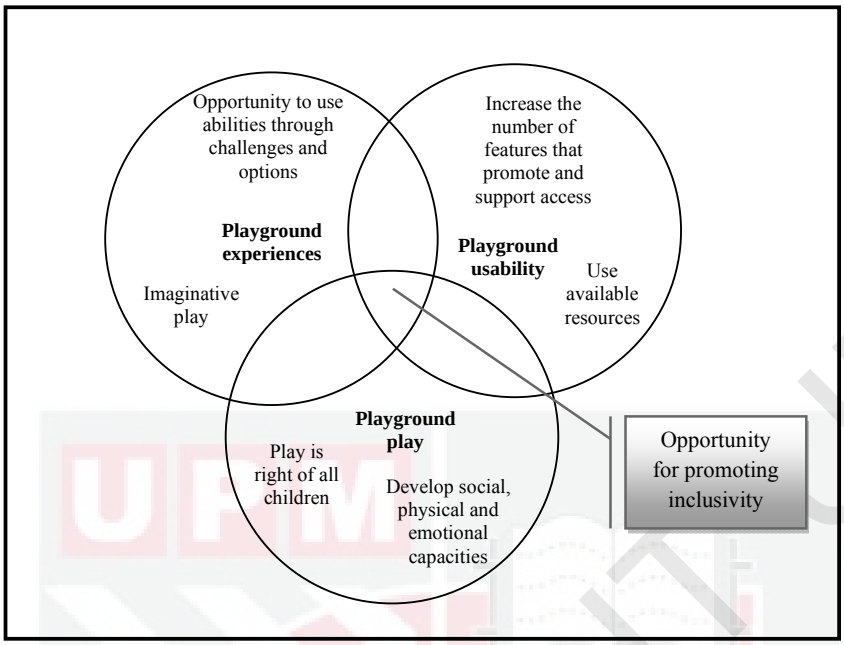

Figure 1.1. Playground Experiences Play and Usability as Trans active and Overlapping Concepts to Promote Inclusivity.

Source: (Ripat and Becker, 2012)

Ripat and Becker (2012) highlighted that during the past two decades, the literature that has emphasized the chances for all the children to play has decreased while the focus has been directed more on children's participation in scheduled and academics activities (Quisenberry et al, 2002). Meanwhile, the USA Affiliate of the International play association (2012) and (Ginsburg, 2007; and Hillary Burdette, 2005) asserted that most children have passive play opportunities, such as playing computer games and video games. Ripat and Becker (2012) also displayed the model for having great playground experiences, play, and usability with active and overlapping concepts to encourage inclusivity.

The necessities of promoting inclusive playground experiences have initiated the study to investigate the UD quality and ergonomic guild lines in Lake Titiawangsa Park playgrounds. As a landscape designer, it is imperative to understand the challenges and opportunities of incorporating the UD principles to improve the facilities for supporting all children. There is a need to assess whether the play equipment for the all children with any ability in the playground areas in Malaysia is being met in terms of ergonomic and UD principle by specifically selecting the Lake Titiwangsa Park playground, a premier public park in Kuala Lumpur as the representative case study area.

It is imperative for this study to fill the knowledge gap in designing a playground appropriate for both the physically disabled children and the able children. This

relates to the notion that the UD principles as well as ergonomic guild lines should be applied in the playground equipment to create a holistic inclusive design for all the children regardless of their health status. In the case of this study, the terms of guidelines specified in the Consumer Product Safety Commission (CPSC) playground handbook and the Universal Design Principles (UDP) will be extensively used as references.

1.3 Statement of the Problem

Many studies have confirmed that the number of individuals with disabilities is on the rise. To be precise, the number of young individuals is escalating correspondingly giving a rise to the needs of the individuals with disabilities. As society ages, those who are responsible for constructing the barriers will become aware of their actions and what our culture defines as "normal" will continue to evolve (Devlin, 2010). It is now the time to take a measure and become educated on the principles and applications of the Universal Design and Accessibility (Devlin, 2010). To date, there is insufficient incorporation of the UD in the design education as the majority of the participants do not know the concept and its content (Helvacioglu & Karamanoglu, 2012). According to Bickenbach (Bickenbach et al, 1999; Metts, 2004), this issue could be a result of ignorance in the policy making system and the physical barriers they encounter in the built environment as well as a lack of the designer's awareness of the UD. Moreover, Imrie and Hall (2001) contend that the policies, practices, and values of the professionals who create the built environment are the main contributors to the barriers in architecture (Imrie and Hall, 2001).

As a result, the lack of the UD implementation in most projects has resulted in ignoring the disabled individuals' needs; especially the children. In line with the Kuala Lumpur Structure Plan (2020), the standards of provision of facilities and utilities in low cost housing such as children's playgrounds including Lake Titiwangsa Park, reading rooms, community facilities and open space are inadequate to meet the needs of the residents. Although there are local parks, children playground, soccer fields are not distributed in the strategic zones evenly according to the population distribution. In many cases, even though the community facilities are adequately provided, they are under-utilized due to inadequate maintenance, vandalism, and poor accessibility. This situation has particularly affected some children's playgrounds, soccer fields and sport facilities. To compound the issue, the need for the special schools as well as playground soccer fields for the disabled children must be also planned to meet the required criteria such as selecting suitable locations and decent designs with adequate provision of facilities and equipment (DBKL, 2004).

Designing for all the children means creating the environment to be usable by all the children without the need for adaptation. It also implies that the environments are

free from both physical and social barriers (Imrie and Hall, 2001). The subsequent list of key elements can be used by designers, architects, and early childhood staff in creating the environments that are inviting and functional to every child (White et al. 2008; and white & Stoecklin, 1998). Existing standards and guidelines are inadequate to prevent injuries which are a major source of morbidity on playgrounds (Vollman et al. 2009). Pre-conceptions or lack of open discussions on disability sometimes results in children with disabilities being overlooked in the planning and provision of the services (Devlin, 2010).

While designing for children, perceiving the special needs would enable the designers to improve good products in direction of developing both mental activities and creativity (Amouzegar, et al 2010). Corresponding to this, Yilmaz & Bulut (2007) elucidated that more efficient playgrounds where children can play securely must be constructed. It is also pronounced that improving and constructing well-equipped public Playgrounds for children with disabilities in Malaysia's public playgrounds is indispensable (Soltani et al. 2012). Furthermore, the society should commence the inclusion and removal of negative barriers from the able bodied and disabled ones towards each other, from the individuals' early age or childhood (Abdou, 2011). Therefore, it is imperative for this study to fill the gap between disabled and abled children in playground areas with the notion that the UD principle should be applied to the playground equipment with the aim of creating a holistic inclusive design for children.

1.4 The Aim and Objectives

The aim of this study is to assess the UD qualities and ergonomic guild lines for the physical equipment and accessory facilities of the children playgrounds in Lake Titiwangsa Park in order to evaluate the most appropriate design for children. It is vital to understand the extent to which the universal playground design principles and ergonomic guild lines have been incorporated in order to support all able and disabled children. In a macro perspective, the study will also provide the insight on the method by which the playgrounds in Malaysia incorporate the UD principles by referring to Lake Titiwangsa Park play ground as the selected case study area.

In accordance with the research questions, the following objectives will be achieved in this study:

1. To assess the physical equipment and accessibility of children playground in Lake Titiwangsa Park in accordance to the universal design principle and ergonomic guidelines.

2. To understand the experts and policymakers' views on the integration of the UD design principles and the barriers in the design of children playground in Lake Titiwangsa Park.

1.5 Research Question

Based on the aforementioned problem, this study has established two research question as follows:

RQ1: What are the prevailing physical UD principle and ergonomic guidelines which are being implemented in the existing playground equipment in Lake Titiwangsa Park?

RQ2: What are the experts and policy maker's views on the integration of the UD design principles and barrier on in Lake Titiwangsa Park children playgrounds?

1.6 The Expected Outcomes

This study provided a theoretical foundation determining the extent of the integration of the UD principles in Lake Titiwangsa Children playground in supporting the all children along with several recommendations to improve the playgrounds. It evaluated the physical equipment as well as accessories in the playgrounds and validates the manner the UD principle has been used to design the playground. The study evaluated playground the design guidelines based on the UD principles and ergonomic guild lines in order to evaluate the most appropriate design for children. Most importantly, it also highlighted the necessity of understanding the children's rights and the UD knowledge for future playground project implementations.

The case study research methodology is categorized into five major components, namely the research questions, proposition, the unit of analysis, and the criteria for linking the data to proposition as well as the criteria of interpreting the findings as highlighted in (Figure 1.2.) it will be explain in chapter 3.

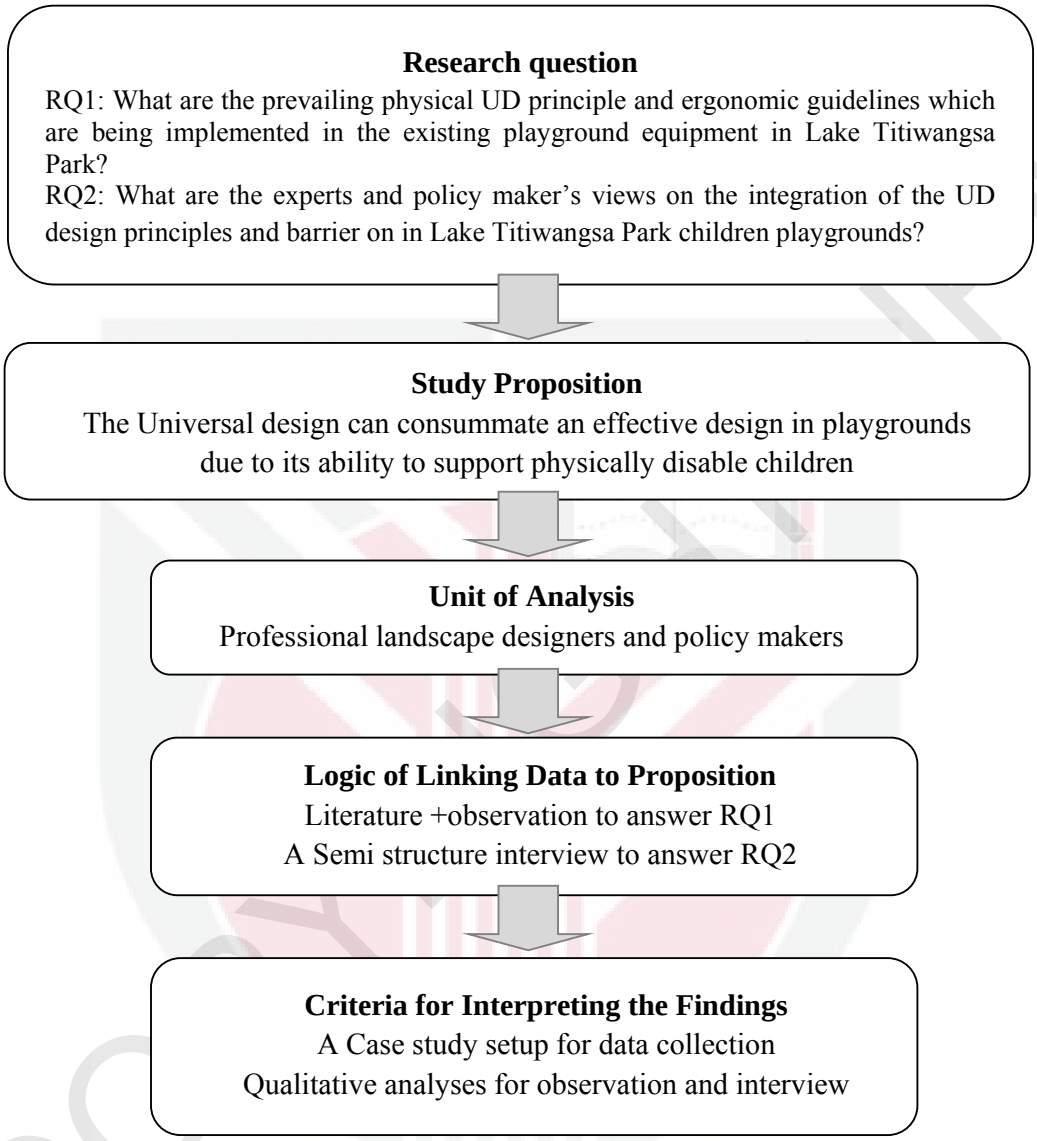

Figure 1.2. Five Components of the Case Study to Summarize the Research Design

Source: (Author, 2013)

1.7 Structure of the Thesis

This thesis is divided into six chapters. Chapter 1 introduces the research background, statement of the problem, the aim and objective along with the research assumptions. In effect, Chapter 1 acts as a guideline for the research subsequent stages of actions.

Chapter 2 reviews the relevant literatures and reputable theories of the related filed majorly dealing with the UD, playgrounds, ergonomic, and the case areas. Finally, the chapter summarizes the important findings in the literature.

Chapter 3 describes the methodological framework and approaches adopted in this study, the conducted research process, and the way the inquiries were structured. It highlights the qualitative facet of the study and enumerates the conducted case study inquiries which include observations and interviews to address the predetermined sub-research question. The chapter ends with supporting the reliability and validity of the conducted experiment.

Chapter 4 presents the study's results and analysis in the physical observation data collection process. Meanwhile, the qualitative data analysis will reply the descriptive analysis of the data collected. It also includes the discussions of the main findings of the observation method.

Chapter 5 presents the study's results and analysis in the interview data collection method. The qualitative data analysis employed is the thematic analysis. This chapter also discusses the main findings related to the interviews with the design experts and policymakers.

Finally, in chapter 6, a summary of the whole thesis and its main findings are presented along with discussing the outcomes of this case study and presenting the findings associated with the three sub-research questions. It also highlights the significance of incorporating the UD principles to playgrounds and makes recommendation for further studies to be done in the research study area.

REFERENCES

Abbott, S., & McConkey, R. (2006). The barriers to social inclusion as perceived by people with intellectual disabilities. *Journal of intellectual disabilities*, *10*(3), 275–287.

Abdou, S. M. I. (2011). Inclusion of Physically Disabled Children Through Environmental Rehabilitation of Urban Spaces Case Study: AL Azhar Park, Cairo, Egypt. *Procedia Engineering*, *21*, 53–58. doi:10.1016/j.proeng.2011.11.1986

Afacan, Y., & Erbug, C. (2009). An interdisciplinary heuristic evaluation method for universal building design. *Applied ergonomics*, *40*(4), 731–44. doi:10.1016/j.apergo.2008.07.002

Alemán, E. (2006). Is Robin Hood the "Prince of Thieves" 1 or a pathway to equity? Applying critical race theory to school finance political discourse. *Educational Policy*, *20*(1), 113–142.

Amouzegar, Z., Naeini, H. S., & Jafari, R. (2010). Design principle of playgrounds' equipments and spaces for children: An interaction education approach. *Procedia - Social and Behavioral Sciences*, *2*(2), 1968–1971. doi:10.1016/j.sbspro.2010.03.265

Aslaksen, F., & Bringa, O. R. (1997). Universal Design : Planning and Design for All Universal Design. *Gladnet*, *12*(1).

Ball, D. J. (2004). Policy issues and risk-benefit trade-offs of "safer surfacing" for children's playgrounds. *Accident; analysis and prevention*, *36*(4), 661–70. doi:10.1016/S0001-4575(03)00088-5

Barr, S. and Gilg, A. (2006). Sustainable lifestyles: framing environmental action in and around the home. *Geoforum*, *37*(6), 906–920.

Betsy J. Case. (2003). *Universal Design* (pp. 1–9). San Antonio.

Bickenbach JE, Chatterji S, Badley EM, U. T. (1999). Models of disablement, universalism and the international classification of impairments, disabilities and handicaps. *Elsevier*, *48*(9), 1173–1187.

Bickman, L., Rog, D. J., & Hedrick, T. E. (1998). Applied research design: a practical approach. In *Handbook of applied social research methods, 19.* (p. 19).

Bogdan, R. C., & Biklen, S. K. (1982). *Qualitative research for education: An introduction to theory and methods*. Boston: Allyn and Bacon, Inc.

Braithwaite, J., & Mont, D. (2009). Disability and poverty: a survey of World Bank poverty assessments and implications. *ALTER-European Journal of Disability Research/Revue Européenne de Recherche sur le Handicap*, *3*(3), 219–232.

Braun, V., & Clarke, V. (2006a). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77–101.

Braun, V., & Clarke, V. (2006b). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77–101.

Bult, M., Verschuren, O., Lindeman, E., Jongmans, M., & Ketelaar, M. (2013). Do children participate in the activities they prefer? A comparison of children and youth with and without physical disabilities. *Clinical rehabilitation*, 1–9. doi:10.1177/0269215513504314

Burgstahler, S. (2012). *Universal Design in Postsecondary Education : Process , Principles , and Applications* (pp. 1–6). Washington.

Burke, J. (2009). *Enabling Play : Insider Accounts of Disabled Children ' S Playworlds in Accessible Playgrounds*. University of Ballarat.

CABE. (2006). Commission for Architecture and the Built Environment. Landon. Retrieved from cabe.org.UK

Canadian Human Rights Commission. (2007). *International Best Practices in Universal Design : A Global Review*. Canada: Gladnet. Retrieved from http://digitalcommons.ilr.cornell.edu/gladnetcollect

Chelvakumar G, Sheehan K, Hill AL, Lowe D, Mandich N, S. D. (2010). The Stamp-in-Safety programme, an intervention to promote better supervision of children on childcare centre playgrounds: an evaluation in an urban setting. *International Society for Child and Adolescent Injury Prevention*, *16*(5), 352–354. doi:10.1136

Chou, J.-R. (2012). A linguistic evaluation approach for universal design. *Information Sciences*, *190*, 76–94. doi:10.1016/j.ins.2011.11.044

Christophersen, J. (2002). *Universal Design:17 Ways of Thinking and Teaching*. (J. Christophersen, Ed.) (p. 111). Hunsbanken.

Conn-powers, M., Cross, A. F., Traub, E. K., & Hutter-pishgahi, L. (2006). The Universal Design of Early Education Moving F or ward for All Children. *National Association for the Education of Young Children*, 1–9.

Consumer Product Safety Commision. (2010). *Public Playground Safety Handbook* (pp. 24–37). United state of America: U.S. Consumer Product Safety Commission.

Craig, W. M., Pepler, D., & Atlas, R. (2000). Observations of bullying in the playground and in the classroom. *School Psychology International*, *21*(1), 22–36.

Creswell, john W. (2003). *Research Design*. (S. A. C.Debora Laughton, Lisa Cuevas-Shaw, Vicki Knight, Ed.) (Third Edit., pp. 173–202). Sage.

Crow, L. (2010). *Including all of our lives. Equality, Participation and Inclusion 1: Diverse Perspectives*. (Routedge, Ed.) (Second., pp. 124–145). Canada: Milton Keynes.

Danforth, S. (2001). A Pragmatic Evaluation of Three Models of Disability in Special Education. *Developmental and Physical Disabilities*, *13*(4), 343–359.

DeMerchant, E., & Beamish, J. (1995). Universal design in residential spaces. *Housing and Society*, *22*. Retrieved from http://www.housingeducators.org/Journals/H%26S_Vol_22_No_1-2_Universal_Design_in_Residential_Spaces.pdf

Department of Social Welfare. (2013). Persons With Disabilities. *Public Services Commission of Malaysia*. Retrieved from http://www.spa.gov.my/PortalEng/PersonsWithDisabilities

Devlin, P. (2010). *Universal Design Visual* (pp. 1–2). Denmark.

Donna Rodman, Petra Frederick, Manfred Wuensche, Greg Turnbull, Don Thorogood, Ed (Chum) Richardson, and M. K. (2010). *Plan and Design for Choice Universal Design Guidelines for Outdoor Spaces*. (R. M. Rosemary Teliatnik, Ed.) (first.). Pitt Meadows: City of Pitt Meadows and the District of Maple Ridge.

Dorneles, V. G. (2012). Universal Design teaching in urban design classes. Brazil. Retrieved from vgdorneles@yahoo.com.br

Dunnett, N., Swanwick, C., Woolley, H., & Government, L. (2002). *Improving Urban Parks , Play Areas and Green Spaces*. London: Tansport Local Government Regions.

Economic and Social Commision Asia and the Pacific. (2010). *Disability at a Glance 2010 : a Profile of 36 Countries and Areas in Asia and the Pacific* (p. 38). Bangkok: ESCAP.

Fjùrtoft, I., & Sageie, J. (2000). The natural environment as a playground for children Landscape description and analyses of a natural playscape. *Landscape and Urban Planning*, *48*, 39–98.

Ford, E. S., & Capewell, S. (2011). Proportion of the decline in cardiovascular mortality disease due to prevention versus treatment: Annual review of public health. *public health versus clinical care*, *32*, 5–22.

Gibson, J. (1979). *The Ecological Approach to Visual Perception*. Boston: Houghton Mif.

Ginsburg, K. R. (2007). The importance of play in promoting healthy child development and maintaining strong parent-child bonds. *Pediatrics*, *119*(1), 182–91. doi:10.1542/peds.2006-2697

Grahn, P., MaÊrtensson, F., Lindblad, B., Nilsson, P., & Ekman, A. (1997). Ute paÊ dagis. *Stad & Land*, *45*.

Groat, L., & Wang, D. (2002). *Architectural research methods*. New York: NY Wiley.

Grozdanovic, M., Jekic, S., & Stojiljkovic, E. (2013). Methodological framework for the ergonomic design of children's playground equipment: A Serbian experience. *Work: A Journal of Prevention, Assessment and Rehabilitation*.

Guimaraes, M. P. (2006). *An Assessment of Understanding Universal Design Through Online Visual Resources and Role-playing Simulation Exercises*. NC State University. Retrieved from http://repository.lib.ncsu.edu/ir/handle/1840.16/3300

Guliani, Mayor W, R. (2001). *Universal design New York*. (Gary Scott Danford & B. Tauke, Eds.). new York: Center for Inclusive Design and Environmental Access.

Hadfield-Hill, S. A. (2013). Living in a sustainable community: new spaces, new behaviours. *Local Environment*, *18*(3), 354–374.

Hamilton, D. (2005). An ecobehavioural analysis of interactive engagement of children with developmental disabilities with their peers in inclusive preschools. *Intellectual & Developmental Disability*, *52*(2), 121–137.

Harding, J., Harding, K., Jamieson, P., Mullally, M., Politi, C., Wong-Sing, E., … Petrenchik, T. M. (2009). Children with disabilities' perceptions of activity participation and environments: a pilot study. *Canadian journal of occupational therapy.*, *76*(3), 133–44. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19630303

Hart, R. (1982). Wildlands for children: consideration of the value of natural environments in landscape planning. *LandshaftStadt*, *14*(1), 34–39.

Hatch, J. A. (2002). *Doing qualitative research in education settings*. Albany: State University of New York.

Heah, T., Case, T., Mcguire, B., & Law, M. (2007). Successful participation: The lived experience among children with disabilities. *Canadian Journal of Occupational Therapy*, *74*(1), 38–47. doi:10.2182/cjot.06.10

Helvacioglu, E., & Karamanoglu, N. N. (2012). Awareness of the Concept of Universal Design in Design Education. *Procedia - Social and Behavioral Sciences*, *51*, 100. doi:10.1016/j.sbspro.2012.08.125

Henniger, M. (1994). Planning for outdoor play. Young children, *49*(4), 10–15.

Hillary Burdette, R. W. (2005). Resurrecting Free Play in Young Children. *American Medical Association*, *159*, 46–50.

Ratte, D. J., Morrison, M. L., & Lerner, N. D. (1990). Development of Human Factors Criteria for Playground Equipment Safety. Torrance, Ca: Comsis Corp.

Imrie and Hall. (2001). An Exploration of Disability and the Development Process. *Urban Studies*, *38*(2), 333–350.

Iwarsson, S., & Ståhl, A. (2003). Accessibility, usability and universal design-positioning and definition of concepts describing person-environment relationships. *Disability & Rehabilitation*, *25*(2), 57–66.

Jackson, J. (2014). Planning for Social Inclusion? What Planners from Glasgow, Melbourne and Toronto Say. *International Planning Studies*, *19*(1), 45–76. doi:10.1080/13563475.2013.799631

Johnstone, C. J., Thompson, S. J., Bottsford-miller, N. A., & Thurlow, M. L. (2008). and Multimethod Approaches to Item Review. *National Council on Measurement in Education*, 25–35.

Kadir, S. A., Jamaludin, M., & Rahim, A. A. (2012). Building Managers' Perception in Regards to Accessibility and Universal Design Implementation in Public Buildings: Putrajaya case studies. *Procedia - Social and Behavioral Sciences*, *35*, 129–136. doi:10.1016/j.sbspro.2012.02.071

Karsten, L. (2003a). Children's Use of Public Space The Gendered World of the Playground. *Childhood*, *4*(10), 457–473.

Karsten, L. (2003b). Children's Use of Public Space: The Gendered World of the Playground. *Childhood*, *10*(4), 457–473. doi:10.1177/0907568203104005

Kennig, B., & Ryhl, C. (2002). *Teaching Universal Design Global Examples of Projects and Models for Teaching in Universal Design at Schools of Design and Architecture*. Brussels: AAoutlis, ANLH.

Krueger, R. A., & Casey, M. A. (2000). *Focus groups: A practical guide for applied research* (pp. 132–159). Sage.

Kuala Lumpur Structure Plan 2020. (2004). *Kuala Lumpur Structure Plan 2020* (pp. 170–181). Kuala Lumpur: Percetakan nasional malaysia berhad.

Lange, J. K. (2002). A Practical Guide for Applied Research. *Qualitative Social Research*, *3*(4).

Leeds City Council. (2007). *A Parks and Green Space Strategy*. UK: Leeds City Council.

Leung, K. W. P., & Mahadev, A. (2011). The cost of sustaining playground related extremity fractures in Singapore. *Injury*, *42*(4), 352–355. doi:10.1016/j.injury.2010.05.024

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills: Sage.

Liu, F., & Maitlis, S. (2010). Non-participant observation. *Sage encyclopaedia of case study research*, 609–611.

Lueder, R. (2010). Through the rearview mirror: ergonomics for children. *Human Factors and Ergonomics Society Bulletin*, *53*, 1-2.

Lueder, R., & Rice, V. J. B. (Eds.). (2010). *Ergonomics for Children: Designing products and places for toddler to teens*. CRC Press.

Mace, R. (1997). *What is universal design*. *The Center for Universal Design at North Carolina State University*. North Carolina State University: The Center for Universal Design.

Mace, R. L., Hardie, G. J., & Place, J. P. (1991). *Accessible Environments : Toward Universal Design*. (E. T. W. W.E. Preiser, J.C. Vischer, Ed.)*Center for Accessible Housing North Carolina State University* (p. 44). New York: Van Nostrand Reinhold.

Malone, K. and Hasluck, L. (2002). *Australian youth: aliens in the suburban environment. In: L. Chawla, ed. Growing up in an urbanising world* (pp. 81–109). London: Earthscan.

Mardzi, A. H. B. M. (2010). *A Study on Outdoor Accessibility in Recreational Areas for Person With Disability*. International Islamic University Malaysia.

Margaret C. Harrell, M. A. B. (2009). *Data Collection Methods Semi-Structured Interviews and Focus Groups* (National D., pp. 27–30). Santa Monica: Rand.

Mark Mitchell, J. J. (2010). *Research Design Explained*. (J. R. R. Potter, Ed.) (seventh.). USA: Gengege Learning.

Mcguire, J. M., Scott, S. S., & Shaw, S. F. (2006). Universal Design and Its Applications in Educational Environments. *Remedial and Special Education*, *27*(3), 166–175. doi:10.1177/07419325060270030501

Merriam, S. B. (2002). *Qualitative research in practice: Examples for discussion and analysis* (2nd ed.). San Francisco: Jossey Bass.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation.* (J. W. & Sons, Ed.) (2nd ed.). San Francisco: Jossey-Bass.

Merriam, S. B. (1998). *Qualitative research and case study applications in education.* (2nd ed.). San Francisco: Jossey-Bass.

Methods, D. C., & Evaluation, P. (2008). data collection methods for program evaluation: observation. *Evaluation Brief*, (16), 1.

Metin, P. (2003). *The effects of traditional playground equipment design in children's developmental needs*. Middle East Technical University.

Metts, R. (2004). *Disability and development*. *human development* (pp. 10–29). Washington, D.C.

Minuter, S., & Bcncdyk, R. (1995). The utility of the potential human error audit in an ergonomic evaluation of public playground safety. *Contemporary Ergonomics*, 462.

Morse, J., & Richards, L. (2002). *Read me first for a user's guide to qualitative research*. *Sage*. US: Sage Publications Thousand Oaks.

N.D'souza. (2001). *Chapter 1 Is Universal Design a Critical Theory ?* (S. K. J. C. P. L. P. Robinson, Ed.) (p. 5). Springer.

Norton, C., Nixon, J., & Sibert, J. R. (2013). Playground injuries to children. *Archives of disease in childhood*, *89*(2), 103–8. doi:10.1136

Nurrabiatul, A (2014), Assessment on space and furniture's ergonomics for children in kindergarten.

Olsen, H. M., Hudson, S. D., & Thompson, D. (2008). Developing a Playground Injury Prevention Plan. *School Nursing*, *24*(3), 131–137. doi:10.1177/1059840532143214

Onwuegbuzie, A. (2009). A Qualitative Framework for Collecting and Analyzing Data in Focus Group Research. *International Journal of Qualitative Methods*, *8*(3), 1–21. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=16094069&AN=51827937&h=qSO5j3Alce06NTBWg07VDTVxfEB51fx3lWNQLT%2FdqwmkukeGY69THXd5dL%2B99wnv6YSfqQ4uf3c%2F3DYmGk0MAg%3D%3D&crl=c

Ostroff, E. (2001). *Universal design: the new paradigm*. (E. O. Preiser, Ed.) (pp. 1.3–1.12). New York: McGraw-Hill.

Parker, R. I., & Vannest, K. (2009). An improved effect size for single-case research: Nonoverlap of all pairs. *Behavior Therapy*, *40*(4), 357–367.

Patton, M. Q. (2005). *Qualitative Research. Encyclopedia of Statistics in Behavioral Science*. Saint Paul, USA: Union Institute and University. doi:10.1002/0470013192.bsa514

Phillips, R. L., Olds, T., Boshoff, K., & Lane, A. E. (2013). Measuring activity and participation in children and adolescents with disabilities: a literature review of available instruments. *Australian occupational therapy journal*, *60*(4), 288–300. doi:10.1111/1440-1630.12055

Play and Learning in Adaptable Environments (1993). *A Design Guide: Universal Access to Outdoor Recreation*. Berkeley,California: PLAE,Inc.

Prellwitz, M., & Skär, L. (2007). Usability of playgrounds for children with different abilities. *Wiley interscience*, *14*, 144–155. doi:10.1002/oti

Quisenberry, I. and. (2002). A Position Paper of the Association for Childhood Education International PLAY: Essential for all Children. *Childhood Education*, *79*(1), 33–39.

Rabiee, F. (2007). Focus-group interview and data analysis. *Proceedings of the Nutrition Society*, *63*(04), 655–660. doi:10.1079/PNS2004399

Ramazanoglu, C., & Holland, J. (2002). *Feminist methodology: Challenges and choices*. New Delhi: Sage,Ltd.

Ramsey, J. D. (1985). Ergonomic factors in task analysis for consumer product safety. *Journal of Occupational Accidents*, *7*(2), 113-123.

Refshauge, A. D., Stigsdotter, U. K., & Cosco, N. G. (2012). Adults' motivation for bringing their children to park playgrounds. *Urban Forestry & Urban Greening*, *11*(4), 396–405. doi:10.1016/j.ufug.2012.06.002

Royal Institute of British Architecture. (2009). Inclusive Design : creating a user ' s world. *Riba*. london.

Ripat and Becker. (2012). Playground Usability: What Do Playground Users Say? *Occupational therapy international*, *19*(3), 144–153.

Roderick, L. M. (2004). The ergonomics of children in playground equipment safety. *Journal of safety research*, *35*(3), 249–54. doi:10.1016/j.jsr.2004.05.001

Rosenberg, L. (2011). *Universal Design Coping Principles for Challenges of Daily Living*. Rutgers.

Said, I., Bakar, A., & Sarofil, M. (2012). Landscape for children to play and learn: a conceptual comparison between natural stream and playground. *Teknologi*, *42*(1), 1–10.

Saito, Y. (2006). Awareness of universal design among facility managers in Japan and the United States. *Automation in Construction*, *15*(4), 462–478. doi:10.1016/j.autcon.2005.06.013

Sandhu, J. (1995). Multi-Dimensional Evaluation as a Tool in Teaching Universal Design. In *UniversalDesign* (p. 105). UK: Inclsive Design Rsearch.

Sangelkar, S., Cowen, N., & McAdams, D. (2012). User activity – product function association based design rules for universal products. *Design Studies*, *33*(1), 85–110. doi:10.1016/j.destud.2011.06.002

Savin-Baden, M. (2013). Spaces in between us: a qualitative study into the impact of spatial practice when learning in Second Life. *London Review of Education*, *11*(1), 59–75.

Scotia, N. (2013). *Choice , Equality and Good Lives in Inclusive* (pp. 29–35). Nova Scotia.

Shakespeare, T. (2006). The social model of disability. *disability studies reader*, *2*, 197.

Sharika Bhattacharya, Holly Cummings, Jordan Gilmore, Amanda Karr, Clint Lee, Jamie Olson, Jonathan Roberts, Dora Syin, Paula Yellon, N. Y. (2003). *Universal Playgrounds :* University of Maryland.

Shehu, V. (2011). *Universal Design Strategies For Developing Countries , Case Study : Tirana*. Epoka University.

Shuttleworth, M. (2008). Case study research design, *10*(23).

Simkins, I., & Thwaites, K. (2008). Revealing the hidden spatial dimensions of place experience in primary school-age children. *Landscape Research*, *33*(5), 531–546.

Smith, R., Sartin-Kirby, R., & O'Connor, T. (2004). *Commitment to Universal Design in Education*. University of Wisconsin-System Campuses.

Solomon, S. (2005). *American playgrounds. Revitalizing community space*. New.England: University Press.

Sreetheran, M., Adnan, M., Park, K. M., & Park, M. L. (2004). Green Network Development of Kuala Lumpur City : From the perspective of Kuala Lumpur Structure Plan. *Green Network Development of Kuala Lumpur City*, *7*, 38–42.

Staempfli, M. B. (2009). Reintroducing adventure into children's outdoor play environments. *Environment and Behavior*, *41*(2), 268–280.

Steinfeld, E, & Danford, G. (1994). Automated Doors: Toward Universal Design. The Construction Specifier, 90–102.

Story, M., Mueller, J., & Mace, R. (1998). The Universal Design File: Designing for people of all ages and abilities. *Design Research and Methods* …. Retrieved from http://design-dev.ncsu.edu/openjournal/index.php/redlab/article/view/102

Surat, M., Abdullah, N. G., & Tahir, M. M. (2009). *Guidelines on Access for Disabled Person*. Kuala Lumpur.

Tepperman, J. (2007). *Play in the Early Years* (pp. 1–7). California.

The City of Calgary. (2010). *Universal Design Handbook*. (creative services, Ed.). calgary: Building Accessible and Inclusive Environments.

United Nations Development Programme. (2010). *A review of international best practices in accessible transportation for person with disabilities*. Kuala Lumpur: UNDP Malaysia.

United Nation Children's Fund. (2007). *Promoting the Rights of Children with Disabilities* (pp. 14–20). Florence,Italy: Innocenti Digest.

USA Affiliate of the International Play Association. (2012). International Play Association USA. *Ipa*.

US Consumer Product Safety Commission (2011). *Public playground safety handbook*. Government Printing Office.

Vollman, D., Witsaman, R., Comstock, R. D., & Smith, G. a. (2009). Epidemiology of playground equipment-related injuries to children in the United States, 1996-2005. *Clinical pediatrics*, *48*(1), 66–71. doi:10.1177/0009922808321898

White, R., Stoecklin, V. L., & Rousseau, J. J. (2008). E nvironmental E ducation for Young C hildren. *White Hutchinson Leisure & Learning Group*, 1–8.

White, R., & Stoecklin, V. (1998). Children's outdoor play & learning environments: Returning to nature.

Wilder, J., & Granlund, M. (2003). Behaviour style and interaction between seven children with multiple disabilities and their caregivers. *Childcare, health and development*, *29*(6), 559–567.

Woodin, S. L. (2006). *Social Relationships and Disabled People : the impact of direct payments*. University of Leeds.

Yilmaz, S., & Bulut, Z. (2007). Analysis of user's characteristics of three different playgrounds in districts with different socio-economical conditions. *Building and Environment*, *42*(10), 3455–3460. doi:10.1016/j.buildenv.2007.02.008

Yin, R. K. (2003). Applied social research methods series. *Design and methods*, *5*.

Yin, R. K. (1994). Discovering the future of the case study method in evaluation reserch. *Evaluation Practice*, *15*(3), 283–290.

Zhang, Y., Tan, Y. W., Stormer, H. L., & Kim, P. (2005). Experimental observation of the quantum Hall effect and Berry's phase in graphene. ,. *Nature*, *438*(7065), 201–204.