# AN EXPLORATION OF CHILDHOOD ATTENTION DEFICIT HYPERACTIVITY DISORDER THROUGH ARCHITECTURE:

## Towards an Inclusive Education Facility in Greater Durban


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# DECLARATION

I declare that this dissertation is my unaided work except where otherwise acknowledged. I confirm that an external editor was not used. This dissertation is being submitted for the degree of Masters in Architecture in the faculty of Humanities in the School of Built Environment & Development Studies, Kwa- Zulu Natal, Durban, South Africa. The work presented in this dissertation has not been submitted previously for examination at any other University or higher education institution.

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Date: 13 January 2024

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# DEDICATION

To my amazing family, **Bianca**, **Noah**, and **Troy**, who understood the importance of completing my studies. It's been an opportunity I have grabbed with both hands. Bianca, thank you for not complaining about the early morning alarms that woke you too many times but allowed me to progress this dissertation. Noah and Troy, for understanding that I could not make all of your weekend sporting events.

To my late dad, **Thomas Edward Calvert,** thank you for all your support along life's journey. I miss you every day.

I love you all so much.

"Architecture is a profession, not a job. Someone willing to go on that journey is committing themselves to a lifetime of learning and working, which I think is the most rewarding path one can take."

*Felix Holland – Architect*

# ABSTRACT

This research examines the built environment's effects on people's lives, including how buildings influence individuals physically and mentally. Attention deficit hyperactivity disorder (ADHD) is among the most common causes of learning and behavioural difficulties in school-aged children. These children have numerous challenges that negatively impact them socially and academically. Despite the prevalence of ADHD in children, the built environment has not considered their specific needs. Unfortunately, this has prevented them from feeling nurtured or given them a sense of inclusion. This research aims to understand the unique needs of these children and interpret the implications of these needs through the built environment.

Furthermore, the literature review investigates the theoretical frameworks of phenomenology, environmental psychology, and placemaking. This theoretical framework is discussed in detail further within this dissertation due to its significance in understanding and analysing critical aspects of architecture. Placemaking, dwelling and the relationship to nature are essential to feeling connected to your environment. Place identity is the foundation of a child's self-identity, and perceptions of the physical world contribute to a child's sense of self-identity. The research investigates this relationship in detail to better understand how architecture affects people's emotions, behaviours, and experiences.

Inclusive school policy in South Africa is investigated and cross-referenced concerning international standards to ascertain how we compare with the rest of the world. Moreover, an inclusive design approach to architecture is highlighted and discussed in detail. This inclusive approach shows how architecture can unite the community through engagement and understanding of people's needs. Architecture is crucial to integrating its uses' legislative and design-specific requirements to contribute to a building that will allow children with ADHD to feel included. The research comprises primary and secondary sources, pertinent precedents, and case studies. This study will finally result in a design brief of an inclusive educational facility in Durban, South Africa, for children in grades 1-7 with attention deficit hyperactivity disorder.

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# CHAPTER 1: INTRODUCTION

## 1.1 INTRODUCTION

### 1.1.1 Background

There is a lack of adequate, inclusive education facilities that allow children with Attention Deficit Hyperactivity Disorder (ADHD) to engage positively within a mainstream school environment. These children are struggling and are often labelled ‘naughty’ or ‘lazy’, which enforces low self-esteem (Selikowitz, 2021). Children with ADHD are usually placed in smaller remedial or “learner support” classes of 10-15 children. These smaller classes are either located within the mainstream environment of a school or dedicated remedial facilities such as Livingstone Primary School in Durban. This approach to children with ADHD excludes them from mainstream schools. Mainstream schools need to be more inclusive so children with ADHD can engage socially and have positive experiences.

In some ways, there is legislative progress. According to the South African Education White Paper 6 (Education, 2001), the education system must promote and foster inclusive and supportive learning facilities so that learners can participate as equal members of society. White Paper 6 addresses the different needs of all learners who encounter barriers to learning (Spandagou et al., 2020). However, most schools do not appreciate or understand architecture's positive and inclusive effect when designed with an understanding and sensitivity towards children (Hertzberger, 2008). Consequently, many of these learners in mainstream schools drop out of school, as seen in plate 1.1.1.1, which is devastating as it limits their future potential (Selikowitz, 2021).

*Plate1.1.1.1: Dropping out of School (Source: https://thejournal.com/articles/2017/05/17/students-with-learning-and-attention-issues-three-times-more-likely-to-drop-out.aspx [Accessed 10/10/2022])*

Children with ADHD experience social difficulties and have challenges making friends; this can leave them isolated and excluded (Selikowitz 2021). An inclusive design approach to a mainstream education facility allows ADHD children to participate equally, confidently, and independently in everyday activities regardless of their ability and circumstances. The challenge is understanding how architecture can contribute to the quality of spaces for ADHD children to create an inclusive facility within a mainstream school environment.

Architects must evaluate the relevance of doctors and other professionals affected by the project during the design process. Teachers should be involved as critical participants in classroom design development. With the process being as inclusive as possible, designing socially inclusive environments can only be achieved through the participation of all kinds of people. Otherwise, vital information from

teachers could be excluded (Day & Midbjer, 2007; Dudek, 2005). An inclusive approach will further develop an inclusive practice among students (Magidimisha-Chipungu&Chipungu, 2021). Architects must focus more on design concepts and theories to facilitate an inclusive process, as other professionals would be more practical in their application and recommendations.

### 1.1.2 Motivation/Justification of the study

Durban and the surrounding areas have numerous private and government schools spread across various ethnic groups and multicultural communities. Many of these schools were built decades ago during the damaging apartheid regime, where students and communities were segregated based on the colour of their skin. Having been suppressed and marginalized, these communities and their schools still bear the deep scars of this unjust past. People were culturally divided and starved of adequate funding needed to prosper. Many children with ADHD would have endured the environment they were placed in. Furthermore, they would have been labelled "lazy" and "naughty", as seen in plate 1.1.2.1. Unfortunately, These terms are still used today (Selikowitz, 2021). Being labelled as such would have long-term damaging effects on their mental and physical well-being.

*Plate 1.1.2.1: Children labelled "naughty" (Source: https://teachingenglishgames.com/the-five-golden-rule of-classroom-management/ [Accessed 10/10/2022])*

Education facilities form the foundation and lifeblood of any community. Children require a positive and inclusive learning space where they can grow, develop, and contribute positively to the community and the nation. This process is crucial to a society where, as stated by Nelson Mandela, "The power of education extends beyond the development of skills we need for economic success. It can contribute to nation-building and reconciliation." (Mandela, 1997)

The purpose of this research involves the role of architecture and its capacity to positively impact children with ADHD in grades 1-7. The built environment can directly impact children's perceptions and experiences. Designing a school to provide an inclusive, nurturing environment gives students a positive experience. There is a disconnect between how children with ADHD and current education facilities are designed. Understanding these children's space and architectural design requirements will create a meaningful and engaging experience. Including these spaces and designs in an education facility will allow for an inclusive, nurturing, and accommodating learning environment for these children that will have a long-term positive influence on their development.

## 1.2 DEFINITION OF THE PROBLEM, AIMS AND OBJECTIVES

### 1.2.1 Definition of the Problem

Attention Deficit Hyperactivity Disorder (ADHD) is a brain disorder estimated to affect 5% of school-aged children. It is one of the most common causes of learning and behavioural difficulties, according to Selikowitz (2021). Children with ADHD have chronic difficulties with inattention and/or impulsivity–hyperactivity, or a combination of both (Selikowitz, 2021). The problem is that current mainstream schools have not considered the impact that ADHD has on children. Schools are not designed to accommodate their individual needs, as shown in figure 1.2.1.1. The architecture of any building can negatively impact the user, affecting their psyche and how they develop. Architects have the potential to create structures that have a positive influence on the user.

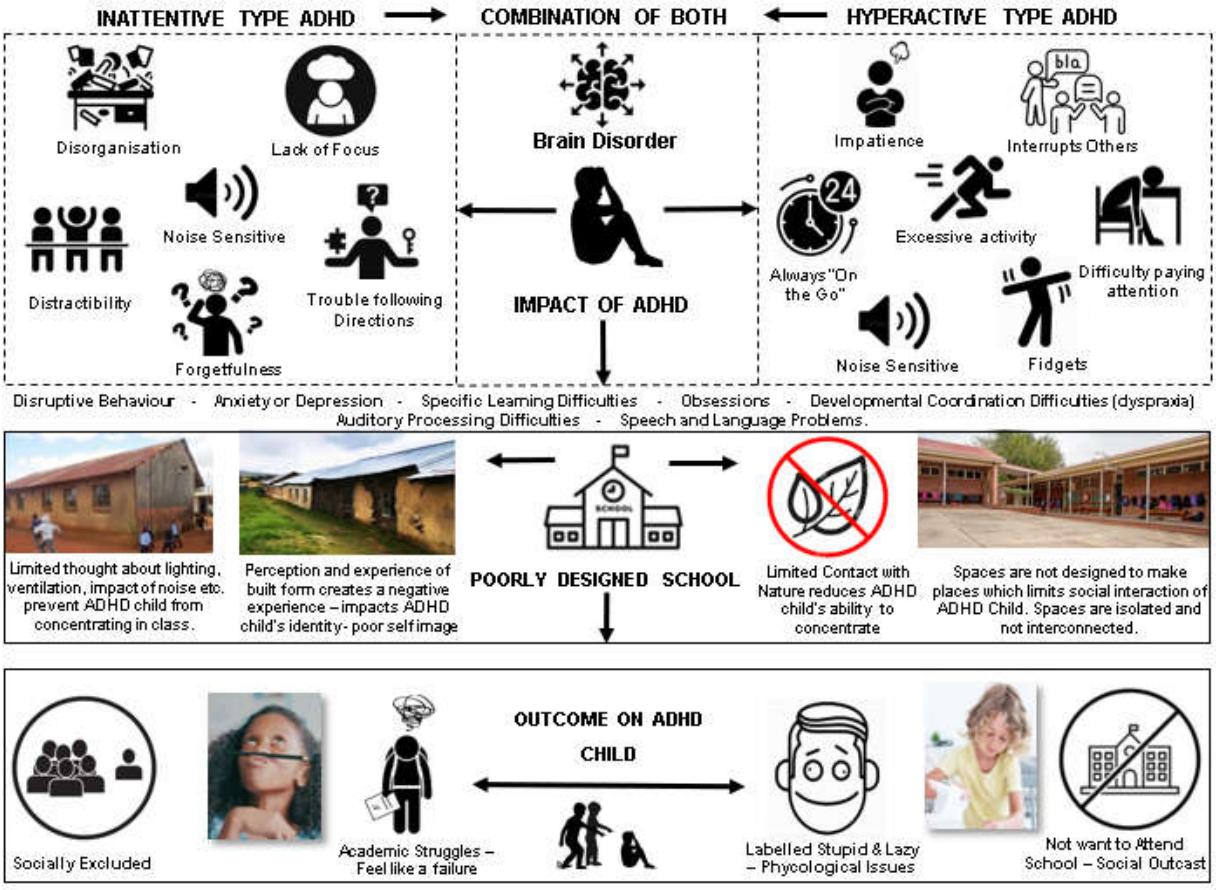



*Figure 1.2.1.1: The impact of ADHD on children. (Source: Author 2023)*

Herman Hertzberger, an architect, states, "Learning is the process of making things part of your domain: making something that was once beyond you your own." Hertzberger suggests that "the notion of school calls for an inner world that can give children confidence and security, that can feel familiar to them." Space that cannot provide a place to associate with and engage in becomes overwhelming and obscure.

From this observation, this dissertation focuses on creating an alternative architectural typology in the built form. This will be done by:

1. Interpreting and interrogating current and alternative thinking methods in the design of a school for children with ADHD in grades 1-7.
2. Questioning and understanding innovative architectural design solutions, with an understanding that a new approach needs to establish in the built form.
3. Understanding that a child should feel included in a school and inclusive approach to design is vital.

Understanding the three items listed above will allow a building typology that will enable children with ADHD to engage socially and have a more positive approach toward schooling, which will benefit society in the long term.

### 1.2.2 Aim

This study aims to explore and understand the impact architecture and the environment have on school children with ADHD in grades 1-7 in Greater Durban, KZN. This exploration will focus on how inclusive and positive learning spaces and settings can be generated through architecture, allowing ADHD children to advance academically and emotionally while participating socially in an inclusive environment. In so doing, breaking down barriers that cause separation within the current mainstream schooling system. Furthermore, these children's needs should be catered for in their local mainstream schools without being moved to dedicated “special” schools that isolate and label them from their peers.

### 1.2.3 Objectives

The objectives of this study are:

1. To investigate the impact that ADHD has on children.
2. To understand the problem that the current school buildings have on ADHD children.
3. Explore learning spaces that allow for the developmental needs and learning styles of ADHD children.
4. To investigate architectural strategies that allow an inclusive, positive, and engaging learning environment for ADHD children

## 1.3 SETTING OUT THE SCOPE

### 1.3.1 Delimitation of Research Problem

This research does not suggest that architectural design and space provisions can remedy the effects associated with ADHD or that they can replace the need for conventional medicine and therapies. Instead, the research will focus on understanding the symptoms and effects of ADHD on children and

attempt to understand why there is disconnection and inadequate transition of these children through grades 1-7 from an architectural design perspective. This knowledge will assist in understanding these children's physical, psychological and social needs and the impact of architectural space on them within an urban context.

The evaluation of current literature, theories, and notions encompassing this topic will be explored to understand the positive impact space, environment, and architectural design can achieve for children with ADHD to establish a new school within the context of Durban. The main research areas will include the effects of ADHD on children in grades 1-7, the current design approach and thinking towards education facilities, and new and innovative design approaches, both locally and internationally, that promote the engagement and inclusion of children diagnosed with ADHD. This study will produce an alternative architectural response with a hybrid methodology that merges traditional and innovative approaches to address the disparities in the research problem.

### 1.3.2 Definition of Terms

**Architectural space** – space that is created by cutting up or carving out areas within an architectural design context

**Attention deficit hyperactivity disorder (ADHD) -** Is a medical condition that affects brain activity and occurs in two varying forms: one that affects mainly behaviour while the other effect is primarily a learning difficulty.

**Built Form –** buildings' shape, function, and configuration, including the relationship to open spaces and roads.

**Community -** a place where a group of people lives with specific characteristics in common, such as attitudes and interests.

**Environment** - the natural world, as a whole or in a particular geographical area, is significantly affected by human activity.

**Hybrid methodology** is combining two different methods to create an approved approach.

**Inclusive approach –** an approach that recognizes and values diversity so that individual learning needs are identified and met.

**Innovative design -** understanding, recognizing, and isolating the needs to develop a creative architectural design approach.

**Learner support class –** a smaller class within a Mainstream school that offers additional assistance and support to pupils to re-instate abilities to join Mainstream education.

**Mainstream school –** is the conventional school that most people regard as ‘usual.

**Non-stigmatized –** the promoting, designing, and executing of programs to prevent discrimination against being diagnosed with a mental illness such as ADHD.

**Place -**When space achieves cultural, social, or emotional meaning, it becomes a 'place'.

**Psychological** - of, affecting, or arising in the mind; related to a person's mental and emotional state.

**Quality** – is about the design and creation of effective, positive use of space within architecture.

**A remedial school –** is a school that is dedicated to assisting students who need additional academic support to achieve expected competencies.

**Social – ( in architecture)**, conscious design of an environment that encourages a desired range of social behaviours leading towards some goal or set of goals

**Transition** - the process or a period of changing from one place or condition to another.

### 1.3.3 Stating the Assumptions

The research for this dissertation is based on the following assumptions:

1. Architecture can provide inclusive spaces where children can find solace to engage and develop in an integrated, nurturing environment, allowing for strong social connections to be forged and each child's individual needs can be met.
2. Existing educational facilities in Durban, South Africa, are not designed to allow the inclusivity of children with ADHD in grades 1-7.
3. Durban needs an educational facility for children diagnosed with ADHD in grades 1-7 that promotes inclusivity, which is fundamental to promoting a child's well-being.

### 1.3.4 Key Questions

Primary Question:

How can architecture contribute toward creating an inclusive and accommodating environment that positively influences ADHD children in Durban, South Africa?

Secondary Questions:

1. What is the effect of ADHD on children?
2. What is the problem with the current school buildings on ADHD children?
3. What learning spaces allow for the developmental needs and learning styles of ADHD children?

4. What architectural strategies and principles allow for inclusive learning environments in mainstream schools for ADHD children?

## 1.4 THEORETICAL FRAMEWORK

The premise of this research is studied from the perspective of various paradigms, theories, and concepts. Postmodernism will form the overarching paradigm approach as it interprets the world from numerous perspectives and theories and has its foundations in social discourse related to architecture. According to Nesbitt (1996), phenomenology forms one of the primary paradigms in which architectural theory has been shaped and will be the lens from which the incorporated theories and concepts will be analysed within the framework of this study. These theories and concepts extend into the built form and engage human connections to their environment.

### 1.4.1 Phenomenology of Architecture - Primary Paradigm

Phenomenology forms the primary lens within the framework of this literature review. Phenomenology recognizes a world where people and their environment reciprocally include and express each other. A phenomenological approach in architecture directs and forms the person-environment relationship (Seamon et al., 1985). According to Seamon et al. (1985), human life is a complex network of concrete and symbolic connections. The essence of design is to enable opportunities for this network to begin, expand and improve. The need is to distinguish the environment as a system of possible places capable of engaging and maintaining a complex of bodily, emotional, rational, and spiritual interactions (Seamon et al., 1985).

### 1.4.2 Placemaking

Placemaking is based on a person's experience in a specific place in both physical and psychological terms. Trancik (1986) states that a person needs a stable arrangement of places to develop themselves, which gives a directive for space to be more than physical and to have emotional content. Places are created in our memories and affections through frequent encounters and complex connections. Relationships with places must be strong and positive (Seamon et al., 1985).

### 1.4.3 Environmental Psychology

A recent study also states that the “founding fathers” of environmental psychology are Bunswik (1903–1955) and Lewin (1890–1947). Their ideas, such as the relationship between the physical environment

and psychological processes and researching human behaviours in real-life settings instead of artificial environments, were significant for numerous studies on human-environment interactions (Steg et al., 2019). Environmental Psychology explores how different environments influence people's perceptions and how this can be controlled to enhance and create positive relationships between an individual and their physical environment (Weiner, 2003).

## 1.5 RESEARCH METHODOLOGY

### 1.5.1 Introduction

The research methodologies of this dissertation, in which a qualitative approach has been taken, will be discussed in the following section. Data obtained from both primary and secondary collection provides an international and contextual understanding of the research topic and will be analysed from a phenomenological perspective. This approach has been taken because it focuses on human interpretations, lived experiences, and peoples' thoughts and ideas, which relate directly to this study and the research methods. The research focuses on children in grades 1-7 diagnosed with ADHD.

### 1.5.2 Research Philosophy and Strategy

Based on the subjective aspects of this study, a qualitative research method has been adopted (Denzin&Lincoln, 2017). Qualitative research comprises an interpretive, realistic approach to the world. Thus, an interpretive approach was used to investigate primary and secondary data as it will effectively understand educators' and other relevant persons' lived experiences with children diagnosed with ADHD. Acknowledging numerous perceptions in interpretivism can lead to a more thorough understanding of the situation (Thanh, 2015). The researcher has thematically analysed primary and secondary data to identify key themes, patterns, and relevant theories.

The impact of architecture and the notion of creating meaningful spaces were examined through in-depth literature reviews to ascertain optimal place-making and environmental conditions for children in grades 1-7 diagnosed with and without ADHD. In addition, relevant writings on space provisions for educational facilities have been investigated. Relevant philosophies, policies, and other pertinent information were assessed globally to establish these children's current architectural design approaches. Case studies were carried out as an architectural research design tool within the greater Durban area to investigate whether positive and engaging educational environments for children with ADHD have been achieved. Semi-structured interviews were performed with the permission of the applicants. Precedent studies were conducted globally to determine an international perspective of what has been designed to allow inclusive learning environments for children with ADHD. Primary and secondary data were thematically analysed to identify key themes and patterns.

### 1.5.3 Secondary Data Collection

Secondary data is presented in text/narrative, images/ sketches, and diagrams. The secondary information for this dissertation comprises the following methods and sources:

Literature review:

The secondary data compilation and review were taken from relevant literature in books, academic papers, journals, articles, reliable online information, and other relevant reports. Data was sourced and evaluated from an international, national (South Africa), and contextual scale (Durban and surrounding areas). The literature review in this dissertation has facilitated an understanding of what is significant to the chosen topic and allowed for a gap in research to be determined concerning what has already been established. Theories and concepts were examined to provide a lens for understanding and analysing the literature using a thematic approach.

Precedent studies:

Two precedent studies were chosen to critically analyse existing buildings on a global platform in a context and theme similar to the research topic. The sample size of the precedent architecture relating to the research focus was limited to what the researcher found most pertinent and suitable to address the research questions. The analysis was carried out to investigate the formal and spatial characteristics of each precedent in accordance with the chosen theories in such a way that the building parts can be understood (Clark&Pause, 2012). Understanding these precedents assists in response to the problem statement by incorporating constructive design approaches into the proposed education facility, allowing for a positive and inclusive learning environment.

### 1.5.4 Primary data collection

Primary data is presented in text/narrative, images/ sketches, and diagrams. Collecting preliminary data through first-hand research has assisted in understanding, perceiving, and interpreting the socially constructed and built environment philosophies toward children diagnosed with ADHD. The primary data for this dissertation comprises the following methods and sources:

Interviews:

Purposeful sampling allowed interviews with key informants from the case study, such as teachers and school principals, to be conducted during this process and related to the framework of this study. The data from these interviews provided first-hand experiences, viewpoints, and information surrounding facilities in the Durban area that accommodate children with ADHD. This information was analysed thematically from a qualitative approach and focused on both the positive and negative impact space, architectural design, and environment have on children with ADHD. The data from these interviews assisted in addressing the aims and objectives of the research topic.

Case study:

The case studies have been conducted at Virginia Primary School and Eden Village Preparatory School, which fall within the greater Durban and surrounding areas. The data has been represented through thematic analysis and is presented in the form of plans (surveyed and historical), text/narrative, images/ sketches, and diagrams. The case studies were constructed several decades apart, allowing for a comparative analysis of the case studies, which provided a more detailed understanding of past and future design solutions and how existing buildings can be adapted. The research was carried out through a rigorous, in-depth, systematic analysis within the context and framework of this dissertation. The main aim of the case study research was to identify and comprehend the association between children with ADHD and how architecture and space affect and respond to these children.

The aims and objectives of this study drove and focused the direction of data collection during the case studies. The data was examined within the theories and concepts aligned with this study and interpreted through a qualitative approach. The methodological procedures used with the aim of co-constructing data are as follows:

- Sketches of the classroom were requested from teachers and students where they colour-coded areas: **green** – positive/engaging space; **red** – negative space and provided written text on reasons for the choice.
- Document and artefact analysis, including historical architectural drawings, surveys of buildings (internal and external), reports, photographs, and historical references. Care was taken to ensure no identity compromise in pictures, such as the complete obscuring of faces and bodies. This process provided invaluable information on the configuration and layout of the schools as well as the design approach of older buildings.

Interviews with the school principal and teachers with ADHD experience were semi-structured and held in a natural environment. This process allowed for a free-flowing organic process that permitted additional valuable information not on the agenda to be discussed with interviewees while maintaining focus on the core motivation for the interview. All interviews were recorded with audio devices and

transcribed into text. To ensure interviewees' privacy, fictitious names were used, and all audio recordings of interviews will not be published.

### 1.5.5 Research Materials

The research materials used to gather relevant data which applies to the problem statement include the following resources:

- Secondary information in books, reliable documents, journals, reports, dissertations, and relevant published literature.
- Reputable online information and reliable websites.
- For the case study, images, drawings, sketches, and notes were taken to collect data.
- Various means of communication to gather information from suitable participants.

### 1.5.6 Research Analysis

The qualitative research data collected from primary and secondary sources were examined and reviewed in line with the principal paradigm approach of Phenomenology and with sub-philosophies of Place-Making and Environmental Architectural Psychology. The literature review, precedent studies, case studies and primary data collection assisted in answering the key questions. A thematic approach was used to collect and analyse research data and triangulate it to develop a thorough understanding of the research problem. Sketches, written text, tables, and photographic images have been utilised to illustrate and analyse data and theories.

1.5.7 Summary (Matrix)

| **Objectives** | **Research Question** | **Data Collection Question** | **Data Sources & Sample Size** | **Data Collection Methods** | **Data Analysis Methods** | **Data Presentation Forms/Style** |
|---|---|---|---|---|---|---|
| To investigate the impact that ADHD has on children. | What is the effect of ADHD on children? | What is the effect of ADHD on children? | Published literature, interviews. | Documents, journals, books, and reliable online content. | Thematic analysis Textual analysis | Text/narrative and illustrations, sketches, and images. |
| To understand the problem that the current school buildings have on ADHD children | What is the problem with the current school buildings on ADHD children? | How are schools designed currently, and what is the impact on children with ADHD? | Interviews, case studies, published literature | Interview key people to collect secondary and primary data | Thematic analysis Textual analysis, disclosure analysis | Themes, images, text/ narrative, illustrations |
| Explore learning spaces that allow for the developmental needs and learning styles of ADHD children. | What learning spaces allow for the developmental needs and learning styles of ADHD children? | Are there examples of learning spaces locally and globally that allow for the developmental needs and learning styles of children with ADHD? | Literature, case study, observations, and precedent study. | Interviews. collect ion of data, precedent, and case study investigations | Thematic analysis, discourse analysis, observation of case study/ descriptive | Images, text/ narrative, illustrations |
| To investigate architectural strategies and principles that allow an inclusive, positive, and engaging learning environment for ADHD children. | What architectural strategies and principles allow for inclusive learning environments in mainstream schools for ADHD children? | What will design solutions allow for an inclusive school for children with ADHD in Durban? What are the social implications of inclusive designs in a school? Will an inclusive school be beneficial to children with ADHD in Durban? | Published documents, journals, magazines, and reliable online content. | Published documents, journals, magazines, case studies, est. Key Design informants | Document analysis, observation of case study/ descriptive and discourse analysis | Text/narrative, images, drawings, illustrations, maps |

## 1.6 CONCLUSION

In conclusion, the need to provide an architectural design response to allow for a positive, inclusive, and engaging learning environment for children with ADHD in grades 1-7 has been highlighted in this chapter. Current design approaches leave these children feeling isolated and excluded, which can have damaging long-term effects on their psyche and overall well-being. The use of chosen theories, concepts, and the research methodological approach has provided parameters and guidelines to establish a framework for answering the research questions and achieving the outlined objectives in this study. This framework has assisted in addressing the problem statement, with the research resulting in the design of an educational facility in Durban that will have a positive and inclusive impact on the development of children with ADHD in grades 1-7. A complete literature review will now be conducted, expanding on the ideas expressed in the preceding concepts and theories and establishing a theoretical foundation for the research.

**Chapter 2**

The research reviews the literature on childhood ADHD and provides a brief overview of the disorder. This understanding highlights the impact architecture, specifically the classroom environment, can have on these children's day-to-day dealings in the school environment.

**Chapter 3**

The theoretical framework is structured around achieving an inclusive, positive architecture for children with ADHD. The concepts and theories highlighted in Chapter 1 are further expanded in Chapter 3 to allow a deeper understanding of how they relate to architecture. These ideas further assist in critically analysing various design aspects to promote an inclusive architecture that will encourage a positive outcome. The chapter is further broken down into essential built environmental considerations that relate to the chosen theories that must be embraced in the design of an educational facility if they are to achieve the planned outcome of an inclusive design.

**Chapter 4**

Literature on inclusive school policies, taken from a global perspective, highlights critical aspects of inclusion and provides an overview of what inclusion in school means. South African White Paper 6 on inclusive school policy (Education, 2001) is analysed to determine critical associations concerning ADHD. Furthermore, White Paper 6 is compared with international policies to understand how we stand globally. Literature on an inclusive design approach emphasizes the importance of professional involvement with communities when designing buildings. An inclusive design approach goes hand-in-hand with architecture and spaces for child development, which is discussed in detail towards the end of this chapter.

**Chapter 5**

Examining two prominent precedents demonstrates critical aspects of an inclusive design approach to an educational facility. The precedents are discussed in line with the chosen concepts and theories to understand better architecture's importance in creating a positive and engaging environment.

**Chapter 6**

Virginia Primary School and Eden Village Preparatory School are explored as case studies. The primary objective of the case study research is to discover and grasp the relationship between children with ADHD and how architecture and space influence and react to these children.

**Chapter 7**

The Case Study themes and subthemes are discussed within the context of the literature examined within the scoping review, other relevant literature, and information gained from the precedent studies. The case studies were selected and analysed to supplement the research and serve as a basis for the project design.

**Chapter 8**

This chapter addresses whether the fundamental problem statement and key questions highlighted in Chapter 1 have been resolved.

# CHAPTER 2: UNDERSTANDING CHILDHOOD ADHD AND THE IMPACT ON ARCHITECTURE

## 2.1 INTRODUCTION

This chapter provides an overview of attention deficit hyperactivity (ADHD) in children in grades 1-7. This overview assists in understanding how the disorder negatively impacts these children and their learning needs, which are highly complex and varied. The reviewed literature develops an understanding of these learning needs, which will assist in answering question 3 (see 1.3.4 - Key Questions) of the secondary questions in chapter 1. This understanding contributes to analysing and understanding the impact of ADHD and the built environment, discussed at the end of chapter 2. ADHD can have long-term devastating effects on an individual that can change the trajectory of their lives negatively if interventions are limited. The buildings children engage with during this time shape their actions and experiences positively and negatively (Sanoff, 2015). A deeper understanding of ADHD in children must be achieved to address the research problem. This chapter critically analyses research from prominent authors to understand how children with ADHD are affected by their condition and the built environment's impact on their lives.

## 2.2 OVERVIEW OF ADHD IN CHILDREN

ADHD is a common and well-documented behaviour disorder that affects millions of children worldwide (Barkley, 2014, Selikowitz, 2021, Kewley, 2011). An estimated 5% of children across all ethnicities suffer from the disorder globally. (Wender&Tomb, 2017, Selikowitz, 2021, Brown, 2005). These percentages can be seen in plate 2.2.1, highlighting the worldwide estimated prevalence of ADHD in children and adolescents.

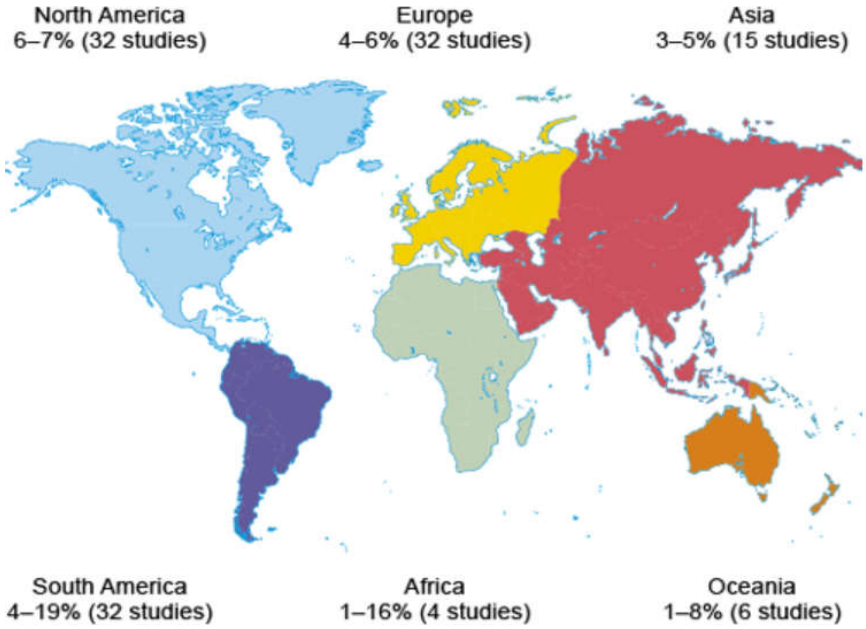



*Figure 2.2.1: The worldwide estimated prevalence of ADHD in children and adolescents (Source: Understanding ADHD: 1.1 Characteristics and prevalence of ADHD - OpenLearn - Open University - SK298_1 [Accessed 21/11/2021] )*

According to Wender&Tomb (2017), ADHD is a brain disorder most likely transferred by genes, which is almost undoubtedly hereditary. At least one child in every 20 could have ADHD, according to Kewley (2011). Barkley (2014) indicates that considerable research has been conducted in Australia, North America, and South Africa. This report by Barkley contradicts a statement by Snyman&Truter (2010) that states very little is known about ADHD in South Africa. Snyman&Truter (2010) further state that although research suggests that the frequency of ADHD is comparable in African and Western nations, there is no official data on ADHD in South Africa. An earlier report by Kleynhans (2005) claims that ADHD affects 5% of South African children and is the most frequent mental disease in South Africa. She states that it is reasonable to presume that at least one child in every classroom in every school has ADHD (Kleynhans, 2005). This statistic is in keeping with international research conducted in other countries.

ADHD can cause complications in the classroom in a wide variety of ways and, in some cases, can be challenging to differentiate from normal behaviour (Kewley, 2011). Without the proper treatment, children with ADHD are likely to have increasing challenges in school. They are much more likely to develop behavioural problems that can lead to a risk to themselves and society (Wender&Tomb, 2017). Most children with ADHD are extremely hard on themselves and have low self-esteem. These children experience social difficulties and have challenges making friends, as shown in plate 2.2.2; this can leave them isolated and excluded, which can have long-term negative consequences on them (Selikowitz, 2021, Barkley, 2014, Brown, 2005).

*Plate 2.2.2: Socially excluded Child. (Source: https://www.nurseryworld.co.uk/features/article/positive-relationships-exclusions-inside-and-out [Accessed 22/11/2021])*

Children with ADHD are considerably more likely than their friends without ADHD to develop behaviour disorders in their teenage years and antisocial personality disorder in adulthood (American Psychiatric Association, 2013). It is essential to detect and treat ADHD in children as soon as possible. Learning more easily at school helps them avoid anxiety and depression related to academic struggles, disapproval from other children, and disputes with their parents. Early treatment, which includes medication, may reduce the risks of defiant behaviour that ADHD children are more likely to develop in their teenage years (Wender&Tomb, 2017). Children with ADHD have chronic difficulties with inattention and/or impulsivity–hyperactivity (Barkley, 2014, Selikowitz, 2021), which are explained in more detail in the section below:

**Inattention** – see plate 2.2.3**:** Another characteristic of children with ADHD is diminished attention control. This is consistent with the general opinion that children with ADHD have difficulty persevering in responsibilities that are not fundamentally interesting or appealing. These children are also more distractible than their peers without ADHD. Distractions may hinder working memory because the child forgets the initial assignment or goal they were pursuing and moves to a new task(Barkley, 2014). These learners are at high risk for poor academic outcomes, as Naidoo (2019) stated, which can result in them being labelled "naughty" and excluded by their peers. With increased class numbers, these students may find it extremely difficult to concentrate and fall behind on classwork. Furthermore, this can negatively impact their self-worth and future relationships with classmates.

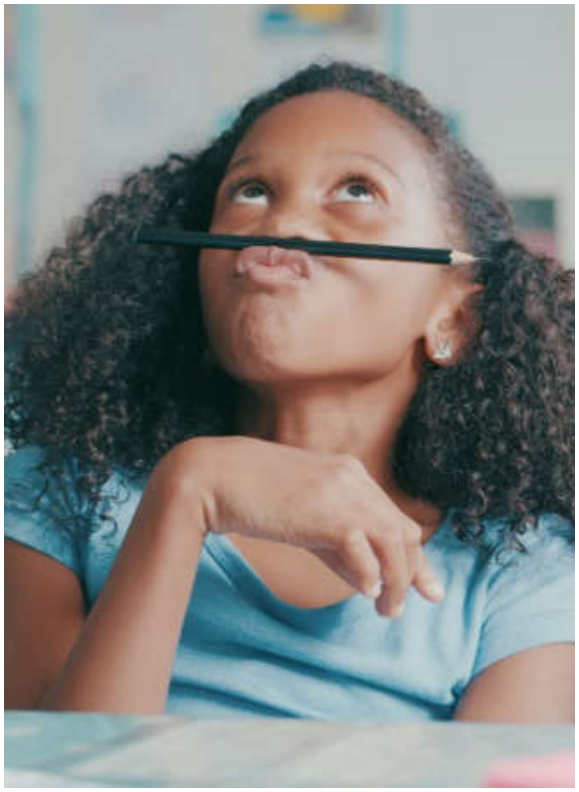


*Plate 2.2.3: Inattention ADHD (Source: https://www.verywellhealth.com/what-is-inattentive-adhd-5203366 [Accessed 04/06/2022] )*

**Hyperactivity–Impulsivity**– see plate 2.2.4: Clinically, children with ADHD are frequently observed to react rapidly to situations without waiting for commands to be completed or sufficiently understanding what is involved in the setting, resulting in impulsive errors. Moreover, these children may fail to understand the possible negative, destructive, or dangerous outcomes of specific circumstances or actions. Consequently, taking risks on an impulse or challenge, specifically from a friend, may happen more often than is normal (Barkley, 2014, Selikowitz, 2021). According to Barkley (2014), these children are prone to learning difficulties that contribute to low academic achievement. Similarly, as with intention, these children are likely to be excluded by their peers at school, fall behind in classwork and be labelled negatively by their teachers.

*Plate 2.2.4: Hyperactivity–Impulsivity ADHD (Source:https://www.hillcenter.org/symptoms-of-hyperactive-impulsive-adhd/ [Accessed 04/06/2022]*

Kewley (2011) suggests that many children with ADHD can also have the following complications:

- Disruptive behaviour disorders.
- Anxiety or depression.
- Specific learning difficulties.
- Obsessions.
- Developmental coordination difficulties (dyspraxia)
- Auditory processing difficulties.
- Speech and language problems.

According to Selikowitz (2021), children with ADHD often have trouble considering specifics closely. Consequently, they make careless errors in their schoolwork. Furthermore, these children are very quickly preoccupied, especially in a group setting and tend to be forgetful in daily activities (Selikowitz, 2021). In such a setting, children with ADHD are at their worst (Selikowitz, 2021). In contrast, ADHD child is at their most attentive and learns best in a one-on-one situation, as shown in Plate 2.2.5.

*Plate 2.2.5: One on one Learning (Source: https://madison365.com/wp-content/uploads/2017/04/P_OneBlackTeacher03-e1491999410888.jpg [Accessed 04/06/2022])*

Selikowitz (2021) further indicates that occasionally a small group of children with ADHD is separated from the large classroom for specific support in the hope that they will have improved results with fewer disruptions. Unfortunately, this setting is likely very distracting as children with ADHD typically distract one another (Selikowitz, 2021). Where possible, Selikowitz (2021) suggests that children with ADHD must not be grouped in a class. Positioning more than one child with ADHD in a class could frustrate them, resulting in them not wanting to attend school, as seen in Plate 2.2.6.

*Plate 2.2.6: Not wanting to attend school (Source:https://thrivealliancegroup.com/taking-charge-of-school-refusal-10-warning-signs-and-8-interventions/jpg [Accessed 04/06/2022])*

School evasion of children with ADHD may occur in varied forms. School evasion could be from flatly refusing to leave home to complaining that they are feeling ill, which could be due to being anxious. School avoidance is usually due to worries about academic or social issues (Selikowitz, 2021). As academic pressures develop through middle school, adolescents with ADHD encounter more significant challenges with homework completion and organization skills (Prinstein et al., 2019). They tend to

experience falling grade averages over the school year (Evans et al., 2016). It is easy to undervalue how unpleasant school can be for a child with ADHD. A child's unique qualities and imagination may get lost in the battle (Kewley, 2011). Kewley (2011) proposed that educational underachievement, behavioural difficulties and socialising complications, and coexisting challenges such as specific learning difficulties, depression or anxiety could further complicate the condition. This argument is supported by Selikowitz (2021), who indicates that children with ADHD have a variety of difficulties, and there must be a wide range of learning activities to address their needs within the classroom. Most children, from an early age, spend more than a third of their time in school. Therefore, their experiences in the classroom and the playground will affect their academic achievements, the advancement of their self-esteem, and their social skills from the foundation phase throughout their educational journey (Selikowitz, 2021).

## 2.3 THE LEARNING NEEDS OF CHILDREN WITH ADHD

Primary school education (grades 1 to 7) is crucial to the overall long-term development of children with ADHD. Most children with ADHD are in mainstream primary school classrooms that do not receive special support services (Barkley, 2014). Reading inabilities and additional learning difficulties are much more common in children with ADHD (Barkley, 2014, Wender&Tomb, 2017. Therefore, these children should be assembled in classes by age to have a sense of belonging to their peer group (Selikowitz, 2021). This response speaks directly to an inclusive approach, as children with ADHD will not feel isolated and will form friendships with children their age.

Selikowitz (2021) suggests the best method for streaming children with ADHD is according to their academic ability. This allows academically weaker children to be provided with additional help and to work at a suitable pace (Selikowitz, 2021). It can be argued that ability grouping creates a stigma toward poorer-performing students, making children with ADHD feel excluded. In response to ability grouping, Laura&Levine (2017) highlight that, after a decrease in this practice from the 1960s through the mid-1990s, there has been a revival of ability grouping in recent years. Ability grouping intends to allow students performing at a higher level to progress rapidly, avoiding boredom and frustration. Slower students, positioned in a separate class, master the material at a pace that matches their ability (Laura&Levine, 2017). In contrast to this, critics have argued that ability grouping creates social stratification, which generates negative attitudes toward lower-performing students, as shown in plate 2.3.1. The negative attitudes can, therefore, be harmful as they damage self-esteem and compound a negative attitude toward school and schoolwork (Ireson et al., 2001).

*Plate 2.3.1: Stigma created from Ability Grouping.(Source:http://icog.group.shef.ac.uk/wp-content/uploads/2019/06/amanda.jpgjpg [Accessed 04/06/2022] )*

Furthermore, ability grouping is negatively viewed, with critics stating children in lower-ability classes receive less support and poorer-quality teaching, Which results in lower levels of academic achievement (Nomi, 2009). This exclusive approach has a compounded negative impact on the learner with ADHD and will have a long-term adverse effect on them. Therefore, the research argues that a collaborative approach needs to be implemented to address the needs of an individual with ADHD and allow them to feel included.

Laura&Levine (2017) indicate that collaborative learning (mixed ability class) has substituted ability grouping in some schools. Collaborative learning is fundamentally a more inclusive approach. It encourages students of various ability levels to work as a team on projects or assignments toward a common goal, as shown in figure 2.3.2. Furthermore, compared to other instructional approaches, children involved in collaborative learning groups show higher academic achievement, better self-confidence, and more remarkable social ability (Curry et al., 2011, Dudek, 2007). Additionally, with this inclusive approach, children preferred what they were learning and were more likely to develop friendships with students from various ethnic backgrounds (Laura&Levine, 2017). Once again, this speaks to an inclusive approach to children with ADHD on an academic, social and cultural level.


*Figure 2.3.2: Collaborative learning*
*(Source: https://acsieu.org/wp/collaboration/the-benefits-of-collaborative-learning/[Accessed 04/06/2022])*

Additionally, research on collaborative learning has found that lower-performing students, like those with ADHD, benefit more from this approach, while higher-ability students achieve similar levels regardless (Laura&Levine, 2017, Dudek, 2007). Reflecting on the above research demonstrates that collaborative learning will assist children with ADHD in socialising with students they may not have had the opportunity to connect with had they been grouped by ability. Collaborative learning will encourage friendships between children with higher academic achievement who can assist their ADHD friends with tutoring.

Several other studies determined considerable evidence for the success of peer-tutoring methods in improving the academic results of ADHD children (Weyandt et al., 2014). Peer tutoring is a means to use classroom friends as a part of the intervention process for children with ADHD (Barkley, 2014). Furthermore, peer tutoring aims to develop educational skills and offers a learning environment well-suited to the demands of students with ADHD (Barkley, 2014). According to Rief (2016), young people need a sense of "connection" and appreciation, as shown in plate 2.3.3. Children need to feel safe and relaxed in their classroom, realizing they will be treated respectfully and not purposely criticized or embarrassed in front of their friends (Rief, 2016). However, children with ADHD may require more assistance than other children to develop at the same rate; this can include the help of a mentor and other professionals, which are discussed in more detail in the next paragraph.

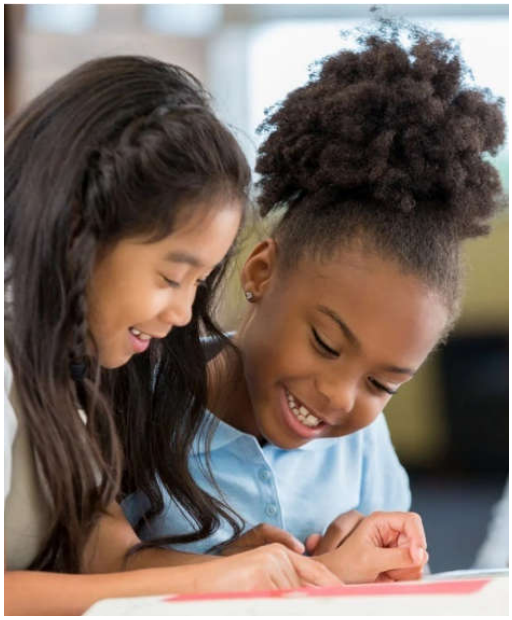


*Plate 2.3.3: Peer Tutoring (Source:https://www.futurelearn.com/courses/peer-tutoring-reading [ Accessed 01/10/2022])*

Kewley ( 2011) proposes assigning a mentor to a child with ADHD. The mentor must understand ADHD and meet regularly to encourage and help with school planning, contributing to the child's progress, as shown in Figure 2.3.4. The assistance of a mentor promotes organisational and social skills, which enable self–esteem. Support teachers should be available to provide additional services, allowing the ADHD child to be integrated into the mainstream classroom environment and feel included.

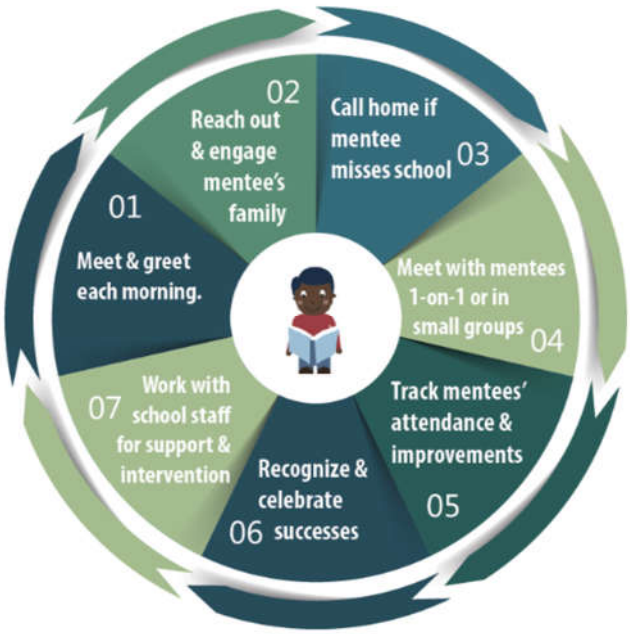



*Figure 2.3.4: Key elements that define the role of a mentor. (Source:https://www.attendanceworks.org/resources/toolkits/mentoring-elementary-success-mentors/what-does-an-elementary-success-mentor-do/ [ Accessed 01/10/2022])*

Providing a support teacher lets the learning style of the class teacher continue with minimal distraction to the other children (Selikowitz, 2021). Dudek (2005) concurs with that research, which allows the class teacher to focus on teaching other individuals or groups while the support teacher addresses the needs of the child with ADHD. School nurses, predominantly utilised in the United Kingdom, United States of America and other countries, are valuable assets in a school, linking with local child mental health facilities and paediatric services (Kewley, 2011). Additional essential support education-based professionals should include speech and language therapists, behavioural support teams, educational psychologists, classroom support assistants, school guidance counsellors, and occupational therapists (Kewley, 2011). The purpose of the additional support staff try to assist in keeping a child with ADHD on track with their coursework so that they can hopefully be able to move to a higher grade in the new academic year.

Many students with ADHD who do not grasp the grade's curriculum are retained for another year to re-learn the same content. (Barkley, 2014, Selikowitz, 2021). Returning to the same grade level for another year, grouped with younger students, could harm the child's self-esteem. Conversely, in some schools, when a child has not mastered the grade-level material, they are still promoted to the next grade. This process is known as social promotion. Social promotion allows the child to be kept in a class with children of the same age. Social promotion ensures that the child is not perceived as a failure and alienated from his friends (Lorence&Dworkin, 2006). Furthermore, this research relates to a more inclusive and less damaging approach. This argument is further reinforced by research findings in several studies showing that retained students offer no significant benefits. At the same time, there were moderate positive effects in favour of those promoted (Moser et al., 2012, Silberglitt et al., 2006). Additionally, children who have been retained are five times more likely to drop out of school (David, 2008). Retrospectively, a school should not be a place where a child with ADHD feels they need to escape. The above research highlights that retaining a child in the same grade has no positive outcomes. In comparison, social promotion reduces the potential of a child with ADHD dropping out of school and changing the trajectory of their lives in a negative way. A school should provide a sanctuary for a child, where they feel positive, and secure in an inclusive environment. Considering the preceding discussions in this chapter develops an understanding of what principles can be applied to create an inclusive learning environment for ADHD children. Subsequently, this assists in answering question 4 (see 1.3.4 - Key Questions) of the secondary questions in chapter 1

## 2.4 THE IMPACT OF ADHD AND THE BUILT ENVIRONMENT

A child with ADHD is usually best positioned at an educational facility near their home (Selikowitz, 2021). The concept of home is furthered by Augustin et al. (2009), stating that spaces that feel more homelike are better spaces for children to learn as familiar environments are relaxing; home is where a child can find an identity. Seamon et al. (1985) indicate that “besides our house, we can feel at home

and find identity with other places. To the degree it generates a sense of being at home, a place is successfully a place." A physical place's design impacts the individuals' mental state in that space, which influences their attitudes and behaviour—good places to learn share specific physical and symbolic characteristics (Augustin et al., 2009). Most buildings are not appropriately designed for children with ADHD, which can negatively impact them long-term. Young children prefer planned buildings and are considered to provide positive and engaging environments (Day, 2017). According to Day (2017), buildings designed in this manner provide pleasure and well-being, impacting them positively in later life.

The influence of physical space to inspire learning practices has been acknowledged by architects and educators for many years (Boddington&Boys, 2011). The architect and theorist Christopher Day argues that different characteristics of space can support various qualities of children's inner progress (Day, 2017). In contrast, research (Barkley, 2014) indicates that children's ADHD symptoms can become more or less evident as a function of their (physical) environment. There are numerous ways to alter the environment in the classroom that will inhibit or drastically reduce behavioural problems and enhance the functioning of students with ADHD (Rief, 2016). Rief (2016) further proposed that children should have environmental options as to where and how they work due to the diversity of education styles. The above research argues that the degree to which a space is considered and designed has a direct impact on the learner within that space. Therefore, spaces designed for a child with ADHD will influence the outcome of their behaviours. This subsequently affects their well-being and sense of inclusion.

A recent report stated that after coming into contact with nature, as shown in plate 2.4.1, children with ADHD are better able to concentrate (Laura&Levine, 2017). Similarly, numerous other reports indicate that time spent in nature has been shown to renew and revive the ability to focus attention (Berman et al., 2008). In further agreement, research on cognitive development and academic achievement conducted by Pellegrini (2006) revealed that the longer children go without a break, the less attentive they become to schoolwork. Furthermore, having free time for play during the day allows for increased attention when they return to their academic curriculum (Laura&Levine, 2017). Discovery during play will enable children to uncover and understand new information without the teacher's direct involvement (Laura&Levine, 2017).

*Plate 2.4.1: Contact with Nature. (Source: https://parentingscience.com/kids-connected-with-nature/ [ Accessed 01/10/2022])*

Additionally, a varied outdoor environment allows a more significant opportunity to explore and be creative, encouraging a broader social opportunity for children to be included. Therefore, it can be argued from the preceding literature that a child with ADHD may be excluded without varied outdoor

play opportunities. Subsequently, this could damage their acceptance and inclusion in the school environment. Children's interactions during breaks are a unique balance to the classroom (Laura&Levine, 2017). These breaks promote lifetime skills gained for sharing, problem-solving, communication, negotiation and cooperation. It gives them contentment and health powers they'll take into later life (Day, 2017). The preceding research further strengthens the argument that a child with ADHD should be allowed to have more breaks where a wide variety of outdoor opportunities are available. More breaks during the day will enable them to learn, socialize and connect with a broader network of peers, allowing them to feel more included. Additionally, using the school grounds strengthens connections between staff and students and improves behaviour and attitudes toward learning, thus resulting in improved academic achievement. (Harrison&Hutton, 2013).

Furthermore, Hendricks (2017) indicates that current research shows that physical activity is essential to physical health and promotes brain cell growth. Several reports by Andrea Taylor and Frances Kuo revealed that contact with natural outdoor environments could decrease symptoms of ADHD and is associated with enhanced self-discipline (Kuo&Faber Taylor, 2004, Faber Taylor&Kuo, 2011). This is further acknowledged by Day&Midbjer (2007), who state that academically, school grounds, as illustrated in plate 2.4.2, offer a richer experience than artificial structures. Human beings have developed as a biophilic species, indicating that we are attracted to nature: we like to feel a relationship to it in our homes, our offices, and our neighbourhoods (Goldhagen&Gallo, 2017). Our genetic makeup is programmed to connect our health to maintaining a personal relationship with the natural world. Although meaningful life lessons, social connections and experiences are gained from the natural environment, the classroom is still needed. Providing a classroom as a place of study is embraced by Hertzberger (2008), who opposes eradicating the classroom environment, stating that it will lead to a society of blurred boundaries where nothing may be exchanged and has its place.

*Plate 2.4.2: Richer learning experience in school playgrounds.*
*(Source:https://www.earthscapeplay.com/project/ottaw-montessori-school-playground/[ Accessed 01/10/2022])*

The location of the student with ADHD in a class can make a considerable difference. The teacher should, wherever possible, keep the child from disrupting stimuli. They should be seated as far away as possible from distractions, such as a window or air-conditioner, as seen in plate 2.4.3 (Selikowitz, 2021, Rief, 2016). Selikowitz (2021) states that a classroom should be an engaging environment for children with ADHD. However, the teacher should avoid making it too cluttered. The classroom should aim to be interesting but muted in tone (Selikowitz, 2021).

*Plate 2.4.3: Distraction in the classroom (Source: https://www.ccgedu.net/blog [Accessed 10/10/2022])*

Furthermore, creating environments suitable for children on the autism spectrum helps those with ADHD and all children gain from these environmental considerations (Gaines et al., 2016). This argument, however, conflicts with a study explicitly relating to the impact of colour. It showed that red aided in stimulating autistic children, getting them more out of themselves (Day&Midbjer, 2007), while the colour blue assisted in calming the hyperactive children. Therefore, care must be taken when choosing a colour palette and other bespoke design elements. Instead, the needs of all individuals should be considered within the classroom and school environment. Considering the preceding discussions in this paragraph, it can be argued that a holistic, hybrid approach should be taken to all design elements to allow for the mutual benefit of all students.

Selikowitz (2021) suggests that the number of students in a class should not be too large for a child with ADHD. He indicates that it is challenging for a single teacher to assist a child with ADHD with more than 30 students. This suggestion, although valid, would be challenging to achieve in most South African government schools, which are underfunded and under-resourced. Consequently, Matsepe et al. (2019) indicate an increased number of students in classrooms in South African government schools, as seen in plate 2.4.4. Hence, as a result, several children with ADHD are likely to be together in the same class. It is, therefore, necessary to ensure that the design of these classes provides the best possible solution to address their needs. Children with ADHD should typically be positioned in the front of the course, close to the teacher's desk (Selikowitz, 2021).

*Plate 2.4.4: Increased number of students in South African government schools. (Source:https://www.theguardian.com/world/gallery/2013/may/01/southafrica-forgotten-schools-inpictures [Accessed 01/10/2022] )*

Furthermore, the classroom should have seating in rows and children facing the teacher instead of desks placed in small groups (Selikowitz, 2021, Kewley, 2011). In contrast, many students with ADHD have difficulty working in their seats and at their desks. Children should be allowed to sit on a beanbag or stand with the assistance of an adjustable-height desk and chair, as seen in plate 2.4.5 (Rief, 2016). The recommended seating in rows suggested by Selikowitz (2021) contradicts several reports (Laura&Levine, 2017, Laal&Ghodsi, 2012, Murphy, 2015), which promote a collaborative, group-learning approach to tasks where desks are arranged in groups. Reflecting on the prior discussion and in conjunction with the literature discussed in 2.3 (The learning needs of children with ADHD), a hybrid approach between collaborative learning (larger groups) and peer tutoring (smaller groups) will be discussed in the concluding chapter of this dissertation. Furthermore, the number of children in South African government schools must be carefully considered when addressing this hybrid approach.

*Plate 2.4.5: Opportunity to use a beanbag. (Source:https://ideas.demco.com/blog/flexible-seating-learning-space-tips/ [Accessed 01/10/2022])*

The configuration of a classroom for a child with ADHD should be a closed space and not an open-plan layout. Open-plan classrooms cause significant challenges for children with ADHD, allowing them to be easily distracted (Selikowitz, 2021, Kewley, 2011). Moreover, according to Della Torre et al. (2020), an open-plan approach is inappropriate for a learning place since form and cognition are inextricably intertwined. An earlier study by Hertzberger (2008) supports the negative aspects of an open-plan approach, which suggests an articulated classroom design as the best possible solution. The articulated classroom provides more places for a range of groups to engage in different activities simultaneously without being distracted by one another (Hertzberger, 2008), as illustrated in figure 2.4.6. Classrooms should have a dedicated breakout area, which is visually calming, within the mainstream class (Rief, 2016). This argument aligns with the design approach of the articulated classroom.

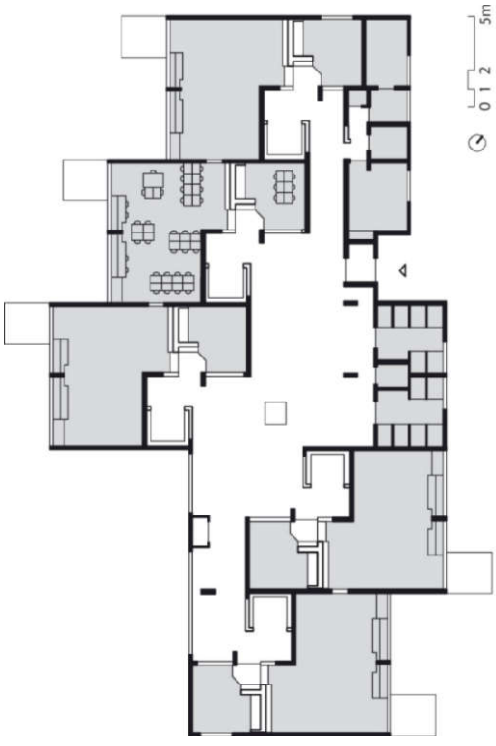



*Figure 2.4.6: Articulated classroom layout. (Source:https://architectureandeducation.files.wordpress.com/2016/02/06_dem-1966.jpg [Accessed 01/10/2022])*

Furthermore, a breakout area allows the classroom to evolve into a home base, a familiar environment where a child can associate. Hertzberger (2008, p.35) claims that “If you don’t have a place to call your own, you don’t know where you stand” This statement relates again to the concept of phenomenology and dwelling (Norberg-Schulz, 1971) and will be discussed in more detail in chapter 3. The articulated classroom arrangement is also supported by Dudek (2005) and Weinstein&David (1987), who suggest a modified space with a variety of large and small areas for different activities to take place.

Additionally, the articulated classroom is preferred by teachers who promote small-group work, hands-on learning, individual project work, spontaneous teaching and an opportunity for privacy within the school (Augustin et al., 2009, Rotraut, 2015). Children will use these private spaces differently; some will want to distance themselves from other children, while others may want to talk to friends in an intimate setting without interruption (Rotraut, 2015). These arrangements deal directly with the requirements of children with ADHD concerning the idea that they prefer to work in smaller groups, are most attentive, and learn best in a one-on-one setting (Selikowitz, 2021).

A breakout space allows a child with ADHD to engage with a mentor or peer in a quieter location away from the larger class. The opportunity to find a safe space in a classroom environment will have a direct impact on their well-being and behaviour. Additionally, Rotraut (2015) has considered the aspect of breakout space and indicates that conflicts and aggressive behaviour could be reduced in schools where children can retreat and find sanctuary during periods when a situation feels overwhelming. This argument relates directly to the current situation in South Africa, where children with ADHD are likely to be grouped in the same class with over 30 students. Having 1 or 2 breakout spaces will allow these children to be separated when they feel overwhelmed, preventing conflict and aggressive behaviour. Children with ADHD should be able to find a place of safety within a classroom environment.

## 2.5 CONCLUSION

This chapter intended to provide an overview of ADHD and its impact on learning and the built environment. The knowledge gained assists in answering questions 1 and 3 of the secondary questions in chapter 1 (see 1.3.4). Considering the research, learning from other children with diverse cultural, social, or academic abilities is essential to develop into well-rounded children. A mixed-ability class has been proven to provide good results for all students at a primary school level. Due to budget constraints, the South African education system does not allow reduced class sizes to accommodate children with ADHD.

Moreover, South African government schools often have more than 30 students per class. These children's learning needs must be carefully considered to grow and develop as a country that can compete globally. There is an unquestionable association between architecture and its impact on child development. Architecture is vital in engaging and promoting a positive and inclusive learning

environment for children. Seamon et al. (1985) indicate that besides our house, we can feel at home and find identity in other places. Therefore, a child must feel at home in a school, secure and nurtured, and find their true identity.

The following chapter of this dissertation will address the role of the built environment and, specifically, the needs of children. The concepts and theories of phenomenology, placemaking and environmental psychology will be discussed and examined. The ability of architecture to engage human emotions will assist in gaining a deeper understanding of the impact the built environment can have on children.

# CHAPTER 3: THE IMPACT OF THE BUILT ENVIRONMENT ON CHILDREN

## 3.1 INTRODUCTION

The built environment, specifically the relationship architecture has as an influential contributor to how humans view and connect with the world, is a complicated and emotional process. Chapter Three will include research on the role of the built environment, the needs of children and the built environment and multiple theories that relate to architecture and child development. Furthermore, these theories expand into the built environment and connect human relationships to their environment. This chapter aims to understand how the built environment and the application of theories can give children a positive experience within their environment.

## 3.2 THE ROLE OF THE BUILT ENVIRONMENT

The role of post-modernism and the theories of phenomenology, placemaking and environmental psychology are critical in understanding and evaluating the literature in this dissertation. These theoretical frameworks assist in establishing what our built environment, specifically architecture, must provide to allow for an inclusive learning space that will positively impact children with ADHD.

Architectural meaning originates from ancient responses and reactions learned by the body and the senses (Pallasmaa, 2012). Moreover, every experience involves the acts of recalling, remembering and evaluating (Goldhagen&Gallo, 2017). Early childhood is the period in life when children's senses are used to the highest ability (Goldhagen & . Through the perception of their surroundings, a child learns and develop meanings and identities. Norberg-Schulz (1968) states that by better understanding the process of perception, a greater awareness of the experience of architecture can be achieved.

Consequently, architects have a heavy responsibility that needs to be placed on them to do more for society. This will ensure that the design of an environment for children with ADHD is extensively studied and examined, culminating in a building that will help children with ADHD establish positive identities and answer the key research question in chapter 1. The following section provides more detail on the specific needs of children and the built environment.

## 3.3 THE NEEDS OF CHILDREN AND THE BUILT ENVIRONMENT

Maslow (2013), an American psychologist, established a hierarchy of needs to explain human motivation. His theory suggested that people have several basic requirements that must be met before people move up the hierarchy to pursue more social, emotional, and self-actualizing needs, as shown in figure 3.3.1. He believed that the primary human goal is to become a fully functioning person, or as he named it, a self-actualising person (Maslow, 2013).

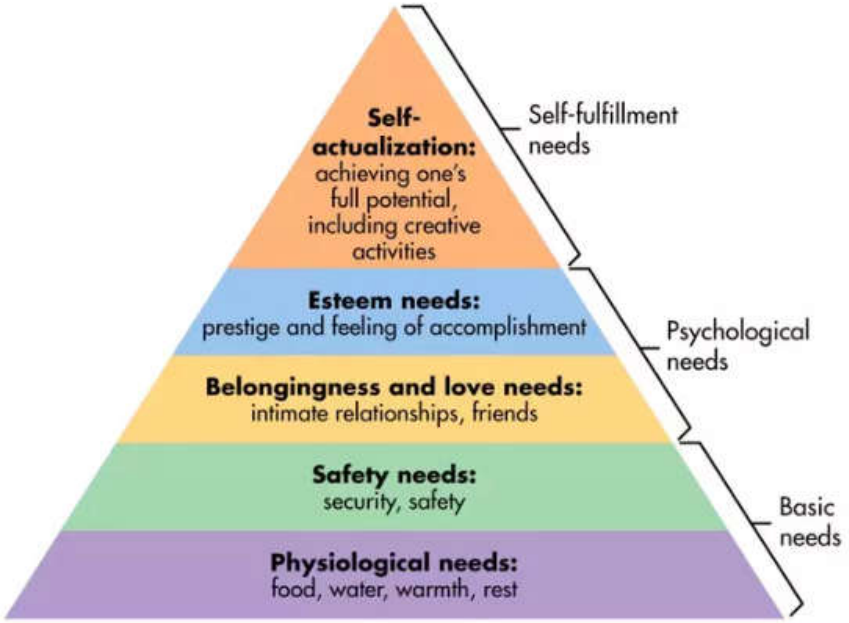



*Figure 3.3.1: Maslow's Hierarchy of Needs (Source: (McLeod, 2007) [Accessed 11/06/2022])*

Maslow believed that self-actualizing people possess several key characteristics. These include self-acceptance, spontaneity, individuality, and the capacity to have peak experiences. Children must be able to feel competent if they can strive toward self-actualisation. Furthermore, children's goals, attitudes and vision for the future are shaped through experiences and opportunities (Medcalf et al., 2013). Medcalf et al. (2013) highlight that children must be given opportunities and experiences that will assist them in developing the skills needed. To dream of a better future for themselves and the world. Architecture must be carefully considered to allow all children to reach the position of self-actualization. The more capable a child feels, the higher they can reach self-actualisation (Medcalf et al., 2013).

Children require buildings and places that are welcoming to the soul: places that aren't oppressive, places that, in the way they're considered and built, show love. According to Day (2017) pg.224, it "can transform the social delinquent into a crusading rebel or the competitive success figure into the servant of a great cause." Therefore, this same approach, designing a school that shows love, will assist in transforming a socially excluded child into a socially included one. Children are inclined to be instinctively optimistic in their attitude toward life. An atmosphere of constantly focusing on the bad things in life can rapidly change the child's instinctive inclination to be positive (Medcalf et al., 2013). Augustin et al. (2009) suggest that good learning places have specific physical and symbolic characteristics. The researched material furthers awareness of how the built environment, spaces, and places may be designed to provide positive, engaging experiences supporting an inclusive learning environment for ADHD children. Day&Midbjer (2007) indicate that growing up and experiencing a specific environment filled with 'character' generates a personal and place identity. Place identity provides emotional security, all intricately tied together.

Figure 3.3.2 demonstrates that through people's interaction with a place, the place shapes and ultimately defines their social (collective) and personal (individual) identities. Jenkins&Forsyth (2009) assert that self-evaluation can be affected by place identity at several levels, and it is further argued by Uzzell et al. (2002) that social identity is a component of place identity. There is little doubt that educational facilities play an essential part in creating the place-identity of the children who attend them. (Weinstein&David, 1987).

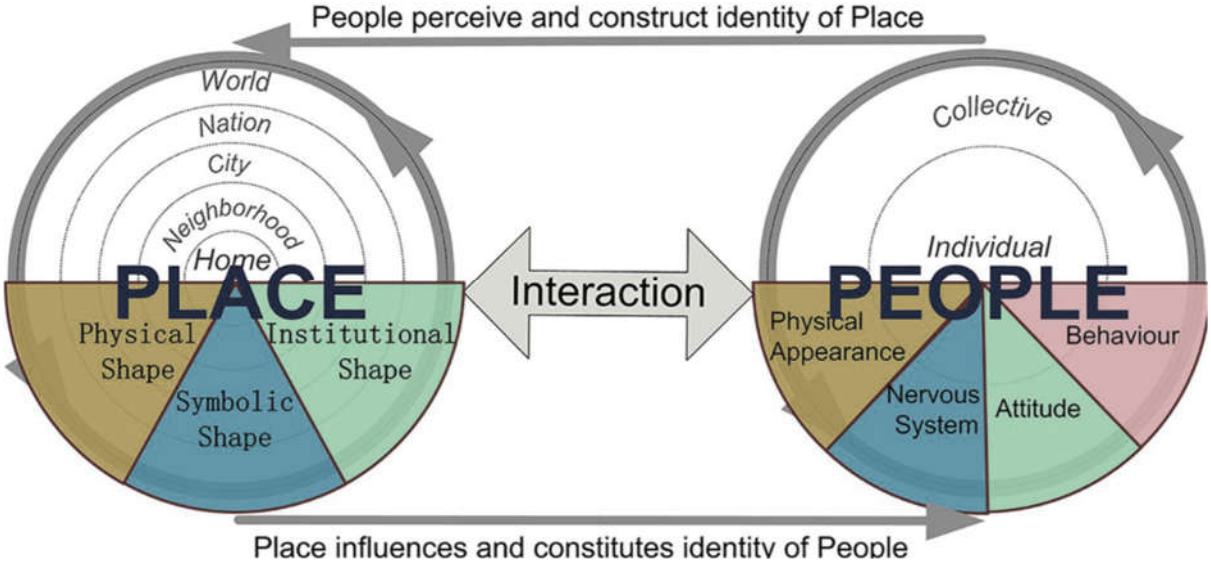



*Figure 3.3.2: Relationships between people, place, and place identity. (Source:https://www.frontiersin.org/files/Articles/503569/fpsyg-11-00294-HTML/image_m/fpsyg-11-00294-g009.jpg [Accessed 01/10/2022])*

Children require educational buildings explicitly designed for them, an environment that nurtures and encourages relationships according to their age (Day&Midbjer, 2007). Children as young as 3 to 5 years old may distinguish between place and mood meaning, and from 4 to 7 years old are concerned about how spaces are used. Around the ages of 6 and 7, children are capable of abstract cognition and idea reflection. They begin to perceive the world and others via concepts and ideas from the adult world (Hendricks, 2017). A sense of place is acquired from 8 to 9 years old (Hendricks, 2017). Augustin et al. (2009) indicate that children ages 8–12 embrace the prospect of being alone in a place, in both the homes and school. They require spaces where they can be isolated; this helps them to create plans to move forward with their lives. This research relates to the articulated classroom design (Hertzberger, 2008) and break-out spaces (Rotraut, 2015) discussed in chapter 2, which provide spaces for children to be alone. Weinstein&David (1987) indicate that all buildings designed with children in mind should serve certain mutual functions concerning a child's development: to promote personal identity; to inspire the development of competence; to provide growth opportunities, to encourage a sense of security and trust, and to permit both social collaboration and privacy. Their needs often necessitate alternative building solutions (Day&Midbjer, 2007). Children need architecture not to mould but to serve them. An environment to support, prepare and protect them for their journey ahead (Day&Midbjer, 2007, Little&Ryan, 1978).

Security advances from parental closeness to having a protected physical base which is dependable, resilient and anchored (Day&Midbjer, 2007). Buildings constructed primarily of steel and glass seem lighter and are more suited for older children. Externally, the desire for protection indicates thick, heavyweight, stable buildings for young children. According to Day&Midbjer (2007), structures made of brick, stone, clay, mud, and other natural components readily give this solidity, as shown in plates 3.3.3 and 3.3.4

*Plate 3.3.3: Building constructed of brick and stone to provide a sense of protection. (Source: https://www.legat.com/laraway-school-wins-national-brick-in-architecture-award/ [Accessed 01/10/2022])*

*Plate 3.3.4: Building constructed of brick, clay and mud provide a sense of protection . (Source: https://mdcafeteria.org/the-result/ [Accessed 01/10/2022])*

*Plate 3.3.5: Concrete used as a richly textured material.(Source:https://images.adsttc.com/media/images/6232/0191/6959/fc01/670c/e63f/large_jpg/136-green-school.jpg?1647444393 [Accessed 02/10/2022] )*

*Plate 3.3.6: Timber used to balance the lack of substance in the building. (Source:https://www.designboom.com/architecture/salagnac-arquitectos-waldorf-school-costa-rica-06-22-2020/ [Accessed 01/10/2022])*

Internally, they require refuges such as window seats, hideouts, alcoves and platforms (Day&Midbjer, 2007). Again, this research relates to the need for a child to have their own space to be alone. As shown in plate 3.3.5, richly textured material, such as concrete, travertine, and teak, infiltrates our peripersonal domain, provoking multisensory, psychologically rich, nondeliberate and deliberate thoughts (Goldhagen&Gallo, 2017). Timber in a building can balance the lack of substance; refer to plate 3.3.6. Furthermore, the visual warmth of undecorated wood stimulates relationships with nature (Goldhagen&Gallo, 2017). When the traces of construction are advertised on a building's surfaces, they

give us opportunities to intellectually simulate the method of their making (Goldhagen&Gallo, 2017). According to Bettelheim (1974), the more architectural aspects invite touch and offer comfort, the more readily the building may be recognized as a safe home. These aspects relate to the concepts and theories discussed later in chapter 3. Making outdoor places feel secure by implementing defensible space measures also dramatically impacts children's safety.

Providing atriums and courtyards at the centre of a building, as seen in plate 3.3.7, is a valuable link to everything, making the whole seem more understandable (Day&Midbjer, 2007). These spaces may be interconnected to provide a framework for the learning spaces or used for performances and productions that overlap with other events instead of having a dedicated space that will be hardly utilized. Many more patterns can be related to these patterns, as seen in plate 3.3.8, in a lattice framework that interrelates all patterns seamlessly (Alexander et al., 1977). An individual's life is a complicated web of concrete and symbolic relationships (Seamon et al., 1985). As a designer, the role is to provide opportunities for the web to start, expand and strengthen. It is essential to envisage the environment as a network of possible places competent in engaging and maintaining a complex of physical, sensitive, intelligent, and spiritual connections (Seamon et al., 1985). Furthermore, by having surroundings full of exploratory prospects encourages creativity and imagination (Day&Midbjer, 2007).

*Plate 3.3.7: Courtyard at center of building. (Source:https://www.archdaily.com/978637/green-school-south-africa-gass-architecture studios?ad_source=search&ad_medium=projects_tab [Accessed 02/10/2022)]*

*Plate 3.3.8: Web of interrelated patterns. (Source:https://www.archdaily.com/978637/green-school-south-africa-gass-architecture studios?ad_source=search&ad_medium=projects_tab [Accessed 02/10/2022)]*

Day&Midbjer (2007) p.18 indicate that design must tread a narrow path, which varies “between places that nurture and those that help them grow”. For healthy development, children want to feel appreciated and secure (Day&Midbjer, 2007). Children's environment during their developmental years can be of assistance or obstruction that they can carry a long way into life (Day&Midbjer, 2007). Furthermore, confusing buildings make children feel oppressed and disoriented. Laura&Levine (2017) believe we are continuously adjusting to our environment by arranging the world in ways we can understand. According to Woolner (2010), considerable research shows that teachers and students observe the built environment and form views about it, recognizing flaws and shortcomings. These perceptions about the

structures influence their thoughts and ideas about the educational experience. Retrospectively, a building that is easy to interpret, where we can orientate ourselves, makes us feel more self-confident (Day&Midbjer, 2007). The reviewed literature develops an understanding of the importance architecture plays in being comprehensible for children to assist in locating themselves (Day&Midbjer, 2007).

In contrast, pathways that cannot connect visually from one place to another can make a child's experience confusing and even scary. Sensory connections between inter-related rooms allow children to know what's happening around them and prevent them from feeling isolated (Day&Midbjer, 2007). Weinstein&David (1987) claim that children feel scared and disoriented by intense variations of stimulation. This relates to the earlier discussion in chapter 2, where (Selikowitz, 2021) suggests the classroom should not be overstimulating; instead, it should aim to be interesting but muted in tone. Furthermore, modest changes in ceiling height, lighting, floor level, colour, and other physical elements will improve the impression of an interesting, comfortable, safe place. Typically, most schools have small clusters of rooms spread across the corridor length, as shown in figure 3.3.7. But what distinguishes one sealed box from another? This can be very confusing for a child to navigate, things are not as they appear, and the world is unreliable. Day&Midbjer (2007) p.22 quotes anthropologist Edward Hall: "To be disorientated in space is to be psychotic". Architecture designed in this manner impedes a child's healthy development.

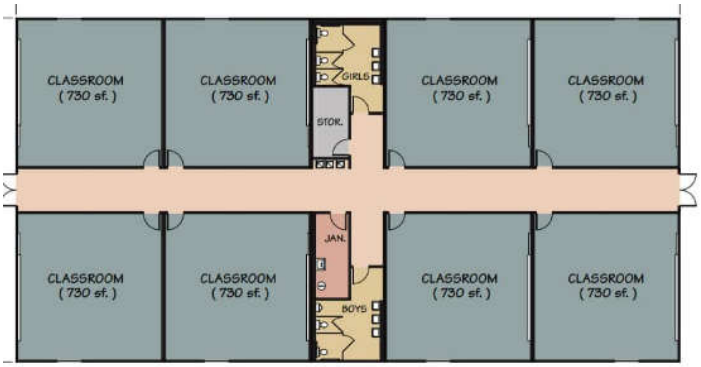



*Figure 3.3.9: Typical classroom floor plan. (Source:https://www.ramtechmodular.com/education-floor-plans [Accessed 02/10/2022 )*

In comparison, orientating a child with meaningful unity and navigational clarity reassures them that life is secure (Day&Midbjer, 2007). Children who can relate to their house makes them feel territorially safe, which allows for better concentration. Moreover, the home, the neighbourhood, and the school are the three physical locations where socialization happens that dictate the child's daily existence (Weinstein&David, 1987). Many of the essential social roles, environmental skills, and interactions are learned in these contexts. The child will later create, identify, appraise, and influence physical spaces and places formed from their lens of place identity (Weinstein&David, 1987).

Small children view the world as a wholeness of qualitatively related relationships (Day&Midbjer, 2007). This is the same way that metamorphosis works, according to Day&Midbjer (2007), who indicate that one principle manifests in altered but connected forms in various situations, which form part of one ‘individuality’. The connection, the principle that unifies them, demands inner activity, like a child's attention. Visual unity and expanded variety are guaranteed from metamorphic variation, both essential for navigation (Day&Midbjer, 2007). The language linked to an architectural theme provides an organizing principle on which the spatial connection of components and identification of the various space units in the school layout relies. This conveys identity, unity, and structure for the community (Della Torre et al., 2020). According to the preceding discussion, a network of interconnected areas must be considered while evaluating space arrangements for a child with ADHD. Similarly, this relates to Christopher Alexanders' approach of creating a semi-lattice network of overlapping spaces, providing more profound meaning, as seen in figure 3.3.8. The more saturated the design solution, the greater the impact on the community.

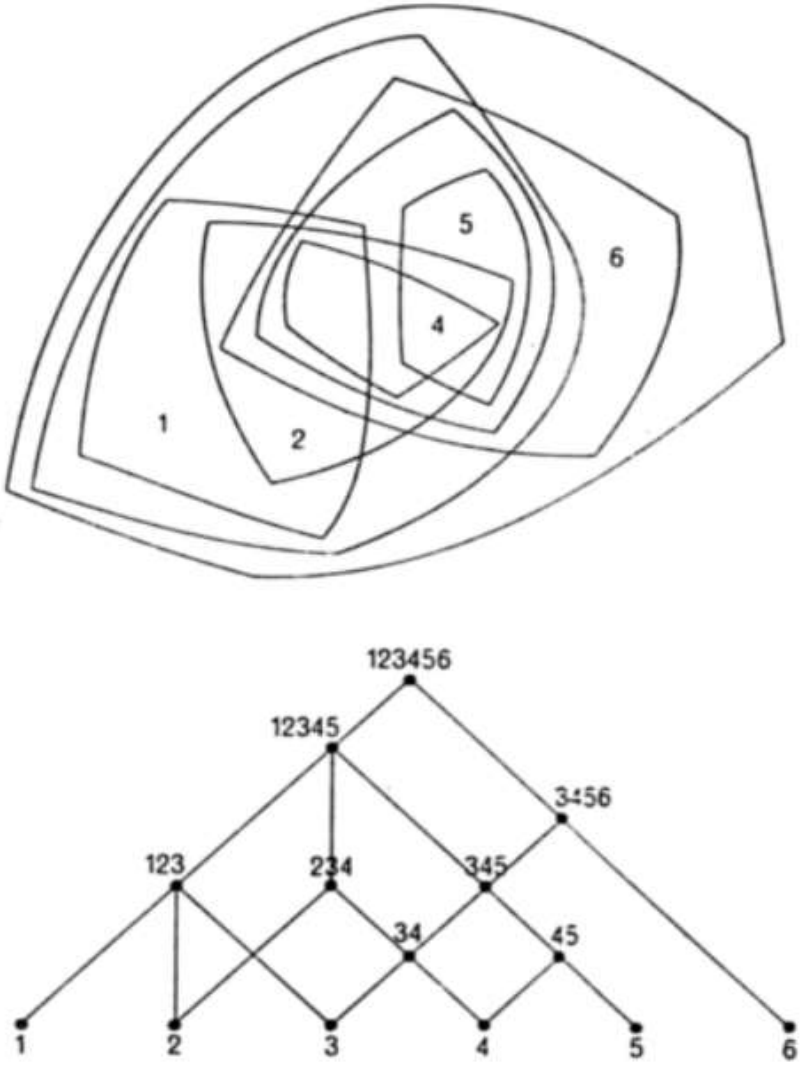



*Figure 3.3.10: Semi-lattice network of overlapping patterns.*
*(Source:https://www.researchgate.net/figure/Christopher-Alexanders-Diagrams-of-Semi-Lattice-left-and-Tree-right-According-to_fig2_354522845 [Accessed 02/10/2022] )*

Therefore, it is essential that a deeper understanding of a child's needs be established before starting any design. As adults, we often forget how we were affected by the built environment when we were children. The preceding discussions in chapter 3 highlighted how the built environment could provide individuals with a sense of identity and how place and architecture can transcend from purely a physically built form to impact us on both a conscious and subconscious level. Furthermore, the research has illustrated the importance of the relationship between the built environment and children's growth. The reviewed literature has demonstrated that buildings must provide more than the basic needs of shelter and safety for humanity. Buildings must provide the psychological, spiritual and specific needs of children with ADHD. Understanding architecture's positive impact on a child with ADHD has provided a deeper appreciation of how essential spaces and places are to one's long-term future growth. This has assisted in answering research questions 3 and 4 of the secondary questions in chapter 1 (see 1.3.4.) The following section will give an argument for the concept of phenomenology and its relevance to a more in-depth knowledge of architecture.

## 3.4 PHENOMENOLOGY

Christian Norberg Shultz (1979), a Norwegian architect, historian, and theorist, was an innovative thinker applying a Phenomenological approach to architecture. He acknowledged phenomenology as having the ability in architecture to make the environment significant by creating individual places. Shultz derived his understanding and philosophy from the concepts of Martin Heidegger (1953), an influential German philosopher of the 20th century. Heidegger's ideas have helped to produce and identify things through a process that allows them to come into the world as they are; he offers a new way to communicate and support our human nature and environment (Seamon et al., 1985). The literature of Heidegger (1962) provides the theoretical foundation for architectural investigation. Kate Nesbitt (1996) describes how Shultz interprets Heidegger's concept of dwelling as being in harmony and a protective place. Shultz further states that "dwelling" is the purpose of architecture and that man dwells when he experiences the environment as meaningful. Norberg-Schulz suggests that different activities require places that dictate a distinctive character; as such, a home should be "protective", a workspace should be "practical", and a place of worship "solemn". This would suggest that a school should be "nurturing" in character, indicating an inclusive approach as illustrated in plate 3.4.1.

*Plate 3.4.1: Vision of truly inclusive education. (Source:https://www.gettingsmart.com/2017/02/01/3-visions-truly-inclusive-education/ [Accessed 22/11/2021] )*

Nurturing is defined in the Oxford Dictionary (2019) as “to care for and protect somebody while they are growing and developing” Architecture in the built form can respond to this need to nurture by creating spaces that provide inclusive, positive engagement. Kate Nesbitt (1996) describes how Shultz interprets Heidegger’s concept of dwelling as being in harmony and a protective place, directly relating to creating a nurturing, inclusive school environment. An individual's quality of life depends on how they can dwell, whereby dwelling means unsurprisingly more than reasonable, functional activities such as simply occupying a room or building (Seamon et al., 1985). According to Seamon et al. (1985), Dwelling from a phenomenological perspective is interpreted as an active human urge, consisting of a need to contribute creatively to the experiences of the concrete world - an act by which individuals establish their reality. Seamon indicates that dwelling involves wanting to belong to the environment and to be at home. Seamon et al. (1985), p.189, highlight that “Home is where a person finds identity, and one's own home is most often where the person and environment's identities overlap most”. Having the classroom conceived as an extension of the home base provides a feeling of identity (Della Torre et al., 2020). The preceding discussion relates to the argument in chapter 2, where Selikowitz (2021) indicates that a child with ADHD  is usually best positioned at an educational facility near their home. Phenomenology recognises a world where people and their environment reciprocally include and define each other and relate to environmental psychology and placemaking, as shown in figure 3.4.2. It concentrates on nature and reality, not as an absolute existence outside us but as a topic for human inquiry, collaboration, and creative involvement (Seamon et al., 1985).

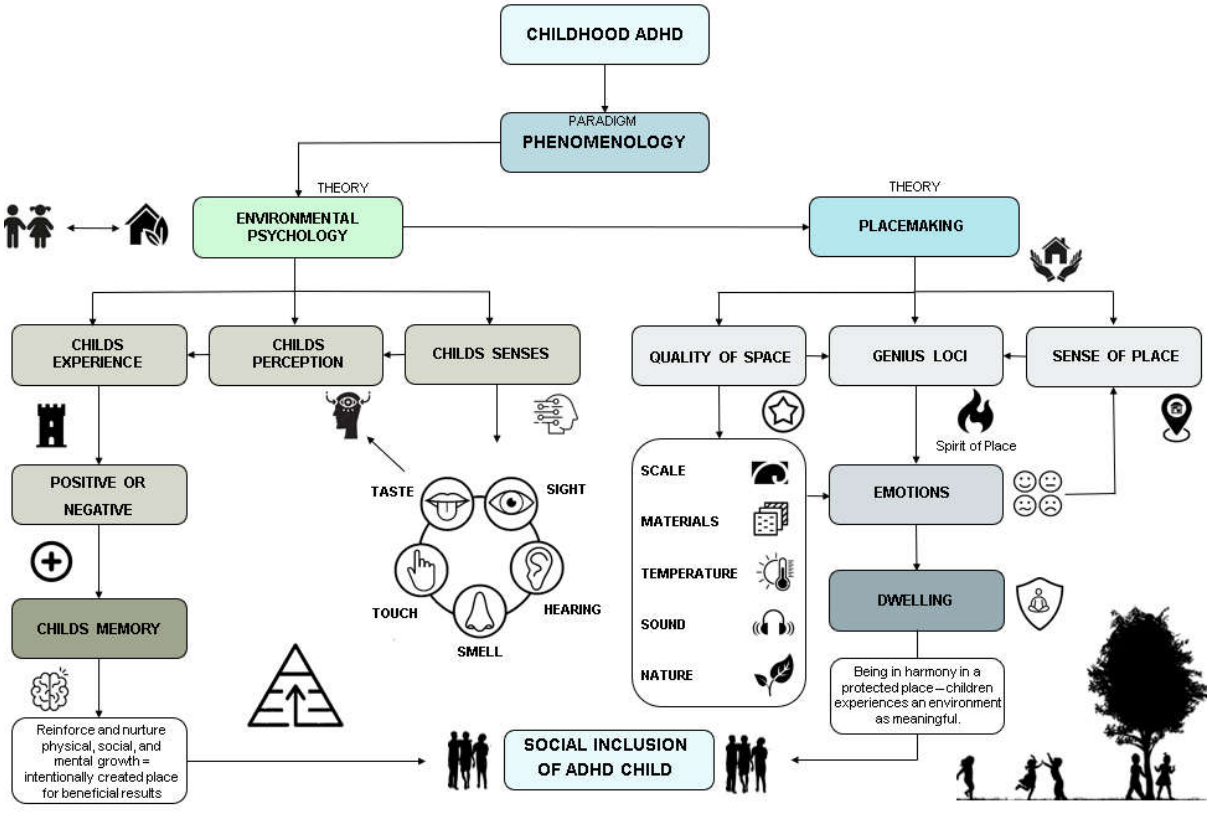



*Figure 3.4.2 Phenomenology mind Map (Source:Author 2023)*

Furthermore, according to Pallasmaa, phenomenology emphasizes that architecture is essentially a multi-sensory experience rather than a merely visual or intellectual activity and sensitizes our whole physical and mental receptivity (Mallgrave&Goodman, 2011). One of phenomenology's most essential assets is pursuing what is apparent but unchallenged and thereby questioning it (Seamon&Sowers, 2008). Nesbit (1996) states that Phenomenology in architecture necessitates purposeful consideration of how things are made. The fundamental elements in architecture are acknowledged and honoured (floors, walls, ceilings, etc.), which has led to a revitalized awareness of the sensuous aspects of materials, colour, and light, and in the symbolic, tactile significances of the joint (Pallasmaa, 2012). Goldhagen&Gallo (2017) indicate that surface details and materials control our attention; we evoke memories, both visual and emotional, of prior experiences with similar surfaces. Other sensory faculties such as smells, sounds, tactile sensations and more are also engaged in our response to surfaces which is more likely to intensely influence the holistic experience of place (Goldhagen&Gallo, 2017).

## 3.5 PLACEMAKING

Placemaking is based on a person's experience in a specific place in both physical and psychological terms. Roger Trancik (1986) states that a person needs a stable arrangement of places to develop themselves, which gives a directive for space to be more than physical and to have emotional content. Furthermore, architecture must respond to and, if possible, enhance environmental identity and sense of place. Placemaking develops meaning from the characteristics of a location and its surroundings as it envisages exploiting the potential of their qualities (Menin 2003). Places are created in our memories and emotions due to frequent interactions and complicated connections; thus, relationships with places must be strong and positive. Shultz's significant Genius Loci contains the following statement: "The task of the architect is to create meaningful places where he helps man to dwell." (Seamon et al., 1985) p26-27). Placemaking demonstrates that the creation of places goes beyond the material dimension and includes aspects such as sociability, activities, connections, comfort, and image, to create relationships between people and a sense of place, as seen in plate 3.5. (Moreira. S, 2021).

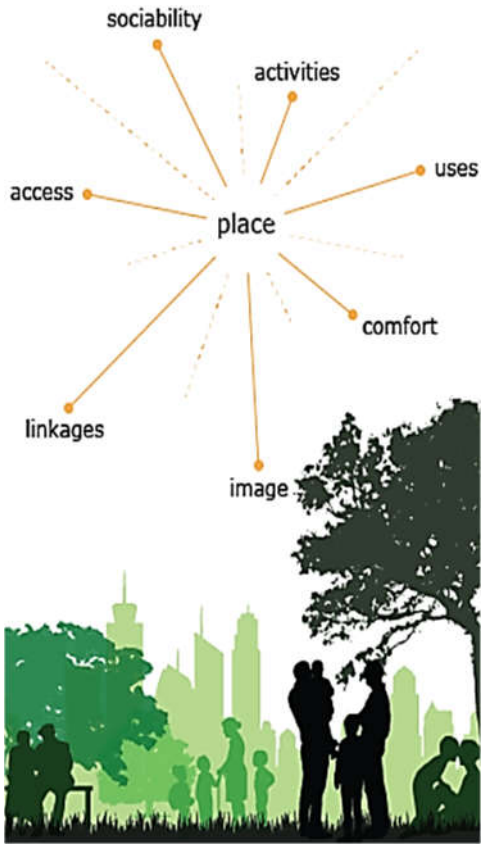



*Plate 3.5.1: "When a space becomes more than the sum of its parts, it becomes a place." (Source:https://www.next.cc/journey/tools /placemaking [Accessed 02/10/2022] )*

Norberg-Schulz states that existential space builds the connection between man and his environment. This concept is separated into character and space in association with the roles of orientation and identification within space. Shultz (1971, p17) defines existential space as “a relatively stable system of perceptual schemata, or ‘image of the environment.” Shulz (1979) uses the term dwelling to define the objective of architecture where a man can orient and identify himself with an environment, consequently gaining significance from it. Dwelling, therefore, suggests that the spaces where life happens are places in every possible way. Shulz further discusses the Roman idea, seen in Figure 3.5.2, of genius loci or "spirit of place," which derives from a certain location's unique character or synesthetic characteristic. Significant factors in evoking this sensation include spatial structures, topographical patterns, textures, natural and climatic elements such as light, wind, sound, people, and the pattern of human occurrences (Seamon et al., 1985). The spirit of a place is more than just the numerical total of its many components; it is the intricate interaction of these features - a broad and ethereal environment, or, in Christopher Alexander's words, a "quality without a name." (Seamon et al., 1985).

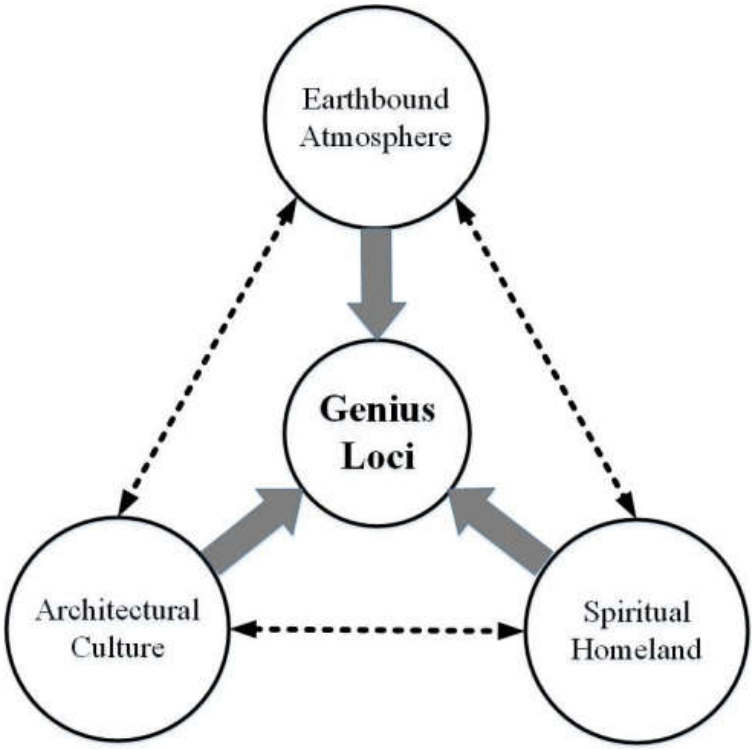



*Figure 3.5.2: “Genius Loci.” (Source: (Jiang&Lin, 2022) [Accessed 02/10/2022] )*

Although a specific physical association exists between individuals and spaces, the associations also include a strong psychological element (Castello, 2016). Each of our unique collections of place memories shapes the creation of the environments in which we may flourish (Augustin et al., 2009). A well-designed place increases personal experiences and is required for happiness. Furthermore, it gives individuals energy and encourages them to interact with others while offering inspiration and comfort that improves people's lives. A well-designed place helps individuals attain their tangible and psychological objectives (Augustin et al., 2009). People experience enhanced feelings in specific spaces. Specific spaces are distinct within the more prominent space in which individuals circulate and,

by being distinct, are identified differently (Castello, 2016). Therefore, it can be argued that these spaces are identified as places by the individuals engaged in them. They have characteristics that allow them to be recognised as a place within the larger space. This implies: that they permit a place to be identified from a space (Castello, 2016).

A place consists of concrete things with physical substance, texture, colour, and shape; collectively, these things establish an "environmental character". A place's material and formal creation determine its character (Norberg-Schulz, 1979). Being simultaneously subjected to specific environmental characteristics within a space allows man to dwell. "orientation" and "identification" form the psychological functions involved in dwelling shown in figure 3.5.3. Moreover, to achieve an existential foothold, man must be able to orientate himself; he must know his location. Man must also understand how he is in a specific place by identifying himself with the environment (Norberg-Schulz, 1979). An excellent environmental image gives individuals a powerful sense of emotional protection, identification and orientation, which are essential aspects of one being in the world (Lynch, 1964).

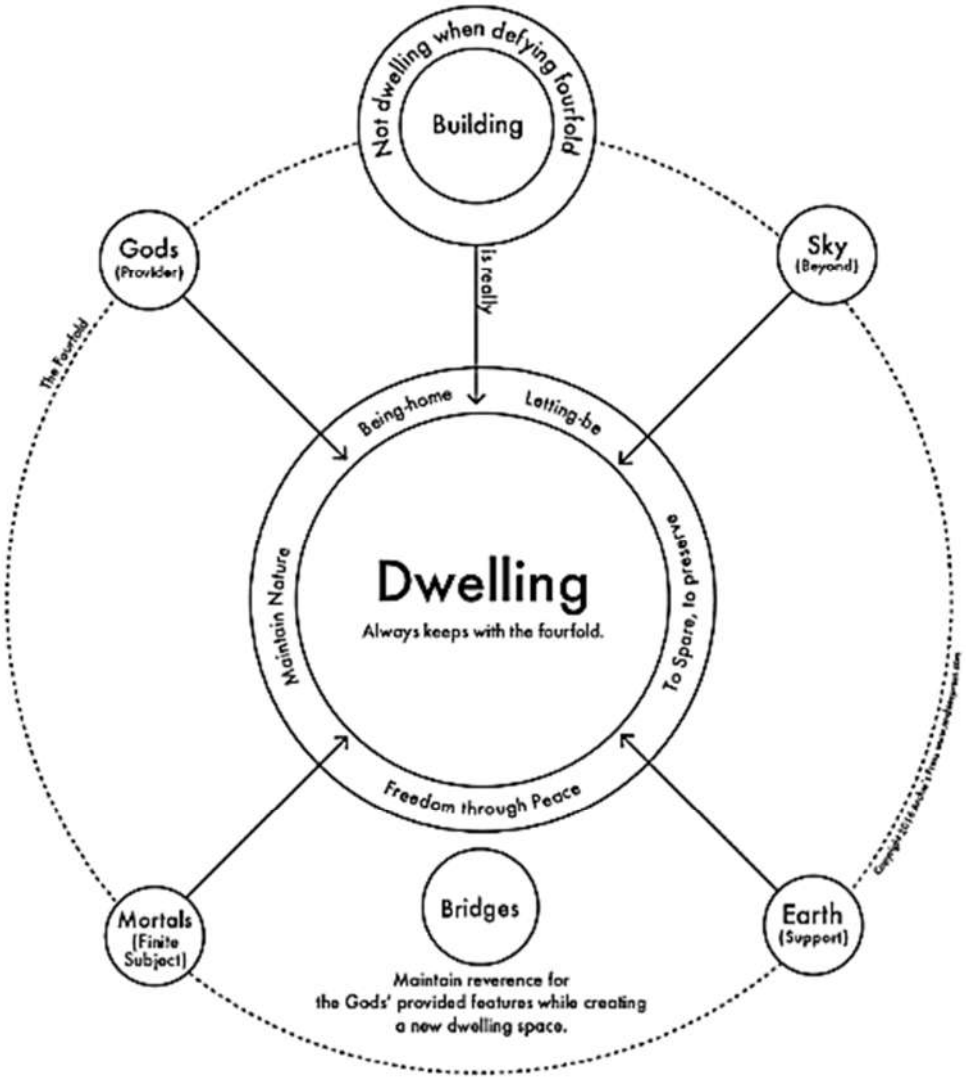



*Figure 3.5.3: Dwelling (Source:https://medium.com/@archiespress/philosophical-diagram-1-building-dwelling-thinking-fa88b75c1cf0Accessed 02/10/2022] )*

In contrast, man becomes perplexed or lost with a weak identification and orientation structure. This leads to a bad image of the environmental character, and consequently, the environment's existential significance becomes compromised (Norberg-Schulz, 1971). Man's relation to places, and through places to spaces, is essential to his dwelling. Therefore, it can be argued that orientation and identification must occur for a child with ADHD to belong to a place truly. Furthermore, these principles assist in answering question 4 of the secondary questions in chapter 1(see 1.3.4)

Numerous authors relate to childhood experiences as part of their investigation concerning phenomenology, which refers to placemaking as they are intrinsically connected (Norberg-Schulz, 1971, Heidegger, 2005, Merleau-Ponty, 2013). According to Piaget (2013), a child must use their body and senses to connect with the environment (Piaget, 2013). This allows them to develop perceptual schemata, establishing the child's future interactions with the environment (Piaget, 2013). Piaget demonstrates that the concept of a structured world progressively develops during childhood and includes a developing series of unique ideas. Menin&Menin (2003) indicate that the relationship between identity and place is far from a "causal requirement".

Additionally, place is one of the determining factors of whom someone is (Menin&Menin, 2003). Designing places where children can relate allows them to orient and identify with a sense of place. Furthermore, a well-developed place inspires social interaction, discovery and self-growth. These considerations are crucial to the psychological well-being of a child with ADHD (Day&Parnell, 2002). Since it has been demonstrated that a child's development is intimately linked to the built environment and a connection with their senses, the following chapters will focus on understanding environmental psychology and its impact on the human senses. This consideration will assist in developing architectural spaces that actively engage children's learning processes and create a positive and inclusive learning environment.

## 3.6 ENVIRONMENTAL PSYCHOLOGY

**3.6.1**

Environmental psychology investigates the relationship between people and their environment, specifically, how the built or natural environment impacts people's daily life, as illustrated in late 3.6.1. Environmental psychology covers numerous design disciplines, including space planning, ergonomics, lighting, acoustics, way-finding, and interior design. Similarly, in schools, as much as in any other environment, psychological processes can influence individuals' learning, teaching, and well-being in many positive and negative ways

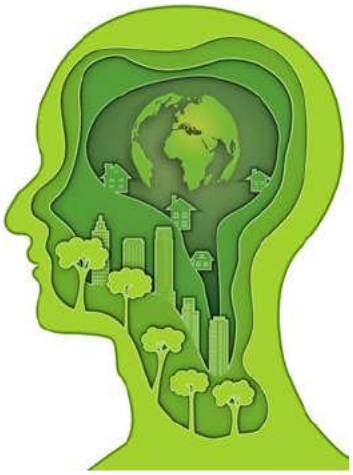


*Plate 3.6.1: Environmental Psychology (Source:https://www.frontiersin.org/research-topics/9810/environmental-psychology-and-the-built-environment02/10/2022] )*

(Sanoff, 2015). Furthermore, Augustin et al. (2009) indicate that the design of a physical place impacts the mental state of the individuals in that space, influencing their attitudes and behaviour. Children learn and develop physically, cognitively, and emotionally via exploration and direct connection with their surroundings (Piaget, 2013). Good places to learn share specific physical and symbolic characteristics (Augustin et al., 2009)

Piaget considered that children take an active role in the learning process and, in so doing, learn about the world. As children engage with the world around them, they repeatedly add new information, build upon existing understanding, and modify previously held concepts to accommodate further information (Ginsburg&Opper, 1988). Piaget was one of the first people to identify that the way a child thinks is different from that of an adult (Ginsburg&Opper, 1988). He proposed that an individual's intellect expands and progresses through a series of four distinct stages, as shown in figure 3.6.2. A child's environment provides the means for intellectual development and, in the process, creates ideas about how the world works (Laura&Levine, 2017). This theory is supported by another influential theorist, Lev Vygotsky, who believed that the external environment provided an essential stimulus that assisted a child's cognitive growth. Richard Lerner, cited in Laura&Levine (2017), suggests the idea that environments affect children and that children also affect their environment. As such, children are both the products and the producers of their development. As a result of the above discussion, it may be argued that if a learning environment does not actively stimulate and engage a child, the child's intellectual growth in that environment will be restricted. Consequently, a child with ADHD would feel excluded when their needs are unmet. The above-cited information reinforces that sensory stimulation is an active ingredient in child development.

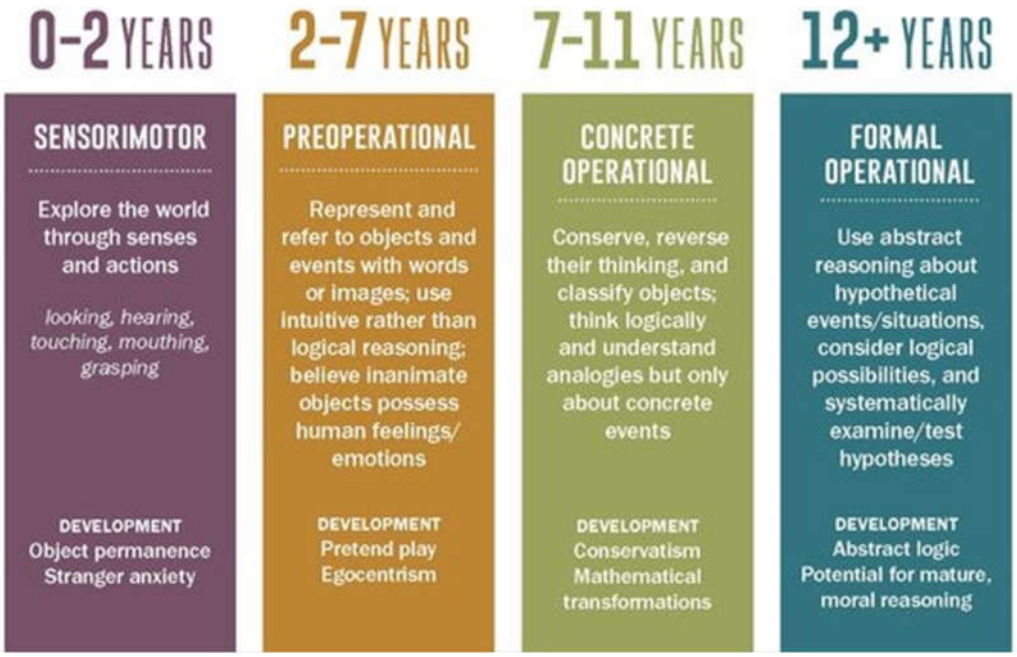



*Figure 3.6.2: Piaget's four stages of development.*
*(Source:\https://za.pinterest.com/pin/195202965088547829/ [Accessed 19/06/2022])*

## 3.7 THE HUMAN SENSES

When architects and designers work on projects for children, they must examine the human senses and how they interact with and are influenced by architecture. Beyond the five typical senses, as shown in plate 3.7.1: taste, smell, touch, hearing and sight, the majority of scientists also include warmth, balance and movement, all of which have been briefly summarized below:

*Plate 3.7.1: The human senses. (Source:http://www.todayifoundout.com/index.php/2010/07/humans-have-a-lot-more-than-five-senses [Accessed 26/04/2022] )*

**Taste** is immaterial when it comes to the perception of space other than when we experience it indirectly in a space, as one in which we eat something that tastes good and associates a positive connection to the space where we ate (Grütter, 2020).

**Smell** has a powerful influence on inducing emotions because smells and feelings are processed in the same area of the brain (Augustin et al., 2009, Day, 2017, Day&Midbjer, 2007). The most remarkable enduring memory of any space is often its smell (Pallasmaa, 2012). Smell is strong enough to trigger memories we didn't realize we had, even from childhood (Day, 2017, Day&Midbjer, 2007). The sense of smell in the experience of architecture is underestimated. We sometimes do not feel relaxed in a space with unpleasant odours (Grütter, 2020). Smell conveys information about the substance of things and how we connect to them. Our mood is also subliminally affected by how a building smells. When we encounter smells during some kind of negative experience, they are swiftly, and permanently, stored in our memory as scents to be shunned in the future (Augustin et al., 2009). The goal of the architect is to determine the use of scent to create a positive impact on the people using that space.

**Touch** is the ability to perceive an object or stimulus that comes into contact with the skin. The sensory mode of touch integrates our experiences of the world and ourselves. (Pallasmaa, 2012). The tactile experience is more critical to our inner being, as hands provide more ' feeling' than the eyes. The things we feel affect our emotional and cognitive responses (Augustin et al., 2009). Texture offers a whole world of 'feeling'. It's essential that the material things children are in contact with, such as lower wall surfaces and floors, invite touch. As indicated Day&Midbjer (2007) p.85 "Once we think 'touch', multiple possibilities for tactile place-identity emerge: smooth and rough, hard and soft places; rigid and flexible surfaces; complex, directional and even-textured ones". Dull and lifeless manufactured materials such as concrete, plastic, MDF and chipboard are prevalent in school buildings. However appealing these materials may seem (Day&Midbjer, 2007, Rotraut, 2015), they are unwelcoming to

touch, and children cannot feel at home with them (Day&Midbjer, 2007). In contrast, materials that make experientially rich encounters include; cork, brick, tile or carpet flooring; smooth or hand-textured plaster; sawn of planed timber walls; fabric, slatted or solid ceilings, all of which assist in creating place identity (Day&Midbjer, 2007). They radiate messages of respect and care that feed the soul and nourish the spirit and heart (Day, 2017).

**Hearing** isn't constrained to what we see (Day&Midbjer, 2007, Pallasmaa, 2012). Our mood is affected by the influence of all sounds, creating an experience of interiority (Pallasmaa, 2012). Children enjoy places such as caves, tunnels, bridge viaducts or echoing walls as they are out of the ordinary. Sound is affected by the proportions, size and shape of a room. Socially desirable circular rooms focus on sound and people (Day&Midbjer, 2007). The sound is bound with space, whether cosy or cavernous, enclosed or open (Day&Midbjer, 2007). A child's attention and understanding are reduced by confusing acoustics (Day, 2017). Children are especially susceptible to the harmful effects of environmental noise, as cognitive processes are less automated and thus more susceptible to disruption. (Klatte et al., 2013). Therefore, significant consideration of the impact of noise must be assessed when designing education facilities for children.

**Sight** is the most accurate of all the senses. Aristotle, cited in Pallasmaa (2012), regarded sight as the noblest of all the senses. Pallasmaa (2012) indicates that architecture has been deemed an art form of the eye, as illustrated in plate 3.7.2. While our society is visually guided, emotionally, we 'hear' what we see. The slightly varying rhythm of our mother's heartbeat in the womb sets the benchmark for all music, where slower tempos are serene, and faster ones are agitating (Day&Midbjer, 2007). Equally, the soul-state is powerfully influenced by the 'tempo' of eye movement. As Day&Midbjer (2007) stated, architecture is sometimes called' frozen music' as its mood-influences range from calming, hypnotic and rousing to aggressive. Our vision of natural materials such as stone, wood and brick enables us to penetrate their surfaces and become assured of the authenticity of matter (Day&Midbjer, 2007). Sight allows us to understand these natural materials, which can express their age and tell a story of their beginnings and their history of human use (Pallasmaa, 2012). Moreover, natural materials provide a sense of warmth through both touch and sight. It is crucial that these elements, where possible, be encouraged to use school facilities to promote a positive environment.

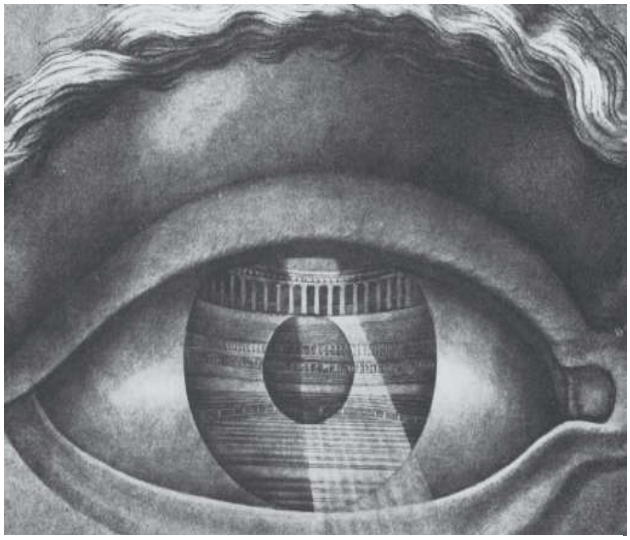


*Plate 3.7.2: Architecture has been regarded as an art form of the eye. (Source: Pallasmaa (2012) [Accessed 23/04/2022] )*

**Warmth** is an early sense and reveals either life-compatibility or hostility of a place, which is also the case for the materials they're made of. Industrial materials do not have the same qualities as ex-living materials, which have internal cells to exchange warmth and moisture with their environment (Day&Midbjer, 2007). Results from a study (Wastiels et al., 2012), which contradicts the above statement, demonstrate that the senses used for the evaluation of warmth have a crucial influence on the perception of warmth and that a difference should be made between the visual warmth and tactile warmth of a material (Wastiels et al., 2012). The visual perception of warmth corresponded to the overall perception of warmth. (Wastiels et al., 2012). According to Day (2017), the lack of warmth in architecture may not be due to low temperatures. It's because the building has lost its heart; it has lost its soul warmth. Therefore, the warmth within a school building must include elements that allow a child to sense warmth and experience it.

**Balance** assists in the resolution of opposing one-sided forces. At around age 7, lateral balance becomes established (Day&Midbjer, 2007). Children appreciate balance-challenging opportunities at this age, such as trees and other obstacles to climb, walk and hop across. Our equilibrium in space is established through finding balance (Day&Midbjer, 2007) and is therefore connected to our identity. Balance in a structure offers stability and structure to a design by positioning the elements so that the visual weight, in terms of objects, colours, textures and space, is distributed. However, balance doesn't necessarily mean symmetry (Day&Midbjer, 2007, Augustin et al., 2009). Balance is required for a foundation of tranquillity (Day, 2017) and is a matter of scale and proportion (Day, 2017). Even though all living creatures have symmetrical establishing principles, one side continuously varies from the other. On the other hand, symmetry has a non-living attribute, whereas balance is alive (Day&Midbjer, 2007, Day, 2017). The opposing pressures of all living forms resolve to form balance. Equally, balanced architecture encourages living, balanced soul moods, as shown in plate 3.7.3 (Day&Midbjer, 2007).

*Plate 3.7.3: Balance in Design. (Source: https://www.gcu.edu/blog/psychology-counseling/how-can-i-maintain-life-balance [Accessed 23/04/2022])*

**Movement** exposes our character and expresses and induces mood (Day&Midbjer, 2007). Spatial orientation is developed by movement and posture, which is fundamental for reading as it forms the bedrock of all intellectual development (Day&Midbjer, 2007, Spencer, 2006). The state of the soul is powerfully influenced by the movement of both the body and eye (Day&Midbjer, 2007). Shapes and spaces need gentle movement to prevent them from feeling lifeless and having no soul, as shown in plate 3.7.4 (Day, 2017). Children must be provided spaces that serve multiple opportunities for exploration and movement but also retreat and rest, both within a building and outside (Rotraut, 2015). Learning experiences for children are generally complemented by movement (Spencer, 2006). It can be argued that schools that provide and encourage adequate moving opportunities, specifically for a child with ADHD, increase productivity, communication and reading ability, allowing them to feel more positive in that environment and thus feel included.

*Plate 3.7.4 Movement in architecture. (Source: https://www.archdaily.com/979479/beeha-headquarters-zaha-hadid-architects [Accessed 23/04/2022] )*

## 3.8 THE IMPACT PROPORTION AND SCALE

Anthropometry is the study of measurements and capabilities of the human body and has considerable importance in optimising the design of buildings. Le Corbusier developed the Modulor, which is an anthropometric scale of proportions. In the long tradition of Vitruvius, Leonardo da Vinci's Vitruvian Man (plate 3.8.1) discovers mathematical proportions in the male body. He then uses that knowledge to improve the appearance and function of architecture. The fundamental principle of anthropometrics is that people should not have to adapt to suit the design of a building. Instead, building designs should be adapted to suit the human form. Children will have precise requirements, which may impact space requirements for fixtures, furniture, and equipment. Several studies have been

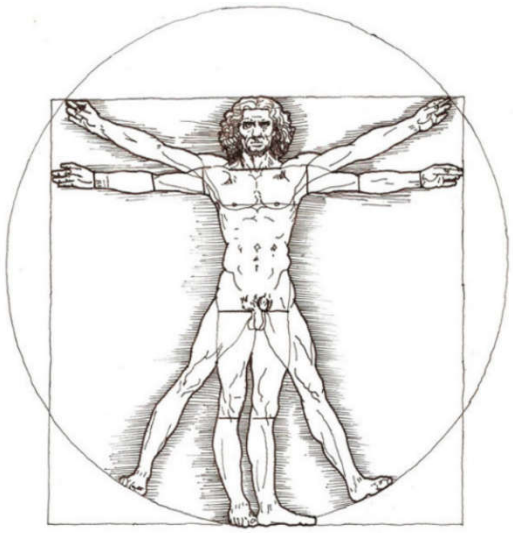


*Plate 3.8.1 The Vitruvian Man - by Leonardo da Vinci. (Source:HTTPs://thenewvitruvianman.com/design/vitruvian-man [Accessed 27/04/2022])*

conducted on children aged 7-12, comparing their body dimensions concerning furniture. The data indicated a mismatch between the student's bodily dimensions and available classroom furniture (Panagiotopoulou et al., 2004). This mismatch harmed their body posture, and it was indicated by Castellucci et al. (2010) that seat height should be considered as the starting point for the design of classroom furniture. Furthermore, during these early years of child development, children will vary in bodily dimensions. It should be the designer's task to ensure that the provision of furniture within the classroom environment is adjustable to suit the needs of all children. Adaptable furniture relates to the suggestion of the standing desk in chapter 2 (see 2.4 ), which provides more opportunities to meet the changing body dimensions of children and will assist the child with ADHD who may need to stand.

The idea of proportion in architecture indicates the relationship between two or more sizes. Le Corbusier devised the golden ratio, also known as the golden section, golden mean, or divine proportion, as shown in figure 3.8.2. In mathematics, the irrational numbers are approximately equal to 1.618. Scale in architecture refers to the relationship of architectural elements as a measurement or ratio with each other and their surroundings, including the human body geometry being in harmony with these elements. The overall context of the site determines how the building should respond regarding height and massing. When creating spaces for children, buildings' shape, scale, and forms are similarly critical. Since they are smaller than adults, some buildings or spaces may feel overwhelming and intimidating. In terms of scale and proportion, every part of the building design is carefully considered to provide children with a feeling of safety, control, and belonging by giving mini microcosms inside the larger picture (Scott, 2010). Providing little-scale furniture and equipment, nooks and hiding holes as seen in plate 3,8,3, low-level little windows, breaking up a larger volume into smaller components, and contrasting the big picture against the small help children make sense of their environment (Scott, 2010).

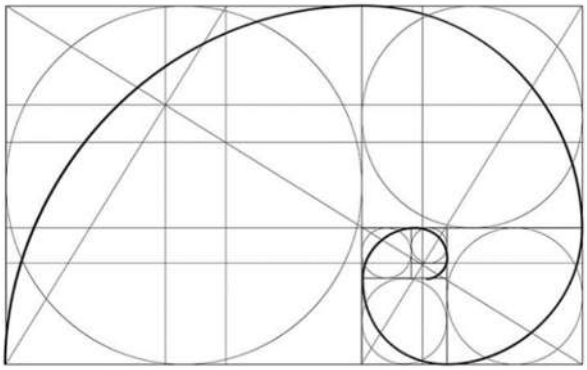


*Figure 3.8.2 The golden rectangle. (Source:https://uxdesign.cc/design-system-based-on-the-golden-ratio-ui-%C9%B8-e45eb98655cb [Accessed 26/04/2022] )*

*Plate 3.8.3: Nooks and hiding holes to provide children with a feeling of safety. (Source:https://images.adsttc.com/media/images/6232/0191/6959/fc01/670c/e63f/large_jpg/136-green-school.jpg?1647444393 [Accessed 02/10/2022] )*

Furthermore, nooks and alcoves or a recessed bay window for sitting measure this scale and positively influence children's sense of safety as it relates to the home. This intimate scale relates to Hertzberger (2009) and his suggestion of the articulated classroom and also to Augustin et al. (2009) and Rotraut (2015). They indicate this smaller-scale space allows an opportunity for privacy within the classroom. Human-scale architecture considers the proportion of space in context to the human body. This scale becomes the unit of design while creating /designing any space. Therefore, the earlier text argues that when creating educational spaces that impact teachers and children, a proportion and scale must be considered to positively affect all users in that space. The knowledge gained from the literature in this chapter develops an understanding of design principles (balance, rhythm, proportion, scale, and movement) that assist in addressing question 4 of the research questions in chapter 1 (see 1.3.4).

## 3.9 THE INFLUENCE OF COLOUR AND LIGHTING

The task involved in accommodating the colour choice of all children is challenging. Children experience different feelings for similar colours (Rotraut, 2015). With light intensity, colour is vitally significant for visual perception (Grütter, 2020). A colour palette perceived as unpleasant will harm a child's motivation and well-being (Grütter, 2020). Conversely, spaces that feel pleasant, where the colour palette and elements are well-coordinated, emitting warmth and softness, have a strong positive psychological effect.

It is well known that warmer or darker painted walls seem closer than cooler or lighter colours, which makes the wall seem further away (Augustin et al., 2009). These influences have been used to change the associations of uncomfortably designed rooms. Low ceilings can feel higher by being painted light, and high ceilings can be lowered with a darker tone, allowing a more cosy feeling (Augustin et al., 2009). Walls can be painted with contrasting colours, influencing how the space feels. Rooms painted with warmer colours seem much hotter to individuals, up to five degrees, than the actual temperature of the room painted in cooler colours (Augustin et al., 2009).

Colours affect our autonomic nervous system (Day&Midbjer, 2007) and influence mental abilities. Red, for example, is assumed to impact brain development and an individual's character (Day&Midbjer, 2007). Colours can be classified as calm, fresh and warm. Calm is unassuming, grey-muted off shades. Fresh colours comprise no black, so it feels clean and pure. Warm colours are soft and gentle and easy on the eye. Rich colours are strong, intense, and the most saturated (Day&Midbjer, 2007). Warmer colour is more active, pulling outward visual, emotional, and social curiosity. Concentration is encouraged by a more passive cool, soft colour. A summarized version provides the following descriptions of colour and the mood effect, as illustrated in the table below in figure 3.9.1.


*Figure 3.9.1: How Do Colors Affect Mood & Emotions? (Source:https://londonimageinstitute.com/how-to-empower-yourself-with-color-psychology/3 [Accessed 02/10/2022] )*

Henner Ertel, cited in Harrison&Hutton (2013) of the Institute for Rational Psychology in Munich, conducted three-year research in which he painted rooms in various colours and discovered that the most preferred colours were light blue, yellow, yellow-green, and orange. Moreover, employing these colours might boost IQ by up to 12 points compared to surroundings where unattractive colours like white, black, and brown were used. Popular colours also increased alertness and creativity, but white, black, and brown playrooms decreased attention span (Harrison&Hutton, 2013). In the design of youth spaces, it is critical to anticipate the behavioural impacts of colour on young people and to consider the integration of colour throughout the whole structure, not just the children's and adolescent areas (Feinberg&Keller, 2010). Colour must be used carefully to establish balance in the surroundings for the design to be effective(Feinberg&Keller, 2010).

Woolner (2010) indicates that even though architects are convinced that good lighting seems sensible, it is difficult to find research evidence substantiating this. He further suggested that some evidence shows that lighting impacts attitude and mood, which may influence performance. The suggestion by Woolner in the preceding literature contradicts research by Walden & Schmitz (cited in (Rotraut, 2015), where they indicate that the lighting provisions of a room are of the highest significance for its ambience, atmosphere and well-being. Furthermore, Rotraut (2015) suggests that from the earliest design concept stages of a school, lighting technology should be included to enhance the learning ability and well-being of the children. Natural daylight has a positive impact on humans, both physically and mentally, which is why school design should include as much natural light as feasible (Rotraut, 2015, Oblinger&Lippincott, 2006). Furthermore, natural daylight improves performance and positively affects social behaviour (Rotraut, 2015). On the other hand, precautions must be taken to ensure the light is not too bright since doing so can harm one's health.

## 3.10 THE IMPACT OF HEATING, COOLING AND VENTILATION

According to various scholars, temperature and air quality are the most significant factors for student accomplishment, with air quality being the most influential (Buckley et al., 2004, Earthman, 2004, Woolner, 2010). Where possible, the best temperatures in winter and summer should be achieved in the classroom environment (Rotraut, 2015). Similarly, as part of detailed research for the Australian government, Fisher (2001) established that these factors are likely to impact student behaviour. Several other reports have associated poor air quality with health problems (Woolner, 2010), which may affect learning and has links to childhood asthma. Furthermore, other studies have indicated that thermal comfort is close to the top of the list of complaints (Woolner, 2010) and that issues with heating and cooling in schools harm education, as shown in Plate 3.10.1.

*Plate 3.10.1: A cold room can lead to lack of attention.(Source:https://socialistworker.org/2018/01/10/classrooms-where-its-too-cold-to-learn [Accessed 02/10/2022]* )

## 3.11 THE IMPACT OF ACOUSTICS AND NOISE

The primary source of unwanted noise is street traffic, followed by rail, air traffic and the noise created by industry (Plate 3.11.1) (Rotraut, 2015, Council, 2007, Day&Midbjer, 2007). These noises were found to restrict the encoding stage of memory (Woolner, 2010). Reading deficits in children in loud environments were discovered to be the consequence of issues with language learning, notably voice perception, produced by the boisterous environment. (Woolner, 2010, Council, 2007, Rotraut, 2015). The literature mentioned above will compound the effects on children with ADHD (Selikowitz, 2021, Barkley, 2014), who generally battle reading and speech (Selikowitz, 2021, Barkley, 2014). Therefore, low ambient noise levels must be achieved in the classroom environment to incorporate pupils with special needs, such as ADHD, into mainstream schools (Dudek, 2007).

*Plate 3.11.1: Unwanted Noise. (Source:https://www.fhwa.dot.gov/Environment/noise/noise_barriers/design_construction/visql/visql05.cfm [Accessed 08/10/2022] )*

Additionally, poor hearing conditions cause misunderstanding of information or even total misinterpretation, which leads to a diminished ability for short-term memory and mental handling of knowledge. In contrast, natural sounds such as the weather or birds singing can benefit the human body as they initiate our sense of equilibrium. Furthermore, using built-up landscaped mounds, trees, fences with hedges, or climbing plants reduces echo as they add absorbency, as shown in plate 3.11.2. Similarly, sheds and workshops lessen the noise of a busy road (Dudek, 2007, Woolner, 2010), while tarmac and still water allow sounds to carry clearly. Parking in noise-sensitive areas increases road-to-ear transfer, whereas the noise is quartered when parking is positioned twice the distance. Children, specifically younger age groups, are the source of most noise within a school environment (Dudek, 2007). The previously reviewed literature in chapter 2 highlighted the increased number of children (over 30 pupils in some instances) in South African classrooms. Consequently, this will impact noise levels, as Dudek (2007) highlighted. Therefore, absorbent materials such as pin-boards, carpets, cushions, heavy curtains, leafy plants etc. must be incorporated to dampen this.

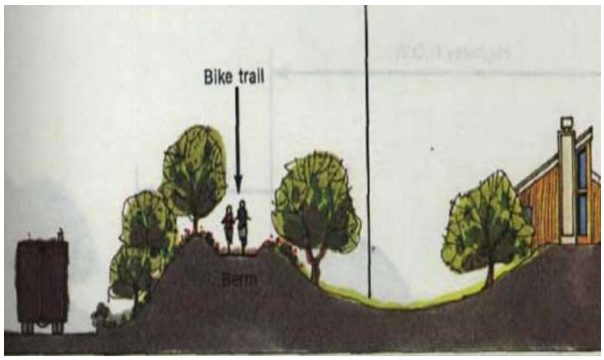



*Plate 3.11.2: Reducing noise through landscape design.(Source:https://www.fhwa.dot.gov/Environment/noise/noise_barriers/design_construction/visql/visql05.cfm [Accessed 08/10/2022] )*

## 3.12 CONCLUSION

The literature review in chapter 3 has shown that the built environment can drastically affect individuals positively and negatively. Architectural surroundings have a direct psychological influence on people's daily lives, health, and well–being. Therefore, it is possible to conclude that children's architectural settings have a direct and long-term influence on their growth and development, including, most crucially, their self-identity. Christian Norberg Shultz (1979) noted that phenomenology could make the environment relevant in architecture by creating unique places. Furthermore, place identity is considered a foundation of a child's self-identity, which consists of perceptions about the physical environment that also help to define who the child is (Weinstein&David, 1987). It is the early physical space and place perceptions of childhood that have the most profound impact on the person's consequent place identity (Weinstein&David, 1987). This chapter has also highlighted that particular colours, lighting considerations, room temperature, noise and use of materials may all induce negative experiences in some manner. As a result, to allow a child with ADHD to reach a state of self-actualization(Medcalf et al., 2013), engaging and stimulating settings are critical for them to develop and feel capable.

The final chapter of this literature review considers inclusive school policies globally to assist in understanding key aspects of what inclusive means in an educational setting. Architectural spaces for child development are analysed using the chosen theories to assist in understanding the impact of these spaces on children and their social and academic development. Architecture does not place us in realms of fictitious creation and fiction; instead, it articulates our experience of being in the world and improves our feeling of reality and self (Pallasmaa, 2012).

# CHAPTER 4: CREATING AN INCLUSIVE LEARNING PLACE FOR CHILDREN

## 4.1 INTRODUCTION

South Africa has a long history of laws and regulations that “justified” living in a society where individuals were excluded based on the colour of their skin. During this period, children were taught to " belong" to a specific group divided by race, religion, and social status (plate 4.1.1). According to the book Urban Inclusivity in Southern Africa, the days of apartheid, when black Africans were deemed foreigners in their own country, have ended. Human rights, democratic values, and social justice are increasingly central to South African culture (Magidimisha-Chipungu&Chipungu, 2021). It can be argued from the preceding text that our country's past has given us a clear grasp of what exclusion means.

*Plate 4.1.1: Excluded child based on race (Source:https://www.mend.org.uk/exclusions-for-racism-related-incidents-increase-by-more-than-40-in-primary-schools/ [Accessed 08/10/2022] )*

Furthermore, it should be something that all South Africans strive to prevent in all aspects of our society, starting with our children and how they understand inclusion. The following chapter provides research on inclusive school policy from a local and international perspective. These inclusive policies afford an understanding of what inclusion in schools aims to achieve, which contributes to answering question 4 in chapter 1 (see 1.3.4). In addition, research on an inclusive design approach, architecture, and spaces for child development is critically analysed. This insight provides a deeper understanding of how architecture provides an inclusive learning environment for children with ADHD in grades 1-7.

## 4.2 INCLUSIVE SCHOOL POLICY

Today, many nations have adopted an inclusive approach to education. UNICEF (2019) describes it as "the most effective strategy to provide all children a fair opportunity to attend school, study, and acquire the skills they need to flourish." The inclusive approach encourages all children to attend the same classes in the same schools (UNICEF, 2019, Forlin, 2014), giving previously excluded children opportunities to engage and socialise with more students across diverse abilities. South Africa has had an inclusive education system since 2001 with the implementation of White Paper 6, which mandates that schools investigate and adopt an inclusive education strategy (Education, 2001). Furthermore, according to UNESCO (2009), an inclusive education system can only be developed if ordinary schools become more inclusive and increase their capacity to teach all students in their communities (Forlin, 2014). Additionally, these principles acknowledge that education is a human right and serves as the basis for more equal, inclusive, and cohesive communities, illustrated in figure 4.2.1

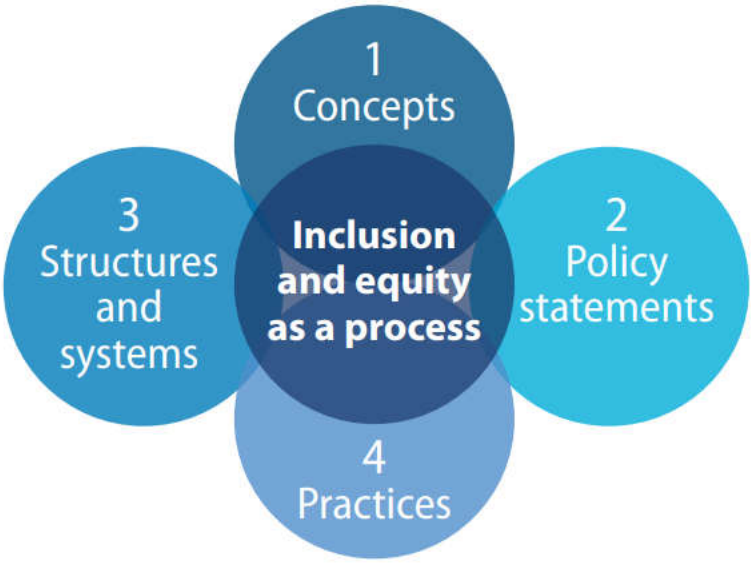



*Figure 4.2.1: Dimensions of the policy review framework. (Source: (UNESCO, 2017) [Accessed 26/04/2022])*

It is essential to recognize that inclusive education may be considered the heart of what South Africa aims to do as a country to establish a changed and integrated society (Education, 2001). A society in which there is tolerance and respect for diversity, as well as care for all human rights. Furthermore, legislation preventing discrimination against human rights is based on the principle that all humans are born free and equal. As highlighted in figure 4.2.2, discrimination is the denial of rights based on an individual's characteristics, such as gender, colour, or handicap, and is the polar opposite of equality (Spandagou et al., 2020). Despite attempts to enhance educational conditions, certain children and young people remain marginalized by present structures. Unfortunately, creating more inclusive schools remains one of the most challenging tasks confronting education systems across the globe (Ainscow et al., 2006). Inclusion is still a complicated and contentious subject, and the emergence of inclusive policies in schools is little understood (Ainscow et al., 2006). To achieve this ambitious goal, governments must ensure inclusion and equity in their educational systems and projects (UNESCO, 2017).

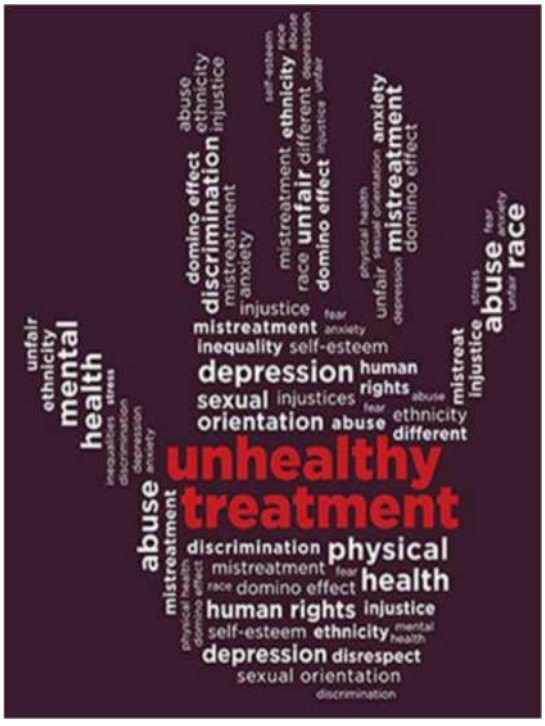



*Figure 4.2.2: Discrimination. (Source:https://newsroom.ucla.edu/stories/discrimination-can-be-harmful-to-your-mental-healthAccessed 08/10/2022] )*

The published Special Needs Education: White Paper 6 (Education, 2001) on inclusive education and training is defined as:

- Recognizing that all children and youth can learn and that all children and youth need help.
- Accept and appreciate the truth that all learners vary in some manner and have varied learning requirements, all of which are equally valued and a regular part of our human experience.
- Are concerned with enabling educational institutions, processes, and learning approaches to fulfil the requirements of all students.
- Recognize and appreciate student differences related to age, gender, ethnicity, language, class, impediment, or HIV status.
- Are concerned with altering attitudes, behaviour, teaching approaches, curriculum, and the environment to suit the needs of all learners.
- Are concerned with increasing the engagement of all learners in the culture and curriculum of educational institutions, as well as identifying and removing obstacles to learning.
- Aim to empower learners by developing their capabilities and allowing them to engage critically in the learning process.
- An inclusive education and training system is designed to offer learners and educators varying degrees and types of assistance.

Additionally, an international perspective of inclusive education gives a summary below that can be found in a wide range of sources available in the literature, classified as essential features (Forlin, 2014)

- All children attend their neighbourhood school.
- Schools and districts have a "zero-rejection" policy regarding enrolling and educating children in their territory. Every youngster is welcomed and respected.
- All children study in regular, varied classes with classmates their age.
- All students follow identical programs with a customizable curriculum. Diverse and adaptive teaching modes fulfil all students' needs. All children participate in school and classroom learning activities and events regularly.
- All children are encouraged to make friends and succeed socially with their peers.

Compared to the research addressed in Chapter 2 (see 2.3 and 2.4), many of the above aspects are significantly related locally and internationally. Furthermore, these key aspects are related to research discussed in chapter 3 ( see 3.3 & 3.4) as they provide a sense of place identity, which is considered a foundation of a child's self-identity (Weinstein&David, 1987, Jenkins&Forsyth, 2009). Moreover, a sense of place identity provides an environment in which to “dwell” (Norberg-Schulz, 1971, Seamon et al., 1985). Place identity created from children's daily settings affects their overall behaviours and

attitudes (Medcalf et al., 2013). It is apparent from the earlier arguments that inclusive policies have a positive impact on students with ADHD.

Legislation for inclusive education is critical in establishing a more accessible and equitable educational system. In particular, it articulates principles and rights necessary for establishing a framework for inclusion and changing those aspects of the present system that may constitute significant barriers (UNESCO, 2017). While most people agree on the principle of inclusion and the need to ensure human rights for individuals with disabilities, they cannot agree on the specifics of what inclusion is and how to achieve it (Ainscow et al., 2006, Kauffman, 2020). Similarly, according to Ainscow et al. (2006), there are various perspectives of inclusion but no singular viewpoint of inclusion within a particular nation or school. With this in mind, a typology of six different approaches to inclusion has been highlighted in the below text by Ainscow et al. (2006) :

1. Inclusion concerns disabled children and those with "special educational needs."
2. Inclusion as retaliation for disciplinary exclusion.
3. Inclusion of all groups is seen to be susceptible to exclusion.
4. Inclusion is a means of improving the school for all students.
5. Inclusion in the sense of 'Education for All.'
6. Inclusion is a guiding concept in education and society

Furthermore, research by Forlin et al. (2013) indicates the following:

- **Full inclusion** is being placed full-time in a mainstream school setting and actively engaging in the curriculum and activities of that classroom.
- **Partial Inclusion** means the student can enrol in a special unit or class on the same campus as the mainstream school.
- **Distinct Special School** suggests that children are put in a setting that is physically and educationally separate from the student's local mainstream school.

Special schools often assist children with moderate to severe disabilities with strict admissions requirements. The above research highlights numerous variations in how inclusive education policies are perceived and implemented. Moreover, specific types of inclusion (full, partial, and distinct special schools) suggest that some students may not be capable of being fully immersed within a mainstream school environment. The idea of inclusion is further questioned by McLeskey et al. (2014), who believe that schools must place equal emphasis on fairness and excellence; otherwise, they will fail to meet the fundamental goals of education. Therefore, the concepts of inclusion are more than simply assuring access to education. It also provides high-quality learning environments and pedagogies that allow students to grow, comprehend their circumstances, and strive for a more equitable society (UNESCO, 2017). This argument implies the necessity for various inclusive ways to ensure that the level of

education is not compromised by the requirement to include children who may reduce that standard. Keeping this in mind, the previously examined material in Chapters 1 and 2 shows that children with ADHD are more than capable of being fully integrated into a mainstream school if they are given the opportunities to cope.

Even though White Paper 6 is enforced by law, a democratic system is predicated on people's collective capacity to create opportunities and address problems (Sanoff, 2015). Furthermore, individuals not only have the right to participate in choices that affect them, but their involvement will also increase the decision-making process's efficacy (Sanoff, 2015). As a result, successful school planning and design require effective collaboration between educators and architects, especially for communities interested in pushing the limits of traditional educational paradigms. (Sanoff, 2015). Unfortunately, the unique behavioural needs of building users are often disregarded in building design, and the architect's decisions are seldom communicated to most users. The goal of social/ inclusive design is to bridge the gap between architects and users. (Steg et al., 2019). Therefore, for the implementation of inclusive education policies to be successful, they need to go hand in hand with an inclusive design approach (McLeskey et al., 2014, Boys, 2017).

## 4.3 INCLUSIVE ARCHITECTURAL DESIGN APPROACH

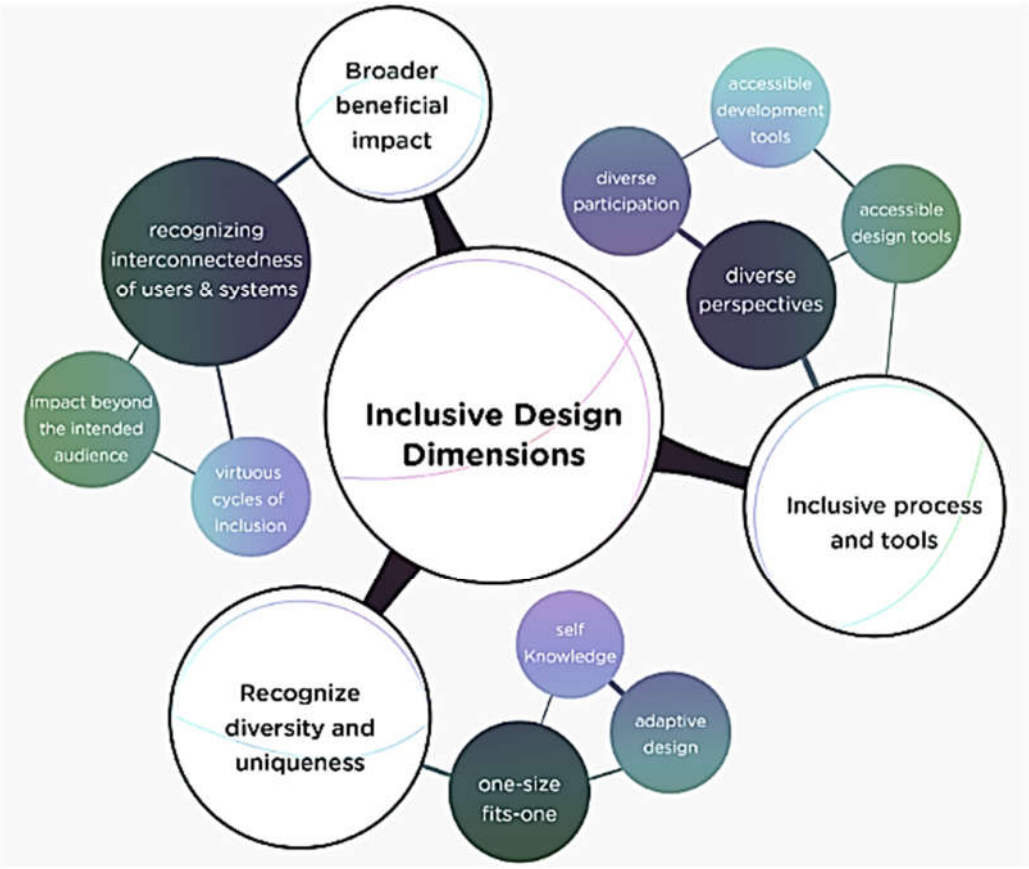



*Figure 4.3.1: Inclusive design approach. (Source: https://accessibilityinclusivedesigncasestudies.wordpress.com/users-technology-rebuilt/challenges-of-inclusive-design-rebuilt/ [Accessed 08/10/2022])*

Day&Parnell (2002) indicate that change isn't always bad, but being unable to control it may be stressful, distressing, and resentful. Additionally, change can make us feel disempowered, undervalued, and unimportant. Consequently, many individuals live where they don't feel a connection. In contrast, we feel accountable for and protect places we have shaped (Day&Parnell, 2002). Facilitating an inclusive school's design starts at the project's inception, which must begin with an inclusive design approach, as shown in figure 4.3.1 above. According to Langdon et al. (2012), design exclusion does not occur by chance: it is the product of neglect, ignorance, and a lack of relevant data and knowledge. The reviewed literature in this chapter develops an understanding of an inclusive architectural design approach. This knowledge assists in addressing question 4 of the research questions in chapter 1 (see 1.3.4)

The inclusive design approach emerged as a reaction to the limitations of mass production design in the late twentieth century, which was discussed in chapter 3 of this dissertation. During that period of tremendous economic growth, architects and designers preferred to approach people as 'universal kinds' rather than individuals (Coleman et al., 2016). In contrast, an inclusive design approach emerged due to a profound shift in how society views various individuals. This approach is reinforced by Coleman et al. (2016), who indicate that speaking to 'the old and 'the disabled' as different groups outside the mainstream is no longer appropriate. Therefore, since a school is a public place, it must accommodate people of all ages, abilities, and sizes, as illustrated on plate 4.3.2, and its architectural characteristics must be adapted (Langdon et al., 2012). Inclusive design must seek to build environments that value diverse human talents and circumstances and advocate integrating user experience into the design process. Furthermore, to design for people of specific abilities, designers must involve people and their real-life experiences in their design process (Langdon et al., 2014, Woolner, 2010, Dudek, 2005). Therefore, the goal is to incorporate people who genuinely contribute to the design process from their experience, offering feedback and commenting on the designer's suggested solutions (Langdon et al., 2014, Coleman et al., 2016).

*Plate 4.3.2: Inclusive design approach.(Source: https://www.monash.edu/education/teachspace/articles/five-principles-of-inclusive-education [Accessed 08/10/2022])*

The significance of memory in the architecture of school buildings cannot be emphasized enough. Adults and children have different memories of specific rooms, places, and architecture (Dudek, 2005). Furthermore, school buildings may bridge adult and child perspectives of architectural space throughout a child's development (Dudek, 2005). An inclusive design approach recognizes that less measurable human factors such as identity, emotion, delight, and self-expression are universal. Getting these correct for users vulnerable to exclusion is an effective way of ensuring that what we design improves life quality for as many people as possible, most simply and intuitively (Coleman et al., 2016).

Additionally, participation requires progressive agreement and ownership that fosters a sense of community (plate 4.3.3) and shared ambitions (Spencer, 2006, Woolner, 2010). People are more linked to an environment they helped create, which means less vandalism, neglect, and costly replacements. Similarly, pride in producing and being heard in schools builds respect for the environment and community, enhancing well-being and learning ability (Spencer, 2006). There is sufficient evidence to show that school users actively participating in the school environment may boost learning. Staff and students should be trained to see buildings' potential (Spencer, 2006). The abovementioned argument speaks again to the earlier research concerning place identity, which relates to self-identity. A child with ADHD will be impacted by having a positive self-identity that culminates in the sense of feeling included. Many places have a communal component that creates a web of invisible ties (Day&Parnell, 2002). A place's layers must be learned: its physical substance, its life, its moods, and its spirit. The individuals who inhabit a location breed its spirit. And, since spirit is so inextricably linked to the community of 'users,' it is they who affect the path that spirit takes(Day&Parnell, 2002). This notion relates to Norberg-Schulz (1979) concept of dwelling, where he argues that the spaces where life occurs are places in every manner conceivable.

*Plate 4.3.3: Sense of community. (Source:https://za.pinterest.com/pin/433119689164860700/ [Accessed 08/10/2022])*

Similarly, in Christopher Alexander's words, the spirit of a place is a "quality without a name." (Seamon et al., 1985). Therefore, one of the goals of the inclusive design process is to establish a degree of truth that resonates with and gratifies all those involved. Increasing societal participation (plate 4.3.3) in the architectural process is critical to its success (Jenkins&Forsyth, 2009). In contrast, according to Day&Parnell (2002), architects seldom appreciate the community's overall competency. Woolner (2010), on the other hand, contends that expanded engagement should ensure that designers have access to critical information and expertise and develop connections and understandings. Furthermore, a reliable method is required to bring this often unconscious knowledge to the surface, enabling it to construct places of integrity in harmony with natural surroundings, climate and culture (Day&Parnell, 2002). Such settings emanate a liveliness and honesty that rational planning can never equal (Day&Parnell, 2002, Jenkins&Forsyth, 2009).

*Plate 4.3.3: Social participation.(Source:https://www.ceo-review.com/the-power-of-community-engagement/ [Accessed 08/10/2022])*

South Africa has a shorter history of an inclusive design approach to architecture than most other nations. Furthermore, according to Jenkins&Forsyth (2009), it seems that broader societal engagement in South African architectural education is restricted. The earlier research argues that architects must educate themselves to comprehend the significance and process of social involvement. Therefore, architects should incorporate as many essential participants in the design process as possible. This participatory process ensures that numerous design considerations are reflected, allowing an overlapping, densely saturated architecture to be achieved. The result is a better overall building that the community will appreciate. The architect needs to be the catalyst for change!

## 4.4 ARCHITECTURE AND SPACES FOR CHILD DEVELOPMENT

Harrison&Hutton (2013) stated that the application of 28 patterns from Christopher Alexanders' book; A Pattern Language is essential for a healthy and productive learning environment. Furthermore, according to Alexander, patterns do not imply definitive claims; instead, they reflect a collection of interactions that react to particular situations and circumstances constantly changing by nature. Patterns are meant to be utilized, questioned, updated, and used in new situations (Rotraut, 2015, Harrison&Hutton, 2013). The pattern language concept celebrates the interconnection of the spatial, psychological, and behavioural aspects of human experience (Harrison&Hutton, 2013). The previously reviewed literature in this chapter (see 4.3) correlates directly with the literature on using patterns to connect individuals to the design process.

Hertzberger (2008) emphasizes the need for coherence and community development in school architecture, citing a single school entrance and some form of the central common area as crucial architectural characteristics that will assist in accomplishing these goals.

*Plate 4.4.1: Village layout centred on green or semi-enclosed courtyard. (Source: https://www.archdaily.com/978637/green-school-south-africa-gass-architecture-studios [Accessed 08/10/2022])*

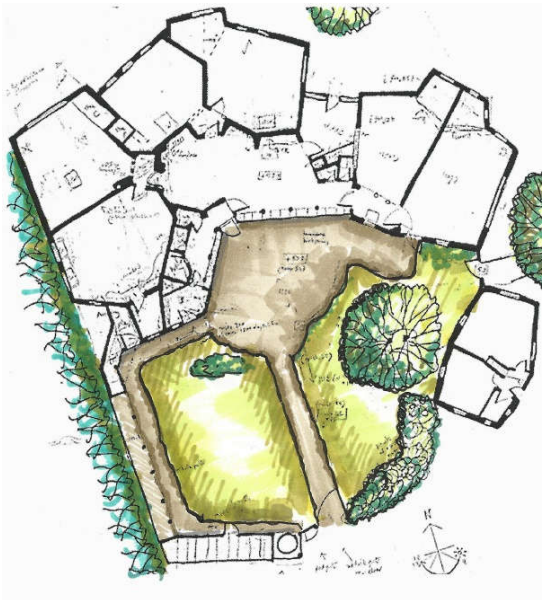


*Figure 4.4.2: Village layout centred on green or semi-enclosed courtyard.(Source: (Day&Midbjer, 2007) [Accessed 08/10/2022])*

Similarly, Day&Midbjer (2007) state that pavilion classrooms reinforce class identification and society. Their work further indicates that courtyards between these extremes preserve whole-school identity while humanizing its size by individualizing its components. The social emphasis of small courtyards is combined with the flexibility of more permeable boundaries in 'village' layouts centred on 'greens' or semi-enclosed courtyards, as shown above in plate 4.4.1 and figure 4.4.2 (Day&Midbjer, 2007). Individual classroom 'front doors' and cloakrooms encourage class-group identities around them. Cloisters and arcades can visually connect different rooms while creating weather-protected zones between them.

Furthermore, this concept, which reduces the need for intersecting narrow corridors, is supported by Woolner (2010), who indicates that these corridors produce strained relationships that may cause confrontations. Similarly, Dudek (2007) advocates reducing narrow passages in schools. His work demonstrates that the most popular solution provides either more oversized corridors with media-rich breakout areas that a cluster of classrooms may use or an H-shaped structure with secondary circulation to classroom clusters and shared amenities, as shown in figure 4.4.3.

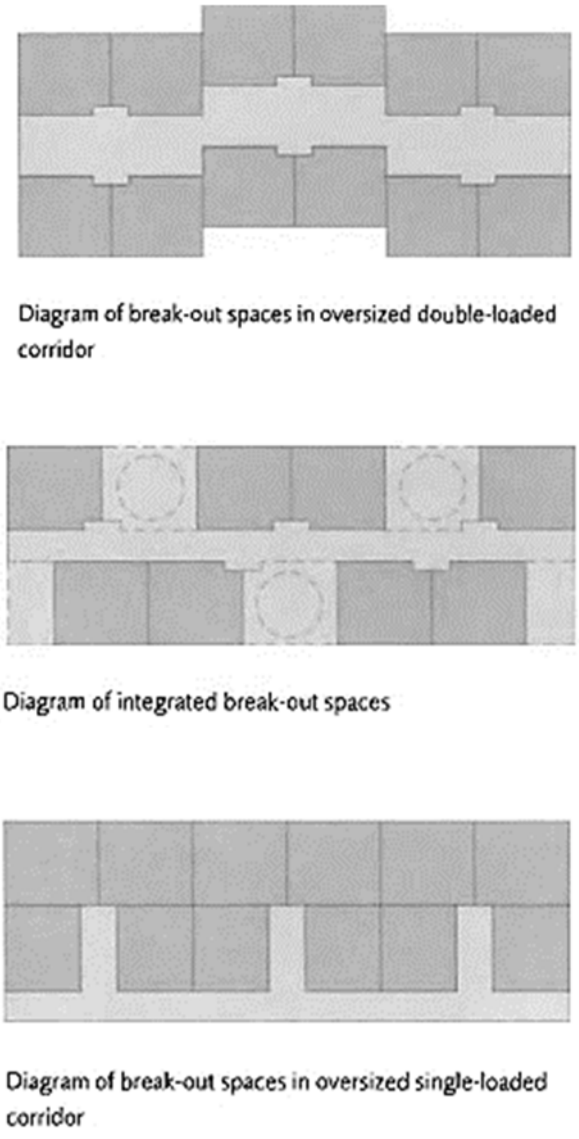



*Figure 4.4.3:Break-out corridor spaces (Source: (Dudek, 2007) [Accessed 08/10/2022])*

Additionally, the elimination of corridors is further supported by Hertzberger (2008). He indicates that school designs should consider classrooms as open spaces rather than confined units and corridors as learning areas. His research suggests that children would gather in smaller groups without corridors, while whole-class instruction could continue in classrooms (Hertzberger, 2008, Dudek, 2005). It can be argued from the earlier research that reducing corridors would positively impact South African government schools, where, as discussed in chapter 2 (see 2.4), classes could have over 30 students.

According to research by Harrison&Hutton (2013), classrooms in modern school designs have evolved into bigger learning studios or suites of interconnected areas where the line between inside, outside, and learning spaces has blurred, often emphasizing informal spaces. These larger studios are achieved by creating new atrium spaces, reimagining corridors and other circulation spaces or finding ways to layer learning activities onto areas used for other activities such as dining or playing, as seen in plate 4.4.4 (Harrison&Hutton, 2013, Alexander et al., 1977). The more flexible a building's movement patterns and room activities are, the less institutional it seems. Therefore flexibility is an essential factor to consider (Day&Midbjer, 2007). Buildings that are appealing and engaging express ideals of pride, which may help children, particularly those who have ADHD.

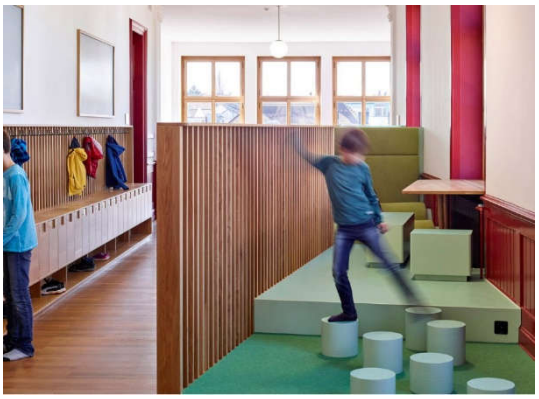


*Plate 4.4.4: Circulation space adapted for play. (Source:https://www.dezeen.com/2019/10/22/zmik-learning-scapes-school-design-basel/# [Accessed 08/10/2022])*

Changes in the shape of a wall can allow spaces to be carved out that can form shade oases or sun traps (plate 4.4.5). Projecting roof eaves allows shade protection of the building envelope and creates a shelter for children from the sun. In contrast, there is no gesture or invitation from a flat wall or roof (Day&Midbjer, 2007). Research has shown that spatial quality impacts mood, where acute right-angled corners cause planes to collide and cause conflict. Externally, acute-angled corners are aggressive and confrontational (Day&Midbjer, 2007). Internally they are claustrophobic and hard to approach.

*Plate 4.4.5:Carved out spaces in curved wall (Source:https://www.glasgowarchitecture.co.uk/hazelwood-school [Accessed 08/10/2022])*

In comparison, as shown in figure 4.4.6, having obtuse angles allows a more hospitable gesture as they impart a kinder and less aggressive feeling externally. Day&Midbjer (2007) suggest that different planes can meet with gentle curves, which suit younger children. Children interpret meanings about

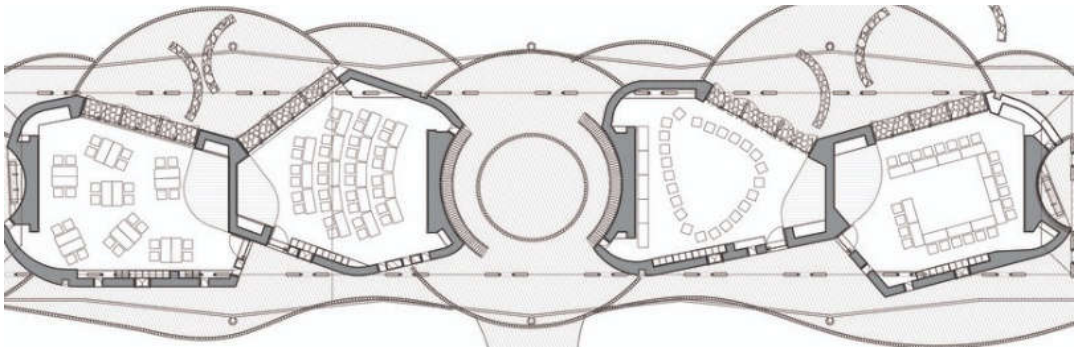


*Figure 4.4.6:Obtuse angles in the classroom allow for a more hospitable environment. (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 08/10/2022])*

themselves and the larger world in their educational surroundings (Dudek, 2005). To develop and improve the sensory perceptions of children, schools must be capable of supporting their needs (Dudek, 2005). This research is supported by Mistrey (2011), who states that if buildings are to become a child's third teacher, then architecture becomes a medium for child development. As a result, architecture is always influential in affecting attention, learning, development, and the introduction to the aesthetic and intellectual experience (Della Torre et al., 2020, Dudek, 2005).

According to Dudek (2005), the physical needs of children must be respected when considering architecture and spaces for child development. Consequently, every classroom must have a bathroom that is easily accessible. Different-aged children should play at age-appropriate playgrounds. Furthermore, outside play spaces should be immediately accessible from the classrooms. Each classroom's closeness to the outdoor spaces creates a feeling of spaciousness and light (Dudek, 2005).

Moreover, research has shown that children learn better in more homelike school environments (Augustin et al., 2009). As such, appropriately built school facilities are critical to facilitating good teaching and learning (Imms et al., 2016, Harrison&Hutton, 2013). As more schools become community hubs, the gymnasium, hall, and cafeteria become the most common public venues. These areas may be combined into a single multi-functional group, either along the school's periphery or as a central meeting place (Dudek, 2007, Dudek, 2005). Other areas of the building would be reserved for students. Since students and the public share specific spaces, a third shared zone, as illustrated in figure 4.4.7, is envisioned between the two(Dudek, 2005).

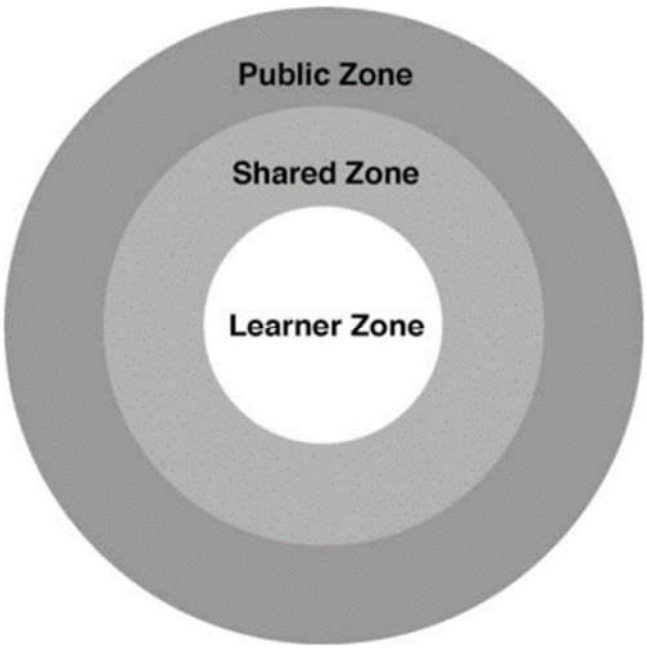



*Figure 4.4.7:Public (community) and private (student) zones(Source:(Dudek, 2005) [Accessed 08/10/2022])*

Integrated break-out spaces are becoming more scalable, nurturing individual and small-group work, focusing on collaboration and the need to accommodate diverse learning styles. As seen in plate 4.4.8, exterior windows and apertures may also provide efficient break-out areas in unused circulation nooks and crannies (Dudek, 2007). Specialised learning places are opportunities to engage all students. Rather than concentrating them in one location, these areas should be designated transitory semi-public spaces (Dudek, 2007). These transitional zones give equitable access to everyone while linking the school's public spaces and front doors to the teaching setting (Dudek, 2007). In addition to specialized learning environments, flexible multi-purpose rooms are required. The dimensions and proportions of multi-purpose rooms must allow for daily, if not function-by-function, alterations (Dudek, 2007, Mirchandani&Wright, 2019, Augustin et al., 2009).

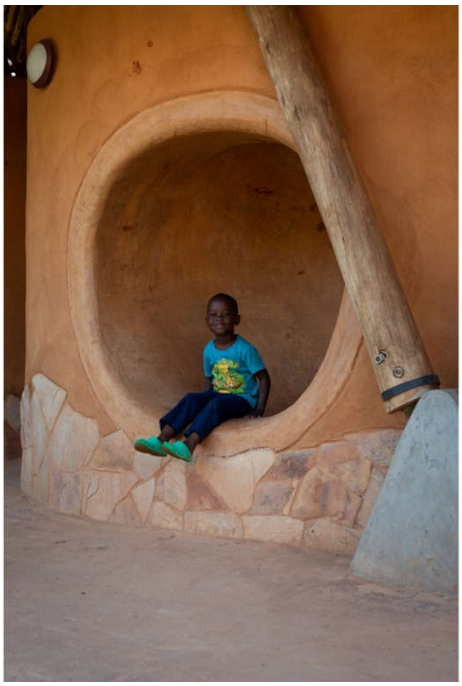


*Plate 4.4.8: Outdoor break-out area. (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 24/05/2022] )*

Furthermore, there needs to be a 30% increase in space allocation for learning settings to enable specialized tailored activities such as remedial reading (Harrison&Hutton, 2013). They recognize that learning occurs across the school and beyond blurs the distinction between the conventional teaching space, the classroom and the rest of the school structure and grounds (Harrison&Hutton, 2013). Moreover, areas may serve many purposes depending on the time of day; social places might be educational spaces. The school library or media centre is becoming a valuable community resource (Perkins, 2002, Harrison&Hutton, 2013, Woolner, 2010). A supportive school library and school library service may significantly improve students' literacy and access to knowledge (plate 4.4.9) (Harrison&Hutton, 2013, Oriogu, 2015). Children who read above grade level are twice as likely as those who read below grade level to utilize the school library. This research directly affects children with ADHD, who, as stated previously, generally battle with reading and speech (Selikowitz, 2021, Barkley, 2014). It can be argued that a high-performing school library is an essential component of an inclusive school designed for children with ADHD.

*Plate 4.4.9: Supportive school library (Source:https://educationsnapshots.com/photos/6225/ [Accessed 08/10/2022])*

Children, like structures, need an organized environment where they may feel at home (Hertzberger, 2008). Feeling at home relates to phenomenology, dwelling and place identity (Norberg-Schulz, 1979, Nesbitt, 1996, Seamon et al., 1985). The student's realm is the classroom which should be distinct from the school's public spaces (Dudek, 2007). Classrooms have traditionally always been rectangular, but they can be altered for more independent study by rearranging furniture and equipment (Woolner, 2010). As seen in figure 4.4.10, nonrectangular shapes promote small-group work, individual projects, and hands-on learning, which benefit children with ADHD (Augustin et al., 2009). However, according to Woolner (2010), these shapes may result in an area that the teacher cannot clearly see, limiting the usage of that space and leading to classroom management issues. Research conducted by both Harrison&Hutton (2013) and Dudek (2005) indicates that there is no ideal classroom design.

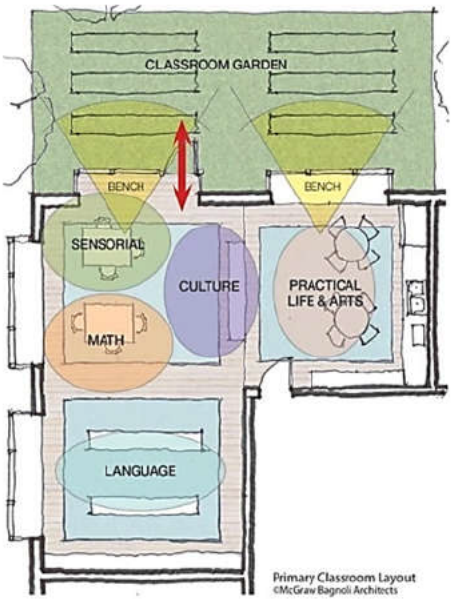



*Figure 4.4.10: Nonrectangular Shaped classrooms are beneficial to children with ADHD. (Source:https://blog.mybrightwheel.com/top-daycare-floor-plans [Accessed 09/10/2022] )*

Nevertheless, they discovered that having diverse places inside a classroom enhances student-teacher/child-adult connections, as seen in figure 4.4.11. These varied spaces also offer locations where students may be in reasonably quiet situations (Augustin et al., 2009, Day&Midbjer, 2007, Harrison&Hutton, 2013), which will assist ADHD children as they do better in smaller class sizes and one-on-one learning (Selikowitz, 2021, Barkley, 2014). In addition, with bigger classrooms in South African government schools, having a range of venues would facilitate more significant opportunities for group work and the separation of children with ADHD.

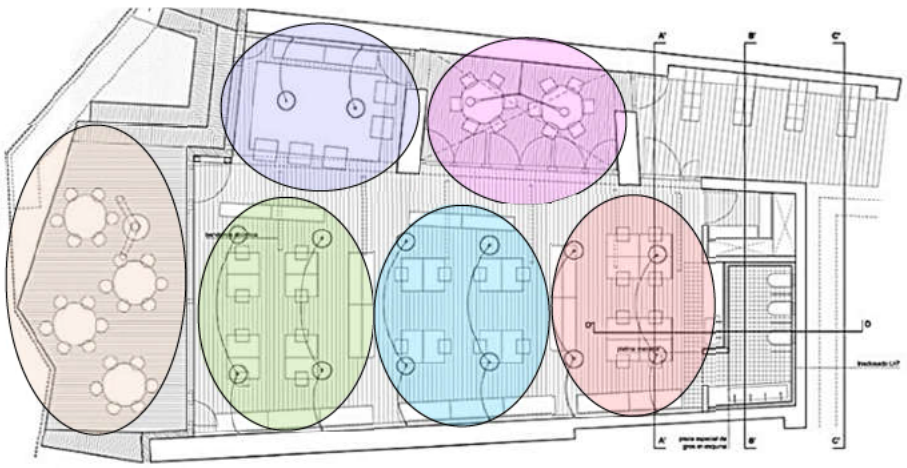


*Figure 4.4.11: Diverse spaces in a classroom. (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 09/10/2022])*

Appropriate scaling promotes children's sentiments of self-empowerment. Students can experience a room as the designers intend (Augustin et al., 2009, Dudek, 2007). Classrooms for younger-aged children should be placed in their precincts, with designated bus/parent dropoff and pick-up zones (Dudek, 2007). Many concepts have blurred the line between outside and inside space, resulting in covered exterior areas, courtyards, streets, and lobbies that may serve as a helpful heart for a school and supplementary learning and social places, refer to plates 4.4.12 and 4.4.13 (Harrison&Hutton, 2013). Moreover, students prefer to feel connected to a school that understands their needs through good design. Their natural propensity towards respectful behaviour and readiness to contribute to the classroom community improves when they encounter a school constructed with their needs in mind (Dudek, 2005). A learning environment's physical and spatial features convey a symbolic message about what is anticipated to occur there. Therefore, the design of a classroom must express behavioural expectations reinforced by institutional regulations.(Imms et al., 2016, Sanoff, 2015, Weinstein, 1979).

*Plate 4.4.12: Inside and outside space (Source: https://www.archdaily.com/984112/jacques-sempe-school-complex-bpm-architectes?ad_source=search&ad_medium=projects_tab [Accessed 09/10/2022])*

*Plate 4.4.13: Inside and outside space (Source:https://www.archdaily.com/941565/casa-de-las-estrellas-waldorf-school-salagnac-arquitectos [Accessed 09/10/2022])*

## 4.5 CONCLUSION

Within the extensive literature review on creating an inclusive learning place for children, it is apparent that policies on inclusive schools are attempting to address the need to include as many children as possible within the mainstream school environment. Furthermore, the evidence indicates that effective practice in inclusive education considers various factors at both whole-school and in-class levels (Forlin et al., 2013). In trying to address the wrongs of the past, South African policy on inclusive education seems to be in line with current international standards. However, implementing these policies appears to have mixed outcomes (Jacobs, 2015).

What is evident is that architecture can have an impact on the ability to provide a place that allows a child with ADHD to feel included. Numerous scholars have shown that by understanding the effects of space on an individual's psyche, a building can be designed for a positive and inclusive experience to be achieved, resulting in long-term positive growth for the individual. The knowledge gained in this chapter contributed to answering question 4 of the secondary questions in chapter 1 (see 1.3.4). The impact of phenomenology, placemaking and environmental psychology are all integral to understanding how these spaces and places must be constructed. Professionals in the design of school facilities can filter through the research results on the impact of school buildings on performance to generate long-term, beneficial effects on academic achievements (Spencer, 2006).

It is also argued that design communication between educators and architects is crucial to good school planning and design (Rotraut, 2015). Collaboration is vital for teaching and supporting children with special needs (Spandagou et al., 2020). For an inclusive school policy to be achieved in the built form, it is essential to take an inclusive design approach as the first step of any project. For this reason, key precedent studies designed with an inclusive approach are explored in the next chapter.

# CHAPTER 5: KEY PRECEDENT STUDIES: TOWARDS AN INCLUSIVE EDUCATION FACILITY

## 5.1 INTRODUCTION

Chapter 5 examines two significant precedents demonstrating critical features of an inclusive design approach to an educational building. The precedents are addressed with the previous chapters' reviewed literature, concepts, and theories. This reviewed research will allow for a better understanding of architecture's significance in establishing a positive, engaging, and inclusive environment for children with ADHD in grades 1-7. Furthermore, the varying scale of the two precedents was deliberately selected to allow for more design considerations across varying topographical locations. The precedent study's findings will guide the planned school's conceptual and functional design in Durban, South Africa.

Additionally, the precedents were selected for their geographical location and fundamental design approach, which links to numerous aspects of an inclusive design discussed in chapter 4. The assessment of the precedent studies looks at how the deliberate interaction between the built environment and the specific requirements of children can be achieved to create a positive learning experience. Even though these precedents have not been specifically designed for children with ADHD, they were chosen because they relate to how a child with ADHD can feel included through design. Where relevant, the evaluation is based on the following considerations, which are highlighted below:

- Phenomenology & Placemaking
- Building materials
- Contact with Nature
- Scale and Proportion
- Light and Ventilation
- Colour
- Acoustics
- Inclusive design considerations
- Community engagement

## 5.2 INCLUSIVE EDUCATION FACILITY: IMAGINE MONTESSORI PRIMARY SCHOOL

Location: Paterna, Valencia, Spain
Architect: Gradoli & Sanz
Landscaping: Gustavo Marina
Year:2016
Built Form Typology: Educational
Total area: 1842m²

The building is situated on Spain's outskirts of the Valterna residential area, positioned on a strip designated for public service buildings and facilities between the residential buildings. The En Dolça ravine separates Valterna from the urban expansion area known as La Pinada. The school has ten large, light-filled classrooms, each measuring more than 100m2, and a patio and garden area, as shown in plate 5.2.1, totalling more than 500 square meters (Montessori, 2021). Additionally, classes consist of students of varying ages (maximum three years), creating a collaborative rather than competitive attitude, with older students assisting younger pupils.

*Plate 5.2.1: Patio and garden area. (Source:https://www.grupovalseco.com/portfolio-items/colegio-imagine-montessori-school/ [Accessed 22/05/2022])*

### 5.2.1 Justification of the precedent study

Children's growth and family integration were considered in the school's design, which was developed in close cooperation with a pedagogical team (Montessori, 2021). The owners want the school accessible to all families and actively seek corporate sponsorship to give grants to families with little means (Montessori, 2021). This inclusive design approach taken by the architects was the critical aspect of including this precedent. In addition, the design of numerous elements relating to creating positive learning environments was also established in this precedent.

Even though Durban and Valencia are divided into the Southern and Northern hemispheres, they share remarkably similar climatic and topographical conditions. They are both considered sub-tropical regions, with high summer temperatures and mild winters. These conditions have played an essential role in assisting with the choice of this precedent, as they significantly impact design considerations.

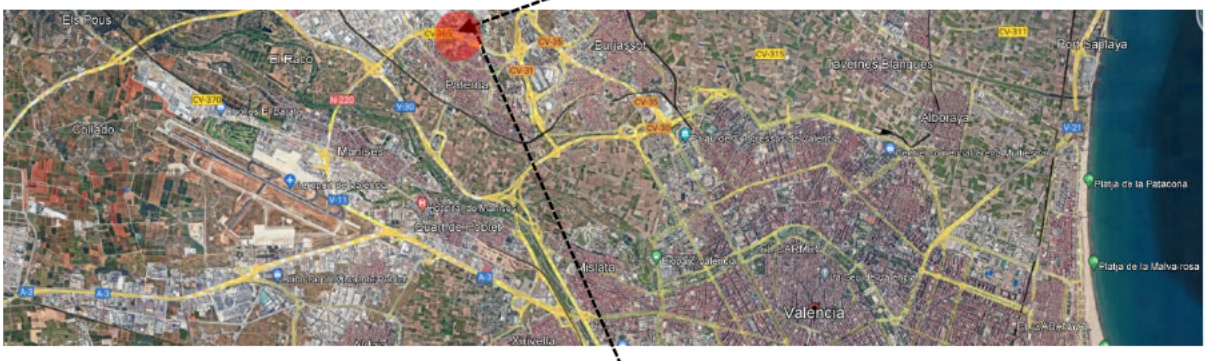
## 5.2.2 Locality

The school is located 8.6 km from Valencia capital of Spain, on the outskirts of Paterna, close to substantial residential and commercial areas (see figures 5.2.2.1 and 5.2.2.2 and plates 5.2.2.3 and 5.2.2.4). The school building is squeezed between the ravine and the outermost roadway of a contemporary, middle-class, mid-rise residential area (Gomez-Moriana, 2021). The ravine is included in the concept, recognizing its value as a natural element that is the region's backbone (Coulleri, 2022).

**5.2.2.1**

**5.2.2.2**

**5.2.2.3**




**5.2.2.4**

*Figure 5.2.2.1 World Map. (Source: https://www.vecteezy.com/free-vector/world-map-grey [Accessed 22/05/2022])*

*Figure 5.2.2.2 Map of Spain. (Source: https://vemaps.com/uploads/img/large/es-04.jpg [Accessed 223/10/2022])*

*Plate 5.2.2.3 Location of Valencia. (Source:https://www.google.com [Accessed 22/05/2022] )*

*Plate 5.2.2.4 Location od School in Paterna. (Source:https://www.google.com [Accessed 22/05/2022] )*

### 5.2.3 Phenomenology & Placemaking

The phenomenological approach taken in the school's design is seen by the deliberate decisions made by the architect to allow students and teachers to experience the building both consciously and subconsciously rather than purely as an object. The relationship of the building to the site and nature has been carefully considered. Furthermore, the design has considered every aspect, from the overall concept to minor details (that relate to the overall whole) that the students will encounter. Authenticity inspires the design and construction: honesty in materials and forms, compatibility, and respect for the environment. Outside, the project is inspired by nature: soil, air, water, light, and plants and animals, which refer to plate 5.2.3.2 (Montessori, 2021). The connection of the interrelated parts, memory and the overall language of the building allows the space to become a place.

### 5.2.4 Building Materials

Steel and concrete have a large carbon footprint and have been avoided as much as possible. Alternative, more ecologically friendly materials, as seen in plates 5.2.4.1, 5.2.4.2 and 5.2.4.3, such as wood and baked clay, have been utilized (Montessori, 2021). The terracotta is used in the 2-foot-thick load-bearing walls, the three-threaded solid brick vaults, which are likewise structural, and the footpaths. Furthermore, brick helps thermal inertia by holding heat, retaining it, and gradually releasing it at night. Its usage provides energy savings in heating and cooling and keeps a consistent temperature in interior areas throughout the day (Montessori, 2021).

*Plate 5.2.4.1: Ecologically friendly materials. (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022])*

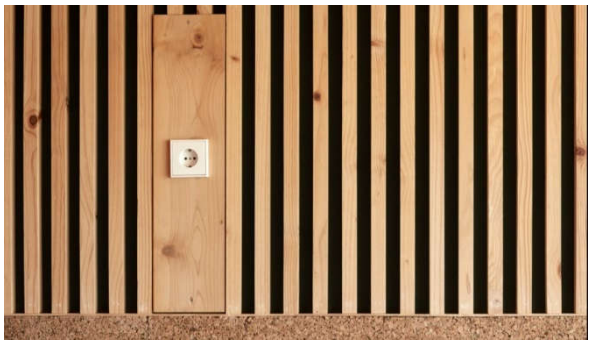


*Plate 5.2.4.2: Slatted timber panel and cork wall (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 06/11/2022])*

*Plate 5.2.4.3: Bricks textured walls. (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 06/11/2022])*

*Plate 5.2.4.4: Exposed services on wall and ceiling. (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 06/11/2022])*

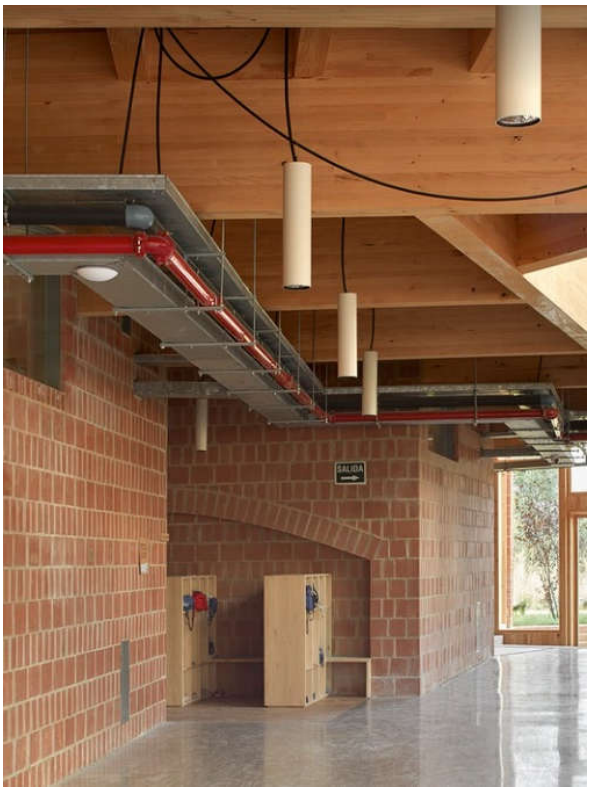


*Plate 5.2.4.5: Exposed services in corridors (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 06/11/2022])*

Wood is used to construct ceiling covering panels, internal and external walls, and door and window carpentry. The wood was sourced from sustainable forest management, which absorbs CO2 from birth, takes no energy to handle, and can be recycled 100 per cent (Montessori, 2021).

Furthermore, every building element is visible, including the brick wall, which serves as a framework, division, and cladding, complete with texture and imperfections (Coulleri, 2022). The fixtures, as shown in plates 5.2.4.4, 5.2.4.5, and 5.2.4.6., are visible, and you can trace their pattern throughout the structure to discover how everything works, how it is installed, and how it was constructed.

*Plate 5.2.4.6: Exposed mechanical ventilation system. (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 06/11/2022])*

### 5.2.5 Contact with Nature

The first lesson of the day starts when children approach the school grounds. A wild and rocky stretch of land with a ravine provides a natural boundary to the town of Paterna (Coulleri, 2022). The children's entrance to the school requires them to briefly stroll through a pine tree promenade over a ravine filled with raging water, as shown in plate 5.2.5.1(Gomez-Moriana, 2021). According to the architect, this encounter with nature is essential for children to experience daily (Gomez-Moriana, 2021). The building is constructed over two levels, linking each classroom to an outdoor terrace overlooking the pine forest by a substantial sliding window. The visual link with nature is the main focus of attention in all rooms (Coulleri, 2022), as seen in the section in figure 5.2.3.2 and the plan in figure 5.2.3.3.

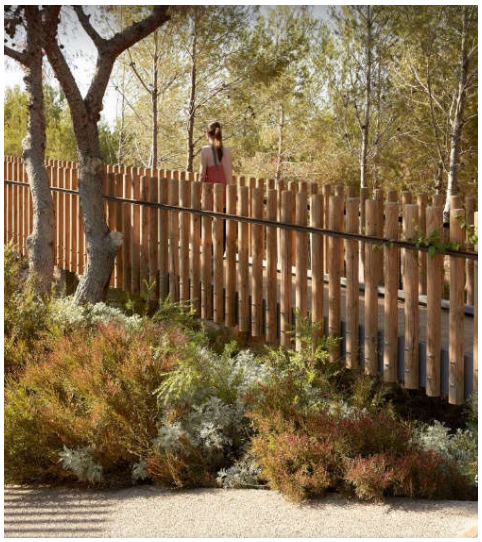


*Plate 5.2.5.1 Stroll through pine forest. (Source:https://archello.com/story/106689/attachments/photos-videos/3 [Accessed 30/10/2022])*

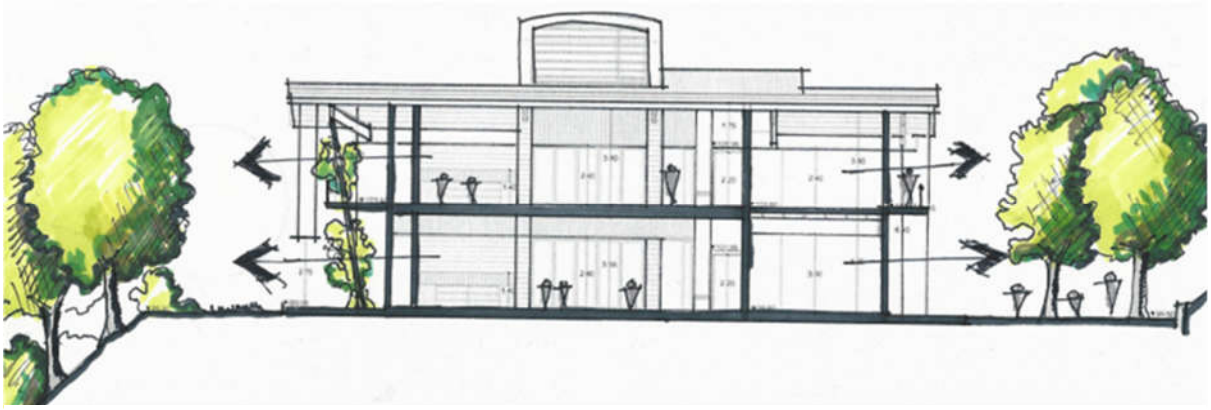


*Figure 5.2.5.2 Visual Link with Nature – Cross Section. (Source:Author 2023)*

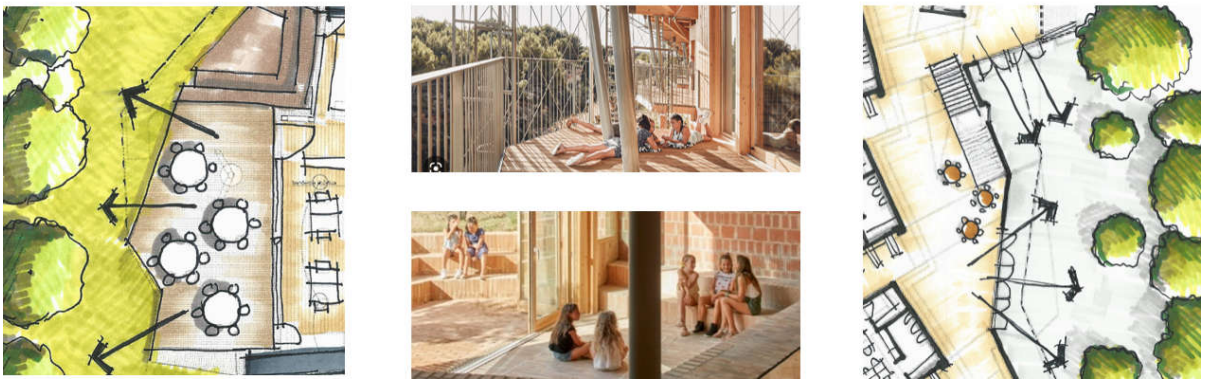


*Figure 5.2.5.3 Visual Link with Nature – Plan View (Source:Author 2023)*

The playgrounds and garden areas are planned and maintained as natural settings, including roots, trunks, branches, dried leaves and pine cones, as seen in plate 5.2.5.4 (Coulleri, 2022). These are not sterile conditions environments with grass, much alone artificial turf. The goal is for the pupils to engage with nature rather than build a green environment. There are no sports grounds or soccer fields; it is about providing areas for quiet and equal connections between genders. The slopes are used to build ramps, slides, ladders, climbing walls, balconies, walkways, shelters, and caverns (Coulleri, 2022).

*Plate 5.2.5.4: Playground is maintained as a natural setting. (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022])*

Additionally, Montessori (2021) indicates that the building's roof has been converted into a wonderfully landscaped space, as shown in plate 5.2.5.5, that blends into the environment, providing a naturalized habitat that promotes the growth of the local ecology (flora and fauna). It is a natural and environmentally friendly thermal insulator that shields the building from direct sunlight by decreasing the transmission of interior-exterior temperature and enabling a steady temperature to be maintained for longer, boosting the comfort of each room(Montessori, 2021).

*Plate 5.2.5.5: Landscaped roof (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022])*

### 5.2.6 Scale and Proportion

According to Gomez-Moriana (2021), the school virtually blends into the environment due to its relatively low profile and the origami-like topography of its vast green roof, illustrated in Plate 5.2.6.1. Coulleri (2022) indicates that every room has child-sized spaces. Such as lofts over the classroom toilets, under the stair landings, and adjacent to the floor-level windows. Areas inaccessible to adults owing to their low height become sanctuaries, as seen in plate 5.2.6.2, for childhood's state of being.

Furthermore, great care has been taken to consider spaces where children may work in small groups to the greatest extent possible. The hallways that lead to the classrooms are more than just practical passages; their widening, reduced-scale corners, balconies, and walkways over the outdoor patio transform into meeting, work, and play places (Montessori, 2021).

*Plate 5.2.6.1 Scaled to blend into the environment. (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022] )*

*Plate 5.2.6.2 Sancturary for children. (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022] )*

### 5.2.7 Light and Ventilation

To improve lighting and ventilation, the architects created triple-height vertical chambers known as solar collectors, as seen in figure 5.2.7.1 and plate 5.2.7.2, which are centrally situated and give extra space to each classroom (Montessori, 2021). A healthy structure has been designed where children can breathe clean air inside and outdoors. Optimizing air quality is supplied by monitoring and lowering carbon dioxide concentrations and removing volatile or hazardous chemicals (Montessori, 2021). Natural cross ventilation is provided in all classrooms through large windows and inside patios, as well as an efficient mechanical ventilation system that recovers energy from the

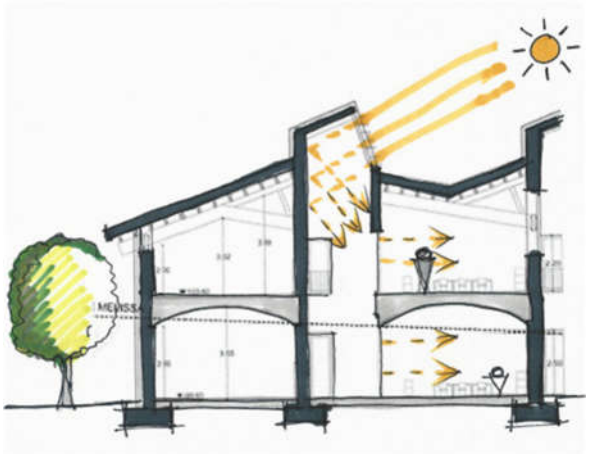


*Figure5.2.7.1: Natural Lighting chamber (Source: Author 2023)*

interior air. This system consists of a network of sensors that monitor air quality and respond to keep carbon dioxide concentrations below the maximum limits advised for educational areas (Montessori, 2021). This school has made the most of natural light, making it one of the design's most prominent features. As seen in plate 5.2.7.3, the vast windows stand out because they provide excellent views of the natural area, integrated into the classrooms so that users are constantly surrounded by nature and natural light.

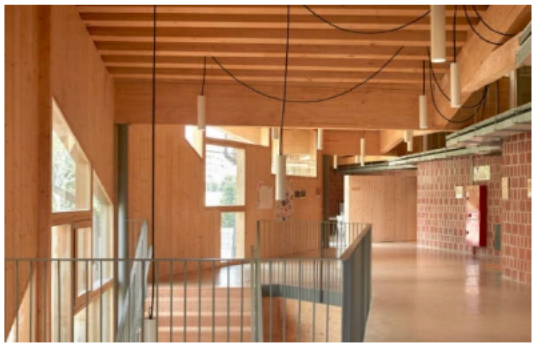
Furthermore, internal patios have been built to collect the sun's rays while minimizing glare (Montessori, 2021). The roof extends on both sides, producing overhangs preventing direct summer sunlight from entering. Similarly, wooden structures have been constructed in each classroom. These structures comprise a network of plant species that act as an additional filter for the sun's rays (Montessori, 2021).

*Plate 5.2.7.2: Natural Lighting (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022])*

*Plate 5.2.7.3: Huge Windows in classrooms. (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022] )*

### 5.2.8 Colour

The chosen red clay brick and wood materials have provided the overall colour concept throughout the building, as shown in plates 5.2.8.1 and 5.2.8.2. Like most Montessori schools, the design is based on minimalism and simplicity. An article by Audrey Miglianiin in Archdaily (2019) states boys and girls do not require much and recommends that light colours and natural light be prioritized. Furthermore, when there are too many colour options in the same area, it can lead to disorientation. Therefore, choosing only a few possibilities is advised to aid the development of decision-making abilities (Archdaily, 2019).



**5.2.8.1**

**5.2.8.2**

*Plate 5.2.8.1 and 5.2.8.2: Materials provide the colour pallette.(Source:https://archello.com/story/106689/attachments/photos-videos/30 [Accessed 30/10/2022])*

### 5.2.9 Acoustics

The first decision on this project was to locate the main entrance on the riverfront rather than on the city side (Coulleri, 2022). If the school entrance had been placed towards the street facing the city, it would have forced the traffic on an already congested roadway to collapse. This entrance location is positioned away from this busy road (Coulleri, 2022) and limits unwanted additional noise impacting children during drop-off and collection times. Retaining the pine forest and keeping the building below the road level provides sound barriers to the building. Thick masonry walls and an earth-covered roof, as seen in Figures 5.2.9.1 and 5.2.9.2, insulate the external envelope of the building from the impact of noise externally and between the classrooms.

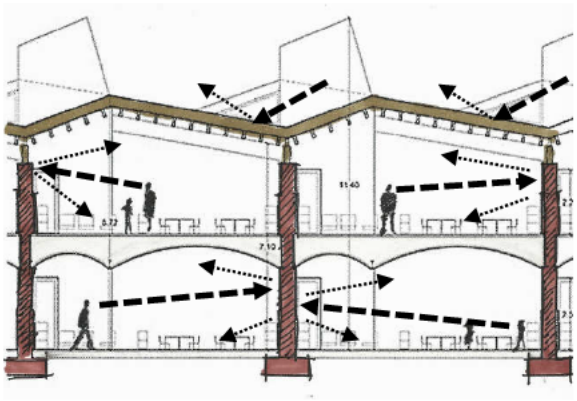


*Figure 5.2.9.1: Thick masonry walls prevent noise. (Source:Author2022)*

*Figure 5.2.9.2: Earth-covered roof prevent noise. (Source:Author2023)*

### 5.2.10 Inclusive design considerations

Construction and structure that is clear, intelligible, and explainable. The first instructional material is the school. Every component of the facilities' design has been carefully considered to blend environmental sensitivity, materials, and Montessori pedagogy (Montessori, 2021). The building has been distorted into an "S," creating two exterior spaces: an entry plaza to the west and a playground to the east, on the idea that two exterior spaces with distinct orientations allow more flexibility than a single area (Coulleri, 2022). Plate 5.2.10.1 shows that the large, open, and airy classrooms promote focus and a scale with children in mind. Furthermore, students will discover a deliberately created and arranged room to encourage their growth in an area of more than 100m2, as shown in figure 5.2.10.2, which represents the floor plan of a typical classroom. Figure 5.2.10.3 shows a quieter break-out space with a connection to nature and allows social engagement.

*Plate 5.2.10.1: Large open classroom. (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022] )*

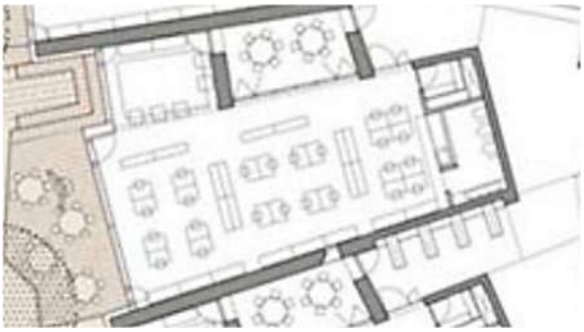


*Figure 5.2.10.2 Classrooms over 100m2 in size. (Source:https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022] )*

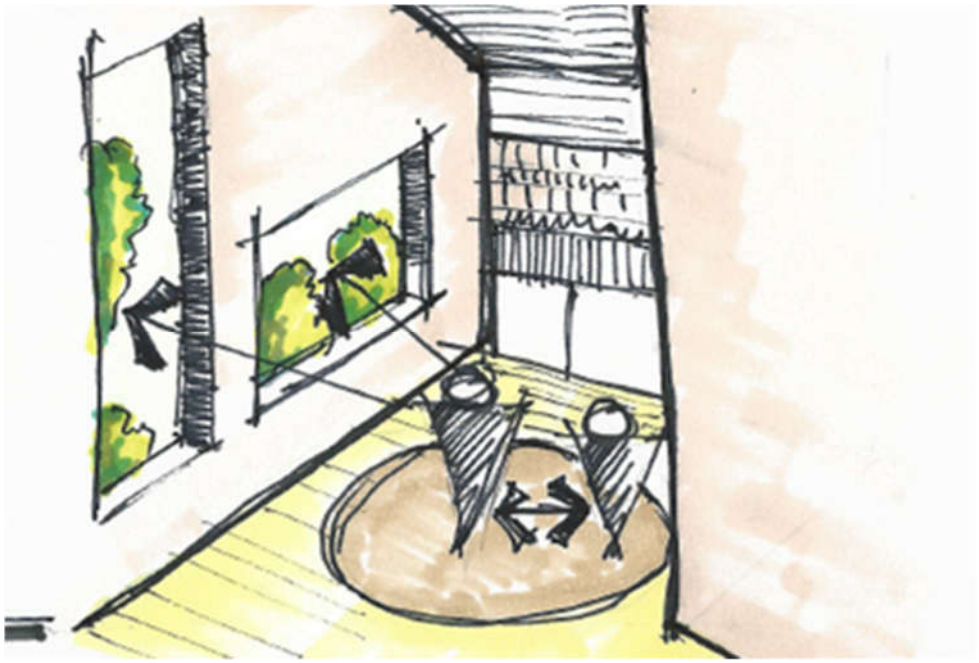


*Figure 5.2.10.2. Break out space with connection to nature (Source:Author2023)*

**1** - Covered outdoor area with a link to nature.

**2** – Break out spaces in all classrooms.

**3** – Break out spaces during outside play

**4** – Obtuse angles to walls.

**5**– Dedicated outdoor learning space for each classroom.

**6**– Each classroom has its own toilets.

**7**– Wide corridors with undulating walls allow for breakout areas.

**8** – large 100m2 classrooms. Each designed to be unique, creating a sense of identity.

**9** – large windows to classrooms allow vast amounts of natural light

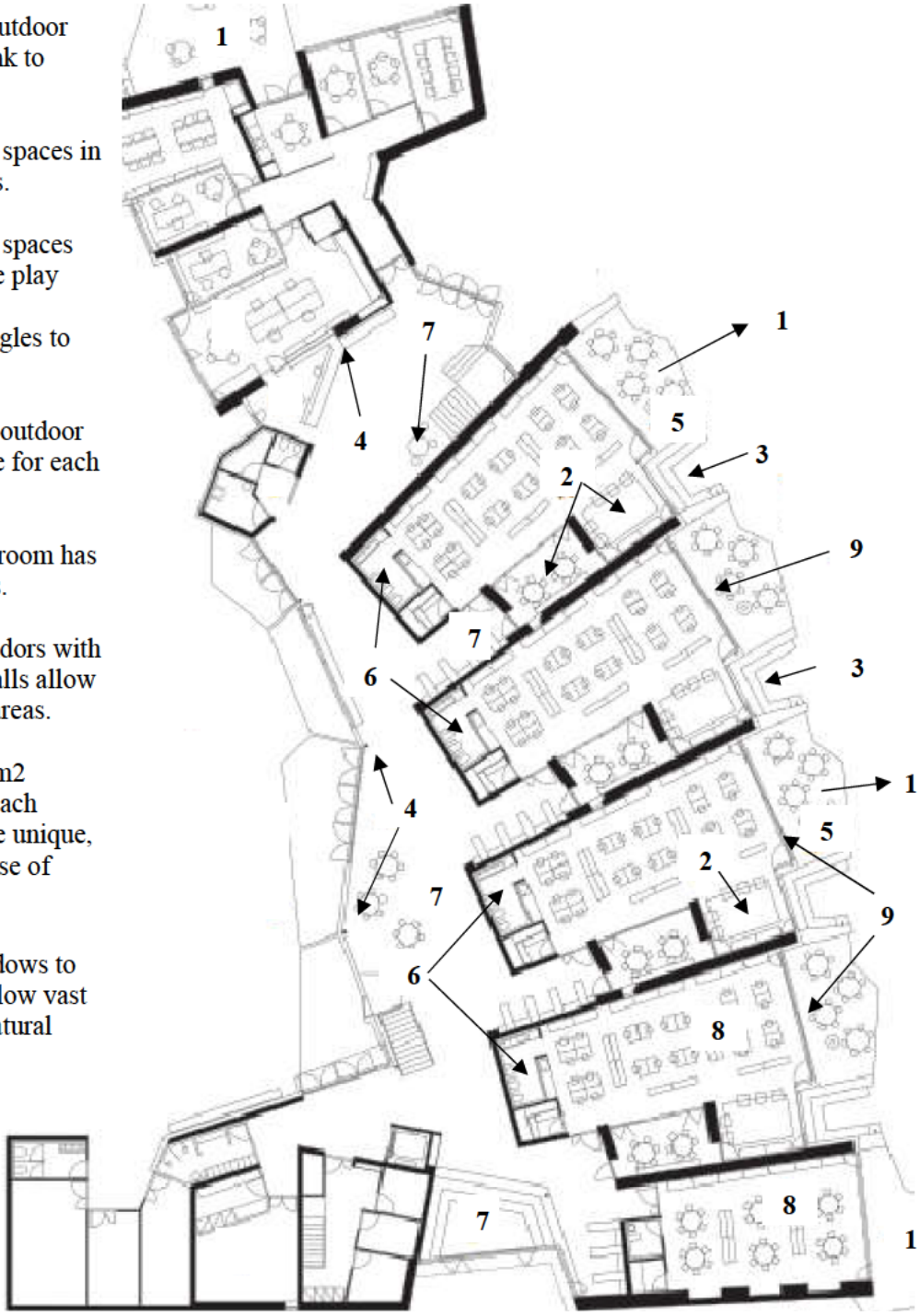



*Figure 5.2.10.4: Classrooms layouts. (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022])*

The classrooms are divided into five sections to which students have free access based on their concerns and needs: sensory, practical life, linguistic, mathematics, and cultural studies (Coulleri, 2022). Additionally, the classrooms are organized in a fan-like formation; the connecting area is not just a practical passageway but also a meeting, work, and play space, with extensions, nooks, and walkways over the outside courtyard as shown in figure 5.2.10.4 (Coulleri, 2022) which highlights additional key inclusive design considerations taken from the literature review.

The design creates friendly spaces outside the classrooms that provide an atmosphere conducive to learning and play, as shown in plates 5.2.10.5 and 5.2.10.6. Spaces created for breaks, meetings, encounters, surprises, studies, and relationships are part of the educational experience.

*Plate 5.210.5: Outside places. (Source: https://www.archdaily.com/974953/imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022] )*

*Plate 5.2.10.6 Outside spaces for learning and play.(Source:https://www.archdaily.com/974953 /imagine-montessori-school-gradoli-and-sanz [Accessed 22/05/2022] )*

Furthermore, free play areas have been created to meet all children's demands. Examples include more physical play areas where you can run, jump, and even climb a climbing wall (plate 5.2.10.7), places that foster discovery, sociability, observation, and reading, as well as sensory activities and skill spaces (Montessori, 2021). The pine forest is a recreational, social, and exploratory place that enhances the school's more structured sections. There is space for free play and more focused physical skill development.

*Plate 5.210.7: Climbing wall. (Source: https://www.facebook.com/photo/?fbid=524764816325976&set=pcb.524764889659302 [Accessed 30/10/2022])*

5.2.11 Conclusion

The Imagine Montessori primary school has been designed with an inclusive approach. Moreover, the school embraces learners from numerous cultural backgrounds and aims to include children from various socio-economic circumstances. The importance of understanding the requirements of teachers and parents has ultimately given the school a sense of ownership and enhanced community spirit through place identity. The concepts of phenomenology, placemaking and environmental psychology discussed in the previous chapters have all been implemented by the architects in their quest to provide more than just a building for learning. Phenomenology is evident in the extent of the detail and choice of materials, which relates to both Nesbitt (1996) and Pallasmaa (2012), who indicate that Phenomenology in architecture necessitates purposeful consideration of how things are made. It is also

evident in understanding the spaces that allow children to “dwell”, enabling them to feel at home in a protected space (Norberg-Schulz, 1979). Even though the design was not explicitly intended for the needs of children with ADHD, it has addressed numerous other considerations, concepts and theories that will assist in creating a positive and inclusive space for these children. These design considerations will significantly enhance the lives of children with ADHD allowing them to have a positive and inclusive experience.

Furthermore, the design approach has also helped answer questions 3 and 4 of the secondary questions in chapter 1 (see 1.3.4). The following precedent study will explore an inclusive design approach to a school in a rural setting, allowing for a contrasting approach and understanding to design considerations.

5.3 INCLUSIVE EDUCATION FACILITY: Mustardseed Junior School

Location: Sentema, Wakiso, Uganda
Architects: Localworks
Lead Architect: Felix Holland
Quantity Surveyor: Dudley Kasibante and Partners
Structural Engineering: Aquila Gallery
Landscaping: The Landscape Studio
Year: 2021
Built Form Typology: Educational
Total area: 1146m²

Mustardseed Junior School, located in Sentema, Uganda, is a new international partner primary school funded by a private charity. This eco-sustainable primary school opened in June 2021 and is meant to immerse students in nature. It is constructed entirely from materials sourced on-site with a zero-carbon impact (College, 2021).

Mustardseed Junior School was founded by Kenneth Buwule, a Ugandan schoolteacher, book editor, and postgraduate peace and conflict resolution researcher, and John Caird, a British writer and theatrical director whose work has been performed worldwide. Kenneth and John are intensely concerned for the world's health, both ecologically and educationally(College, 2021).

The school's name is derived from the Mustardseed Parable: Even the tiniest seed, planted in healthy soil, may develop into a magnificent tree, providing a place for birds of the air to build nests and rear their young. Plate 5.3.1, a symbolic gesture mentioned above, shows the planting of a sapling mustard tree on site before construction. Mustardseed aims to offer young children an inspiring and practical education to encourage them to develop and succeed in Uganda and globally (College, 2021).

*Plate 5.3.1. : Planting sapling Mustard Tree. (Source: https://mustardseedschools.com/school-site/video/ Episode 1 [Accessed 22/05/2022]*

### 5.3.1 Justification of the precedent study

The professional team's inclusive design approach has highlighted the importance of this precedent from inception to completion. Starting with collaboration from an international investor to the one-stop shop and hands-on inclusive approach of the design team, it has illustrated the importance of adaptability and the value of local community inclusion. Plate 5.3.1.1 highlights this and shows a few of the 200 local solid craftswomen weaving the coloured ceiling mats. The design of these mats involved a collaboration of the craftswoman and the professional team.

*Plate 5.3.1.1: Community involvement – Making ceiling mats. (Source: https://mustardseedschools.com/school-site/video/ Episode 5 [Accessed 28/05/2022]*

The school's overall design relates to the theories and concepts discussed in chapter 3. This is highlighted in the creation of the classrooms, corridors, courtyards, break-out spaces, and numerous other design considerations, which will be discussed and analysed in more detail later in this chapter. Durban and Uganda share similar climatic, topographical, and socio-economic conditions, as in plate 5.3.1.2. These conditions have played an essential role in assisting with the choice of this precedent, as they will significantly impact the architect's design considerations and relate to the proposed site in Durban.

*Plate 5.3.1.2: Steet view of Sentema. (Source:https://www.google.com/maps [Accessed 22/05/2022] )*

### 5.3.2 Locality

Mustardseed Junior School is a recently established private initiative situated in Sentema, a community approximately 25km west of Kampala (Localworks, 2021), as shown in figures 5.3.2.1 and 5.3.2.2 and plate 5.3.2.3 and 5.3.2.4 which provides a sequence of the world map to a view of the school in context with its surroundings at a visible scale.

**5.3.2.1**

**5.3.2.2**

**5.3.2.3**


**5.3.2.4**


*Figure 5.2.2.1 World Map. (Source: https://www.vecteezy.com/free-vector/world-map-grey [Accessed 22/05/2022] )*

*Figure 5.2.2.2 Map of Uganda. (Source: https://vemaps.com/uganda/ug-04 [Accessed 223/10/2022] )*

*Plate 5.2.2.3 Location of Kampala. (Source:https://www.google.com [Accessed 22/05/2022] )*

*Plate 5.2.2.4 Location od School in Kampala. (Source:https://www.google.com [Accessed 22/05/2022] )*

### 5.3.3 Phenomenology & Placemaking

The architectural goal was to motivate teachers and students to occupy spaces creatively and regard the whole school as one learning environment (Localworks, 2021). This design consideration relates to allowing more permeable boundaries and whole school identity (Day&Midbjer, 2007). Similarly, this echoes Christopher Alexander's pattern language, where all spaces and linked to each other, creating a lattice web, where spaces overlap, creating a more complex design.

Furthermore, according to the architect, the school was designed as a "large home" for the children. In its traditional geometry, the roof shape is a simple and attractive gesture children readily connect with (School, 2021). Using mud-rendered sandbag walls was a deliberate design choice and expressed the local vernacular. This design approach to the walls, roof, and courtyard, as seen in figures 5.3.3.1, 5.3.3.2 & 5.3.3.3, relates to the theories and concepts discussed in the previous chapters. These theories and concepts resonate with the “home”, establishing a sense of safety and providing a sense of place and self-identity (Day&Midbjer, 2007, Weinstein&David, 1987, Hertzberger, 2008). The ability of an individual to feel at home within an environment relates to the concept of “dwelling” in phenomenology (Seamon et al., 1985, Norberg-Schulz, 1979).

**5.3.3.1**

**5.3.3.2**

**5.3.3.3**

*Figure 5.3.3.1: Undulating Walls provides hospitable gesture.(Source:Author 2023)*
*Figure 5.3.3.2: Large roof overhangs provide social interaction.(Source:Author 2023)*
*Figure 5.3.3.3: Central Courtyard provides sense of security.(Source:Author 2023)*

5.3.4 Building materials

According to Archdaily (2021), all construction materials are acquired locally and have been carefully chosen to represent Mustardseed's goal of being holistically 'green'. Scissor trusses constructed of thin eucalyptus poles support the hipped roof, as seen in figure 5.3.4.1. The roof sheeting has also been clad in these same timber poles, sawn in half, with gaps in between to allow natural light ingress, as shown in plate 5.3.4.2. The thick, earthy, undulating exterior walls, rendered traditionally using earthbag technology, as seen on plate 5.3.4.3, are rendered traditionally. Using locally sourced stone for walls, benches, stairs, and pathways, as seen on plates 5.3.4.4 and 5.3.4.5, further connects to the surrounding environment. The stone walls on the exterior envelope, as seen in plate 5.3.4.6, provide additional protection from rain at low levels and a solid, secure feeling for the children. Traditional clay pots provide water collection points for chain-linked downpipes, as seen in plate 5.3.4.7.

Using all these materials as design elements relates to the concept of genius loci discussed previously in chapter 3. (see 3.5 Placemaking).

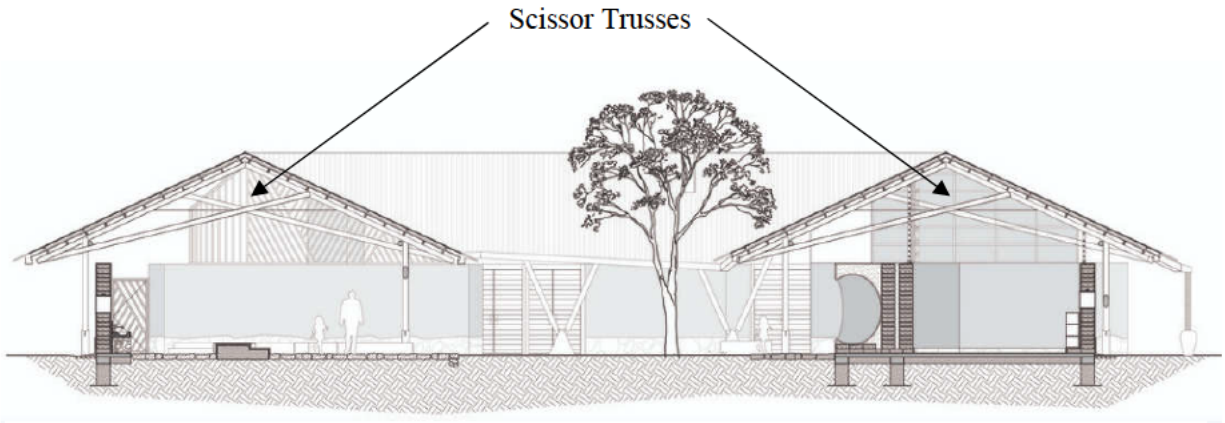



*Figure 5.3.4.1: Scissor trusses.*

*Plate 5.3.4.2: Timber Roof Cladding. (Source: https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 01/11/2022] )*

*Plate 5.3.3.3: Thick earthbag walls. (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed*

*Plate 5.3.4.4: Natural stone used forseating Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 01/11/2022])*

*Plate 5.3.3.5: Natural stone retaining wall to walkway (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 24/05/2022] )*

*Plate 5.3.4.6: Natural Stone Exterior wall. (Source: https://localworks.ug/project/mustardseed-junior-school .[Accessed 01/11/2022] )*

*Plate 5.3.4.7: Traditional Clay Pots . (Source:https://localworks.ug/project/mustardseed-junior-school .[Accessed 01/11/2022] )*

### 5.3.5 Contact with Nature

The school has been designed to urge teachers to leave the classroom and explore their surroundings (School, 2021). Considerable effort has been given to the school's landscaping and plant life to encourage students to think sustainably and care for their environment. Since the soil had been exhausted by decades of farming, the design team wanted to leave a location that could regenerate over time. The developers planted about 3000 indigenous trees, illustrated in plate 5.3.5.1, which shows

*Plate 5.3.5.1: Proposed Site Plan. (Source: https://www.youtube.com/watch?v=hELxuA87zuI [Accessed 22/05/2022] )*

the extent of the school grounds and the arrangement of natural vegetation. The only grassed area is the football field at the bottom of the site. Essentially, the school grounds are included in the design as a research space provided by their surrounding natural environment, as seen in plates 5.3.5.2 and 5.3.5.3 (College, 2021). Classrooms have been built to have a specific indoor area and a dedicated outdoor room, clearly covered by trees but without a roof over your head, to maintain the experience as near to nature as possible (Designdotstory, 2021).

*Plate 5.3.5.2: School grounds as research space. (Source:http://thelandscapestudio.com/1364-mustardseed-school/ [Accessed 06/11/2022])*

*Plate 5.3.5.3: School grounds as research space. (Source:http://thelandscapestudio.com/1364-mustardseed-school/ [Accessed 06/11/2022])*

### 5.3.6 Scale and Proportion

The scale of the building relates to the surrounding area and the overall context of the site. Furthermore, furniture at a child scale (plate 5.3.6.1) has been thoughtfully created and incorporated into the curriculum throughout the school, including built-in benches, shelving, and cubby holes (Archdaily, 2021). The cubby holes seen in plate 5.3.6.2 break down a larger volume into smaller components, and contrasting the big picture with the small picture can help children make sense of their surroundings (Scott, 2010).

*Plate 5.3.6.1: Child scale furniture (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 24/05/2022] )*

*Plate 5.36.2: Cubby hole and child scaled lockers (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 24/05/2022] )*

5.3.7 Light and Ventilation

The exterior walls stop short of the roof (College, 2021). Having the roof independent of the walls allows for maximizing cross ventilation (Designdotstory, 2021), enabling fresh air to flow through and cooling the interiors (figure 5.3.7.1). Furthermore, as shown in figure 5.3.7.1, large roof overhangs give shade and weather protection, preventing direct sunlight and keeping exterior walls cool (School, 2021). These design considerations relate to several aspects discussed in chapter 3. Additionally, the thick undulating wall provides children with a sense of security, and external break-out areas are supplied by the large roof overhangs where children can gather. In some areas, direct sunlight is filtered through the ceiling, providing the room with suitable amounts of natural light, as seen in plate 5.3.7.2. When natural lighting is insufficient, locally made grass-woven pendant lights are utilized.

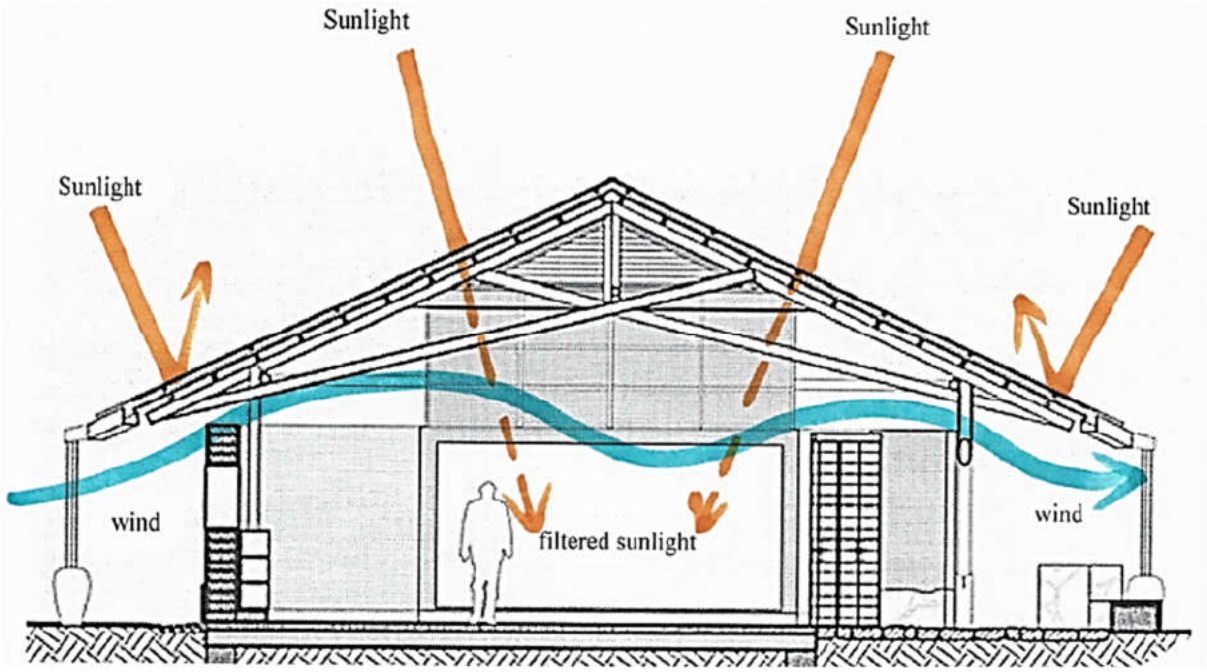



*Figure 5.3.7.1: Large roof overhangs provide protection from direct sun .*
*Raised roof allows for cross ventilation. (Source:Author 2023)*


*Plate 5.3.7.2: Natural sunlight filters through the ceiling.*
*(Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 06/11/2022])*

5.3.8 Colour

The spaces are naturally formed and have warm, natural materiality emphasized by bright and inspirational colours (College, 2021). The walls are clothed in local sandstone slates or unpainted lime-earth render (Archdaily, 2021). Having walls painted orange (plate 5.3.8.1) has a positive association with numerous scholars mentioned in previous chapters (Harrison&Hutton, 2013, Day&Midbjer, 2007, Augustin et al., 2009). Additionally, five different coloured mats were used on the ceiling to give the classrooms a sense of individual identity, as seen in plate 5.3.8.2. Steel-framed shutters with a mix of thin glass and coloured wood strips, as seen in plate 5.3.8.3, were planned for the classroom entry and double doors (School, 2021), providing a sense of individual identity.

*Plate 5.3.8.1: Psychology of Colour (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 24/05/2022] )*

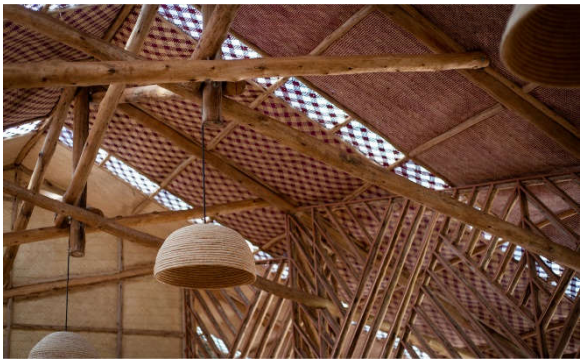


*Plate 5.3.8.2: Classroom Identity. (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 05/11/2022] )*

*Plate 5.3.8.3: Classroom doors provide sense of individual identity. (Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 06/11/2022] )*

### 5.3.9 Acoustics

Windows on the 'circulation side' of the structure are planned as relatively modest, with squarish apertures of varying size and spacing; colourful wood shutters cover these windows and should be closed only at night or during severe storms. Additionally, as seen in plate 5.3.9.1, the shutters reduce noise and prevent the children's concentration loss. Planting indigenous rows of trees in areas of concern, as seen in plate 5.3.9.2, reduces noise impacting school children during class.

*Plate 5.3.9.1: Small windows with shutters of circulation side to reduce the impact of noise.*
*(Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 24/05/2022] )*

*Plate 5.3.9.2: Planting rows of trees to reduce the impact of noise*
*(Source:https://www.archdaily.com/972894/mustardseed-junior-school-localworks [Accessed 06/11/2022] )*

### 5.3.10 Inclusive design considerations

Each classroom is 50-60 square meters and easily accommodates thirty students. Moreover, classrooms can have desks in rows facing the blackboard, in groups, or in U-shaped configurations (School, 2021). No two classrooms are designed the same, and none are rectangular. Internal teaching rooms have free-flowing shapes with fluid, flowing lines that attempt to foster children's desire for learning, as seen in figure 5.3.10.1 (Archdaily, 2021). The free-flowing overall plan layout of the classrooms for younger and older children is illustrated in figure 5.3.10.2 on the following page and highlights key inclusive design considerations. Similarly, the floor plan relates to the articulated classroom, which provides breakout spaces for children (Augustin et al., 2009, Rotraut, 2015, Hertzberger, 2008, Dudek, 2005) to support the needs of children with ADHD (Selikowitz, 2021, Barkley, 2014). Furthermore, having all classrooms shaped differently will allow children to orientate themselves to a specific place and space (Day&Midbjer, 2007, Pallasmaa, 2012, Norberg-Schulz, 1979) and provide a meaningful experience.

The classrooms for the youngest students are located on the lowest level of the school. Children will gradually move upwards, from kindergarten to the upper primary years. This journey is intended to be portrayed architecturally by moving into a new classroom each year. Where each classroom with its personality, physically and aesthetically distinct from the others (Designdotstory, 2021). When a child can orientate and identify themselves, they can dwell (Norberg-Schulz, 1979). Being able to dwell will positively impact a child with ADHD and promote a sense of inclusion. Furthermore, all the classrooms have been designed to have views of nature, positively impacting children with ADHD.

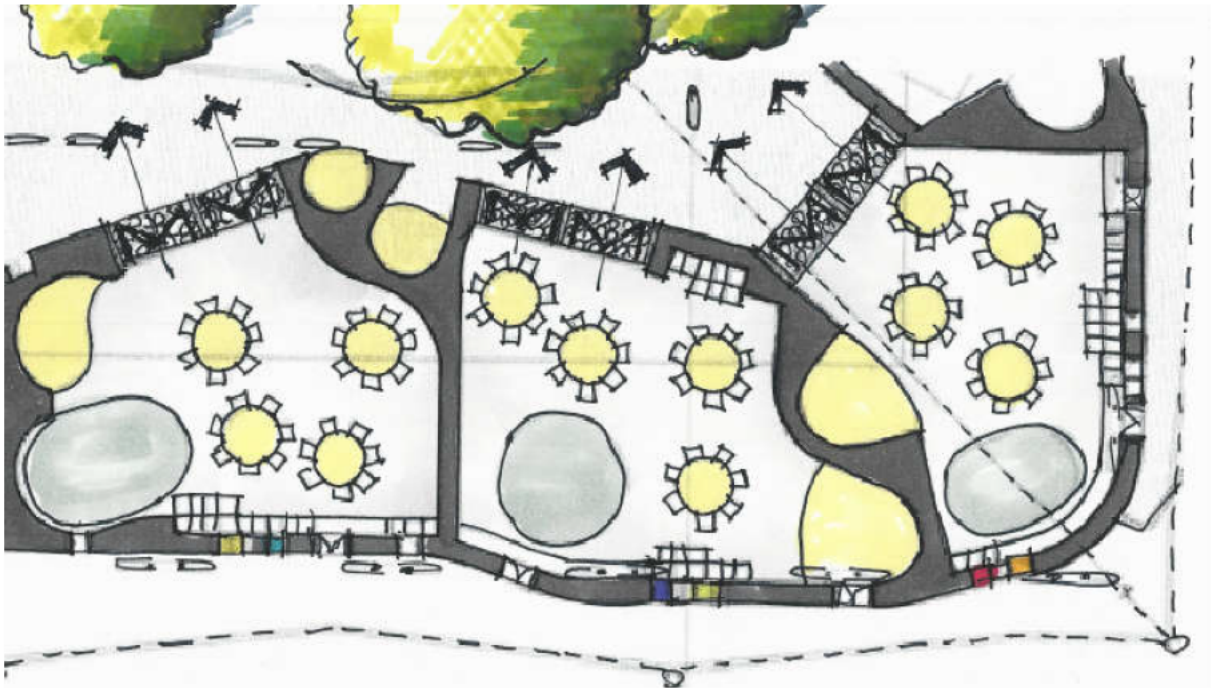


*Figure 5.3.10.1: Free flowing learning spaces – all classrooms are designed to be individual (Source: Author 2023)*

**1** - Covered outdoor area with a link to nature.

**2** – Break out spaces in all classrooms.

**3** – Break out spaces during outside play

**4** – Obtuse angles and curved walls.

**5**– Central Courtyard area.

**6**– Dedicated outdoor learning space for each classroom

**7**– Large roof overhangs activate spaces below.

**8**– Outdoor learning spaces

**9**– Break-out spaces along corridors

**10**– All classrooms have views of nature

**11** – Each classroom is designed to be unique, creating a sense of identity

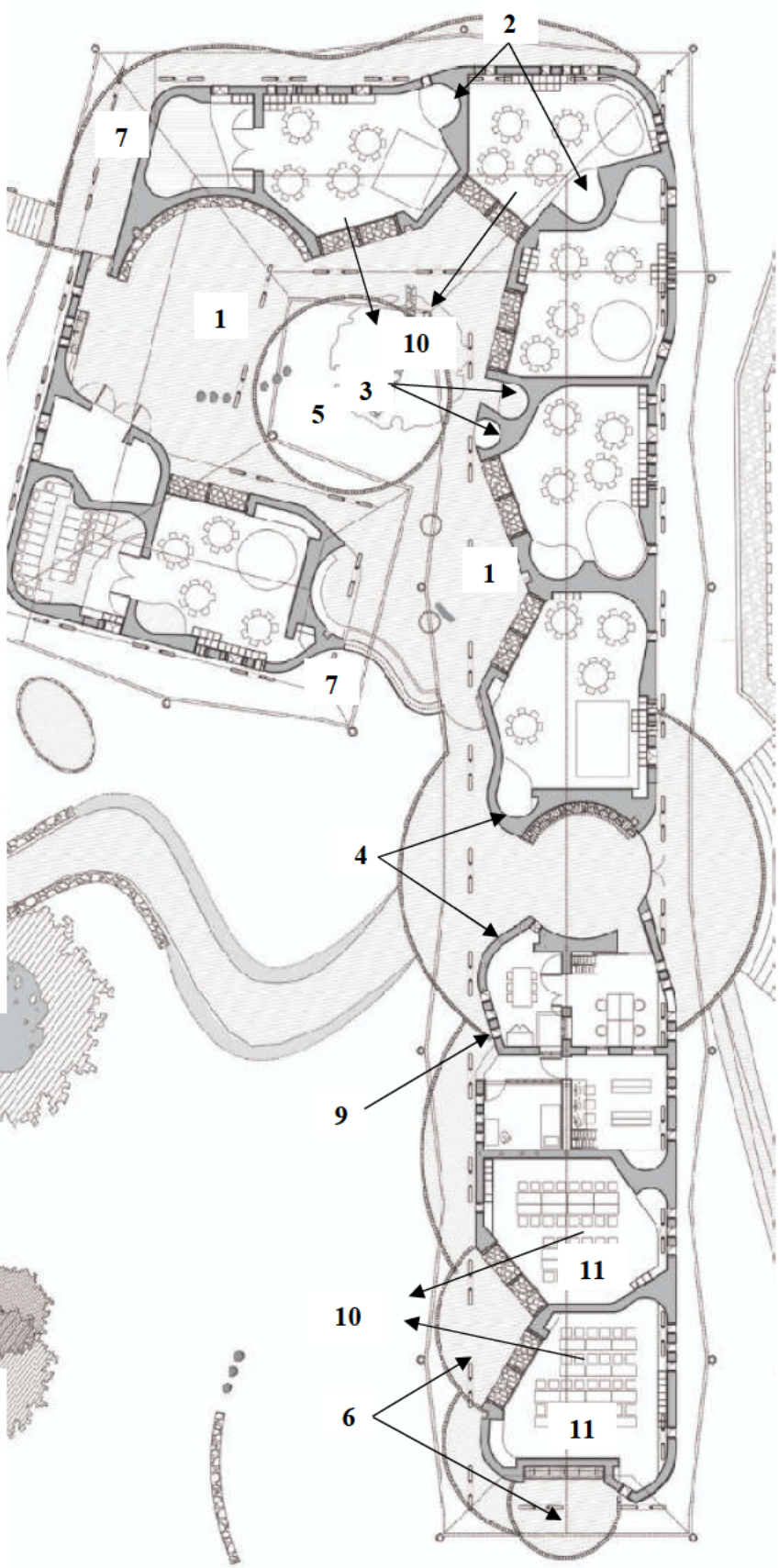



*Figure 5.3.10.2: Overall classroom layout of the school*

*(Source: https://localworks.ug/project/mustardseed-junior-school [Accessed 06/11/2022])*

The production of the ceiling mats provided the women in the community with work, promoting a sense of connection to the school. The main reason for the coloured mats was to give a sense of warmth and provide a homely feeling (Localworks, 2020). The architect embraces their role in the world and provides the following statement that resonates deeply with me, “Architecture is a profession, not a job. Someone willing to go on that journey is committing themselves to a lifetime of learning and working, which I think is the most rewarding path one can take” (Designdotstory, 2021)

### 5.3.11 Conclusion

The Mustard Seed Junior School has embraced and embodied an inclusive design approach at all project stages. Additionally, the relationship to Durban’s rural landscape and climatic and socio-economic conditions have provided invaluable information and have given the researcher a newfound appreciation for the design considerations of buildings constructed in this context. Using relevant theories in this school's design approach has created a positive, inclusive learning environment. Furthermore, to achieve this inclusive design, the architect has actively collaborated with all relevant people during the initial design process through to the completion of the project. This precedent is an excellent example of how relevant theories and a collaborative approach integrated into architecture provide meaningful and inclusive designs with positive outcomes for the user.

Once again, the design approach to this precedent study has further helped answer questions 3 and 4 of the secondary questions in chapter 1 (see 1.3.4). The following chapter will provide commentary from two case studies with an inclusive approach to children with ADHD within Durban and the surrounding areas.

# CHAPTER 6: CASE STUDIES: LOCAL EXPRESSION IN ARCHITECTURE

## 6.1 INTRODUCTION

In this chapter, two case studies within the context of Durban are utilized to evaluate current educational facilities in light of the critical aspects outlined in the preceding sections. The chosen case studies are Virginia Preparatory School and Eden Village Preparatory School. These schools were designed to meet the requirements of including children with ADHD in a mainstream school environment. The case studies offered the chance to pinpoint and critically evaluate certain contextual and environmental aspects covered in the earlier chapters. In-depth observations and assessments of the built environment have been used to analyse the case studies.

Additionally, this was reinforced with input from children with ADHD, teachers and the school principals to gain a deeper understanding of the specific needs and requirements of ADHD children in an inclusive environment. Children were requested to colour-code classroom floor plans, and the researcher surveyed and produced the school site plan. The colour coding and written text provided the researcher with positive and negative spaces perceived by the children. The interview questions for teachers and principals were specifically chosen to address the objectives ( see section 1.2.3) and answer the secondary and primary questions in chapter 1 – see section 1.3.4. The data from the interviews, classroom and site plans of both schools is thematically analysed by grouping information into codes, sub-themes and themes (Creswell&Poth, 2016). These sub-themes and themes will be discussed and analysed later in this chapter.

## 6.2 AN INCLUSIVE EDUCATIONAL APPROACH TO CHILDREN WITH ADHD: VIRGINIA PREPARATORY SCHOOL

### 6.2.1 Introduction

Virginia Preparatory School, as shown in plate 6.2.1.1, a government school, opened its doors on January 21, 1958, with 102 students. The school was initially built for students in grades 1 to 3. Since then, the number of students on the register has grown to just under 600. The school has evolved over time and now serves students in grades 4 through 7, with an average class size of 28. For grades 4 to 6, the school provides a separate academic support unit (ASU) of up to 14 children, which caters for various learning difficulties and includes children diagnosed with ADHD. The remedial support class enables instructors to offer ADHD students a more hands-on approach and address knowledge gaps. In preparation for high school, the grade 7 class re-integrates the students from the support class back into mainstream classes.

*Plate 6.2.1.1: Viginia Preparatory School. (Source: Author, 2022)*

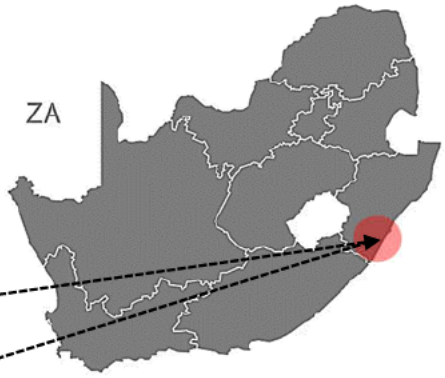
### 6.2.2 Justification of Case Study

Virginia Preparatory School was selected as a case study for various reasons. Firstly, and most importantly, the school offers an inclusive learning environment by implementing academic support units (ASU) for children with ADHD within a mainstream school environment. Secondly, the school was constructed many years ago, which provides an opportunity to understand past thought processes behind the design and allows for a comparison between the second case study, which was recently constructed. Thirdly, as a government school, it will allow a direct comparison with the second case study, which is a privately owned facility. Furthermore, the school's location will give an understanding of design features that meet the needs of Durban's local climatic conditions. Evaluating these features in the built form will aid in understanding their benefits and drawbacks, giving a solid basis for bridging the gap between theory and practice.

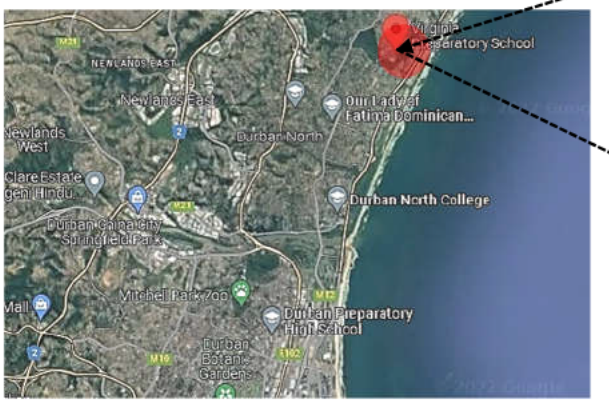
### 6.2.3 Location

**6.2.3.1**

**6.2.3.2**




**6.2.3.3**




**6.2.3.4**


*Figure 6.2.3.1 World Map. (Source: www.vecteezy.com/free-vector/world-map-grey [Accessed 22/05/2022])*

*Figure 6.2.3.2 Map of South Africa (Source: www.vectorstock.com/royalty-free-vector/south-africa-map-with-provinces-grey-vector-23601898 [Accessed 223/10/2022])*

*Plate 6.2.3.3 Location of Durban in South Africa. (Source: www.google.com [Accessed 22/05/2022])*

*Plate 6.2.3.4 Location od School in Durban. (Source: www.google.com [Accessed 22/05/2022])*

The school is located in Virginia (figure 6.2.3.1 - 6.2.3.1 and plate 6.2.3.3 - 6.2.3.4), a relatively densely populated residential area in Durban North on the outskirts of the Durban City Centre. Durban, the third largest city in South Africa, is situated on the east coast of South Africa and is also known as eThekweni. Durban has a humid subtropical climate, with hot summers and warm, relatively dry winters. Durban is also a popular tourist destination known for its vast sandy beaches. The school benefits from being located between 2 large areas of indigenous vegetation that have been zoned and protected.

### 6.2.4 Historical and Social Context

The school is over 60 years old and traditionally serves Glenhills, Glen Anil, Glenashley, Virginia, La Lucia, and Sunningdale communities. Virginia Preparatory School has a three-school alliance with Christopher Robin (Pre-Primary) and La Lucia Junior Primary, which enables students to retain friendships forged from age three onwards. Initially, the school was designed for children in grades 1-3, which meant a number of the classrooms and other facilities were designed at a smaller scale than what is required for today's grades 4-7.

*Plate 6.2.4.1: Apartheid years. (Source: http://wozamark.blogspot.com/2007/06/durban-primary-teacher.html [Accessed 15/10/2022])*

*Plate 6.2.4.2: Diverse school society. (Source: https://www.facebook.com/photo?fbid=524606356331820&set=pb.100063473799925.-2207520000. [Accessed 15/10/2022])*

The school is built on one level and has been transformed over the years by adding a new hall and other mainstream and learner-support classrooms. The school's design is typical for the period, with long straight corridors and many classrooms in rows. The school was originally designed as a junior primary school and initially served only the affluent white community of the Durban North area during the apartheid era, as seen in plate 6.2.4.1. The school now embraces students from more varied socio-economic and cultural backgrounds, as seen in plate 6.2.4.2.

In terms of a typical South African government school, Virginia Preparatory differs vastly. The school is fortunate to be located in an affluent neighbourhood where most parents contribute more than other government schools in poorer areas, as seen in plate 6.2.4.3. Most government schools do not have the luxury of smaller support classes for children with ADHD. Therefore, ADHD children would most likely be positioned in a class with more than 30 children.

*Plate 6.2.4.3: Typical South African government School. (Source: www.groundup.org.za/article/parents-demand-brick-and-mortar-classrooms-rural-limpopo-school/ [Accessed 15/10/2022])*

### 6.2.5 Empirical Data

When arriving at the school, children are greeted from 7:00 am by at least one staff member who waits on the footpath below the stairs outside the main school entrance. During the busy morning drop-off, a dedicated staff member directs traffic and children over the pedestrian crossing to the school entrance.

Having several schools in a similar area causes some traffic congestion; however, it is well-managed and orderly. After a short climb up several stairs, children walk through an open parking area with large shady trees at the front of the school. These trees provide children with a natural setting that offers a sense of calm when entering the school.

The children are directed through the student entrance, as seen in plate 6.2.5.1 on the right-hand side and move to their allocated outdoor areas. The assigned areas are located in a paved courtyard with numerous large trees and benches that provide abundant shade and allow children access to the natural environment, as seen in plate 6.2.5.2.

*Plate 6.2.5.1: Student entrance between the hall and admin building (Source: Author 2022)*

*Plate 6.2.5.2: Allocated outdoor waiting areas with large trees for shade. (Source: Author 2022)*

*Plate 6.2.5.3: School raised above road level. Large trees reduce noise (Source: Author 2022)*

Having the school raised slightly and with the constant presence of a teacher provides a sense of security for children as they enter the school. Furthermore, the combination of the school building being elevated above road level and large trees along the school's boundary reduces the noise impact, as seen in figure 6.2.5.3. Meetings with staff members or the principal involve a left turn at the top of the stairs to the administration offices, as shown in plate 6.2.5.4.

*Plate 6.2.5.4: Staff Entrance (Source:Author 2022)*

The overall school design, seen in figure 6.2.5.5, is based on its long straight corridors that direct the layout and functioning of the school, with several classrooms teeing off on either side. Classrooms are all similar in shape and design, with no distinguishing features. The administration, library and computer room are located near the school's entrance and form the building's hub. The school hall is somewhat detached but allows for easy access for parents during school functions. The overall site plan of the school and associated spaces can be seen in figure 6.2.5.6.

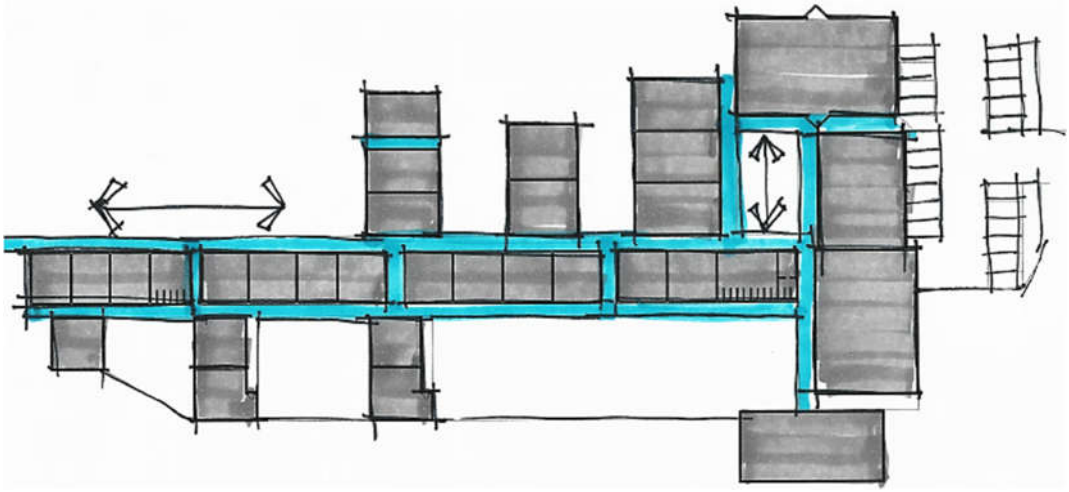


*Figure 6.2.5.5: Design based on long straight corridors (Source:Author 2022)*


*Figure 6.2.5.6 School Site Plan . (Source: Author, 2023)*

The vast school grounds allow numerous sporting and cultural events to cater to each individual's needs. Numerous large indigenous trees scattered throughout the school grounds offer shade in summer during sporting activities, as seen in plate 6.2.5.7 and the opportunity for a meeting place for friends. Furthermore, numerous trees around the school building reduce noise impact, as seen in figure 6.2.5.8. Additionally, trees in courtyard areas provide contact with nature and a sense of security, which allows for social interaction for children with ADHD, as seen in figure 6.2.5.9

*Plate 6.2.5.7: Large trees provide shade during sporting events and the opportunity for children to gather and make friends (Source: Author 2022)*

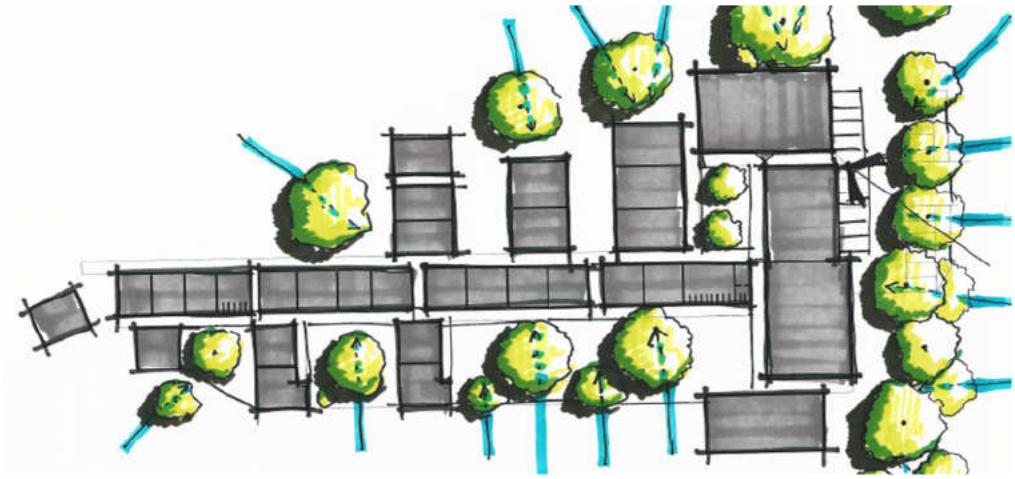


*Figure 6.2.5.8: Large trees reduce noise tranfer into school (Source: Author 2023)*

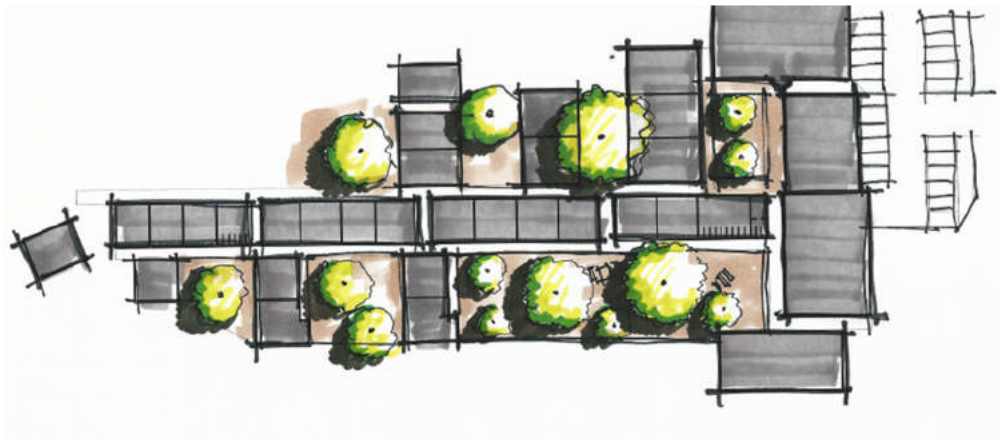


*Figure 6.2.5.9: Trees in courtyard areas provide contact with natute, sense of security and social interaction. (Source: Author 2023)*

In most instances, the school building is constructed of smooth red brick external walls, built up to the window/door height, with the walls above painted a very light yellow, as seen in plate 6.2.5.10. Brick walls give a sense of security and solidarity (Day&Midbjer, 2007). The green fibre cement roofs have a low pitch and overhangs of approximately 600mm. Several large white PVCu windows on at least two classroom walls allow for natural cross ventilation. The ASU have large PVCu sliding doors that open onto a paved open courtyard used for the 1st break, as seen in plate 6.2.5.11. These doors sometimes allow too much visual distraction; curtains must be drawn to prevent this.

*Plate 6.2.5.10: Typical External Elevation of the school building. (Source: Author, 2022)*

*Plate 6.2.5.11: ASU sliding door onto paved courtyard. (Source: Author, 2022)*

Furthermore, the size and location of grade 4 & 5 ASU east elevation windows and doors have not been carefully considered. This location causes massive heat gain in winter and summer due to the direct sunlight. Conversely, the adjacent grade 6 ASU has a covered veranda in the exact location, preventing most of the direct morning sunlight from hitting the window and allowing the room to remain cooler without needing the airconditioner. These discrepancies can be seen in plate 6.2.5.12.


*Plate 6.2.5.12:* ASU windows and door on the right take direct east sunlight, and ASU windows and doors on the left are protected by a covered veranda (Source: Author, 2022)

The three academic support units (ASU) are in separate buildings away from the mainstream classes. The primary reason for separating children into the ASU is to provide additional support and assist them in bridging the gap in their academic or social shortcomings. The ASU has a typical rectangular, almost square shape, as seen in Figure 6.2.5.13.

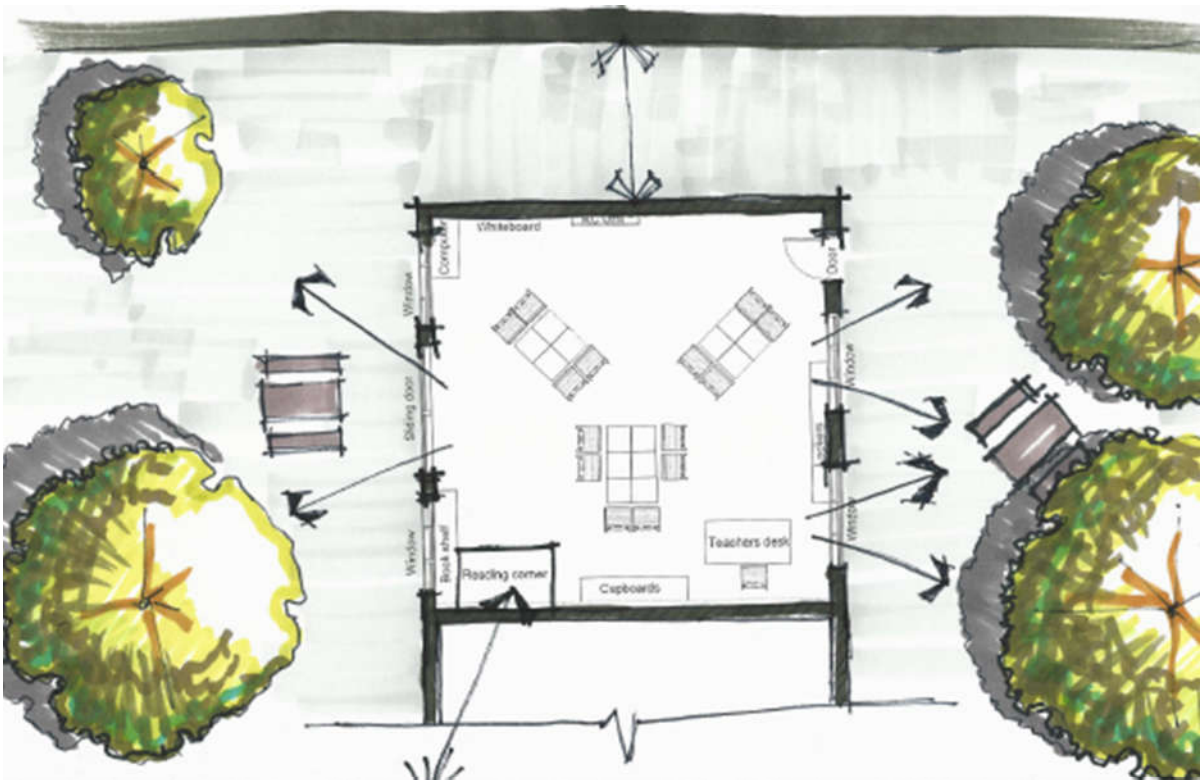



*Figure 6.2.5.13 Grade 4 ASU Classroom Layout. (Source: Author, 2023)*

The internal walls of the grade 4 ASU are painted white and have numerous visual clues to assist children in the class, as seen on plate 6.2.5.14 and plate 6.2.5.15. This is further highlighted in the interview section of this chapter.

*Plate 6.2.5.14: Visual Clues – Grade 4 ASU (Source: Author, 2022)*


*Plates 6.2.5.15: Visual Clues – Grade 4 ASU (Source: Author, 2022)*

### 6.2.6 Research Findings from Interviews

The thematic analysis of the transcribed participant interview involves highlighting various sections and passages to create different qualitative codes. These codes were chosen due to their relevance to the research question and objectives (see chapter 1 – 1.2.3 Objectives and 1.3.4 Key Questions. The initial codes were then re-arranged and focused into groups to provide overarching sub-themes and themes. These codes, themes and sub-themes are illustrated in the table below. This inductive process involved the researcher switching back and forth between the themes and the database until a comprehensive set of themes was established (Creswell&Poth, 2016). The final research is presented in narrative stories. These stories relate to the understanding and explanations of the participants in this study.

Table 6.2.6.1 – Thematic Data Analysis Process for Both Schools (Author, 2023)

| **Codes** | | **Sub-Themes** | **Themes** |
|---|---|---|---|
| Codes were used to identify and summarise essential concepts within the interview transcript. | | Condensation of codes into Sub-Themes. | Identified Themes from Sub-Themes |
| Learning Needs of children with ADHD | Types of Children in the support class | Learning Needs | **Developmental Environment** |
| Inclusivity of children | Movement and being Active | Learning Challenges | |
| Learning Styles of ADHD Children | Design negatively impacts children | Impact of Design | |
| Excluded from Mainstream. | Concentration challenges | | |
| Government Classes | Colour considerations | | |
| Additional Support Staff | Visual Issues | | |
| Lighting considerations | Sports and other activities | | |
| Classroom Layouts | Inclusion into Mainstream | | |
| Playground and break activities | Number of Children in a class | | |
| Additional academic support | Diagnosing ADHD | Ethos of the school | **Inclusive Environment** |
| Number of children in the school | Classroom layout | Playground and Extracurricular | |
| Medication | Funding | Mainstream Inclusion | |
| Contact with nature | Positive design aspects | Exclusion from Mainstream | |
| Ethos of the school | Number of ADHD Children | Design for Inclusion | |

The thematic analysis from the transcribed interviews from both schools resulted in two main themes; 1- Developmental Environment and 2- Inclusive Environment. These themes relate to the aims, objectives, and research questions.

6.3.6.1 Developmental Environment

As discussed in chapter 2, ADHD children can have numerous learning challenges. Participants at Virginia Junior Primary School described the challenges that ADHD children have and what is required to enable them to learn. Bridging this gap allows them to reintegrate into a mainstream class.

**1. Learning Needs**

Participants described the learning needs of ADHD children.

*"…my role in this is mainly to facilitate children with learning challenges and to enable them to keep up with the curriculum and to accommodate them in their learning so that they can understand in a more positive and easier environment and get through the work." Pg 2 (Teacher)*

*"…it's just more to be able to facilitate their needs regarding providing the best environment for their learning." Pg 2 (Teacher)*

*"So, we might include movement, you might get movement breaks, that kind of thing." Pg 3 (Teacher)*

*"Try to include different learning styles so that they are not, for example, just learning visually on the board or just listening to you. So that they are actively involved in their learning and just helping them to draw the focus in." Pg 3 (Teacher)*

*"I do a lot of partner work with the kids. I find that kids with ADHD when they're engaging in another child and sharing their learning… that becomes quite helpful for them." Pg 6 (Teacher)*

*"I've got maths clues, I've got opposites, and I've got all the days of the week. And so, I can tell them that your answers are all around you. Just Look." Pg 8 (Teacher)*

*"So, I change up my classroom often…at the beginning of the year, it's in rows. So the rest of the school has double disks, and the ASU have single desks…The rest of the school has those plastic chairs. We have these chairs because they are apparently better for your posture. And the individual desks, especially now that COVID is gone, I can do many different things" Pg 9 (Teacher)*

*"I would love headphones and be able to get them into quiet zones." Pg 10 (Teacher)*

*"I would say that in the support unit, the teachers do a lot more reinforcement and individual tuition with the children because they have reduced numbers of 12, maximum of 14. They can work with each child's individual needs, whereas as soon as you double that or double and a half up to 28, it's very difficult to meet every child's needs. So they tend to learn coping mechanisms for whatever is holding them back in the mainstream within that unit." Pg 6 (Principle)*

**2. Learning Challenges**

Participants described the learning challenges that affect a child with ADHD and their ability to concentrate in class.

*"It's to provide an environment where the least distractions are possible. So, try and cut out on distractions." Pg 2 (Teacher)*

*"You sometimes get them to go and sit outside or change the environment up. But you have to be very careful, movement breaks are good, giving them a break to release their energy is really good, but they can easily be distracted. Again, another challenge is to draw them back into a quiet space." Pg 3 (Teacher)*

*"I find noise quite difficult, or movement, that kind of thing. Or you'll have the intercom going in the middle of your lesson, and then you've lost them…that is quite tricky from a negative point of view." Pg 6 (Teacher)*

*"So, movement past your classroom, people moving past your classroom, intercom going off...it's sound, and it's a visual." Pg 7 (Teacher)*

*"Of course, when they (ADHD Children) are in a mainstream class of up to 28 or between 25 and 28, it is a little bit more difficult." Pg 2 (Principal)*

**3. Impact of Design**

Participants described how the layout of the classroom or other areas of the building could impact the developmental needs of ADHD children.

*"The problem is space. We've got 26 to 28 people in a normal classroom, which is pretty tight. I think that in rural areas with a low economic base, you even got more children squashed up in a class. So, the opportunity for that is very tricky unless you do things outside the classroom." Pg 4 (Teacher)*

*"…they did things like on the corridors, they had like a measuring line, and they had hopscotch, for example, they had a lot of different things. That was outside of the classroom." Pg 4 (Teacher)*

*"So where our classroom is situated, we are in the red zone from a noise point of view. So, children will often come into these courtyards on either side, which is very distracting, especially with many ADD kids!... From a positive point of view, the same areas are good to spill out on." Pg 6 (Teacher)*

*"I listen to the comments of the children…we have got all these fluorescent lights, and I don't think they're great. I think they like Hyper stimulate… there is something to be said for ambient lighting …" Pg 7 (Teacher)*

*"I have a lot of colourful stuff …Some people say, no, you need to make the classroom muted… I think the children get used to the classroom environment. So, if you are changing it up all the time, I think that is going to be a distraction…I think the colour of your walls and your general class can't be bright yellow, green or whatever …there is a balance between giving your children visual clues for their work and making it interesting and overdoing it." Pg 7 & 8 (Teacher)*

*"I've set up a reading corner… they love to sit on the mat or the cushions in a circle with a whiteboard and a whiteboard marker and with lots of equipment and clay, you know, that is the ideal…" Pg 9 (Teacher)*

*"I would love to have more of an area where children can work quietly... I wouldn't mind a bank of desks…with children who are easily distracted, but others can choose to go and work quietly away from the distractions of the rest of the class." Pg 10 (Teacher)*

*"It could be bigger because I would have a desk or an area where you could do all the practical stuff… and it's easier in a group…or even in a lesson where some children could come and work practically around a table. Other children will need to come and work quietly on their own…another area where a teacher could sit." Pg 11 (Teacher)*

*"I would have a sink in my classroom … or a desk area to physically work out something." Pg 13 (Teacher)*

*"…it's still very regimented how our classrooms... we would like to have a more sort of flowing type classroom…just to try to open it up a bit more so that, you know, the children feel it's not just a closed environment. They love going to the library, for example, because it's more spacious and they can go sit on the floor on one of those bean bags…you've got more space to move and to be yourself" Pg5 & 6 (Principal)*

Participants described drop up and collection of children from school.

*"I think ours is relatively calm in that, you know, we've got two people out there... So, they seem to come and quite calmly, there doesn't seem to be much agitation." Pg8 (Principal)*

6.2.6.2 Inclusive Environment

As discussed in chapter 4, there are various approaches concerning an inclusive school environment. Participants described their understanding of inclusivity and how this can be achieved.

**1. Ethos of the School**

*"The ethos of the school would be very inclusive. So, by no means is this a class alienated from the rest of the grade fours. We try to do combined activities with other grades four classes" Pg2 (Teacher)*

*"There is a culmination of different children…many of them do have either ADD or ADHD. Some are hypoactive; some are hyperactive. I've got a few children I know that are on the spectrum, some that you suspect and are not sure about. Others that have either auditory processing problems or they have problems with language spelling." Pg2 (Teacher)*

*"As far as we're concerned, ADHD children, we have them in every single class, not only the academic support unit. Our teachers are trained to handle the situation within a class with ADHD children. And we are very open to any child. I mean, as far as the ethos is, we are supportive of a child with any disability, whether it is ADHD or whatever, and we do our best to be able to accommodate them." Pg2 (Principal)*

**2. Playground & Extracurricular**

Participants described how play and extracurricular, which are offered to all children, create an inclusive environment.

*"So, they participate in sports and music, and many lessons outside the classroom are in tandem with another class. And it's just to allow them to be as involved as anyone else would be had there no learning challenges." Pg3 (Teacher)*

*"…he has social issues…he's got a chance to mix outside of the box, so he doesn't keep in a safe zone, you know, so kind of pushes out of his comfort zone. I think extra murals are a huge advantage." Pg5 (Teacher)*

*"The first break is for everybody, and every grade has a designated area. But there is no running around…, especially the boys…. they need to move, so you're always catching them out because they are going wild, doing something they shouldn't be doing but need to move. So that's the difficulty... At the big break, the grade fours and fives are together, so they allowed freedom of the field… they come back or sweety and hot, but they've had a really good run around." Pg 12 (Teacher)*

*"…we introduced, maybe seven or eight years ago, because they all used to go to break at the same time. And it wasn't working. So, this way, we sort of like it managed to calm the waters." Pg 7 (Principal)*

*"…the staff are saying it's almost like they've got rid of energy, and they've come in now and they can focus and get on with the day. Which does seem to help." Pg 9 (Principal)*

Participants described how children from other remedial schools can be included at Virginia.

*"…for a school like Livingstone, for example, we allowed those children to come through to play sports with us because they didn't offer the same co-curricular that we do. So, then they could come through to here. But the understanding had to be that they were a child that would have normally been accepted into our school." Pg 3 (Principal)*

**3. Mainstream Inclusion**

Participants described what they considered as mainstream inclusion and presented various other contributions that the researcher considered as Mainstream approaches to inclusion.

*"If this were a fully inclusive school, all the children in this class would probably be in a mainstream class." Pg3 (Teacher)*

*"There is sometimes pairing with other children in other classes…So we do PE, for example, with another class. We do computers, and another class comes into effect. Tomorrow we are doing a grade activity. So, at every term, we probably got two or three things we do across the grade." Pg5 (Teacher)*

*"I think just about every activity that any other class is doing; we are doing the same thing to try to normalise it as much." Pg5 (Teacher)*

*"We have a school-based support team and any child diagnosed with ADHD or has any type of disability has a leader in every grade…and any children who…maybe needs to be treated differently, whether its dyslexia, ADHD, anxiety, whatever…they are flagged. So, when they're flagged, it might be that for that child, it might need a 15-minute dispensation because they have officially been diagnosed …it has been an official diagnosis. But once that's come through, then we look at what we do within our unit, with our children. We try and accommodate the children in the mainstream the same." Pg 3 (Principal)*

*"So as far as inclusive and inclusivity, to be able to accommodate every child with whatever disability they have, it's very difficult in a big class. So as much as we accept any child, you have accepted children with hearing problems, we have one at the school now, and we accept any child. But we've got to be able to meet their needs. So, the parents must understand that if we cannot fully meet their needs, the child will be at a disadvantage." Pg 3 (Principal)*

Participants described how children from other remedial schools can be included

*"…for a school like Livingstone, for example, we allowed those children to come through to play sports with us because they didn't offer the same co-curricular that we do. So, then they could come through to here. But the understanding had to be that they were a child that would have normally been accepted into our school." Pg 3 (Principal)*

Participants described how they thought children from the ASU felt about being included.

*"Yes, I do...I think they feel like it's just a small class. Because although they had more individual help, they are treated the same way…I've never really found that it's been a problem." Pg 3 (Principal)*

Participants described why ASU children are fully included in Maistrean in grade 7 at Virginia.

*"…we thought here we could still protect them in grade seven, before they then entered high school. Instead of being in a small class in grade seven, which we had at one stage and then into high school, we found that that was too much of a gap for them." Pg 4 (Principal)*

**4. Exclusion from Mainstream**

Participants described what they considered as an exclusion from the mainstream class regarding having the ASU.

*"I know this is, in a way, being separated. So, it's not entirely inclusive." Pg3 (Teacher)*

*"I think at times they feel excluded. They want to know why they are still here. I try hard to explain that it's not because they are stupid. Because that is their default mechanism…So in some ways, I think they feel excluded." Pg5 (Teacher)*

Participants described what they thought of having more opportunities where ASU and Mainstream is integrated.

*"There is definitely an opportunity for more of that. I don't think there's enough of that happening." Pg5 (Teacher)*

**5. Design for Inclusion**

Participants described design elements and spaces that they considered would be beneficial to the children. This sub-theme relates to design consideration that will allow children with ADHD to feel positive about their environment and, therefore, feels included.

*"I think there are too many walls; the school is very isolating…I would probably move a few walls. I wouldn't have it so linear." Pg 6 (Teacher)*

*"I think boundaries like around the school; if you think of spaces around the school that have boundaries but still give them space. So, if I say to them, you can go good work in the courtyard, but work in this area…Not giving them a go on the field, they can't work with that." Pg 8 (Teacher)*

*"…additional space, but you could even design it outside of the classroom… if for every grade, you had an area or free classroom or a free whatever, where you go and practically use the things and do the things together. So, if you had an outside classroom where kids could learn and play and draw and write on the floor…linked to your classroom." Pg 13 & 14 (Teacher)*

*"If we had an extra room were children…who need more than just a time out. That there would be somebody there that could also talk them through it…I can see the benefit of that. I see more and more children who need to have that type of thing every now and again." Pg 10 (Principle)*

*"…what's fortunate for us in some ways is we on one level, because a lot of the time kids don't like to go up and down stairs, you know, it gets chaotic and yeah, silly things happen. I wish our classrooms*

*were bigger. Even for smaller classes, it would be nice to have a bigger environment so you can create reading corners… like a carpet, they can lie there and read." Pg 10 (Principle)*

### 6.2.7 Research Findings from Children's Sketches and Notes

The researcher produced the floor plans of the classroom and an overall site plan of the school. These plans were handed out to the children on the day of the data collection exercise. The children were asked to colour-code green – positive/engaging and red – negative/disliked areas and provided written text as reasons for the choice. The results from the 12 children who participated are shown in table 6.3.6.1 below:

Table 6.3.6.1 – Classroom and School Feedback from 11 Children at Virginia Primary School (Author, 2023)

| **Positive / Engaging – What they like or would like to have.** | **Negative/ Disliked – What they don't like or want to change** |
|---|---|
| | |
| Preferred the lights off ( 8 No) | Distraction from Monkeys (3 No) |
| Liked to work at their desk ( 1No) | Wanted to sit closer to the teacher ( 4 No) |
| Liked facing the whiteboard (1No) | Did not like working on the floor ( 1 No ) |
| Would like to sit on Cushions ( 2 No) | Airconditioning as was cold ( 3no) |
| Wanted Plastic Chairs ( 4 No) | The noise outside class ( 3 No) |
| Watching Movies ( 2 No) | Sitting at a desk – Wanted to Stand ( 6 No) |
| Reading Corner ( 9 No) | Children distracting them ( 3 No) |
| Poster and Cue Cards ( 2No) | Move closer to their friend ( 2 No) |
| The Tuckshop (4 No) | Can't see the Board ( 2 No ) |
| Sitting in Rows ( 4 No) | Wants teacher at the front of the Class ( 1No) |
| Sitting in Groups ( 5 no) | Playing in the courtyard – too small ( 4 No) |
| Wants to work on Computer ( 2 No) | The Tuckshop (1 No) |
| Likes Projector on the whiteboard ( 3No) | Caretakers Room - Scary (1 No ) |
| Likes the Lockers ( 6 No) | Playing on the field (1 No) |
| Playing on the Field ( 10 No) | Being to the Aircon (3 No) |
| The School Hall (7 No) | Did not like the reading Corner ( 1No) |
| The Library and Computer Room (7 No) | The plastic chairs ( 1 No) |
| Tennis Courts (2 No) | Classroom to small (1 No) |
| Drama Room ( 2 No) | The swimming pool ( 1No ) |
| The Art Room ( 2No ) | |
| The Pool ( 5 No) | |
| Counselling Room ( 1 No) | |
| Sitting at the back of the class ( 3 No) | |
| Liked the Aircon (5 No) | |

### 6.2.8 Conclusion

The inclusive approach taken by the school is evident in the positive attitudes and engagement of children observed in the academic support unit (ASU) with other children from the mainstream classes. The inclusion of these children can be attributed to several reasons. ASU classes have a few combined classes with mainstream children during the academic week. The school offers various extra mural activities that allow all children to engage in a social setting outside the classroom. Allowing children of mixed age groups to socialize during playtime (grades 4 & 5 and 6 & 7) benefits children with ADHD in grades 5 & 7, as they sometimes prefer to associate with younger children. However, children in grade 6 may not benefit as much from this separation. Although very well located, the school building is limited by its original design and available funding initiatives. The school is part of the fabric of the community. It provides children in the area with a sense of a home environment and inclusion.

Furthermore, the interviews and case study analysis have also helped answer questions 1 and 2 of the secondary questions in chapter 1 (see 1.3.4). The following case study will explore an inclusive approach for ADHD children to a newly constructed school, allowing for a contrasting understanding to design considerations.

## 6.3 AN INCLUSIVE EDUCATIONAL APPROACH TO CHILDREN WITH ADHD: EDEN VILLAGE PREPARATORY SCHOOL

### 6.3.1 Introduction

Eden Village Preparatory School (plate 6.3.1.1 & 6.3.1.2) opened its doors in January 2020, providing an inclusive learning opportunity for children in grades 1-7 with ADHD in a mainstream education setting. Class numbers range between 14 and 24 students. Smaller classes allow a more personalized teaching experience for students with ADHD, particularly those seeking to overcome specific short-term learning challenges. The school was not designed specifically for children with ADHD but did cater for their needs.

*Plate 6.3.1.1: Eden Village Preparatory.(Source: https://www.evps.co.za [Accessed 15/10/2022] )*

*Plate 6.3.1.2: Eden Village Preparatory.(Source: https://www.evps.co.za [Accessed 15/10/2022] )*

### 6.3.2 Justification of Case Study

Eden Village Preparatory School was selected as a case study for several reasons. The main contributing factor is the inclusive approach to children with ADHD within a mainstream school environment. Furthermore, understanding and analysing the inclusion of a leap class ( learner support class) assists in determining the inclusive approach that enables children with ADHD to progress in the mainstream school environment. The school's recent construction as a private institution offers a chance to comprehend contemporary design methodologies and compare them with Virginia Primary School. Once again, having the school in Durban provides an understanding of the design process in addressing climatic and topographical considerations.

### 6.3.3 Location

The school is located in Ballito (plate 6.3.3.1 to 6.3.3.4), an affluent town in KwaZulu-Natal, about 40 kilometres north of Durban. Ballito forms part of the KwaDukuza Local Municipality and iLembe District Municipality. The school is located off a minor road close to the N2 highway in a mixed-use area comprising residential, commercial and retail facilities. There is also a large open area of indigenous vegetation adjacent to the school grounds.

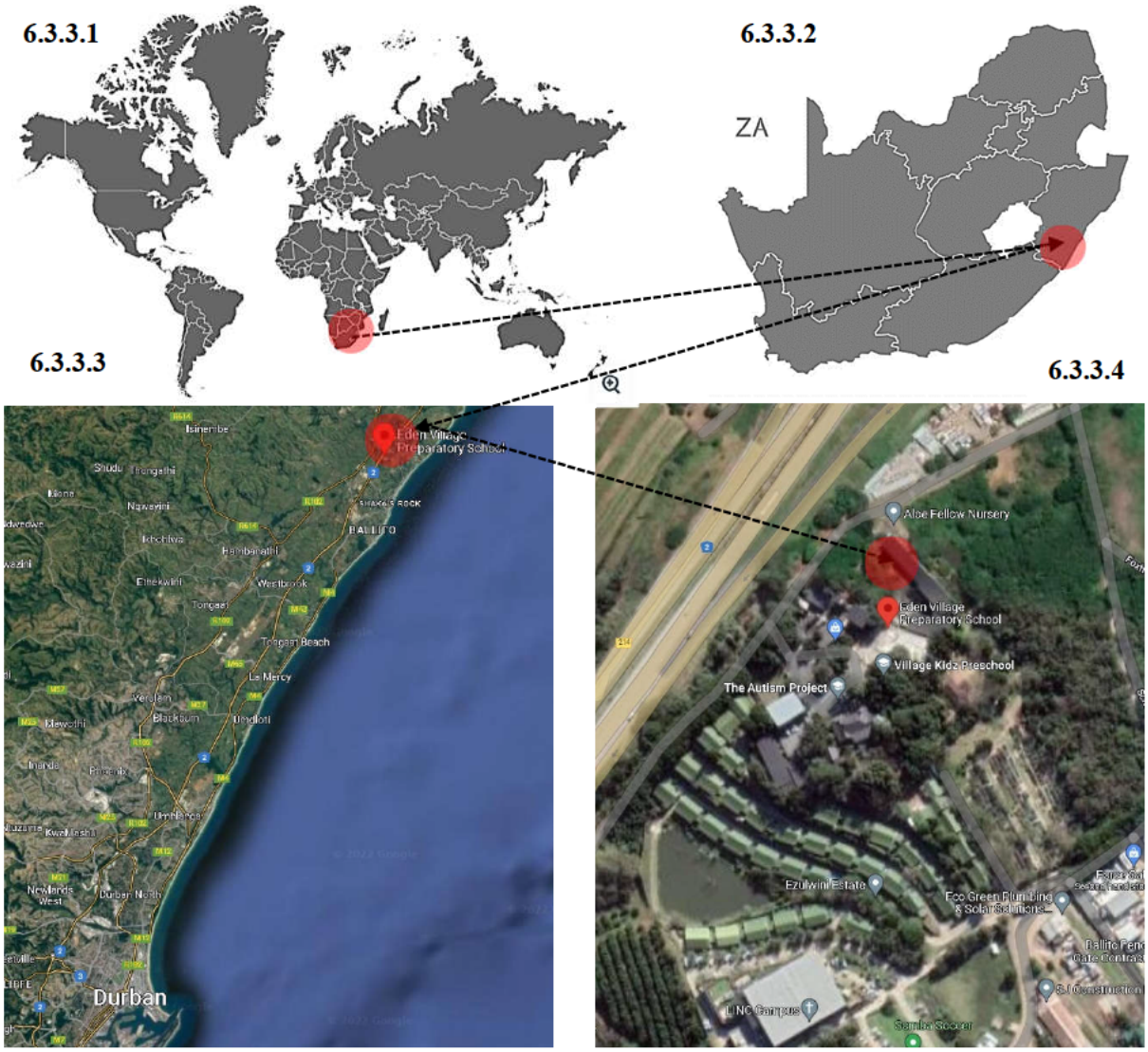



*Figure 6.3.3.1 World Map. (Source: www.vecteezy.com/free-vector/world-map-grey [Accessed 22/05/2022])*

*Figure 6.3.3.2 Map of South Africa (Source: www.vectorstock.com/royalty-free-vector/south-africa-map-with-provinces-grey-vector-23601898 [Accessed 223/10/2022] )*

*Plate 6.3.3.3 Location of Durban in South Africa. (Source: www.google.com [Accessed 22/05/2022])*

*Plate 6.3.3.4 Location od School in Durban. (Source: www.google.com [Accessed 22/05/2022])*

### 6.3.4 Historical and Social Context

The school has no long history since it has only been in operation for almost three years (it was founded in 2020). Ballito's significant urban expansion throughout the 1960s and the next two decades ensured it had stopped existing as a separate seaside community by 1994 (Duminy, 2007). Instead, a linear stretch of unbroken residential development was created (extended Ballito) by merging the previously separate Ballito, Shaka's Rock, Salt Rock, and Sheffield Beach townships. This coast-hugging development was mainly constructed as vacation housing for middle-class demographic groupings. The official townships of Shakaskraal, Tongaat, Groutville, and Stanger and tiny housing clusters like Foxhill and Shakas Head were where low- to middle-income residential precincts were situated

(Duminy, 2007). A recent study by Mbambo (2018) shows that in Shaka's Head, there has been a noticeable but limited role of housing in achieving socio-spatial integration. Through housing location, it was possible to attain a multi-class urban neighbourhood strategically located closer to economic opportunities. However, social groups cannot create social relations and share in the local economy.

Furthermore, the development of the King Shaka International Airport and Dube City to the south have also contributed significantly to the growth of Ballito. With Ballito's expansion, new educational facilities have been much needed. Eden Village has filled this gap.

### 6.3.5 Empirical Data

The school opens its gates at 6:00 am, and children arrive there from 6:30 am. As seen in figure 6.3.5.1, the one-way system and the reduced number of children in the school allow for a smooth transition during drop-off and collection times. This smooth transition will enable children with ADHD to arrive at school calmly and orderly, reducing stress as they start the day.

Large indigenous trees have been retained, allowing most of the parking to be shaded. Furthermore, it acts as a sound barrier against the freeway (see figure 6.3.5.1) and cars leaving and arriving during school hours. Additionally, the trees give the children a sense of calm when coming to school and views of the natural environment throughout their school day.

Children then walk up a short gradual ramp, as seen in plate 6.3.5.2, where the principal greets them in the foyer. From there, they move to their allocated classrooms, where their teachers await them.

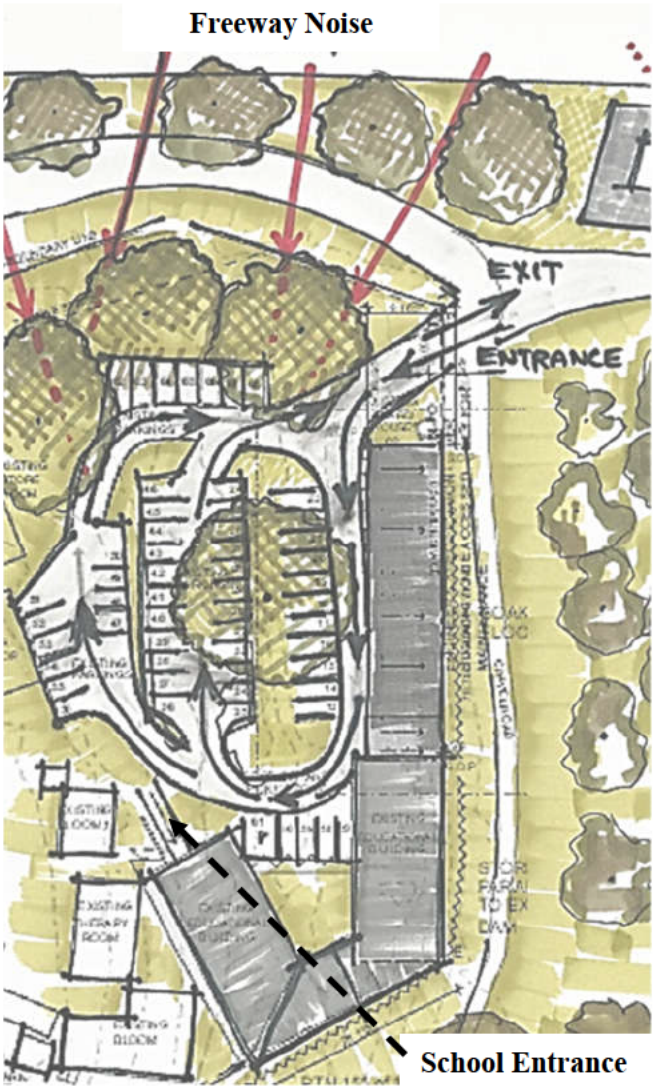



*Figure 6.3.5.1: One way drop-off and collection with large trees retained (Source: Author2022)*

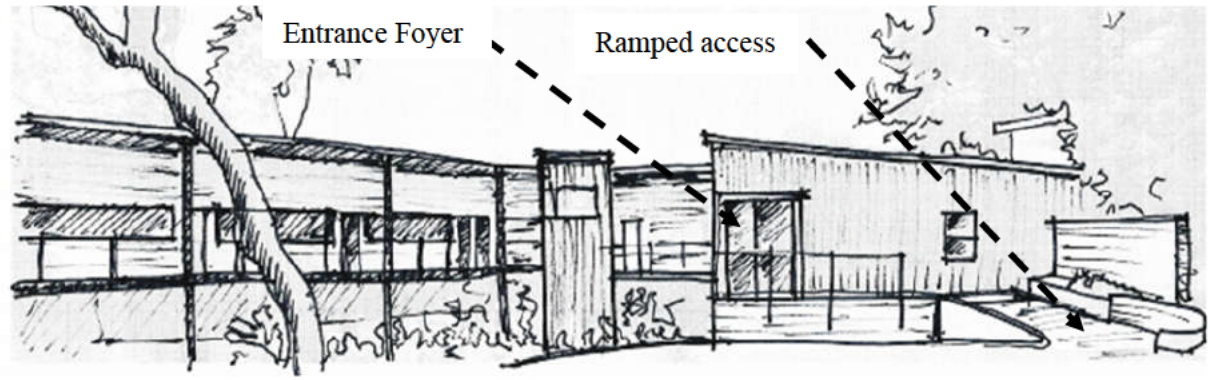



*Figure 6.3.5.2: Entrance into the school building (Source: Author 2023)*

The school is contemporary in design, built on two storeys with steel and concrete and clad in varied colours of grey corrugated sheeting. The school is situated above the road, offering a sense of protection. The mono–pitch roof provides a child scale with a contemporary form. Aluminium sheeting to walls horizontally on the double story further reduces the scale of the building.

The overall school design, like that of Virginia Preparatory School, is built on straight corridors that govern the organization and operation of the school, with classrooms teeing off on one side. Classrooms are all the same shape and style, with no distinctive elements. The administration and principal's offices are close to the school's entrance. Figure 6.3.5.3 and 6.3.5.5 depicts the general ground and first-floor plans of the school and its related areas.

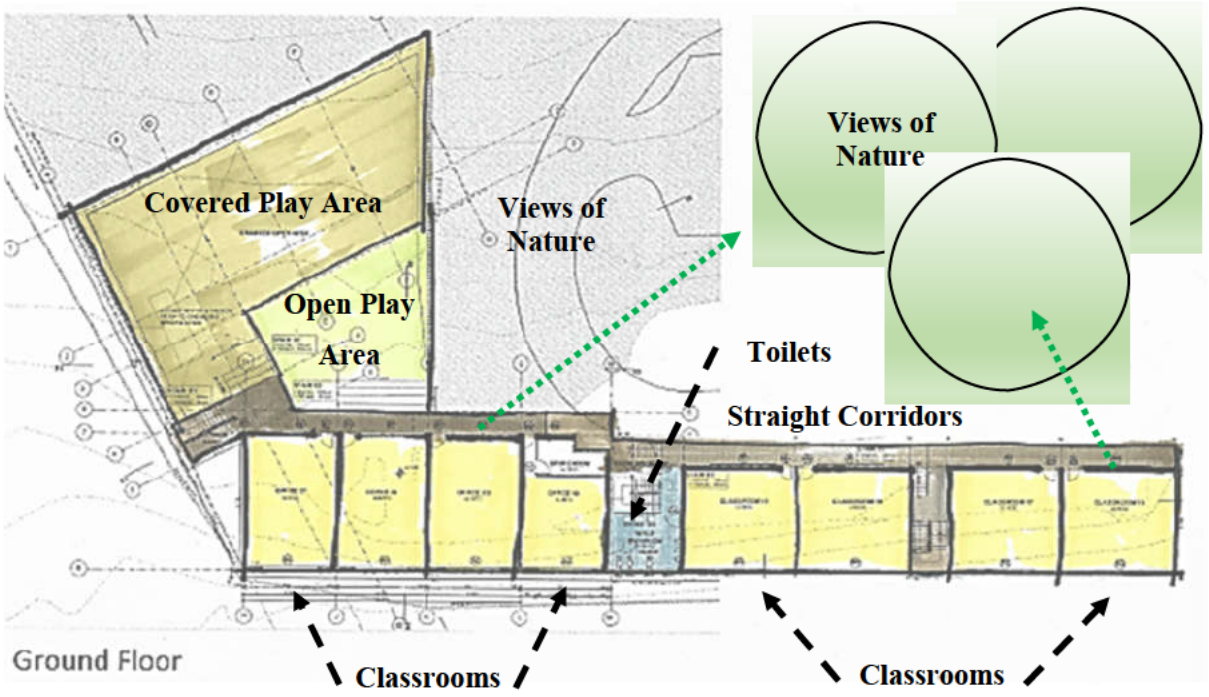



*Figure 6.3.5.3: Ground Floor Plan Layout (Source: Author 2023)*

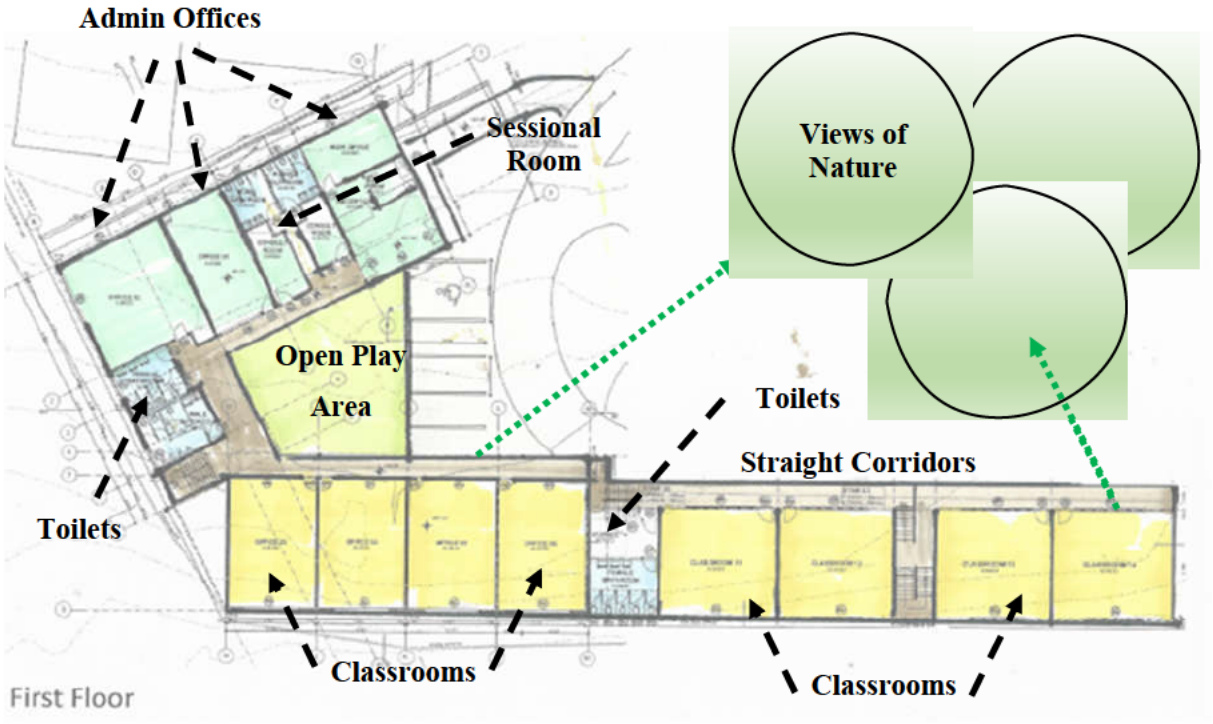



*Figure 6.3.5.4: First Floor Plan Layout (Source: Author2023)*

The school grounds are relatively small compared to Virginia Preparatory School, which limits the amounts and types of sporting activities. However, the introduction of a multi-purpose astroturf, as seen in plate 6.3.5.5, has provided an opportunity for play during break time and several sporting activities. Furthermore, adding a coffee shop creates a sense of community and allows for permeable boundaries

*Plate 6.3.5.5: Addition of an astroturf (Source: www.facebook.com/photo?fbid=565136695617849&set=pcb.565136752284510 [Accessed 03/12/2022])*

between the school and community engagement. The school admin offices and classrooms are built around a partially covered courtyard, seen in plate 6.3.5.6, which offers additional space for play and other activities on rainy days.

*Plate 6.3.5.6: Partially covered Courtyard (Source: https://www.evps.co.za [Accessed 04/12/2022])*

Several large aluminium windows on at least two sides of the classrooms allow for natural cross ventilation. The windows facing the corridor are more extensive than those facing the open wild land. The smaller windows facing the natural vegetation provide limited views of nature, although they reduce the amount of direct sunlight entering the classroom. Figure 6.3.5.6 illustrates these concerns regarding the windows.

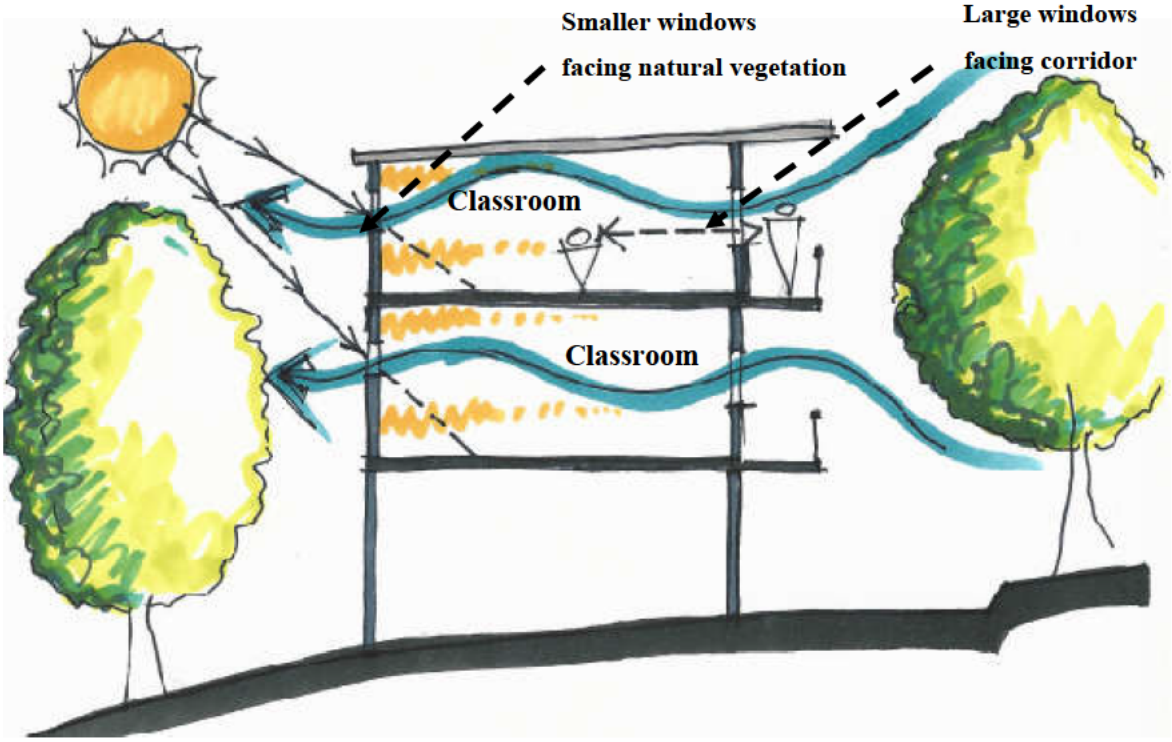



*Figure 6.3.5.7: Cross Section showing impact of windows (Source: Author 2023)*

The leap year classes (academic support) are positioned alongside the mainstream classes and are 48m2. As with Virginia Primary, the internal walls are painted white and have several key cards and graphics to assist the children, as seen on plates 6.3.5.8 and 6.3.5.9.

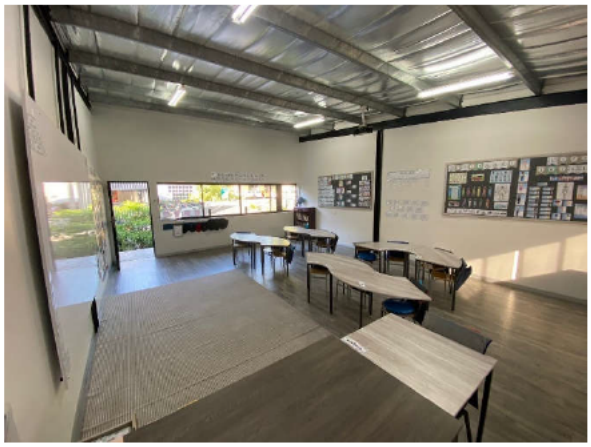


*Plate 6.3.5.8*

*Plate 6.3.5.9*

*Plate 6.3.5.8 & 6.3.5.9: Internal walls with key cards and visual prompts (Source: Auhtor 2023)*

The inner walls separating the classroom are constructed with drywalling and do not prevent noise transfer from the adjoining classrooms, as seen in figure 6.3.5.10. The impact of noise has a drastic effect on the ability of ADHD children to concentrate. Furthermore, the large windows facing the corridor cause children with ADHD to lose focus when people walk past, as seen in figure 6.3.5.11

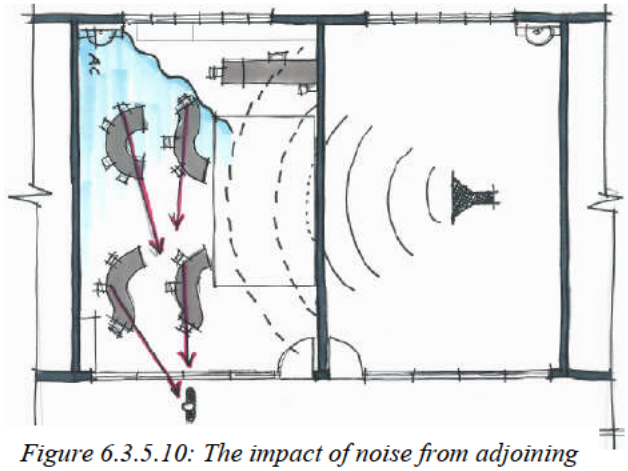


*Figure 6.3.5.10: The impact of noise from adjoining classroom(Source: Auhtor 2023)*

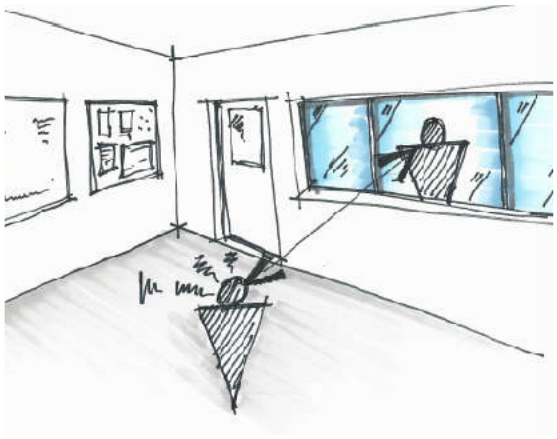


*Figure 6.3.5.11: Large Windows facing corridor cause learners to loose focus (Source: Auhtor2023)*

### 6.3.6 Research Findings from Interviews

As with Virginia Preparatory School – see 6.2.6, a thematic analysis was carried out, and the findings are presented in narrative stories. Also, see Table 6.2.6.1 – Thematic Data Analysis Process for both schools. The thematic analysis from the transcribed interviews from both schools resulted in two main themes; 1- Developmental Environment and 2- Inclusive Environment. These themes relate to the aims, objectives, and research questions.

6.3.6.1 Developmental Environment

Participants at Eden Village Primary School described the challenges that ADHD children have and what is required to enable them to learn. Bridging this gap allows them to reintegrate into a mainstream class within three years. Children with ADHD lose focus when people walk past the large windows facing the corridor.

**1. Learning Needs**

Participants described the learning needs of ADHD children.

*" we got to push them harder, and we want seven days of reading. We want hours every afternoon. We do try not to go over the top with the homework." Pg2 (Teacher)*

*"So I typically would go for…touch and feel, making blocks and sitting on the carpet and counting and doing things like that…so as long as I can keep their attention, and I've given them the movement break…And then your other kids, it's visual, so it's going to be interesting….But most of the time it's going to be hands on. So if I'm teaching money, I need money and you see me in front of them, they need to touch it, count it,move it around to look at it. But if I'm doing a comprehension, then maybe I want them to calm down and just listen and shut their eyes…having a A.D.D. child myself, they have got to be moving." Pg4 (Teacher)*

*"… if I've got this on ( headphoned) and they are down, especially for assessments, so for me, anything we doing here….Wobbly cushions, movement and headphones are a must…your ADHD kids are so sensitive to any noise. Yeah, so most people can cancel it out, filter it out. They can not! If you saw the ball fly there, I would go ja-ja I saw the ball. If they see the ball and they have to tell you about it." Pg 6 (Teacher)*

*"…I'm very particular about the eyes, and I've only got 12 children, so I've got two rows. If the ADHD child has eye problems, then they're going to be right under my nose." Pg 11 (Teacher)*

*" So your ADHD kids need timers…at least 1 big timer. Because with ADHD everything has got to be timed…and it works with a red ticker and you say okay, you've got 15 min, because with ADHD, they "disappear", and then you say to them… check the clock. So, timers, wobbly cushions and headphones, all of those are an absolute must." Pg 12 (Teacher)*

*"…they've had an education psychology report done, they would have concessions. So it could be 15 minutes extra time for reading." Pg2 (Principle)*

Participants described additional support staff availible.

*"On site but to the parent's experience, a psychologist can come in and use our sessional room. The speech therapist can come and use the sessional room. We have an onsite occupational therapist, where all the children from grade one to grade four actually enjoy a half an hour of occupational therapy, once a week." Pg5 (Principle)*

Participants described movement breaks for ADHD children

*" No, there is no need to get them out to class ... ultimately, all classes have to be inclusive. I don't care what age you are. Every 20 minutes, 30 minutes, you must get up. Teachers will argue…. it takes too much time. We've got too much .....rubbish. It takes minutes. Up, jump, Step, five jumping jacks, do a quick balancing act, breath in, breathe out. That's 2 minutes. Okay, sit. And then you've got your ADHD kids and you want them on a wobbly cushion because that movement keeps them moving, but they still can concentrate. But there's no point going on and on and on. And you've lost them and it's 45 minutes. What's the point! …But I wouldn't send my ADHD child for a walk because he might never come back." Pg 5 & 6 (Teacher)*

Participants described the need of headphones.

*" because your ADHD kids are so sensitive to any noise…so most people can cancel it out, filter it out. They can not!" Pg6 (Teacher)*

**2. Learning Challenges**

Participants described the learning challenges that affect a child with ADHD and their ability to concentrate in class or at home.

*"...if they are medicated, the medicine has worn off by 3:00pm. So then I don't want parents having fights with their children all afternoon. And if your parents work , by 5:00pm, that's when they come in to do homework. Now, what are you going to do?" Pg2 (Teacher)*

*" ...your ADHD kids, medicated or not, they need to zone in and get on with their work. And it's it's the noise. I mean, it's literally a flicker of Mrs. XYZ is walking past... Mrs XYZ is walking past , you know, anything…" Pg 6 (Teacher)*

*" They've just got barriers here and there that have to be fixed. And the sooner the parents do it, the less the problem will be later." Pg7 (Teacher)*

Participants described movement breaks away from the classroom.

*" But I wouldn't send my ADHD child for a walk because he might never come back." Pg 6 (Teacher)*

**3. Impact of Design**

Participants described how the layout of the classroom or other areas of the building could impact the developmental needs of ADHD children.

*" I want them close and they have to be able to see that board. So I would try to put the ADHD kids further back so that they can stand and not interrupt me. I don't have any problem with that, you can stand up. You can stand on one foot as long as you don't take a walk and annoy anybody else." Pg 4 & 5 (Teacher)*

*"...I would prefer more sound proof classrooms…my main thing is if children have barriers to learning or they have ADHD, because they do need quiet classrooms." Pg 10 (Teacher)*

*"... I need the ones that are ADHD should be further on the right, away from that main window." Pg 11 (Teacher)*

*" Our classroom works perfectly because they're long ( rectangular)." Pg 12 (Teacher)*

*" So if it's for a government school, just my opinion. So yes, we need way bigger classes, but if you have a breakaway room, you need a TA ( teachers assistant) in there to assist that… Because we cant let them literally out of our sights… your ADHD kids are so busy wondering they just need movements. They need space to move. I would say have a gym of something, maybe a punching bag. But again, you've got to have someone to go with them all the time. So a room with a punching bag you can get some energy out. I know St Peter's in Johannesburg outside every class they've got a trampoline. Because my kids went there and Connor was constantly sent outside to go to jump, get his energy and come back, you know, so that's a good idea." Pg 13 (Teacher)*

*" The windows are quite big, so they can sometimes be a distraction because the children will look at the window and see somebody walking down the pathway…We're very fortunate because on the other side, uh, we look out onto the trees and the farm around us. Uh, but those windows are a little bit smaller." Pg 9 & 10 (Principle)*

6.2.6.3 Inclusive Environment

As discussed in chapter 4, there are various approaches concerning an inclusive school environment. Participants described their understanding of inclusivity and how this can be achieved.

**1. Ethos of the School**

*" And it's been a wonderful challenge to have mainstream and remedial children in the same class with our ethos to try and assist children on both sides." Pg2 (Teacher)*

*"..this really comes down to the culture of the school. So our school is that we include… and when we started, our classes were all inclusive. Now we've specialised a little bit more to really help those children that need the help. It comes down to the culture and the teachers …therefore, we do not accept bullying or differentiating." Pg7 (Teacher)*

*" I think it comes from unity amongst the teachers…and what we have discovered through our journey, because it's been a journey, that we look after the children, we look after their self-esteem. We grow to understand them. They grow to understand us." Pg3 (Principle)*

**2. Playground & Extracurricular**

Participants described how play and extracurricular, which are offered to all children, create an inclusive environment.

*" I think what's great is, they've got sport together. There are cultural events; I mean, we'll do the Christmas concert where both classes are combined. Doing the choral verse in both classes or combined…They play beautifully together, But I really think it's because. We don't differ." Pg7 (Teacher)*

*"The playground is awesome, because we've got this whole set up now. And if it rains, ours is even better because we've got a cover." Pg 10 (Teacher)*

*" Initially, when we started, we had 43 children, everybody was integrated…As a school group, we then decided that a grade four to grade seven would have the break time and then we'd swop over , and grade one and grade three would have their grade time." Pg 6 (Principle)*

*" So the school started with a little Astroturf downstairs. And when I reflect back on it, it was absolutely wonderful. And it's undercover. So they could always have their break time off, even if it was raining.*

*...we used to have an old house here, which they dismantled and they've put in an Astroturf, which is a limited ground. So it's the size of a mini hockey club and it carries a basketball field for matches. And then alongside it is a smaller basketball field. And then obviously when netball comes along, we can swop the posts. What we also have up there is just a fabulous, huge tree that they're going to put Astroturf down and other children can sit there in the shade." Pg 7 (Principle)*

**3. Inclusion of Mainstream**

Participants described what they considered as mainstream inclusion and presented various other contributions that the researcher considered as Mainstream approaches to inclusion.

*"... So inclusive environment is basically to include everyone and get your children with barriers to learning up to speed. And as simple as that." Pg8 (Teacher)*

*"... do this remedial thing of three years, then after that we carousel them in back again into mainstream...They embraced them so beautifully, they pulled them right in. It was. Oh, Anthony ... Antoney, come and sit next to me. This is it. It was beautifully orchestrated and done. The teacher handled it well, and I'm actually really looking forward to seeing them all together next year. " Pg9 (Teacher)*

*"So we have two classes running alongside each other, a mainstream class, a leap class. They follow the identical curriculum. Their promotion requirements are exactly the same." Pg2 (Principle)*

*" An inclusive environment for many people is an environment where regardless of race, sex, religion, colour, languages, everyone is included in the school... for me, the inclusive part in our school is that the children are made to feel that they're part of a bigger community. So they may have a learning disability, but they're made to be part of the whole. And lots of integration. So when we have a speech and drama festival or we have speech day or we have our carol service, the classes come together and they perform as one." Pg3 (Principle)*

Participants described their thoughs as to whether children in the support class felt included.

*"I think it's something that we pride ourselves on because all the teachers know the children, all the children know the teachers, and everyone is treated as a unique individual. But at the same time, I think we've been able to teach the children to respect and understand that other children may have differences." Pg3 (Principle)*

**4. Exclusion from Mainstream**

Participants described what they considered as an exclusion from the mainstream class regarding having the ASU.

*" So this one is difficult because if the school doesn't have that ethos and you've got a mainstream class and the remedial next door, the ethos of the school is not such. Then they're going to be ridiculed. " Pg7 (Teacher)*

*" But as a teacher wanting to close the gap, I think the remedial on its own is easier to do because I find that the mainstream kids become slightly frustrated… Why are we repeating this again? Why are you telling us to start the sentence with a capital letter again? " Pg9 (Teacher)*
*"…I have days of of a bit of bullying here and there, but we sorted it out quickly. I just believe if you're going to try and close those barriers, you need to zone in on it… I would say remedial on its own is, is easier." Pg9 (Teacher)*

Participants described why a child with ADHD works better in a smaller support class.

*" But they just found that the children are often in a very big class. And they get swallowed up in the big classes. But now they come across and they're in a smaller class and they're given an opportunity to show their strengths." Pg4 (Principle)*

**5. Design for Inclusion**

Participants described design elements and spaces that they considered beneficial to the children. This sub-theme relates to design consideration that will allow children with ADHD to feel positive about their environment and, therefore, feels included.

*"…we've maintained the trees as much as possible. So it gives it a very a tranquil atmosphere …We found that early morning drop off goes very smoothly. And again, all the children are integrated because they start arriving from 6:30 am… I greet them all, and then they come through the foyer… It's a calm start to the day." Pg4 (Principle)*

### 6.3.7 Research Findings from Children's Sketches

The researcher produced a detailed floor plan of the classroom and an overall site plan of the school. The children were asked to colour-code areas on these plans in **green** – positive/engaging and **red** – negative/disliked and provide written text on why they chose those specific areas. The results from the eight children who participated are as follows:

Table 6.3.7.1 – Classroom and School Feedback from eight Children at Eden Village (Author, 2023)

| **Positive / Engaging – What they like or would like to have.** | **Negative/ Disliked – What they don't like or want to change** |
|---|---|
| Preferred the lights off ( 7 No) | Wanted to have a bigger field ( 7No) |
| Like having the WHB in Class ( 7No) | Wanted a bigger classroom ( 7 No) |
| Liked to sit on the floor/carpet ( 8 No) | Distraction from monkeys ( 8No) |
| Liked Poster and Cue Cards ( 4No) | Airconditioning as was cold ( 3no) |
| Sitting in Rows ( 8 No) | The noise outside class ( 5 No) |
| Likes Projector on the whiteboard ( 7No) | Sitting at a desk – Wanted to Stand ( 5 No) |
| Liked the Aircon ( 2No) | Wanted to work on a computer ( 7 No) |
| Liked the bookshelf ( 6No) | Move closer to their friend ( 6 No) |
| Playing on the Field ( 6 No) | Wanted a different chair (3 No) |
| Playing under the trees ( 4no) | Wanted to be closer to the teacher ( 4No) |
| Wants lockers ( 5No) | Didn't Like the parking area ( 4No) |
| Wants a wobble cushion ( 6No) | Didn't like the toilets ( 3No) |
| Wanted a new room in the classroom ( 6No) | |

### 6.3.8 Conclusion

The semi-structured interviews allowed for a deeper understanding of the inclusive approach taken by Eden Village Preparatory School and also assisted in answering questions 1, 2,3 and 4 of the secondary questions in chapter 1 (see 1.3.4). The leap classes (support class) have been implemented to run in parallel with the mainstream classes academically, culturally and with playground and sporting activities. Children in grades 4- 7 are allowed to play together during break time, which creates a greater sense of cohesion across the grades and will enable children with ADHD to play with children of various age groups. The school grounds are slightly limited; however, implementing an astroturf has allowed different functions and sports to occur within a limited space. As a newly built private school, the classrooms are designed to be larger, allowing for adequate space and movement breaks within the classroom which will benefit children with ADHD. The school is in a fortunate position, being a private facility, that additional support staff and equipment can be implemented to assist children with ADHD. As with Virginia Primary School, noise and visual distractions have not been carefully considered, and these have a massive effect on the concentration levels of ADHD children. The following chapter will discuss and summarise the themes and sub-themes from the case study analysis in this chapter.

# CHAPTER 7: DISCUSSION OF CASE STUDY FINDINGS

## 7.1 Introduction

This chapter aims to discuss and summarise the themes and sub-themes from the case study analysis. These themes and sub-themes are examined within the context of the literature review and precedent studies analysed in the previous chapters and which relate to the study's objectives (see 1.2.3 objectives). Furthermore, the chosen theories and concepts (see 1.4 theoretical frameworks) provide the framework for analysing the research findings.

## 7.2 Discussion of Findings

The observations from primary data collection in the previous chapter resulted in similar responses from the participant groups relating to the inclusion of children with ADHD. The thematic data analysis process converted the participant responses into two main themes and several sub-themes. Furthermore, children in the academic support classes at Virginia Primary School provided feedback by colour coding and annotating their classroom plan and the school's overall site plan. The feedback from the children is included as additional information to bolster interpreted themes and sub-themes where possible.

### 7.2.1 Developmental Environment – Main Theme 1

#### 7.2.1.1 Learning Needs - Sub Theme

Participants described the learning needs of children with ADHD are crucial to their overall development. These needs were highlighted on numerous occasions by the various participants. Children with ADHD find it extremely difficult to concentrate without a movement break. Movement breaks were identified on multiple occasions as having positive benefits. These movement breaks could be achieved inside or outside the classroom, resulting in a re-focused child. However, participants expressed contradicting views regarding allowing a child with ADHD to walk around the school without supervision. Although all participants considered movement breaks crucial, getting the child to re-focus straight after the movement break was another challenge.

All participants stated that having a smaller group of children with ADHD separated from the mainstream classes was beneficial. Having fewer children allowed more individual tuition and focus for the child. This grouping of ADHD children contradicts Selikowitz (2021), who suggests that ADHD children should not be grouped in a class as they distract one another.

ADHD children are very tactile and enjoy learning through touch and feel. This tactile requirement relates to the use of materials in the construction of both precedent studies. A small carpet or cushions on the floor was advantageous and allowed for a change to the typical learning approach, which relates somewhat to the articulated classroom (Hertzberger, 2008). Furthermore, the classroom design of

Imagine Montessori (see 5.2) allowed for these spaces in their design. Implementing headphones and wobbly cushions was also central to assisting ADHD children in learning and remaining focused.

Additionally, keeping the children close to the teacher and allowing them to stand and move simultaneously allowed them to stay focused. Providing standing opportunities is promoted by Rief (2016). Furthermore, most of the children in the academic support class at Virginia Primary School wanted the chance to stand at their desks rather than be constantly seated.

#### 7.2.1.2 Learning Challenges - Sub Theme

Ultimately, parents of children with ADHD have the final say as to whether their child uses medication to reduce the symptoms of ADHD. However, participants expressed great concern regarding children with ADHD who were not medicated. One of the participants further acknowledged this concern for parents when a medicated child attempts to do homework late in the afternoon when the medication has worn off. Providing an environment with the least distractions was challenging for the participants. Noise and movement outside the classroom were critical issues affecting both schools, resulting in children's concentration loss. The Participants stated that it wasn't easy to have an ADHD child in a larger mainstream class of up to 28 children, as they could get overlooked and left behind. However, it was confirmed that Virginia Preparatory had ADHD children in most mainstream classes. Furthermore, these children were flagged and received additional support from a team dedicated to assisting children who were seen to be battling. The use of support staff is recommended by Kewley (2011) to help children with ADHD.

#### 7.2.1.3 Impact of Design - Sub Theme

Participants at both schools provided numerous insightful suggestions regarding the design considerations for ADHD children at their schools. The small classroom size was the primary concern for the participants at Virginia Preparatory School, which was initially designed as a Junior School and has been adapted over the years as a Senior Primary school. With space restrictions, having 26 to 28 students in mainstream classes was challenging. In contrast, Eden Village had more space, and the classroom size was considered suitable for all activities. However, teachers at both schools indicated a need for additional dedicated computer space. In addition, areas that allowed for more practical work in the classroom were considered necessary for the participant at Virginia Primary.

Furthermore, a separate smaller quiet space in the classroom, which permitted a teacher's assistant to help children individually, was also considered valuable by Virginia Primary School's teacher. Once again, this smaller quiet space relates to Hertzberger (2009) and his idea of the articulated classroom, as well as Augustin et al. (2009) and Rotraut (2009). They claim that the smaller-scale space allows for

more privacy within the classroom. The participants preferred muted tones on the classroom walls, related to earlier research by Selikowitz (2021). However, providing children with colourful key cards, such as the alphabet, and visual cues enabled them to carry out their work without endless questions, which could disrupt the rest of the class. Participants at both schools were concerned with the size and position of glazed doors and windows. Not only did large glazed areas cause significant heat can, but they also impacted the ADHD child's ability to concentrate. Glazing at low meant children were distracted whenever someone walked past the classroom. Therefore, natural lighting and window positions must be carefully considered to prevent heat gain and concentration loss. Furthermore, the ability to provide views and contact with nature must also be a consideration.

Additionally, outside noise and noise between classrooms were a significant concern for participants and related to research from Rotraut (2015), Council (2007) and Day&Midbjer, (2007) discussed in Chapter 3 (see 3.11). Separation walls between classes need to be soundproofed. Moreover, considering where a classroom is positioned to prevent excessive outside noise is crucial in allowing an ADHD child to concentrate. The classroom desk layout was a mixed response, whereby rows were preferred by one of the participants, which related to Selikowitz (2021) and Kewley (2011) and groups, which associated with Laura&Levine (2017), Laal&Ghodsi, (2012) and Murphy, (2015), was chosen by another. This inconsistency in seating layouts refers to feedback from children in the support class at Virginia, where some preferred sitting in a group, and others preferred seating in rows. However, participants at both schools stated that space for a mat and cushions on the floor was a positive space where children preferred to engage. This preferred space was reinforced by children at both schools, where most of them colour-coded this area as a positive space they enjoyed. Children at both schools preferred Natural, ambient lighting over artificial lighting.

The impact of Durban's weather was also emphasised, with most children highlighting air conditioning as a positive attribute in their classroom. However, having slit units rather than a ducted system caused some children to feel cold, while others didn't benefit from the air conditioning as they were too far away. As discussed in Chapter 3 ( see 3.10), air temperature is the most significant factor for student accomplishments (Buckley et al., 2004, Earthman, 2004, Woolner, 2010). Durban's high summer temperatures can harm the progress of all children; it is not thoroughly considered as part of the classroom design and location.

### 7.2.2 Inclusive Environment – Main Theme 2

#### 7.2.2.1 Ethos of the School - Sub Theme

An inclusive approach to children with ADHD was a fundamental attribute of the ethos of both schools. In some instances, amalgamating mainstream and support classes were sometimes seen as challenging. However, children's differences need to be understood and accepted. Participants stressed that any form

of bullying or ostracising of children was not accepted. Combining particular mainstream and support class activities allowed children with ADHD to socialise outside of their classroom peer group.

Nevertheless, more of these inclusive activities were suggested by one of the participants who felt they were highly beneficial to mainstream and support class children. Having principals with a strong understanding of inclusivity allowed the school's culture and teachers to drive an inclusive approach. A child's self-esteem and the ability to provide additional support enabled children with ADHD to feel included within a mainstream school environment.

In typical South African government schools, children with ADHD would be included in mainstream classrooms with over 30 students. The school's ethos of inclusion would be fundamental to how teachers and their peers treat these children. The ethos of a school is not something that an architect can enforce; however, the philosophy of an inclusive approach can assist in reinforcing the school ethos.

#### 7.2.2.2 Playground & Extracurricular - Sub Theme

The ability of children with ADHD to socialize with mainstream children during break time, sports and other extracurricular activities was considered critical by all participants. Virginia has extensive school grounds and offers various sporting and extracurricular activities. Most children highlighted this social integration, colour-coding the playing field as an area they enjoyed. Furthermore, most children highlighted the Hall as a positive space due to playing chess and integrating the mainstream and support classes during assembly. The air-conditioned library was also viewed positively, with children enjoying the ample space to relax on beanbags and read during breaks with other children from mainstream classes. Additionally, the computer room, drama room, tennis courts, and pool were all areas considered positive and engaging by the children.

In contrast, Eden Village has less open space due to limited site constraints, albeit fewer children in their school than in Virginia Primary, which means the smaller space catered to the children's needs. Eden Village has a new astroturf, viewed as a positive space by the children, that allows various sporting and play activities. Both schools have large shady trees that enable children to mix, gather, and be in direct contact with nature. Contact with nature is shown to enhance a child with ADHD's ability to concentrate (Laura&Levine, 2017, Berman et al., 2008, Pellegrini, 2006). Moreover, allowing a child with ADHD to run and play during break time was considered imperative by the participants and resulted in a calmer, more focused child with ADHD. In addition, research indicates brain cell growth and physical health depend on physical activity (Hendricks, 2017).

Having an undercover open play area allowed children at Eden Village to engage in play even when it was raining and which relates to Harrison&Hutton (2013) outside and inside spaces that serve as the heart of the school, allowing social interaction between children, further breaking down barriers in differences. Furthermore, allowing children of different age groups to mix during the break provides

opportunities for children with ADHD to interact and forge new friendships. Limiting the ability to physical activity during the break impacts children with ADHD negatively, with a few of the children emphasising that the courtyard playing area at Virginia was too small and was seen as a negative space. Adequate consideration of playground spaces and layout must ensure a child with ADHD feels included in the mainstream school environment.

#### 7.2.2.3 Inclusion of Mainstream - Sub Theme

Most participants felt that children in the support classes felt included and part of the mainstream school. The support classes at both schools cover the same curriculum as the children in the mainstream classes, and their promotional requirements are the same. As discussed in this chapter (see 7.2.2 Learning Challenges), one participant confirmed that ADHD children were in most Virginia Primary mainstream classes. These children are flagged and can be given special dispensations, such as additional time to help them cope. A school-based support team was also in place to assist them in the mainstream classes if needed. Even though children with ADHD have numerous challenges, they can interact and learn in a mainstream learning environment (Selikowitz, 2021). Having children with ADHD in a mainstream class is considered full inclusion (Forlin et al., 2013). In this respect, Virginia Primary School would be regarded as providing full and partial inclusion.

Furthermore, Virginia Primary offers students from short-remedial schools, such as Livingston Primary School, the opportunity to engage and play in sporting activities that the remedial school may not provide. These children must be from the local area and considered future school students. This engagement allows children with ADHD to form connections with peers they will connect with once they have completed their short-term remedial tutoring. Both schools saw the support classes as short-term (max three years) vehicles to a fully inclusive mainstream education system. One of the participants describes how by grade 7, all academic support children are reintroduced into mainstream classes. This mainstream full inclusion assists in bridging the gap before they enter high school, where most classes consist of 28 -30 students.

#### 7.2.2.4 Exclusion from Mainstream - Sub Theme

Even though both schools include children with ADHD in a mainstream environment, they acknowledge that separating the children into a dedicated smaller class is more of a partial inclusion rather than full inclusion. This understanding of partial inclusion relates to research by Forlin et al. (2013).

A participant confirmed that children in the support class at Virginia questioned why they needed to be separated from mainstream classes. This questioning highlighted that they did feel excluded from their

mainstream peers. In addition, it was further confirmed that children in the support class tended to socialise mainly with themselves during break time and not with other children from the mainstream classes. It could be argued that three consecutive years with the same children in the same class creates an isolated group that becomes excluded from their mainstream peers. In comparison, children in mainstream classes will potentially mix with new children at the change of each grade. As suggested previously by one of the participants, these separation barriers could be broken down by allowing more integration with the mainstream and support class.

However, the participant still felt that teaching ADHD children as part of a separate support class is more beneficial to a child with ADHD. The smaller classes allowed the teacher to focus and address the child's short-term needs, enabling them to show their strengths. A school environment must aim to make children feel safe and secure, so they feel loved and nurtured (Seamon et al., 1985). This feeling will allow them to feel included within the mainstream school environment.

#### 7.2.2.5 Design for Inclusion - Sub Theme

Participants at both schools expressed that drop-off and collection of children was a smooth process that limited undue stress on children with ADHD. Additionally, both schools have numerous large trees at the entrance to the schools, providing contact with nature before starting the school day. Contact with nature is a crucial consideration acknowledged by numerous academics (Kuo&Faber Taylor, 2004, Faber Taylor&Kuo, 2011, Day&Midbjer, 2007, Goldhagen&Gallo, 2017).

Participants at Virginia Primary described the limitation of linear corridors and the need for more open spaces along the corridor length. The rethinking of the linear approach to corridors is debated by Woolner (2010) and Dudek (2007) (Chapter 4 – see 4.4) and further supported by Hertzberger (2008). This additional space in corridor reconfiguration could allow for trampolines where children with ADHD could bounce to burn unwanted energy, enabling a more focused child. Furthermore, long corridors meant the gap between inside and outside spaces was limited. Therefore, it was suggested that breaking down building areas would create a more open feel, allowing for a relationship between the open tree-covered courtyard and classrooms to be achieved. These indoor/outdoor spaces allow for contact with nature, which benefits children with ADHD. Spill-out areas adjacent to the classroom allowed group work activities to take place. However, these spaces needed to be more defined to enable children to understand the boundaries of the space.

Furthermore, allowing children to work outside the classroom in a designated natural setting linked to the classroom was considered a top priority by one of the participants at Virginia. This requirement relates to the designs of both previous precedent studies discussed in Chapter 5. In addition, participants at Virginia Primary School saw extra space as highly valuable in the classroom environment. This space would allow for break-out areas where children could sit or lie and read books. Once again, these break-out spaces relate to feedback from the children, with most children highlighting the reading corner and

carpet as positive spaces. Furthermore, having extra space will allow the teacher to set up different classroom stations where children can work practically with others who may prefer to do worksheets or work on computers.

## 7.3 Conclusion

Inclusivity of children with ADHD within a mainstream school environment is challenging. Not only does the school environment need to cater for their specific individual needs, but the ethos and culture of the school need to be inclusive. Participants' feedback on inclusive design considerations has been shown to align with the significant aspects of the literature reviewed in previous chapters.

Furthermore, places and spaces that allow for social interaction and connection with children highlight the need for a more cohesive collaboration between support and mainstream classes. The need for improved space requirements varied between the schools. However, larger classrooms with opportunities to create spaces within the classroom were considered crucial. Additionally, the ability to learn outside the classroom was emphasized and relates to this dissertation's literature review and precedent studies. Analysing the themes and sub-themes has clarified all the research questions in chapter 1 (see 1.3.4).

Additionally, Phenomenology as the primary paradigm and the concepts of placemaking and environmental psychology must be incorporated throughout the design process to provide an inclusive architecture with optimal space provision and meaning. Designing with an intent to give children a sense of being at home in a protected place (Norberg-Schulz, 1979, Seamon et al., 1985) will enable them to feel included. Chapter 8 will discuss the research from the previous chapters, its limitations and recommendations.

# CHAPTER 8: RESEARCH DISCUSSION, LIMITATIONS AND RECOMMENDATIONS

## 8.1 INTRODUCTION

This study explored how architecture can be implemented to create positive learning spaces and places that allow ADHD children in grades 1-7 to advance academically and emotionally while participating socially in an inclusive environment. Furthermore, the development of relevant theories and analyses began to answer the key questions and achieve the objectives outlined in the initial phase of this dissertation. The researcher will discuss key considerations from the study in this chapter, its limitations and further recommendations to progress this research.

## 8.2. RESEARCH DISCUSSION

### 8.2.1 Introduction

Mainstream government schools in Greater Durban do not have architecturally responsive spaces catering to the needs of children with ADHD in grades 1-7. This research attempted to investigate how childhood ADHD affects the architecture of a mainstream school for children in grades 1 to 7. It aimed to engage the positive roles that the built environment can play in the educational, social, and emotional development of ADHD learners. Therefore, the study intended to identify and establish specific architectural design principles that can be applied to enhance the design approach for an inclusive school for children with ADHD in the context of Greater Durban, South Africa.

### 8.2.2 Summary of Study

The literature review highlighted that designing for children with ADHD necessitates an in-depth understanding of the impact ADHD has on a child. Furthermore, a clear understanding of their learning needs and how the built environment impacts their well-being is necessary. Additionally, in-depth knowledge of a child's senses is essential to understanding how buildings and children relate. A child's senses are involved in the complicated process of perception, which is closely connected to feelings, past events, and memories. Therefore, an architect must consider a child's perception of past experiences that will allow a child to feel secure. That space and place that provides sanctuary would start with a connection to home.

Feeling safe and secure in an environment is fundamental to a child with ADHD's success and social integration. A school's shape, size, and form are all essential considerations when designing environments for children with ADHD. Every aspect of the building design must be carefully examined in size and proportion to offer children a sense of safety and belonging by providing little microcosms inside the broader picture. Phenomenological considerations in the design process must consider the need for a child to feel protected, and all building elements must be considered to achieve this.

The ability of a building to allow a child with ADHD to orientate themselves assists in creating a space whereby they can feel at ease with the knowledge they know where they are in the world. The foundation of the self-identity comprises perceptions about their physical environment and contributes to their sense of self. Early physical space and place perceptions during childhood affect their subsequent place identity. The results from the literature review indicate that proportion, scale, colour, lighting, heating, cooling, ventilation and noise impact and influence how children perceive and function in their environment. Moreover, using and applying specific building materials relating to a child's age is crucial to providing an environment they perceive as secure. These aspects highlighted above must be carefully considered and implemented to allow a child with ADHD to thrive emotionally and academically. Their ability to succeed will allow them to develop a positive identity that will enable them to reach their highest potential and feel included in society.

Environmental psychology research demonstrates the advantages of engagement in nature for children with ADHD in terms of increased mood, social relationships, and cognitive performance. Playing comes easily to children; nature offers them endless experiences and learning opportunities. Children with ADHD should not be subjected to excessive artificial lighting, noise, hazardous materials, or air conditioning that serves only a few children ( depending on their position) in the class. These negative attributes have long-term health consequences and prevent an ADHD child from concentrating and performing effectively in the classroom. Whereas natural light, ventilation, and materials mitigate the impact of these health issues and assist a child with ADHD in focusing.

Furthermore, acoustic considerations, both externally and in between classrooms, significantly benefit a child with ADHD's ability to concentrate. Nature's sights and noises have significant beneficial physiological effects. Therefore, having lessons outdoors or providing visual contact with nature results in a short-term or long-term improvement in symptoms, enabling children with ADHD to feel positive and included in mainstream schools. However, there are gaps in knowledge linking the extent to which a child with ADHD can better manage once they have been in contact with nature.

The role of an inclusive design approach to a project acts as a catalyst for the entire design. It sets in motion a process of engaging and understanding various ideas and concerns across multiple participants. Ultimately, this results in a building that embraces a collaboration of interwoven ideas that benefit most people and create a sense of place. The ability to create a lattice web of interconnected spaces, whereby all spaces merge, is something that all architects should aspire to achieve.

### 8.2.3 Key Findings

The objectives outlined in chapter one have been achieved by answering the research questions (see 1.3.4). These objectives are reviewed, and an answer is provided below. This culminated in a response and conclusion to the main research question.

**Research Objectives.**

1. To investigate the impact that ADHD has on children.

Answer: Chapter 2 explored literature from various scholars and academics to assist in understanding childhood ADHD and its impact on children. The data provided an in-depth understanding of these children's challenges and the psychological challenges that affect their day-to-day activities that "normal" children take for granted. Chapter 6 offered rich data from interviews with teachers and principals who interact with ADHD children daily. The analysis of the data identified key themes that are highlighted in chapter 7.

2. To understand the problem that the current educational typology has on ADHD children.

Answer: Chapter 3 explored the impact of the built environment on children. This data supported the chosen theories and provided an understanding of building design elements and considerations that allowed for positive and negative perceptions about spaces and places. These perceptions around the built environment allowed for the critical analysis of the local case studies (current school typology) discussed in detail in chapter 6. The research identified that by not understanding the impact of ADHD on children, the spaces that provide security and social interaction are not currently being catered for in the design of the current educational typology.

3. Explore learning spaces that allow for the developmental needs and learning styles of ADHD children.

Answer: Chapter 3 explored literature on the built environment's impact and provided principles for architectural strategies for a positive and engaging learning environment. Furthermore, chapter 5 provided insight into precedents through the theoretical framework that allowed for the analysis of inclusive and engaging learning environments. This was further reinforced in chapters 6 & 7 during interviews with principals and teachers at two schools who provided rich data into how children with ADHD are taught and space provisions that allow for this. In addition, children with ADHD from 2 separate schools provided input on spaces and places that had either a positive or negative impact on them by colour-coding their classroom and the school site plan.

4. To investigate architectural strategies that allow an inclusive, positive, and engaging learning environment for ADHD children

Answer: Chapter 4 explored literature on an inclusive approach (whitepaper 6) to schools in South Africa and globally. This information provided the backbone for understanding the various strategies for including children in a mainstream schooling system. Chapter 5 provided an understanding of inclusive design principles for children through key precedent studies. A further response to objective 4 will be provided in part 2, culminating in this research dissertation and the design of a proposed school in greater Durban for children with ADHD in grades 1-7.

**Research Question:**

How can architecture contribute toward creating an inclusive and accommodating environment that positively influences ADHD children in greater Durban, South Africa?

**Conclusion:**

Architecture and the spaces and places it provides significantly influence how ADHD children in grades 1-7 engage through their senses, perceive and experience a place. Ultimately, great care needs to be taken to understand the individual needs of children with ADHD so that architecture can respond and provide an environment that positively influences them and allows them to feel included.

## 8.3 LIMITATIONS

Based on the subjective approach of this study, the researcher accepts that their interpretation of data will be analysed differently from other researchers who may conduct a similar study. In addition, the researcher also consents that having their child diagnosed with ADHD at age five has provided a situation where their own experiences may influence specific ideas about children with ADHD and how they are currently being taught. However, numerous academic papers and literature on childhood ADHD have been reviewed to assist with providing factual and rigorous research in this regard. The researcher attempted to prevent any bias or influence over the outcome of reviewed data and findings and to remain partial at all times.

Feedback from the case study interviews will differ from one school to the next depending on the participant's experience and background. Furthermore, the case studies were conducted in more affluent areas where private funding allows for better facilities. Typical South African government schools are not afforded the luxury of additional funding and are limited to the statutory allowance. The number of participants involved in the interview process, limited to four Caucasian women, provides only a small information window. Therefore, the generalizability of these findings is uncertain due to the limited sample size. A more extensive sample size across different ethnic and social backgrounds would allow the researcher to analyse and provide more concise participant feedback. Additionally, time constraints

on the researcher and participants resulted in only 1 or 2 meetings to conduct and analyse large amounts of data.

## 8.4 RECOMMENDATIONS

The following guidelines for developing a school for students with ADHD are based fundamentally on an inclusive design approach to these children. Architects must actively collaborate with school principals, teachers, doctors and relevant professionals during all stages of the design process. Architects should focus more on design concepts and theories that would facilitate an inclusive approach, as other professionals would potentially be more practical in their application and recommendations. The school hall, library, computer room, swimming pool, and sports field are key spaces that allow social interaction between children of various classes and grades. Furthermore, these spaces can be designed for community usage without affecting daily school activities. Involving the community and allowing public spaces and interaction within the school provides social interaction and upliftment of that community and allows both the school and community to merge.

A school should aim to embrace the idea of a home away from home. However, due to the vast inequalities in South Africa, the representation of the "home" will vary drastically. Therefore, the architect must consider the local context of the site and cultural norms and values. These will be critical considerations when designing the "home". What is vital is that the school reflects a place of safety across all socio-economic backgrounds. Incorporating a courtyard as part of the overall design provides a sense of security and social interaction. Courtyards are referenced throughout this dissertation and highlighted in figures 8.4.1, figure 8.4.2 and plate 8.4.3

*Figure 8.4.1: Village layout centred on green or semi-enclosed courtyard.(Source (Day&Midbjer, 2007) [Accessed 08/10/2022])*

*Figure 8.4.1:Precedent Study 2 – Mustardseed Primary – Courtyard intergration.(Source: Author 2023)*

*Plate 8.4.3: School designed around a secure courtyard.(Source:www.archdaily.com/978637/green-school-south-africa-gass-architecture-studios [Accessed 22/04/2023])*

Younger children perceive thick, heavy walls as secure structures. Designing exterior walls with an insulated cavity provides this sense of security and allows for reduced noise, reduced heat gain in summer and heat loss in winter. Alternatively, thick sandbag walls offer the same properties and reduce cost and carbon footprint, as seen in figure 8.4.4. Furthermore, acute-angled corners are perceived as aggressive and confrontational (Day&Midbjer, 2007). Internally, they are claustrophobic and hard to approach. Therefore, walls need to be designed to have obtuse angles or curves, as seen in plate 8.4.5, to prevent them from negatively affecting the perception of children with ADHD.

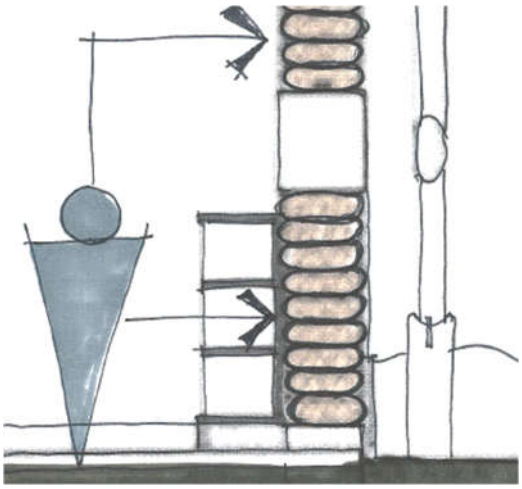


*Figure 8.4.4: Cross Section showing sandbag wall (Source: Author 2023)*

*Plate 8.4.5: Obtuse or curved walls prevent negative perceptions. (Source :www.archdaily.com/978637/green-school-south-africa-gass-architecture-studios [Accessed 22/04/2023])*

The classroom size for children with ADHD must be designed larger for several reasons:

- The number of children in mainstream government schools (more than 30 per class)
- An opportunity to have combined classes with children in the same grade
- The need for various workstations that allow for diverse learning styles
- Provide an opportunity for children with ADHD to stand at their desks
- The implementation of an articulated classroom design allows for break-out (quiet) spaces
- Incorporation of cubby holes and safe spaces within the classroom
- Reading corner with cushions and bean bags
- Toilets incorporated into the individual classrooms – specifically for younger students

Circulation spaces throughout the school must allow for social interaction opportunities that overlap as multipurpose spaces rather than just a designated movement corridor. Furthermore, Where circulation spaces merge, the design must allow for free-flowing movement patterns, preventing conflict areas between students, as shown in Figure 8.4.6. Moreover, circulation spaces create noise and movement distractions for children with ADHD. The external envelope of the classrooms facing these areas must prevent these distractions. Having a dedicated circulation space teeing off the main circulation corridor or having a planted buffer zone will assist in reducing these distractions.

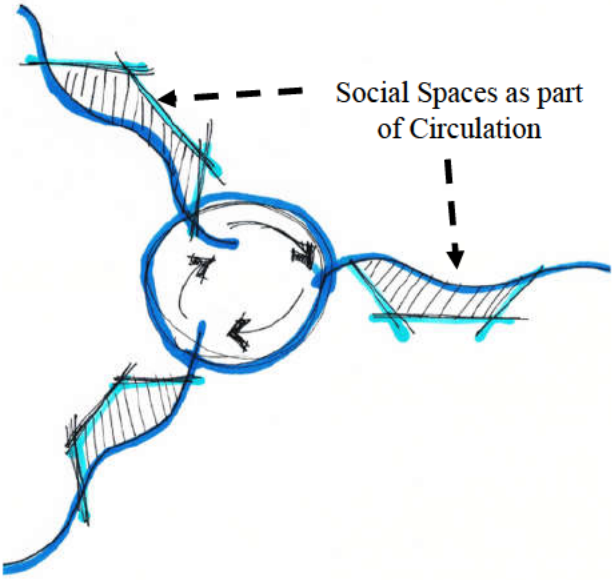



*Figure 8.4.6: Free-flowing circulation pattern where corridors merge (Source: Author 2023)*

The design and location of windows need careful consideration. Although a need for natural light is crucial, windows have the potential to cause visual and noise disturbances and allow too much direct sunlight into a room. Smaller, high-level windows should, therefore, be positioned where visual distraction could be an issue, and larger windows and doors should be placed in areas that allow for views of nature with no other visual or noise disturbances. If windows are positioned in locations with a noise impact, care must be taken to specify windows that prevent noise and have an airtight seal.

Natural airflow is a critical consideration when designing the size and location of the openable windows. The classroom must be able to adjust the natural airflow depending on the wind direction and speed. Therefore, multiple adjustable window sections must be included in the design to allow for a bespoke adjustment of natural air movement through the classroom on any given day.

Noise between individual classrooms also needs careful consideration. Walls must be designed to prevent noise transfer between classrooms; if the site allows, classrooms should be entirely separated

from one another with a buffer zone. These outside buffer zones can merge outdoor learning opportunities between individual classrooms, enabling social interaction between different classes. Furthermore, incorporating a covered area as part of the buffer zone creates an indoor/outdoor environment and allows views of nature. Figure 8.4.7 illustrates the design considerations of this paragraph as a schematic representation.

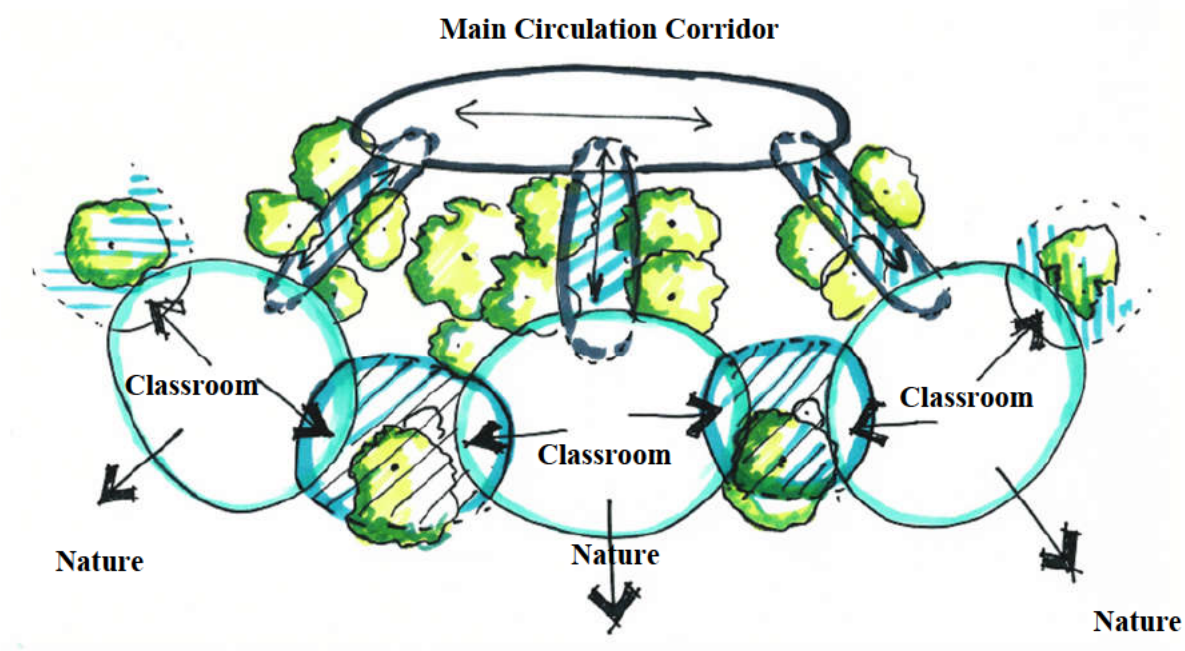



*Figure 8.4.7: Schematic drawings showing buffer zones to prevent noise transfer but allow social interation and views of nature (Source: Author 2023)*

The natural world's value and benefit to children with ADHD cannot be underestimated. Incorporating nature and her elements of natural light, ventilation and sounds as a critical part of the school's design is essential. Nature can influence a child with ADHD positively and should, where possible, be implemented thoughtfully throughout the design process. Blurring the lines between built form and nature allows the natural environment to penetrate the hard edges and create a climate that reciprocally benefits each other. Natural vegetation can protect the building from the harsh elements of the sun, wind, and rain, limiting the need for an artificially controlled environment within the building envelope. Architects need to collaborate with landscape architects or upskill themselves to have a deeper understanding of indigenous vegetation to implement specific plant species for particular uses in and around the buildings. Additionally, natural vegetation provides a barrier to noise penetration from the outside environment.

## 8.5 CONCLUSION

Children diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) may have difficulties in experiencing a sense of belonging and acceptance within the educational setting. These children's sense of inclusion is affected by the design of spaces, lighting, ventilation, acoustics, scale, form and materiality. These design considerations are not limited to children with ADHD and will assist most students in feeling more socially included within the school environment. Additionally, principals and teachers have innovative ideas for enhancing the educational environment. These ideas must be explored through collaboration as they can influence subtle design outcomes that positively affect ADHD students.

A phenomenological design approach has shown that children might feel more included in the educational environment, enabling them to be in harmony and a safe place (Shultz, 1971). This is supported by the concept of the articulated classroom (Hertzberger, 2008) and the requirement for a break-out space to escape (Gaines et al., 2016), which are inextricably linked. Analyses of the chosen theories have shown that the discipline of environmental psychology and sensory design is a significant aspect of all built environments. The relationship between architecture and child development necessitates a much more concerted effort to ensure that buildings have a positive psychological impact, allowing children with ADHD to feel socially included and reach their full potential.

Children diagnosed with ADHD have challenges in maintaining focus, controlling impulsive behaviour, and exhibiting hyperactive tendencies. These obstacles may substantially affect their learning experiences, as they may have difficulties concentrating, finishing assignments, and engaging with classmates in a traditional classroom environment. Furthermore, ADHD may impact their ability to regulate emotions and engage in social relationships, perhaps resulting in experiences of exclusion or isolation. The need for accommodating and comprehensive design stems from acknowledging that ADHD affects cognitive abilities and how children interact with social dynamics and physical surroundings.

Existing mainstream school buildings may unintentionally worsen the challenges experienced by students with ADHD. Unsuitable lighting, defined by intense fluorescent lights or insufficient natural light, may negatively affect one's focus and emotional state. Inadequate ventilation may create an unpleasant and disruptive atmosphere, impacting physical and cognitive health. The absence of specifically defined areas for relaxation and separation exacerbates the difficulties since children with ADHD may have problems locating a serene spot to gather themselves and regain concentration.

Furthermore, the conventional arrangement of classrooms may not adequately accommodate the varied learning requirements of children with ADHD, impeding their academic and social development. The issue stems from the discrepancy between the current physical infrastructure and the specific needs of children with ADHD, highlighting the need for personalised design solutions.

To successfully respond to the developmental requirements and learning styles of children with ADHD, it is necessary to have a comprehensive awareness of their issues and create learning environments accordingly. As shown in the study, an articulated classroom refers to a learning environment that is flexible and adaptive, allowing for different learning styles and approaches. These settings should provide sensory stimulation that promotes focus without causing sensory overload. Breakout spaces, created explicitly as secure retreats for rest periods, play a role in managing emotions and provide chances for introspection. To further promote engagement and understanding among ADHD children, it is beneficial to provide environments that facilitate mobility, include visual aids, and allow for alternate sitting configurations, considering their particular learning styles.

Architectural designs for inclusive learning spaces need a thorough understanding of the complex correlation between the physical space and the development of children. The study promotes a thorough investigation of these strategies, highlighting the importance of designs that benefit children with ADHD.

Creating a sensory-friendly atmosphere involves using natural light, ensuring sufficient ventilation, and taking steps to limit sound. It is essential to ensure that the spaces' size, shape, and materiality align with universal design principles so that they are accessible to all pupils. Collaborative environments that facilitate social contact and group activities accommodate the varied social requirements of children with ADHD. Essentially, the architectural techniques seek to create surroundings that promote academic development and cultivate the social and emotional welfare of children with ADHD, promoting a genuinely inclusive learning experience.

Additional research should include an in-depth investigation of conventional South African government schools. It is essential to comprehend how they may be modified and adapted to enhance inclusivity for children with ADHD. Moreover, it is advisable to do additional studies to thoroughly investigate the influence of architectural design on students with ADHD in secondary educational institutions. These findings may provide practical suggestions for architectural interventions and design adjustments in mainstream schools to provide more inclusive learning environments for older children with ADHD.

The results highlight the significance of a comprehensive and cooperative strategy towards school architectural design, focusing on environmental psychology and placemaking. The study establishes a basis for practical suggestions that might benefit architectural practices, guaranteeing that educational settings favour the social integration and optimum growth of children with ADHD.

# APPENDICES

APPENDIX 1

## Semi-Structured Interview Principal

The following is a sample of the interview that will be conducted with the participants. These interview questions are open-ended to allow the participant flexibility in response.

1. What is your job/role in the school?
2. How many children are currently enrolled at the school?
3. What is the ethos of the school regarding teaching ADHD children?
4. What is your understanding of an inclusive school environment?
5. In your opinion, do you think the children in the learner support class feel included?
6. Are there any areas of the building which have either a positive or negative impact on the children?
7. How do the learner support classes differ in learning styles compared to mainstream classes?
8. What additional support facilities do you have on-site for ADHD children?
9. Are different grades allowed to interact during play, and what impact does that have?
10. Can you describe the process of drop off and pick up of the learners?
11. Can you describe the playground and related sports facilities available?
12. Do you think children enjoy being at this school?
13. Are there things you feel this school lacks that are found in other schools?
14. If you could change anything relating to the design of your school, what would you change and why?
15. Is there anything else you would like to discuss?

APPENDIX II

## Semi-Structured Interview Teacher

The following is a sample of the interview that will be conducted with the participants. These interview questions are open-ended to allow the participant flexibility in response.

1. What is your job/role in the school?
2. What is the ethos of the school regarding teaching ADHD children?
3. What are the learning styles and developmental needs of ADHD children?
4. What is your understanding of an inclusive school environment?
5. In your opinion do you think the children in the learner support class feel included or excluded from the mainstream classes? Please give your reasoning.
6. What measures have been implemented to make sure children feel included within the school?
7. Are there any features or areas of the building which have either a positive or negative impact on the children?
8. Can you describe the layout of your classroom and how the children are seated?
9. If you could change anything relating to the design of your classroom, what would you change and why?
10. Can you describe the playground and related sports facilities available?
11. Are there things you feel this school lacks that are found in other schools or that you may have heard about?
12. Is there anything you would like to discuss?

APPENDIX III

**Informed Principal and Teacher Consent**

# UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

## INFORMED CONSENT

Information Sheet and Consent to Participate in Research

Dear Principal & Teacher,

My name is Gareth Calvert from UKZN, School of Built Environment and Development Studies, Department of Architecture. I am working towards my Masters in Architecture.

You are invited to participate in a study that involves research on Architecture for children with ADHD in grades 4-7. The title of this study is: "An exploration of childhood attention deficit hyperactivity disorder through architecture": Towards an inclusive education facility in Durban. The study aims to explore and understand how architecture can promote an inclusive and accommodating environment that will provide a positive impact on schoolchildren with ADHD in grades 4-7. The study is expected to enrol The Principal and Teachers from Eden Village Preparatory School and Virginia Preparatory School.

It will involve the following procedures:

Participation will be in the form of interviews. The duration of your participation, if you choose to enrol and remain in the study, is expected to be no longer than 1-2hours per participant. The date and time of your interview will be at your convenience.

Each interview will follow the same procedure as a semi-structured interview process. This will present itself as a guided conversation between the researcher and participant, following themes as talking points designed by the researcher to allow the participant flexibility in response.

You will be recorded audibly, this is simply for record-keeping and the recordings will not be published or released.

We hope that the study will create the following benefits in the long term; the design of an inclusive education facility that will allow children with ADHD to participate equally, confidently and independently in everyday activities regardless of their ability and circumstances.

The research will involve no risk of injury or psychological harm. This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval numberHSSREC/00004300/2022).

In the event of any problems or concerns/questions, you may contact the researcher at:

Tel. 082 257 3590, Email. 221119094@stu.ukzn.ac.za

Supervisor:

Magdalena Cloete Email :

Cloete@ukzn.ac.za

Or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details are as follows:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban 4000 KwaZulu-Natal,

SOUTH AFRICA

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Participation in this research is voluntary and participants may withdraw participation at any point, in the event of refusal/withdrawal of participation the participants will not incur penalty or loss of treatment or other benefits to which they are normally entitled. Recordings of participants will be destroyed if the participant elects to withdraw. There are no consequences to the participant for withdrawal from the study. The procedure/s required from the participants for orderly withdrawal would be to contact the researcher or supervisor via Email.

No costs will be incurred by participants as a result of participation in the study, however; there are no financial incentives or reimbursements for participation in the study either. Participants are encouraged to choose a false name (alias) to maintain anonymity. Any personal details will be left out of the research findings to maintain confidentiality. Research participants may request any data or findings collected within the finished thesis.

Research Data will be stored both in hard copy and electronically within a secure location arranged by the supervisor.

**CONSENT**

I …… have been informed about the study entitled "An exploration of childhood attention deficit hyperactivity disorder through architecture:" Towards an inclusive education facility in Durban" by Gareth Michael Calvert.

I understand the purpose and procedures of the study.

I have been allowed to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

I have been informed about any available compensation or medical treatment if an injury occurs to me as a result of study-related procedures.

If I have any further questions/concerns or queries related to the study I understand that I may contact the researcher at 221119094@stu.ukzn.ac.za, or Tel. 082 257 3590

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban

4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557 - Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview YES/NO

Use of my photographs for research purposes YES/NO

…… ……

Signature of Participant Date

…… ……

Signature of Witness Date

(Where applicable)

APPENDIX IV

# GATEKEEPERS FORM

DATE: 15 March 2022

To whom it may concern

Mr Gareth Michael Calvert ( Student no: 221119094 ) is a Masters student in the School of Built Environment and Development Studies and formally requests permission to interview staff in your institution/department. The data collected will be used in his Master's Research Project entitled: **An exploration of childhood ADHD through architecture: Towards an inclusive education facility in Durban, KZN**

This form is a formal request for permission to :

1. Provide site plans of the school to children and members of staff to ascertain positive and negative areas in the school.
2. Classroom layout drawings are requested by students and staff to provide insight into positive and negative spaces within the class.
3. Interviews will be conducted with members of staff to gain insight into their perceptions of learning spaces for ADHD children.
4. Observations will be done to understand how the children engage with the indoor and outdoor spaces.
5. An architectural survey of the buildings will include sketches and photographs to capture the architectural form and qualities of both internal and external spaces.

The study will acknowledge the organisation and the research will be shared if requested.

Thank you and Kind regards

**Principle Sign Above** _____

**School Name**: _____

Mrs Magdalena Catharina Cloete
Supervisor.

SCHOOL OF BUILT ENVIRONMENT AND DEVELOPMENT STUDIES
Email: Cloete@ukzn.ac.za
Tel number: 031 260 1172

Built Environment and Development Studies, University of KwaZulu-Natal, Howard College Campus, Durban 4041

APPENDIX V

Virginia Preparatory School

125 Margaret Maytom Avenue, Durban North 4051 • Tel: 031 563 6986 Fax: 031 564 5926
Private Bag 4, Glenashley, 4022 • principal@virginiaprep.co.za • www.virginiaprep.co.za

21 June 2022

**Reference**: An Exploration of Childhood Attention Deficit Hyperactivity Disorder through Architecture: Towards an inclusive education facility in Durban, KZN

To Whom it May Concern

This letter is to indicate that I, Mr. D.J. de Gouviea-Smith, the Principal of Virginia Preparatory School in Durban North, have been in conversation with Gareth Calvert about gatekeeper authorization at my school. I can affirm that we have no objections to his carrying out his investigation on the condition that it be done on school days and at the appropriate times. Gareth has made it clear that he would want signed permission documents from the school's Principal, as well as any relevant instructors, parents, and students. He has also mentioned that he would be collecting comments from teachers and students about classroom and school layout designs and that he will be offering these layouts to the teachers. The teachers will then instruct the children on what to do with the layout plans. If Gareth does not always have a member of the staff available when he visits the school, he will not be able to carry out any of his research and will have to reschedule for another time. Gareth is welcome to schedule his research at any convenient time throughout the next six months, and we are pleased to accommodate his schedule.

If you have any queries, please contact me directly.

Regards

[redacted]

Mr. D.J. de Gouviea-Smith
Principal

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PRIVATE BAG 4
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PREPARATORY SCHOOL
EST 2019

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Email: info@evps.co.za

22 June 2022

**REF: An Exploration of Childhood Attention Deficit Hyperactivity Disorder through Architecture: Towards an inclusive education facility in Durban, KZN**

To Whom it May Concern

This letter serves to confirm that I, Haden Keeton, the Director of Eden Village Preparatory School in Ballito have been in communication with Gareth Calvert regarding gatekeeper permission at my school.

I can confirm that we are happy for him to conduct his research based on it being carried out on weekdays during school hours. Gareth has explained that he will need consent forms signed by the principal, relevant teachers, parents, and children. He has also explained that he will be requesting feedback from teachers and staff regarding classroom and school layout plans and that he will be providing these to the teachers. Gareth will not be able to conduct any of his research without always having a staff member present. We are happy to arrange suitable times during the next few months to allow Gareth to conduct his research.

If you have any queries, please contact me directly.

Yours sincerely,

[redacted]

Haden Keeton
**Chairman – Board of Governors**

EDEN VILLAGE PREP SCHOOL
SALT ROCK
TEL: 087 460 0244

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