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SENSORY PERCEPTION AS AN INFORMANT IN BUILT FORM DESIGN PROCESS: A PROPOSED PRIMARY SCHOOL FOR THE DURBAN NORTH AREA

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DECLARATION

I declare that this dissertation is my own, unaided work and carried out exclusively by me under the supervision of Majahamahle Nene Mthethwa and co-supervision of Magalena Cloete. It is being submitted for the degree of Master in Architecture in the University of KwaZulu-Natal. It has not been submitted before for any degree or examination in any other University.

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Peter Oravecz

10th of December 2015

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To all my friends, thank you for all the support and understanding that my absence from the world was for a good cause.

DEDICATION

To all the wonderful people in my life, especially my parents.

ABSTRACT

The decline in academic performance throughout educational systems in South Africa may be stemming from elementary/primary school learner's perception of the built environment resulting negative psychological effects which is evident in their results.

This problem has been met with existing research into various aspects of child psychology primarily focussing on sensory perception and phenomenology. This allows one to gain an understanding into how a child perceives and responds to his or her environment.

The case study results pertaining to sensory perception are supported by other similar research contained in the literature review (chapter 3). It therefore verifies the need that interventions into existing educational institutions can improve the academic outcomes of schools. Any future elementary/primary educational institution planning should strongly adhere to the design principles dictated by the results of this study.

TABLE OF CONTENTS

CHAPTER THREE: CHILDREN AND THE BUILT ENVIRONMENT

CHAPTER FOUR: CHILD DEVELOPMENT PROCESSES THAT SHAPE SCHOOL DESIGN

CHAPTER FIVE: HUMAN INFLUENCE ON THE BUILT FORM

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTERVIEW SCHEDULE

STAFF:

- DeWaal, Deborah Rose, School Principal, Glenwood Junior Primary School, Glenwood, Durban – 6 May 2014
- Armstrong, Kristen, Grade 0 teacher, Glenwood Junior Primary School, Glenwood, Durban – 13 May 2014
- Kinloch, Megan Amy, Grade 1 teacher, Glenwood Junior Primary School, Glenwood, Durban – 16 May 2014
- Hatcher, Tracy, Grade 2 Teacher, Glenwood Junior Primary School, Glenwood, Durban – 16 May 2014
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- Learner A-1.2, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 8 May 2014
- Learner A-1.3, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 8 May 2014
- Learner A-1.4, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 8 May 2014
- Learner A-1.5, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 8 May 2014

GRADE 2 LEARNERS:

- Learner A-2.1, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 9 May 2014
- Learner A-2.2, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 9 May 2014
- Learner A-2.3, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 9 May 2014
- Learner A-2.4, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 12 May 2014
- Learner A-1.5, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 12 May 2014

GRADE 3 LEARNERS:

- Learner A-3.1, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 13 May 2014
- Learner A-3.2, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 13 May 2014
- Learner A-3.3, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 13 May 2014
- Learner A-3.4, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 14 May 2014
- Learner A-3.5, Grade 1 Pupil, Glenwood Junior Primary School, Glenwood Durban - 14 May 2014

CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

1.1.1 Background statement

Most people spend their lives in buildings, with their thoughts being shaped by the walls around them, yet they do not really know why they are unable to concentrate, why they feel cold, yet it is not, or why they are never comfortable at their desk yet they have a nice chair, a nice desk, a neatly painted wall. These occurrences are all phenomenological aspects of architecture.

The psychology of the Architectural Environment can be separated into two main elements: “Understanding” – how one notices their environment – and “Perception and cognitive” – how one cognitively maps what they experience based on what they know or think they know about their environment. Environmental psychology studies people’s motivations illustrating the fact that people naturally seek out places where they will feel competent, productive, confident, where they will feel comfort or enjoyment.

These principles apply to not only every scenario in life, but throughout one’s life. There is always a prevalent influence of the environment on humans; whether is it out in nature, or in a basement parking lot. It is therefore crucial to address issues pertaining to the psychological effects of the built environment that will impact on children as well.

1.1.2 Motivation / Justification for the study

The performance of learners in South Africa has deteriorated drastically over the years as indicated by the South African Department of Education’s Annual National

assessment (South African Department of Education 2013). This has far-reaching consequences, impacting negatively on the economy and leading to a general degradation of society. This may seem contradictory since the Matric pass rate has gone from 60.6% in 2009 to 67.8% in 2010, followed by 78.2% in 2013. It has not been considered that the matric pass mark has a role to play in these figures as well as the massive dropout rate. The learners that obtained their matric in 2013 began grade one in 2002 with a number of 1 261 827, and by 2013, only 562 112 learners had completed all their years of schooling to write their matric examinations. The minister of higher education is also endeavouring to reduce the matric pass mark to 30% (John 2014). This suggests that 70% of the knowledge taught at schools is essentially unnecessary knowledge.

There are other influencing factors that may also be contributing to this deterioration in academic performance; factors such as the financial situations in the learners' families, nutritional needs of learners' limited support from families, lack of motivation by teachers due to low salaries, the negative effects of information technology causing a detachment from the physical world, etc… The NDP report (2010 p. 9) also highlights the important fact that the areas and living conditions in rural areas where the children live, plays a significant role in their well-being. The influencing factors are extremely broad and require individual attention, however, in the case of this research, the aspects of the built environment are being addressed in order to narrow the scope of research.

These few facts beg the question of whether or not the school environment plays a role in motivation of students in completing their schooling career stemming from their elementary school years. How can a learning environment promote concentration, discipline and performance?

If a child feels uncomfortable or unhappy in their learning environment, how are they able to concentrate, and more importantly, how long will it take them to feel at ease? This may take days, months or even years. One may ask if this initial negative

impression of educational institutions is a lingering factor affecting the child through their entire educational phase? How can this be prevented? How can well-being and concentration be promoted by the child's learning environment?

This research will outline an ambitious intent to propose a building typology that addresses the issue of promoting learner well-being and the desired psychological responses that ultimately translate to a better educational system.

1.2 DEFINITION OF THE PROBLEM, AIMS AND OBJECTIVES

The declined academic performance of scholars in secondary educational institution may have stemmed from their time spent in primary school. There are both direct and indirect effects that the built environment has on mental health (Evans 2003). These effects are both positive and negative. It can therefore be deduced that the performance and well-being of learners in the built environment will be effected to some degree either positively or negatively.

1.2.1 Definition of the research problem

Based on the annual reports by the South African department of Education as well as the media, it is clear that there has been a general decline in the performance of learners in educational institutions, matric marks are lower on average with each year that passes, so much so, that new measures have been implemented within the educational system in order to allow learners to pass, such as the lowering of the pass mark to 30 percent (John 2014). To further support these findings, the researcher conducted informal interviews with teachers in primary and secondary educational institutions, and they themselves have stated the decline in learner motivation to perform academically and have noticed increased discipline issues throughout their years of teaching.

These disturbing reports has resulted the public as well as the Department of Education, blaming ineffective teaching methods educational system in South Africa (Bolowana 2014), but is this the only problem? Has school building design been considered a potential problem? It is evident by simple observation that the majority of Model C Government schools are of a similar design specification, the buildings appear purely functional without the consideration of the user.

During a visit to various government institutions, the researcher observed dark corridors, weathered floors, dreary classrooms and bland colors. This in turn leads to the assumption that the quality of the built environment is an influencing psychological factor in causing the decline in learner performance through lack of motivation, given that the world is constantly evolving but the building is not. Both teachers and learners would be affected by these aspects and it is imperative that the building, the teachers and learners exist and interact in harmony. These aspects of the built environment will be explored in detail in the literature review, both from a practical and theoretical standpoint.

1.2.2 Aims

The aim of the research is to understand the various aspects pertaining to education and the well-being of learners through the study of the psychological effects that the built environment has on humans, the influence of humans on built form, what key aspects promote concentration and academic performance and in primary government educational institutions and to develop a building typology as a guideline for the design of future primary schools.

1.2.3 Objectives

1. To study the psychological effects of the built environment that various primary educational institutions have on children as well as their responses.

2. To study design interventions into existing educational environments.

3. To establish design principles or norms to follow when designing new primary educational environments influenced by the theoretical, social and psychological relationship that humans have with the built environment.

1.3 SETTING OUT THE SCOPE

1.3.1 Delimitation of the research problem

The research will begin with the understanding of how children experience their educational environments from a phenomenological and psychological level, what it is that they like or dislike, how they behave in certain situations, their reactions to different spaces and their reactions to shapes and forms. This would be achieved by immersing oneself into the child's educational environment and observing both passively and actively. This immersion will take place at an educational institution selected by the researcher with an average academic performance in its learners. The study will be based on the educational institution's built form and the learners' interactions, reactions and opinions thereof. The evaluation of the quality of education provided at the selected institution, will not be a part of the research scope, although it should not be disregarded in future studies should they be done. This is due to the fact that the quality of education provided, will at a later stage, when all aspects of future research are combined, prove crucial in having an institution functioning at its optimum in terms of both a design based on sensory perception as well as the quality education that the learners receive.

1.3.2 Definition of key terms

Learner - a person enrolled in an educational institution, however, in this particular study, the term *learner* pertains to children between the approximate age of 6 and 8 years of age and enrolled in grades 1, 2 and 3. This age range may also be considered as the *foundation phase* (the age range may vary as some children may have birthdays earlier or later than the date of the research being conducted)

Psychological Effect – The effects that the built environment have on humans at a subconscious level that manifests in a physical and mental state

Experience – The combination of sensory perception and emotional responses gained from a space or place.

Phenomenological – The complex intertwining of all attributes and objects, tangible and intangible in a space or place and how they are perceived and understood by the consciousness of humans.

Learning environment - The space in which academic learning takes place, in the case of this research, "learning environment" refers to a primary school consisting og grades 1, 2 and 3.

Interactions – How the built environment directly and indirectly interacts with humans, conversely, how humans directly and indirectly interact with the built environment

Reactions – The psychological and physical responses of humans to the built environment.

1.3.3 Stating the Assumptions

Human beings are influenced by their surrounding environment, in this particular case, the built environment. Conversely, Human beings have an effect on their surrounding environment. These effects are both negative and positive and result in constructive and destructive results. The effected aspects are shapes, forms, colours, spatial arrangements, place, behaviour, psychology and integration with nature.
By sculpting a learning environment with the correct spatial requirements and integration thereof, colours, forms and integration with nature, its users will experience well-being, increased cognitive function, improved concentration and motivation, thus improving overall academic performance.

1.3.4 Key Questions

Primary Question:

How Can the built environment of a primary school be engineered to achieve the desired effects of improved wellbeing, improved motivation, improved academic performance as well as improved discipline in terms of behaviour and habits in the learners?

Secondary Question:

- What are the components of sensory perception that that are likely to influence the design of the built environment?
- What is the connection between sensory perception and phenomenology?
- How does sensory perception theory and phenomenology influence place making?
- How can children's' perception influence the design of the built environment?

- How does the micro and macro context Influence the design of the built environment?

1.3.5 Hypothesis

By designing a learning environment based on the findings and principles of this research, it will enable the learners to achieve improved cognitive function, concentration, overall well-being and academic performance.

1.4 RESEARCH SCOPE, PROBLEMS AND LIMITATIONS

1.4.1 Research Scope

Five government primary institutions have been selected and will be evaluated in terms of design upkeep and functionality. The Institutions that meet the average criteria that would be developed during the initial stages of the investigation and observations, after which, the collection and recording of qualitative data may begin. Time constrains however, will determine how many of the institutions will be a part of the case study.

1.4.2 Problems and Limitations

The First problem that occurred is obtaining permission from the gatekeeper of the school to conduct the interviews, as well as finding time within the school's curriculum to conduct the interviews. This has been overcome by obtaining permission as soon as possible with the aid of the school's administrators. Extra time has been granted for instances where more than one visits to a school may occur in order to complete all the interviews.

During the research, it was observed by the researcher that the children felt intimidated by the researcher or by having a parent or teacher present. It seemed as if

they felt compelled to give answers that they assumed would make the researcher happy. The researcher endeavoured to assure the children involved that there was no such thing as a wrong answer.

The anticipated issues such as problems with camera equipment, recording devices as well as any ad hoc technology issue were a possibility. Therefore, backup devices were included during the research and failing that, the researcher was to defer to manual methods of recording (e.g. transcribing the interview by hand). Fortunately, no problems were encountered.

Limitations to the study were time factors. In order to complete the entire study, further research will need to be conducted through pre-primary and secondary educational establishments in a similar manner. This will enable the entire educational system to be evaluated, thus translating into the entire educational system being addressed in terms of sensory perception. This was not possible with the allocated time for this dissertation.

1.5 CONCEPTS AND THEORIES

This section aims to provide the reader with a concise introduction to the concepts and theories pertaining to the research as well as the main focus thereof.

Understanding how learners experience their learning spaces as well as the phenomenological aspects of daily living is the foremost aspect of this study and has set the foundation of this research. Following that, one needs to gain an understanding of the influence that humans have on the built form. From there, aspects such as environmental psychology, and the effects of sustainable design will be explored. Studying the effects of Experiential learning through the built form will provide an alternative aspect of learning that should be incorporated into learning institutions of this day and age.

1.5.1 Perception Theory

When one describes a space, they are repeating information gathered by their senses and how they are perceived. There are many attributes that contribute to an overall perception. Demuth (2013 p. 7) talks about perception as *meeting reality* through one's senses, how one captures it, cognitively maps it and forms a construct in one's mind.

Demuth (2013 p 13) explains what one perceives is not always accurate. He uses a stick dipped in water as an example – One perceives that the stick is bent through observation, but when removed, it is straight. Without the scientific knowledge of the laws of refraction, one may continually question the world in which we live and constantly question how accurate one's senses truly are. This is but one example of perception through vision.

According to Gifford, Steg, and Reser, (2011 p.440), experiencing spaces can also be termed *transactions* between physical settings and the individuals within. In these transactions, individuals may alter their behaviours to accommodate their surroundings, or alter their surroundings to suite their behaviours. Three key concepts will be explored in the literature to follow. The first of these concepts is the *fundamental psychological process*, this includes; perception of the environment, special cognition and personality. The second concept is *social space management*, this includes; personal space, crowding, territory and privacy. The third concept is; *Interactions with Nature* and *psychology of season change* (Gifford, Steg, and Reser 2011 p.441).

Each of the concepts mentioned above have a series of influencing characteristics that are a direct link to the various aspects that comprise the built environment and should be used as an informant in designing learning spaces to achieve the desired behavioural results by the individuals those spaces.

1.5.2 Phenomenology

Norberg-Schulz (1980) defines the phenomenology as the character of a place with contributing factors such as environmental, economic and socio-cultural aspects however it cannot truly be explained through the use of scientific data, but rather through a sensory experience. These sensory experiences are directly related to the surrounding environmental conditions which within the concept of phenomenology help enrich the experience of spaces of which a place is comprised (Zumthor 1999 p.9-11).

1.5.3 Place Theory

The basis of place theory is the understanding of both the natural and built environment in micro and macro context. This understanding is influenced largely by various cultures resulting in different understandings. Place theory investigates the need for humans to explore places which go beyond their basic necessities. The overall character of a place is determined by the individual inhabitants create through their understanding of the environment. This is a key to the concept of critical regionalism or *place-making* and phenomenology (Crowe 1995 p.73).

1.6 RESEARCH METHODS AND MATERIALS

In this section, the various data collection and analysis methods will be discussed. The following methods have been implemented in order to address the research question in the best possible manner. Due to the nature of this dissertation, time constraints and possible problems with the sample group have been considered resulting in the following range of methods.

1.6.1 RESEARCH MATERIALS

1.6.1.1 Internet & Library based literature search

The use of literature in the form of Journal articles, newspapers and literature covering aspects relevant to this research is crucial in the development of a conceptual and theoretical framework. Considering research done in this area needs to be incorporated and collated to form a hypothesis.

1.6.1.2 Literature review and problem statement

The review of literature will cover the relevant aspects that play a significant role in making this research a success and address the various issues pertaining to the problem statement.

1.6.1.3 Collected Data

The qualitative data will be collected by means of one-on-one interviews with the learners by the researcher, questionnaires filled in word for word by the researcher and photographs taken by the learners which will then be transcribed and interpreted.

1.6.1.4 Analysed Data

The data acquired through the collection methods will then be analysed to extract and determine the various factor addressing the hypothesis and problem statement.

1.6.1.5 Interpreted findings

The interpretation of the findings within the analysed data will pave the way forward in addressing the problem statement and validate the hypothesis.

1.6.1.6 Communicate findings through written document, photographs and drawings.

The interpreted findings will provide insight into the measures that need to be taken to address the problem statement as well as design considerations and interventions through this written document and detailed design drawings.

1.6.2 DATA COLLECTION METHODS

1.6.2.1 Sample

Learners from metropolitan a model C primary school, in grade one, being newly enrolled in the institution, grade two and three, being existing learners in the institution at different maturity levels. Depending on the number of leaners and how many classes per grade, five (5) learners in different classes per grade will be selected for observation and investigation. Considering the fact that different learners have different academic abilities, it would be difficult to determine who they are in the initial phase of education, therefore, they will be selected at random. The genders of the subjects are not focused on during this study.

1.6.2.2 Procedure:

Listening

This is a passive role taken by the researcher, in which they are immersed in the learner's daily environment, listening to their communication amongst themselves during decision making exercises, routines and activities. This also involves once-off consultations with the learners.

The purpose of this would be to gain an understanding of the child's adaptability and attitude to challenges and routines.

Learner guided tour

This consists of three group tours, one group tour given by the sample group of each grade, and fifteen one-on-one tours given by each learner from each grade in the sample group.

The tour will be conducted in a way that the learners will show the researcher their favourite spaces and least favourite spaces with questions as to why the places were chosen. This will enable one to gain an understanding of the interaction amongst the learners within their educational environment by listening and documenting. This will also place emphasis on how their decision making process affects the outcome of the tour as a group as well as understanding similarities about the spaces as they are rated by the learners by identifying characteristics of the space. On individual tours, questions as to why a particular order of places have been shown to the researcher as well as understanding similarities about the spaces as they are rated by the learners by identifying characteristics of the space.

Observation

This takes place with the researcher immersing themself into the learners' environment and views it from the learners' perspective and experience the environment in a different way. It also involves taking part in the activities, communicating with the learners and recording findings.

The two observation methods used are that of *Passive* Observation and *Participatory observation*. Passive observation being where the researcher does not actively engaged in the activity and records findings in a qualitative way. Participatory Observation being where the researcher takes part in the learners' activities, allowing the children to become co-researchers and the researcher experiencing what the learners experience.

Interviewing

The interviewing is done using three different methods. The first will consist of a standard questionnaire (appendix A) from which the researcher will ask the questions as well as fill out the questionnaire. This is simply to reduce the difficulty of data collection that may occur due to the possible lack of concentration, and age of the sample learner.

The second method is a more formal interview that takes place while on the move while the group of learners are giving the researcher a tour or while they are playing or talking to one another during their daily routines.

The third method for interviewing is done on a one-on-one basis. This is an informal interview as well as a formal one where the standard questionnaire (appendix A) is used. This is done either sitting down, or while the learners are engaged in another activity or during their individual tours, depending on their age and ability to concentrate.
Interviews also need to be sensitive to different children's interests and skills. All of these aspects will need to be considered when deciding upon which method of child consultation to use in order to gather understanding for a proposed school design.

Learner photography

By giving children cameras and allowing them to document their surroundings in their school, insight will be gained into the surroundings from a child's perspective. This will also provide the opportunity to observe the child as he or she selects images to take. If a second interview is granted, the researcher will, together with the sample children, review the photographs in the form of a brief discussion with questions, comments and responses from the child and researcher pertaining to the photographs.

1.6.3 RESEARCH LIMITATIONS

Due to the learners being of such a young are, the learner photography section was impossible to do, due to the learners taking photographs of each other and themselves, with the relevant photographs being of poor quality that made them redundant. In order to rectify the problem, the learners were asked what photo should be taken on their behalf. These are the photographs that were used as learner photography.

Time limitations were a major problem in collecting data. The learners took a very long time to answer the questions as well as decide where to go on the individual and group tours, thus prolonging the data collection time. In order to minimise disruption to the learner's curriculum, the learners were only allowed to participate in the study at certain times. The School day ends at 12:30pm, where data collection had to cease until the following day, further prolonging the data collection time.

With the above in mind, I believe that this particular questionnaire, focussing on the school's architecture and interiors is not very well suited to grade one learners, as they are not fully able to explain their preferences due to limited vocabulary, however they are able to show them physically in cases such as the learner guided tour. Therefore, for future studies with younger learners, or children in general, a different approach should be considered.

Permission from parents caused issues when asked to return consent forms on time, those parents that did not return consent forms were contacted telephonically by the school and oral consent was given and signed forms were agreed to be returned, which they were.

1.6.4 METHODS EMPLOYED IN THE DATA ANALYSIS

A qualitative study is being conducted to obtain subjective, unquantifiable data. Data will be collected in in the form of semi-structured questionnaires. The wording and structure of the questionnaire will allow for each individual to highlight their own experiences within a school environment. This will also help guide the researcher in terms of a guide for future building design and recommended design interventions to existing buildings.

An excel document will be drawn up when all the data has been collected to highlight thematic importance in the data, similarly, the photos will be included in order to identify any recurring themes or architectural features. This will be put together in discussions as evidence towards the hypothesis and problem statement.

1.7 CONCLUSION

The research methods employed in this study have are inspired by the authors mentioned in the literature review to follow and have provided adequate qualitative data from which comparisons with other studies may be done. A further analysis is done to highlight additional data that holds weight in influencing the final outcomes of this study.

CHAPTER TWO:

UNDERSTANDING THE SENSORY PERCEPTIONS

2.1 Introduction

How can one create a learning environment that improves the performance of learners, particularly in government institutions where a classroom is just a square or rectangular space with a chalk board, dreary floor and dreary colours on the walls?

In order to obtain a matric certificate in South Africa, a child has to successfully complete twelve years in school – three years in primary, four years in senior primary school and by five years in secondary school. With this in mind, it is apparent that most human beings will spend (or have already spent) a significant proportion of their lives attending educational institutions – even more if they choose to pursue a tertiary education in order to increase chance of success in adult life. It is therefore important to challenge ourselves by asking *how productive were those years?* and *Could better results have been achieved?* This literature review will provide a summary of existing work of other authors who have addressed the psychological effects that the built environment has on humans and how these positive effects may be implemented in the design of a school and how to alleviate any of the negative ones.

The goal of this literature review is to gain a deeper understanding of the psychological responses of humans, particularly children, to the various aspects of the architectural environment, and how these responses can influence the design process of the built environment. In order to compliment the findings, one needs to identify elements of design that have already been shown to promote general *well-being* and enhanced *mind-set,* including behaviours such as keeping calm, increased concentration, improved academic performance and heightened creativity. Armed with this

knowledge, we will then be able to tackle the chosen research problem more effectively.

In order to make use of these findings, one must first gain an understanding of the basic concepts and theories pertaining to humans, particularly children and the built environment, the relationship between nature and the built environment, space and place, environmental psychology, sustainable design and methods of education.

2.2 Fundamentals of perception theories and information processing

According to Demuth (2013 p. 23), the majority of applicable theories define perception as the processing of acquired information. Depending on the direction of information flow, these theories are divided into two main groups.

The first group of theories use a *bottom-up* approach, which begin at the farthest levels of sensory receptors, namely, the eye, which then progressively lead to more abstract ways of thinking (Demuth 2013 p. 23).

Demuth (2013 p. 24) continues to explain that group of Bottom-up theories dictate that the final perception of an entity is influenced by the quality and content of sensory input. He uses the perception of a tree as an example; basic sensory data such as points, horizontal and vertical lines is collected forming the primary individual characteristics of the object. This primary data of the individual attributes is then combined to form more complex assemblies of shapes, ultimately forming a more complex perception of the entity which one knows as a tree. An alternate reference to this theory is *data-driven processing perception* (Demuth 2013 p. 24).

The second group theories, is the *top-down* approach, where sensory perception begins at the more complex stage of *feeling* followed by the rationalising of information as the more basic receptors gather accompanying information (Demuth 2013 p. 23).

The fundamental characteristic of the top-down approach is that the representation of the perceived entity is based on mental representation of a given reality such as previous experience and knowledge followed by the introduction of the sensory stimuli confirming or adding to the collection of perceived entities (Demuth 2013 p. 31).

Another of the bottom-up theories and perhaps the most relevant to this portion of this document is *Constructivist Theories*. These theories consider perception itself as the end product of the perception process as the extraction, interpretation, backward organisation and evaluation of sensory stimulus combined with the knowledge of the observer, internal hypothesis and expectation. Perception can also be influenced by a wide range of factors, emotions being the most important. These influencing factors may even result in an inadequate interpretation of the entity being perceived, therefore deeming perception a very personal and subjective process (Demuth 2013 p. 31). The subjective nature of perception brings one to *phenomenology*, as mentioned above in Norberg-Schulz (1980)'s explanation of *experiences.*

2.3 Exploring Phenomenology, Genius Loci and its place in Architecture

The natural environment in which man-made environments exist, encompass characteristics that influence design decisions, which ultimately influence the outcome of the built form. The phenomenology and genius loci of a place are aspects of place theory that intend to provide a theoretical standpoint upon which the metaphysical of a space may be explored and concretized (Nesbitt 1996 p. 414-415). Norberg-Schulz (1980) identifies these concepts as an emphasis the failure of their consideration by the modernist movement.

Norberg-Schulz (1980 p. 6) begins describing phenomenology by introducing the elements of our everyday *life-world* that are *concrete* phenomena – people, animals, flowers, trees, stone, earth, wood, water, towns, doors, windows, streets, the sun, the moon and stars – but to name a few. He then proceeds to introduce the more

intangible phenomena such as feelings. All elements – both tangible and intangible – are crucial as they are interlinked in complex and perhaps contradictory ways

The natural conditions of a place are understood as features contained in a topographical landscape. These features include *cosmological* aspects that are beyond our physical reach, such as the continual change in lighting conditions, as well as *temporal* aspects like the state of vegetation throughout the annual cycle. These repetitive cycles he refers to as *rhythms*, and such rhythmic fluctuations seem to have a profound effect on the stability of the physical form. This is the *genius loci* (Norberg-Schulz 1980 p. 52).

Norberg-Schulz (1980 p. 11) describes *place* in terms of *landscape* and *settlement* by means of the categories *image*, *character* and *space*, where space is defined by the three-dimensional organisation of elements that make up a *place*. Furthermore, *character* denotes the general *atmosphere* which is the most comprehensive property of any place.

Norberg-Schulz (1980 p. 27-32) places special emphasis on this notion of the *genius loci* towards natural conditions and identifies three basic characteristics of *landscape*; *romantic*, *cosmic* and *classical*. These, according to his writing, can be described as ideal types of characteristics and can be applied to both buildings and the symbolic meaning of a settlement. These characteristics are important for the *genius loci* concept as expressions of society's cultural interpretation of *place*.

Norberg-Schulz's (1980 p. 23-42) views range from visual experiences to the *lived* or *experienced* realm. His previously- mentioned categories of description – *image*, *space*, *character* – and the finality *genius loci*, denote human experience of the physical environment. His aims however, are to *achieve* the atmosphere, light conditions and sense-related experiences of the *genius loci* that result from either natural occurrences, man-made interventions, or a combination of the two which, according to Schulz, should always exist in harmony.

Norberg-Schulz (1980 p. 32) argues that nature is the foundation for people's interpretation of things, and it is within the relation to nature that places and objects take on meaning. He discusses the way in which *temporal* and *cosmological* connections are physically expressed within society's dwelling and living. He seeks meaning and symbolic function by understanding the systematic pattern of the *settlement*. In summary, Schulz's view of society's *life world* is a basis for orientation and identity.

Norberg-Schulz (1980 p. 42-45) relates man-made structure to nature in three basic ways: "Firstly, man wants to make natural structure more precise. Man wants to *visualize* his *understanding* of nature, expressing the *existential* foothold he has gained. To achieve this, he *builds* what he has seen. Where nature suggests a delimited space, he builds an enclosure; where nature appears *centralised*, he erects a *Mal;* where nature indicates direction, he makes a path. Secondly, man has to compliment the given situation by adding what is *lacking*. Finally, he has to symbolise his understanding of nature [including himself]. Symbolisation implies that an experienced meaning is *translated* into another medium. A natural character is, for instance, translated into a building whose properties somehow make the character manifest".

It is therefore important never to force a landscape to become something it is not accommodating towards, but rather compliment it. A design should allow itself to be moulded by its natural surroundings, both tangible and intangible in order for it to come into being and exist in harmony with its surroundings.

The approach of Holl (2006 p. 41) to the subject of phenomenology is that of the *existential* kind. He begins by exploring sensory perceptions – the passage of time, light, shadow and transparency, colour phenomena, texture and material – stating that they all participate in the complete sensory experience in architecture. He refers to our modern-day media as something that saturates our lives and provides emotional

stimuli (to an extent); he therefore claims that only architecture can awaken all the senses – “All the complexities of perception”.

In essence, Holl (2006 p. 41) explains that even through cinematic media or photographs that follow predetermined paths, regardless of the attention to detail, the true essence of a *place* cannot be experienced in a way that it can as if one was physically present. He uses a stone cathedral as an example: “The actual building allows the eye to roam freely among the inventive details; only architecture itself offers the tactile sensations of textured stone surfaces and polished wooden pews, the experience of light changing with movement, the smell and resonant sounds of space and bodily relations of scale and proportion. The building speaks through the silence of perceptual phenomena”.

Whilst this view somewhat differs from that of Norberg-Schulz (1980), it does not contradict his writings but rather complements his focus on the fundamentals of *space* and *place* and how *things* “gather to become” Holl (2006) before an intention, design or idea manifests, or a *building/structure/intervention* takes form.

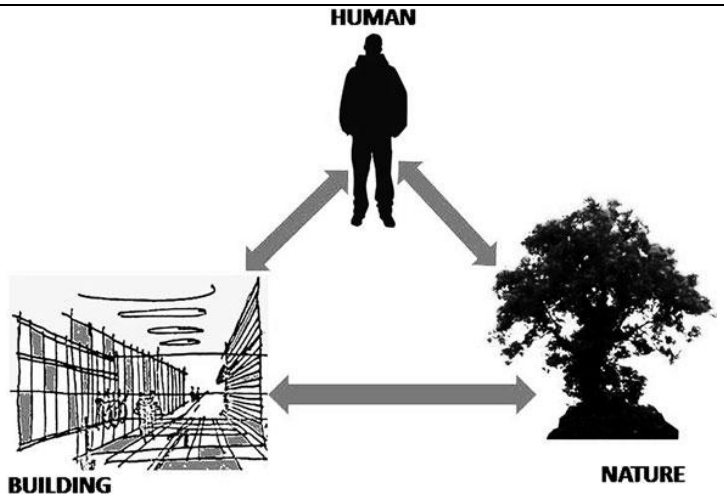

Figure 1: The relationship between humans, the built form and the natural environment.

Source: Almusaed (2011)

2.4 Critical Regionalism – How humans shape the world

One of the greatest advancements of mankind is global culture, or globalisation however, it has resulted in the slow and subtle destruction of regional and local cultures. The lack of cultural diversity and disregard for natural conditions has led to a lack of authenticity and mediocrity (Nesbitt 1996 p. 470-471).

Nesbitt (1996) describes a paradox; that emphasises the need for the expressing architecture in terms of regional and local identity while at the same time being a part of the modern world in order to progress. Critical regionalism does not encourage the replication of local traditions in terms of architecture, but rather a consolidation of local cultures and universal systems of the current times. This can be achieved by the re-assessment of local tradition and culture and utilizing modern techniques in order to conceptualise local concepts in a new way.

Frampton (1983 p. 26) highlights six points that makes one question the influence of the universal design trends; Culture and nature, Context, topography, Climate, Light and tectonic form. In these points, Frampton (1983) encourages the adaptation of construction methods to the natural environment in order for the built form to exist in harmony with its natural context. Nesbitt (1996 p. 467-468) encompasses the same principals encourages the use of local building methods and the response to climate and light in order to create special and experimental architecture that is aesthetically authentic and unity with nature.

CHAPTER THREE:

CHILDREN AND THE BUILT ENVIRONMENT

3.1 Introduction

When it comes to designing an educational institution, one must first understand what it means to a child to be in this kind of place and one must determine exactly what is it that they like or dislike about the place. Children should be called upon to participate in the design process. In fact, it is imperative to seek out their assistance as a contribution to the understanding of the environment from a child's perspective will heavily influence the shape of the school design. As an adult, one must also cast their mind back to those day spent in their respective educational institutions and attempt to recall various aspects that have contributed to a lasting memory, be it positive or negative.

Different methods of participation have been developed and tested by child psychologists, Augustin (2009) to bring the views of children together with that of architects and design practitioners. However, regardless of the approach, child participation in the decision-making process is always based on a shared means of communication that is achieved through listening.

3.2 Understanding how children experience spaces

Day (2007 p. 5) explains how differently children experience spaces to adults; for instance, adults categorise rooms by their function such as a bedroom or dining room, whereas a child identifies many spaces in one room, namely; a centre with four corners (*See Figure 2)*. Spatial boundaries also vary as the line of sight and range of reach are more prone to obstruction as that of an adult of average size. In terms of special consciousness, adults navigate through spaces within a grid-like manner to

organise spatial experience, whereas children navigate through spaces more by emotional triggers and influence; For instance, a child would be more likely to explore a well-lit space over a dark one, as the dark space may invoke negative emotions of insecurity as part of the instinct of self-preservation.

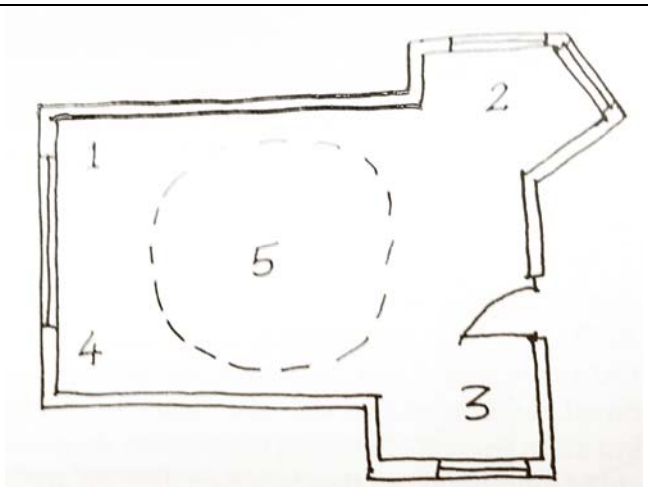

Figure 2: Children's' perception of spaces within a room

Source: Day (2007)

Day (2007 p. 3) describes how adults use themselves as tools to improve their environment, as well as seeing a place for having a pre-defined purpose and uses the place to achieve an end result. Children on the other hand, use the environment to improve themselves by finding opportunities for things to do. Day (2007 p. 4) classifies this behaviour as *critical distinction*.

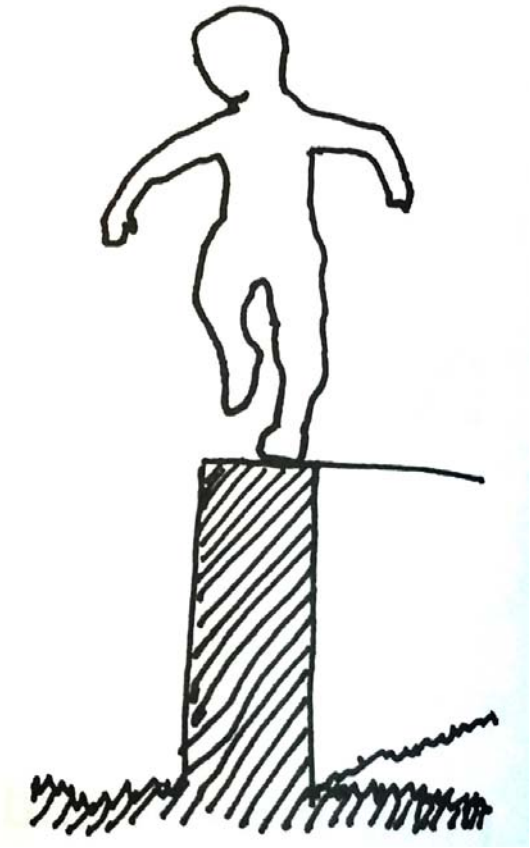

Figure 3: Where adults see a wall, a child sees something to walk and try balance on

Source: Day (2007)

According to Clark (2010 p. 1-43) young children are sensitive to their environments and rapidly gain an understanding of routine, people and places, along with a developing awareness of their own identity. They are able to communicate their feelings and wishes through various gestures before they even learn to speak. As an example, in a crèche, Clark (2010) explains that the norm is to keep babies in cots with high bars that prevent them from falling out. However, from the infant's perspective, they may feel like they are trapped in some kind of prison. If the bars of the cots were lower, those infants that are strong enough to climb over and explore their surroundings might ultimately feel empowered by their environment. It is this kind of effect, even if just in a primitive form, that this research is trying to explore. Further research however needs to be conducted in the case of lower income groups, as they may not be able to afford cots and therefore infants are kept on the floor, perhaps on a

mattress. These very simple emotional responses are present even among adults as it is human nature to seek freedom from confines. In a built environment, removing or subduing physical barriers will provide one with a sense of freedom at a psychological level promoting well-being.

In order for one to understand this concept, one must carefully examine their mind set and emotions in a confined space with barriers, as well as spaces with no barriers and determine which space is more comfortable. There are various factors however that need to be kept in mind, for example, large open public spaces may seem overwhelming and one may seek a more enclosed space. Having said that, various barriers or designation of areas are necessary for the proper functioning of spaces, however, they need to be carefully considered in order to find a suitable balance. Spaces without designation may result in confusion, which is an undesirable affect (Clark 2010 p. 18-27).

Day (2007 p. 21) speaks about *decipherable architecture* and the way that humans, particularly children, experience it. A confusing building causes disorientation and detachment, without a sense of direction, or where one may be. One would not be able to navigate the building without the aid of retrofitted indicators such as signage. *Decipherable architecture*, especially for children is therefore crucial. Children need to feel safe; they need to know how they arrived and how to exit. Children need to know what the spaces are connected to. Without visually apparent pathways of interconnecting spaces, a child may experience confusion, even fright and despair.

Environments may refer to either physical or emotional surroundings (Clark 2010 p. 12). However, in this literature review, the focus is primarily on the physical environment, tangible objects, spaces and places, as well as the intangible environment such as lighting and climate.

One way to gather understanding of a child's response to a particular environment such as their school would be for them to take researchers on a tour in order to

observe their expressions and reactions to the various things that they point out and listen to the tone in their voice as they explain things. This *listening* method could offer architects and designers an alternate perspective of child's environment, both indoor and outdoor. One could quickly identify the places that are important to them and why it is important to them (Clark 2010 p. 27-42).

Listening of course, also involves observation and interaction with the children. The use of cameras, child-led tours, and map-making exercises in which children play an active role in gathering and discussing information are all highly effective tools (Clark 2010 p. 27-42).

These methods have been implemented into the data collection portion of this research.

3.3 The Human response to built form: how humans influence built form

Augustin (2009 p. 15) explains that much of human behaviour is based on emotion. The information that has been acquired through one's senses causes one to experience emotion without consciously thinking about it. Different sensory experiences combine all at one time to create a common mood or emotion that ultimately impacts on how humans live their lives. Varying combinations of sensory experiences lead to different responses in emotion.

Man-made spaces have a lot more to them than the natural environment – greater intricacies and variable elements which in turn exert greater influence on the way in which one's perception and behaviours are shaped in these places. Why do people whisper inside a church? This is an example of *place-based behaviour,* but is also a considered *learnt behaviour*. (Augustin 2009 p. 15).

Behaviours can vary from person to person depending on their background and objectives. Sixteen different human motives have been identified; power, curiosity,

independence, status, social contact, vengeance, honour, idealism, physical exercise, romance, order, family, eating, acceptance, tranquillity, and saving. These listed motives can all be influenced by space so it is therefore essential to take them into consideration when designing spaces. This is of utmost relevance to this research problem as learners are in the developmental stages of life and will therefore be impacted more severely by the detrimental effects of a badly designed space. They need proper stimuli to become successful in all walks of life. (Augustin 2009 p. 16-19).

As an example, Augustin (2009) p. 221) explains the communication between the building and the people inhabiting it. In this particular case, educational spaces that do not appear well maintained, communicates that the financial administrators of the institution that are responsible for the upkeep are not concerned whether or not pupils learn the material thought to them. This is due to associating the impression given off by a single aspect with other aspects. It is therefore imperative that a learning environment projects a positive emotional response to learners, educators and parents alike by having a well-designed and maintained educational facility.

According to Augustin (2009) p. 221-222), traditional knowledge tests are an easy way to measure the success of the classroom – whether or not the learners the learners know more after a series of classes they have attended than they did before attending any of the classes. Furthermore, the design of the classroom can influence the scores achieved in these traditional tests as well as the social experience of the learners.

3.4 The effects of Colour on humans in the built environment

Colours and also have a psychological effect on people and therefore should be considered carefully in the learning environment. Day (2007 p115) explains that colour affects the human nervous system, muscle tension, cortical activity, enzymatic and hormonal secretions, breathing rate, blood pressure and reaction time. It also affects mental and cognitive abilities.

Colour need to be in moderately bright, and moderately energizing, colours that are in contrast to one another should not be energizing. The saturation and brightness of a colour has been scientifically shown to have a profound influence on how one responds emotionally to it (Valdez & Mehrabian 1994 p. 394-409).

A learning space should not be painted red, nor should red be used as an accent colour as it inhibits the use of material already learned as well as learning new material. Greens on the other hand, provided that it is a lighter and less saturated, promotes the appropriate mood to learn although may be considered *institutional* (Augustin 2009 p. 49-56). Greens should therefore be a dominant colour within the learning spaces. However, Day (2007 p. 118) emphasises a need for balance in terms of response to colour, therefore other colours should be incorporated to achieve this balance.

3.5 The effects of Light on humans in the built environment

When it comes to artificial lighting in buildings, Mills, Tomkins & Schlangen (2007 123(4) p. 1) explain that through the recent discovery of non-visual retina receptors, which are not related to the image forming receptors in the eye, gives sufficient grounds to quantify the effects natural daylighting vs. artificial lighting on humans.

The brightness and wavelengths of lighting play an important role in order for humans to function in particular ways. For instance, in order for office tasks to be completed adequately, the lighting needs to be of a particular intensity as well as temperature. Lighting also has a profound effect on the human circadian rhythm [commonly known as the body clock], as well as one's mood and alertness (Mills, Tomkins & Schlangen 2007 p. 4-5).

Through various studies, it has been shown that light has a positive influence on depression, alertness, psychomotor vigilance, task performance, cortisol levels, and sleep quality. It has also been shown that during winter time, exposure to bright light

reduced distress and improves general health in the test subjects. Exposure to bright light, has also shown improvements in mood, alertness and productivity in people with subsyndromal seasonal disorder (Mills, Tomkins, & Schlangen 2007 p. 4-5).

According to Mills, Tomkins, & Schlangen (2007 p. 2), Outdoor illumination levels range from approximately 2000 to 100 000 lux, and in an office environment, 500 lux, which is considerably lower. The typical fluorescent lighting found in almost all classrooms and office settings contain less short wavelength light (blue spectrum) than daylight, which is the wavelength required for the circadian rhythm to function properly.

In studies that have been conducted, higher colour temperatures [7500k] are more stimulating when it comes to mental activity, the parasympathetic and sympathetic nervous system. Drowsiness however, has been observed with colour temperatures that are lower [3000k] (Mills, Tomkins & Schlangen 2007 p. 2).

The studies conducted by Mills, Tomkins & Schlangen, (2007) have concluded with the recommendation of the installation of lighting with a colour temperature of 17000K which will yield improvements in individuals raging from improvements in general wellbeing, task completion and productivity. It is also a cost effective solution to problems associated with artificial lighting. To support these results, 17000K lighting was installed in a call centre in Stockport which resulted in positive trends emerging from its employees is wellbeing and functionality.

Installing additional lighting with the appropriate colour temperatures to compliment daylight as well as supplement poor lighting conditions on overcast days is a beneficial design consideration in a new learning facility.

3.6 The effects of Scents on humans and how they should be used

Scents have the ability to change one's mood as they have strong links to emotions due to the brain processing smells in the same area of the brain as emotions. Therefore, they can put one into either a bad or good mood, coping better with mental or physical tasks, reduce tension or anxiety enhance memory, etc… One must keep in mind that after a few minutes of smelling a scent, one may not consciously perceive the scent any further, though it does not eradicate the scent's influence on the brain (Augustin 2009 p. 40-43).

In this particular instance, we will look at the aspects that are relevant to a learning environment; completing mental tasks, enhancing memory and alertness. According to Augustin (2009 p. 43), in order to improve one's performance completing mental tasks, lemon and jasmine scents should be used, whereas lavender has been found to improve performance on mathematical tasks. The peppermint scent encourages one to complete tedious mental tasks as well as heightens alertness. Memory can be improved with the scent of rosemary, particularly long term memory.

In addition to the overall design of the building, aroma therapy oil burners should be strategically places and maintained, providing a subtle scent in order to aid concentration and cognitive function.

3.7 The effects of Noise on humans in the built environment

Studies in the field of *psychoacoustics* have shown that children's perception of speech is impaired by unfavourable listening conditions, more so than adults. Children's ability to recognise speech in under noisy conditions, including reverberation continues to improve until they reach their teenage years (Klatte, Bergstrom & Lachman, 2013 p 1).

The comparison between adults and children are that, for instance, a speaker to which the subject is listening to has to produce speech that is 5-7decibles higher for a child than for an adult in order to identify speech at the same level of understanding and clarity (Klatte, Bergstrom & Lachman 2013 p. 1).

In tasks that do not involve listening, studies in adults have shown that noise has a negative effect on short term memory as well as the serial recall of visually presented verbal items is impaired by sounds that are irrelevant to the task (Klatte, Bergstrom & Lachman 2013 p. 2).

Studies have shown that performance impairments with a single speaker occur with non-speech sounds such as tones or instrumental music but not with continuous broadband noise. Irrelevant sound-effect (ISE) is the term given to continuous broadband noise or babble noise at low intensities. This consists of meaningless speech, such as speech in a language that is not understood by the test subjects. It can therefore be deduced that recall performance is significantly impaired by sounds with fluctuating characteristics, such as the ones found in music which are essentially consecutively varying auditory-perceptive entities (Klatte, Bergstrom & Lachman 2013 p. 2).

Further irrelevant sound-effects studies in elementary school children have shown that there is a decline in the retention and recall of visually presented information. It has also been shown that as a child grows older, their ability to supress the influence of the

irrelevant sound-effect increases by 28%. Studies regarding the noise produced by passing aircrafts over a school environment have revealed that they also have a negative impact on a child's memory and ability to read (Klatte, Bergstrom & Lachman 2013 p. 3).

According to Klatte, Bergstrom & Lachman (2013 p. 4), the effects that noise has on children is far greater than on adults, especially when completing tasks that involve speech perception and comprehension. Short term memory, reading and writing tasks are also impaired by noise. These impairments are cause by specific interference with the perceptual and cognitive processes in the task by noise by acting as attention catching or generally distracting entities. Klatte, Bergstrom & Lachman (2013 p. 4) also demonstrate that environmental noise affects the cognitive development of children, albeit in a small amount, nonetheless, it is still a negative effect.

We can deduce that the learning spaces must therefore be treated with sound absorbing materials in order to reduce reverberation essentially provide a silent environment. The reduction of environmental noise that could possibly penetrate the learning environment must be controlled with the use of performance glazing as well as ensuring an air-tight seal on openings where natural ventilation is not required.

In the areas where natural ventilation is required, openings should be an adequate distance from the learners and measures incorporating sound absorbing materials need to be considered to reduce environmental noise before it reaches the learners.

3.8 Human influence on Space and Forms

The implications of static elements need to be considered, as they also have effects on how one perceives a space. Ceilings must be at the appropriate height for the activity that may take place under it. Seating arrangements also have psychological implications and therefore need to be considered for different scenarios. A flexible seating arrangement is one that may be adapted as required (Augustin 2009 p 69-76).

Considering the nature of a primary school, a learner starting off in grade one may feel somewhat overwhelmed by vastness of their new space and therefore a hierarchy should be considered among the different spaces for the different grades; A lower ceiling height needs to be considered for the lower grades to provide a perception of security as one would feel in their home environment. Ceiling heights need to increase with grade, ultimately promoting *independence* among learner, as they are not *sheltered* in higher grades as they are in lower ones.

Day (2007 p. 130-132) highlights that view angles play a significant role for both the teacher and learners; the teacher has sight of the whole class and the whole class has sight of the teacher (*See Figure 5*). The traditional rectangular shapes of classrooms are abrupt and not *embracing* enough for younger learners, whereas concave classrooms project a more *protective* gesture. Concave classrooms (*See Figure 4*) imply a seating and table arrangement that leads to a more focused point but are also less formal. Contrary to this, straight rows imply formality and hierarchy that distinctly separate the learners from the teacher, rather than have them incorporated into a collective.

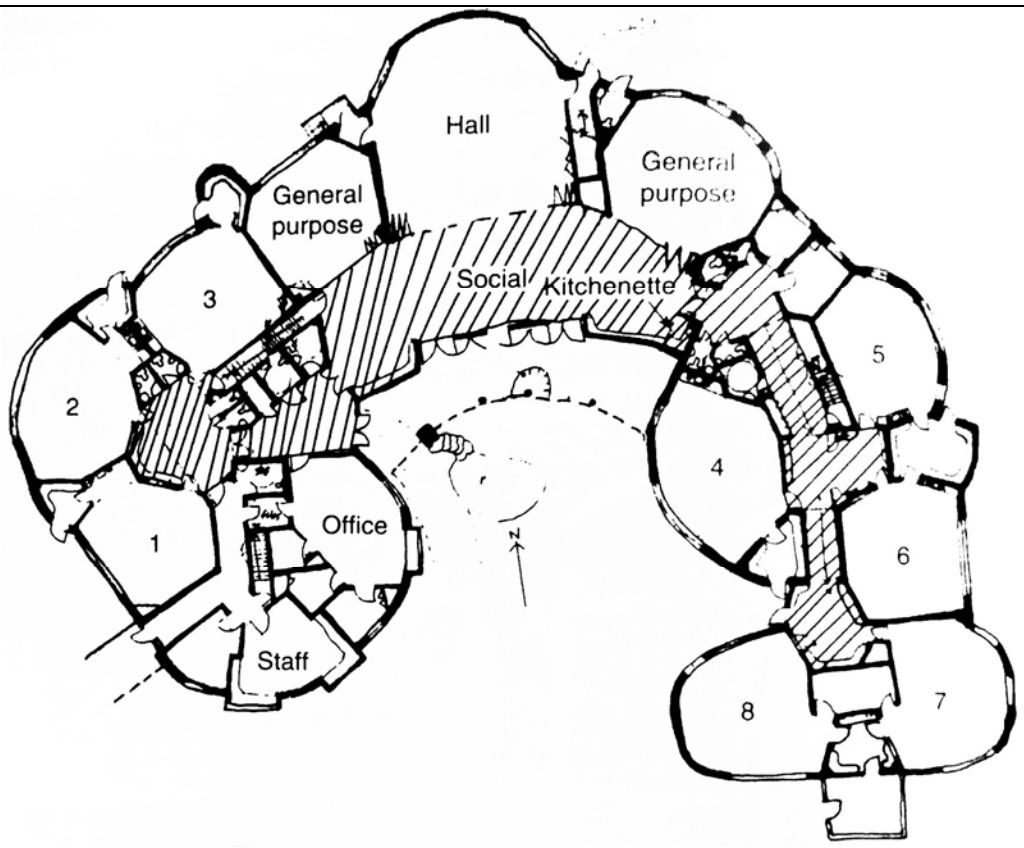

Figure 4: Example of a Waldorf school with concave classrooms

Source: Day (2007)

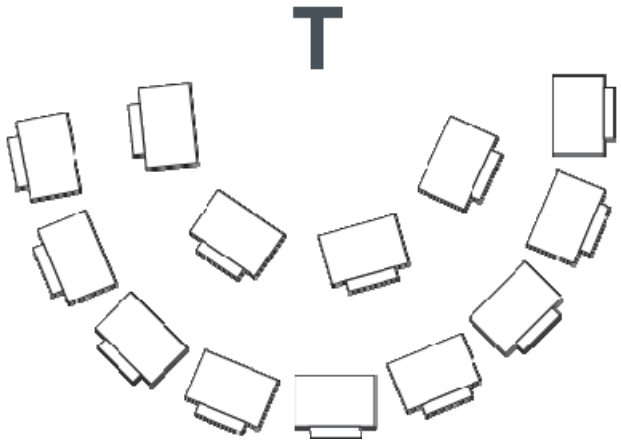

Figure 5: Example of a semi-circular seating arrangement encouraging focus

Source: autismoutreach.ca (2013)

Day (2007 p. 132) further continues to emphasise that a space should not rely on added loose elements/things – young children play with things. Spaces would be better if they stimulate imagination. Spaces should consist of a variety of textures, colours [keeping in mind their psychological effects mentioned earlier] and even unusual acoustics.

3.9 Social Interactions amongst children in the learning environment

With modern life becoming increasingly more private, community interactions hardly exist. Children make friends quickly although some may be withdrawn and socialising may not be an automatic response, this in turn, needs to be taught to them. By having children do things together encourages social interaction, this is achieved by them focusing on a particular task, in which case the social interaction will be encouraged naturally (Day 2007 p. 48).

In a classroom environment, it is not possible to know whether or not a table is willing to be shared until the relationships between those people have been determined (Augustin 2009 p. 75). This may be remedied as the classes settle and relationships among learners are ascertained. Learners may be relocated within their class. Furthermore, a large amounts of socialising occurs in circulation spaces as children move from one place to another, thus making circulation spaces a crucial aspect of social learning and should be considered when designing (*See Figure 6*).

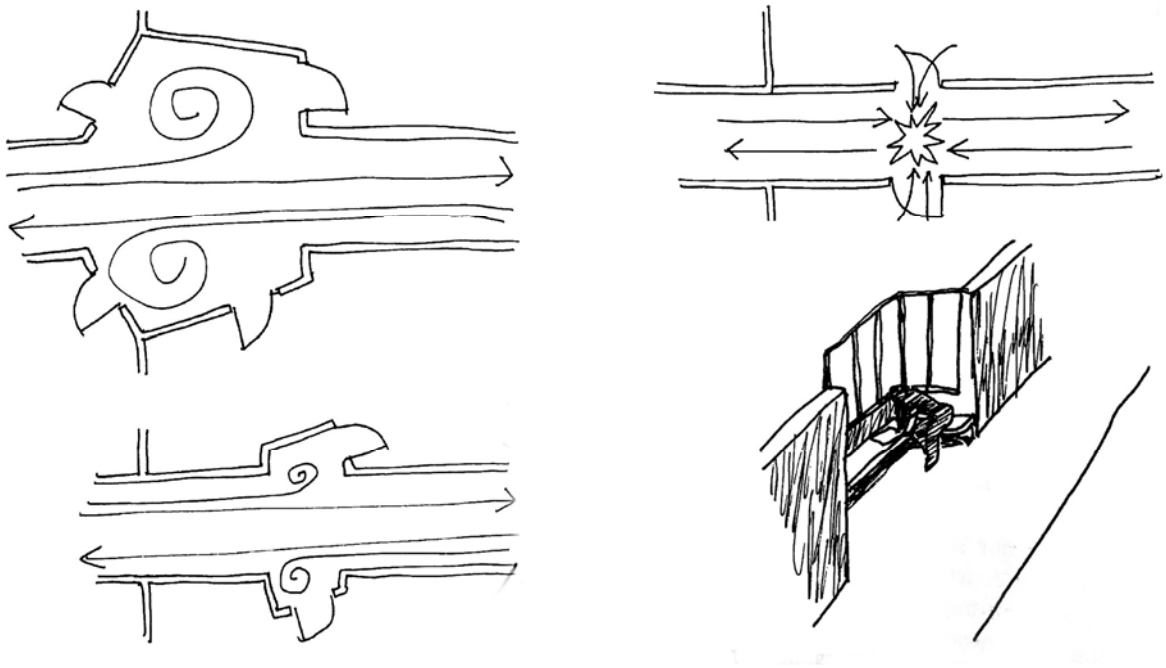

Figure 6: Examples of circulation and socialising spaces combined;
Source: Day (2007)

3.10 The effects of Local Context and Crowding on humans and how it influences learning space design

When it comes to neighbourhood quality, Evans (2003 p. 1) explains that when people move to a new neighbourhood, changes in mental health are indicated. In three experiments with low-income families, Evans (2003 p. 238) implemented a voucher program to relocate the families to a middle-income area, enhancements in mental health in both adults and children were shown.

Evans (2003 p. 238) explains that these studies do not pinpoint the physical characteristics of the place, though there is the presence of a multitude of contributing factors that are combined that indicate a general urban decay. The households in these decaying areas that have balconies either at street level, or in a multi-storey

building are affected more by the surrounding area than those that do not have balconies.

According to Evans (2003 p. 239), there is an association with the number of people and psychological distress. Experimental studies involving short term crowding, with test subjects completing random tasks, have displayed a negative impact on their psychological and physical wellbeing. This presents itself in physical symptoms of psychological distress in both adults and children.

With the above in mind, the proposed building should therefore be located in a relatively upmarket area that is we maintained with little or no signs of urban decay in order to add to the positive aspects that are required for a successful learning environment.

However, some areas that require schools do not meet the criteria of “upmarket living”. This is addressed by the school environment, both the building and grounds, being designed in a way that all the attributes of this research may be contained within the grounds and adequate interaction between the boundary of the school grounds and the surrounding context promote and motivate the community to uplift their area.

CHAPTER FOUR:

CHILD DEVELOPMENT PROCESSES THAT SHAPE SCHOOL DESIGN

4.1 Introduction

Children in their developmental stage in life sometimes need to be assisted in their learning endeavour, there are various theories and concepts that have been applied to this. In this section, the most applicable ones will be discussed in order for one to gain an understanding of how children respond to various methods and how these responses can influence the built environment.

4.2 The learning perspective: behaviourism

The definition is a view that any form of development results from either experience or adaptation to the environment. Behaviourism – Humans respond to the environment in the same way as other organisms, either through reaction or adaptation to their environments (Papalia, Olds, & Feldman 2006).

4.3 Jean Piaget's Cognitive-stage Theory

It is suggested by Piaget (in Papalia, Olds & Feldman (2006)), that the development of cognitive function and the ability of adaptation to an environment is a something that all humans are born with. Albeit that humans differ from each other, they all adapt in their own way.

The development of mental processes through learning are established on basic sensory perception, motor activity, logical and abstract thought. *Organization*,

Adaptation and *Equilibrium* are three interconnected processes in which cognitive growth occurs (Papalia, Olds, & Feldman 2006).

Organization is the formation of complex cognitive learning systems in which the information obtained is structured in a way that enables the awareness of reality. These cognitive systems or structures are called schemes in which organized patterns of thinking as well as behaviour is associated with a certain situation. As the young brain obtains more information, this structure becomes more complex (Papalia, Olds & Feldman 2006).

Adaptation is the term given to how the young brain processes new information based on information already acquired. According to Piaget (in Papalia, Olds & Feldman (2006)), Adaptation involves two stages, the first being *Assimilation*, which is absorbing new information and incorporating it into existing cognitive structures, the second being *Accommodation*, which is the adjustment of existing cognitive structures in order to fit the newly acquired information.

Equilibrium is the constant endeavour for balance which is the result from the constant shift between assimilation and accommodation. When new information cannot be processed adequately by a child's brain, this *disequilibrium* is addressed by organising mental patterns within their cognitive structure in order to integrate the new experience (Papalia, Olds & Feldman. 2006).

As a designer, one must consider the notion of one's adaptability and reaction to the environment and should endeavour to minimise the need for adaptability, especially for younger inhabitants of a space. In the case of a learning environment, a positive reaction to the space is required with minimal adaptation and should therefore incorporate *familiar* aspects in a new way that the learner may relate to.

An example of this would be to create a space that is more to a human scale rather than a vast space where a young learner may feel lost and as discussed before; easing the learner into a larger space in their journey through the educational system

4.4 Playgrounds and children

According to Malone & Tranter (2003 p. 1-2), when children play, it is not only an enjoyable activity, but another means through which children learn. In a child's developmental stage of life, play is something that takes place in the classroom in the form of various activities as well as on the playground. Play stimulates and helps develop a child's problem solving abilities as well as stimulates creative thought. Theatrical or role-playing also contributes to the improvement and stimulation of an array of personality and psychological traits such as; imagination, interpersonal problem solving, communication, creativity, cooperation and communication. Essentially, play is a method of children learning without being taught.

Studies by Malone &Tranter (2003 p. 4) have shown that playgrounds with high degrees of challenge, novelty and complexity are preferred by children. A play environment that may be moved around to create different play opportunities are preferred as they are more beneficial to environmental learning than static or fixed environments.

Three main categories of play have been identified regarding child development. The first of these are physical and motor skill development. Activities such as running, jumping, climbing, crawling and swinging through the use of fixed structures, taking part in structured games, playing with balls and bats, etc. make up the basis of this category. These activities help with bone and muscle growth, agility, strength and endurance (Malone & Tranter 2003 p. 4).

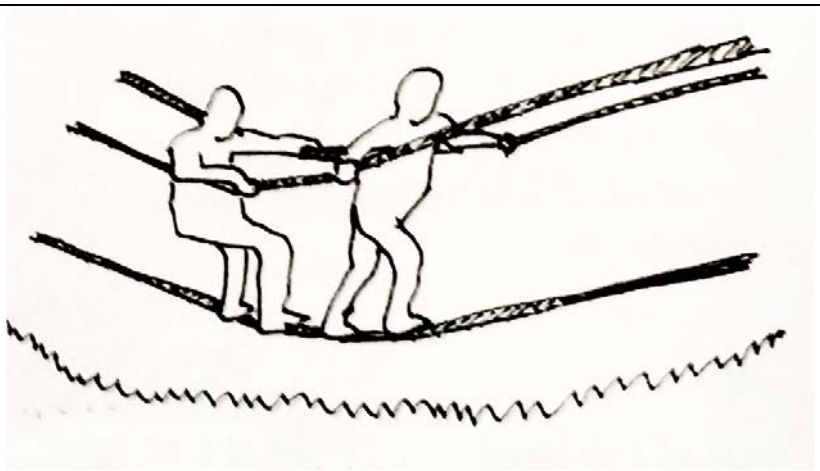

Figure 7: Cooperation among children as they balance cross a rope bridge together

Source: Day (2007)

The second category is Social Development – emotional development through interaction, cooperation and negotiation with other children. Activities such as talking, observing others, daydreaming and reading comprise this category and are both social and non-social. These activities contribute to self or identity development as well as develop their social skills which are essential for a successful adult life (Malone & Tranter 2003 p. 4).

The third category is Cognitive Development – Exploration and discovery with the incorporation of imagination and creativity. These activities are observing and interacting with the environment, exploring the environment and engaging in activities that are based on the child's imagination. This enables a child to develop an understanding of their surrounding environment and become familiar with the various systems and patterns and their relationships (Malone &Tranter 2003 p. 4-5).

According to Malone & Tranter (2003 p. 5), children are naturally attracted to wild or natural environments as well as prefer to play in these environments. This is because of children's diversities in their personalities and ways of thinking.

Figure 8: With imagination, a child can create anything they wish

Source: Day, (2007)

It is as mentioned earlier by Holl (2006) that the effects of globalisation and minimalism have removed the essentials of what is needed to allow imagination to grow. This notion reinforces the need for designing *for* the individuals, rather than a global trends and magazines.

The presence or view of nature from one's indoor environment has cognitive and psychological benefits that have been shown through research in prisoners, hospital patients, college students and children (Malone & Tranter 2003 p. 5).

The incorporation of nature is therefore a requirement in the design of schools, be it incorporating nature within the building, allowing one an unsecured view of nature, or both (*See Figure 9*).

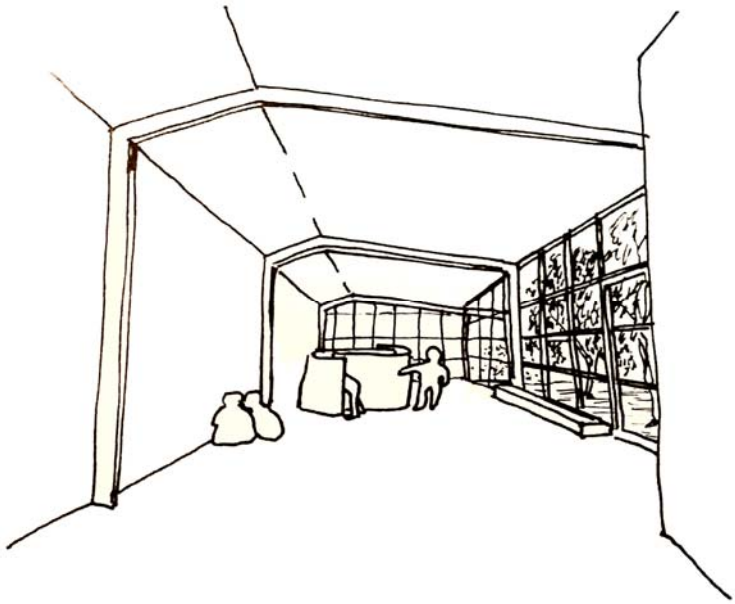

Figure 9: Large windows allow for indirect interaction with nature

Source: Day (2007)

Malone & Tranter (2003 p. 26) also state that allowing a child to experience things in physical form rather than from a book or computer screen is more beneficial to a child's learning process and gives them a more whole understanding of things being learnt. Experiencing the physical environment that does not pertain to what they are learning from books still contributes to a better understanding of what they are learning as there are many aspects of the physical environment that relate to what they are learning by other means.

The proposed learning facility should therefore comprise play areas that vary in complexity and may be restructured to provide new experiences to the learners. This may be in the form of jungle gyms that are modular that may be re-structured in to a variety of different arrangements. Play areas also need to encompass areas where learners may partake in group gatherings as well as areas where individual exploration and reflection time may be carried out. This may be in the form of an undulating landscape with seating areas or landscaping forming paths where learners may walk and enjoy the natural aspects of it.

The location of the proposed school is ideal for this kind of playground as the site borders a nature reserve and with the relevant applications to the *parks and recreation department*, the school may use portions of this reserve for their use as is will be a government learning facility.

4.5 Experiential learning through the built form

In a case study by Clark (2010 p. 24), the reader is taken for a tour through a school in the way in which an author would describe a scene in a book, giving emphasis to elements such as floor, wall and ceiling materials, the room sizes, colours, types of furniture and their arrangements, the means of access, means of vertical circulation through the building, how spaces lead into each other, lighting and temperature. These phenomena are both tangible and intangible and are continually emphasized to invoke feeling. Such emotions that are invoked by space and place, either indoor or outdoor, are the key fundamentals of *Experience*.

These emotions and experiences are from an adult's point of view. The challenge now lies in establishing how children *experience* these spaces and how it affects them. These experiences will have an effect on their feelings and emotions and ultimately their performance in the learning environment. Hence, it is critical to the success of the proposed school design that an understanding is gained of how children experience their environment.

The case study to follow in this research will endeavour to bring to light how children experience their learning environment as well as their emotional responses from the various spaces.

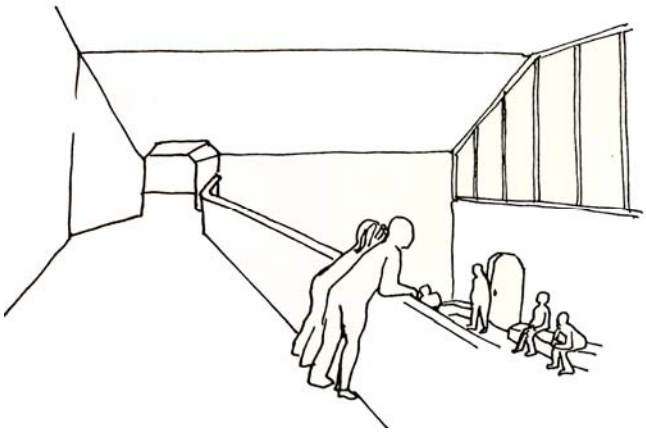

Figure 10: Indirect interaction between learners at different levels

Source: Day (2007)

4.6 Sensory Stimulus in learning spaces

Humans have evolved in a world that constantly changes, noticing this change is essential to one's survival. Humans therefore would not function optimally in stagnant and unvarying environments due to the nature of being stimulus-seeking beings. Without any variation of the environment, the brain will seek out other means of stimulation such as day dreaming, or sleeping. The lack of stimuli also results in lapses in concentration. Sensory experience enables one to gain a deeper understanding and therefore creates *interest*. *Interest* is another factor promoting attention. Documentaries and films are no substitute for experience, although they have their place in education (Day 2007 p. 83).

"While the emotional power of cinema is indisputable, only architecture can simultaneously awaken all the senses" (Holl 2006 p. 41)

CHAPTER FIVE:

HUMAN INFLUENCE ON THE BUILT ENVIRONMENT

5.1 Introduction

The aim of this section is to shed light on the on the basics of a sustainable school as well as the implications of incorporating good management strategies in order for learners to be aware of their surroundings, take pride in them and maintain them, encouraging social interactions and community involvement as well.

5.2 The value of sustainability in school design

Gelfand & Freed (2010), provide guidance on how to plan, design, build and run a sustainable school. Aside from the need to reduce the environmental impacts that are generated in the construction and operation of any building, they also elaborate on benefits that are linked to developing moral behaviours within children, as well as creating better environments for learning. Hence, they believe that the benefits of sustainability do not only pertain to the *outside world* but should part of the core mission of the school.

Gelfand & Freed (2010 p. 14) infer that higher student test scores are strongly associated with *daylighting* where the admission of natural light in to the classroom is controlled through light shelves, skylights and windows. Other studies of the acoustics within classrooms also indicate that better student hearing-ability leads to higher student performance. It is therefore clear that *daylighting* and the consideration of classroom acoustics will need to be integral in the proposed school design.

With the above in mind, it is therefore imperative that the inclusion of openings allowing sufficient amounts of light into the classroom be incorporated into the design.

However, they need to be strategically placed in order to avoid glare as well as direct sunlight, as this may cause discomfort in the learners.

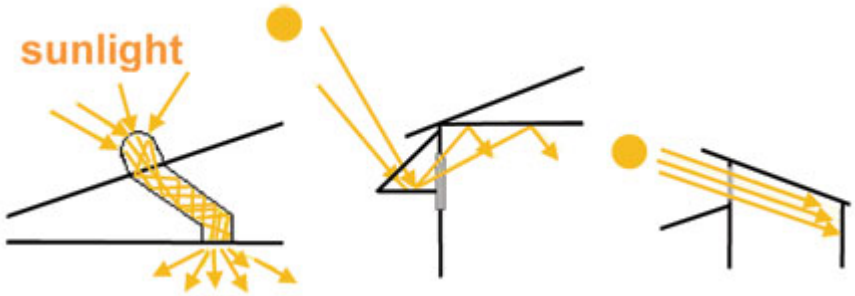

Figure 11: Methods of introducing controlled light into the learning environment
Source: Landon (2007)

With regards to acoustics, there are numerous products available on the market, such as general surface treatments with high sound absorption coefficients, acoustic ceilings, acoustic diffusers / reflectors and floor finishes. These are also important aspects to incorporate into the design of a leaning space and may become a part of the overall design as most products are not limited by shape or size.

Furthermore, it will also be important to ensure the best possible quality of indoor air in the proposed school through sustainable design as Gelfand & Freed (2010 p. 16) emphasize the role that it plays in reducing asthma and other respiratory problems. Gelfand & Freed (2010 p. 4) reference *displacement ventilation* as one of the heating, ventilating and air-conditioning (HVAC) strategies that have been shown to reduce absentee rates on the part of both employees and students by up to 60% in sustainable schools.

An HVAC system needs to be provided in order to maintain a comfortable temperature in the learning space, especially in the coastal city of Durban, South Africa, where the proposed school will be located. However, the proposed HVAC system needs to comprise fresh air intake and not rely solely on recirculated air to function.

According to Evans (2003 p. 540), malodorous pollutants have a substantial effect on mental health. Some factors contributing to indoor atmosphere pollutants may even be the building materials themselves, some of which may be even be toxic. Behavioural toxins, such as lead and other heavy metals, solvents and pesticides affect mental health, more specifically, neurological and cognitive functions. As an example, Lead hinders a child's ability to self-regulate their behaviour and is represented as inability to focus, with displays of frustration, lack of tolerance and general aggression. Other pollutants such as organic solvents, mercury and manganese cause neuropsychiatric symptoms such as depression, inability to concentrate, anxiety and irritability.

One must be therefore mindful when selecting building materials and finishes that will comprise the building. As with most building products, there are natural alternatives that do not pose health risks and their manufacturing processes do not involve the use of harmful chemicals. The only disadvantage to using products of this nature is that their cost is on average, significantly higher than those of mass production. Having said that, there is a growing demand for these *green* products globally and is resulting in a decrease in their cost.

Finally, the most compelling moral benefit of sustainable school design that Gelfand & Freed (2010 p 245-263) describe, relates to the changing of attitudes within a community by demonstrating *environmental stewardship* and influencing behaviours beyond the classroom. Human beings are creatures of habit so it is important to use architecture and design to instil a deep respect for the environment at an early age in order to prevent the cultivation of wasteful mind-sets. It is essential to promote the development of a generation that is far more conscious of their impact on the world through the use of experiential learning. This can be done in a variety of ways, something as simple as incorporating a recycling station for the various waste products, or assigning each learner a plant that they will maintain within their learning environment, carefully designed into the building

5.3 The Importance of influential design in children's learning spaces

Nicholson (2005 p. 45) highlight the importance of building especially designed around children and their needs. Furthermore, states that there are effective child-centred programs in less than adequate buildings, as well as poor programs in magnificent buildings.

Furthermore, Nicholson (2005 p. 45-46) states that all the various design choices and aspects in the learning environment influences one's judgement on what quality of education that is to be provided will be like at the learning institution as well as what the priorities are as a learning institution. Every aspect of a school design needs to carry a symbolic message, essentially creating a first impression.

According to studies conducted by Nicholson (2005 p. 46-47), learner's movements around their school environment is too rigidly controlled, all movements are in straight lines, effectively telling the learners to look ahead, ignoring all else around them. This occurs in tightly packed corridors and linkages within the building that creates a feeling of imprisonment. Psychological escape and separation in scenarios such as this is impossible and may lead to psychological turbulence in learners, which in turn may affect learner's academic performance and well-being.

Nicholson (2005 p. 49-50) highlights a school in Emilia Romagna, Italy where there is a distinct philosophical commitment to architecture as well as architecture's role in learning which became known as the third teacher. It is essential for schools to stimulate sensory perceptions in order for them to be refined and is a vital part of education.

By integrating spaces through the minimisation of physical barriers and the use of transparent barriers where barriers are required, as well as the use of organic forms and paths, these negative attributes of a traditional learning space may be eliminated

and will contribute to the positive psychological responses desired from the learners in the spaces.

5.4 Conclusion

From this literature review, some crucial insight has been gained pertaining to the various aspects of not just the architectural design of a learning space or institution, but rather a variety of aspects found in everyday life and the vast range of effects they may have on children and adults, more specifically in the learning environment.

The studies conducted by the various authors mentioned in this literature review have shown astounding results that should not be taken lightly when designing a learning institution.

It is therefore an architect's duty to take these discoveries, rationalise them and implement them into the design of future primary learning built environments in order to ensure maximum results from learners without compromising their well-being but rather promoting it.

Some of the key points that need to be considered are;

There are many aspects of life in general that may affect a learner negatively, such as family life, etc. however, by removing one of possible negative influences such as their learning environment and making it into a place of positive influence, society will have one less aspect of negative influence on the future generation of children, paving the way for future improvements. This ultimately contributes to the improvement, rather than the decline in academic performance.

We can therefor conclude that in order to design a successful building, a progressive approach to understanding to the following concepts and theories needs to be undertaken that will ultimately lead to a successful learning environment;

- Phenomenology – the human interpretation of things
- The complex interactions of sensory stimuli resulting in various cognitive and emotional states.
- Cognitive function – the various states one's mind can be in.
- The effects of the natural and built environment on humans, specifically children in order for them to influence and shape the future built form.
- Behaviours and emotions and how they influence cognitive function
- Integration of spaces and the use of barriers

Lastly, it is important to include children in the design process be employing various methods of interaction in order to understand their emotional and physical responses brought about by their experiences. In their totality, these methods, concepts and theories will ultimately be the informant to the design of a successful school.

CHAPTER SIX: PRECEDENT STUDIES

6.1 PRECEDENT STUDY No. 1: DESIGNING WITH THE USE OF RESEARCH ONLY

6.1.1 Introduction

Mill Brook School, Abbot-Downing School and McAuliffe School are Three schools in Concord, New Hampshire that have been designed to promote mental, social and physical health in the learners that are enrolled in the school where the goals are not only focused on education, but also on lifestyle (Vinnitskaya 2012).

Figure 12: Abbot-Downing School – Main entrance. (Source: Archdaily Dec 2012)

The reason for these three schools being combined as a single precedent is due to the approach and design all being of the same nature, but the same architect.

Figure 13: Abbot-Downing School – Learning House. (Source: Archdaily Dec 2012)

According to HFMH Architects (2012), the project was implemented in order to replace the undersized, aging schools in the city. The design process included the collaborative contribution from the faculty, local community and administration in equal parts. The main question raised, was; how can architecture help the development of children's early skills such as creativity and inquisitiveness in

order to become inspired adults of the future? The resulting ideas were that collaborative learning should be supported by the spaces and should also be easily accessible to the learners and staff in order to fully integrate them into the daily learning experience. The spaces should provide flexible environments that would host a range of learning activities. The school is constructed of locally produced and recycled materials for a reduced carbon footprint and negative impacts on the environment (HFMH Architects 2012)

Figure 14: Abbot-Downing School – Project Area. (Source: Archdaily Dec 2012)

6.1.2 The school design and layout

The school's layout is open plan with subdivisions and implied spaces rather than physical boundaries. This enables class groups to have a degree of separation from the other class groups and activities, though at the same time, integrated with each other (Vinnitskaya 2012).

The traditional layout for the library was replaced by a "multi-use learning corridor" (HFMH Architects 2012). The corridor is the main public space that weaves its way through the entire building in close proximity to the

Figure 15: Abbot-Downing School – Library. (Source: Archdaily Dec 2012)

classroom doors as a continuous presence to promote flexibility in its use for learning. The space consists of discreet nooks or spatial reliefs in which media presentations, performances, individual learning and small group projects may take place. It also performs as an interactive hub amongst both the staff and learners. Up-to-date technology is also a key integration into the school in order to maximize learning outcomes promoting the goals of the school (HFMH Architects 2012).

Figure 16: McAuliffe School – Main Entrance.
(Source: ConcordPatch Oct 2012)

According to Vinnitskaya (2012), the learners are not confined to a classroom with only a few windows peering onto the school lawn, but rather have large portions of their school and fellow learners carrying out their own work in site. The result of this promotes participation and group work as well as observation and inquisitiveness (Vinnitskaya 2012).

In cases where privacy or isolation is required, there are specific classrooms and offices provided, however, ample transparency to both the interior and exterior of the building is provided. Albeit that a physical barrier is in place, the psychological perception is different to that of a solid wall being in place, hence promoting integration and a sense of belonging with the private space, even if it is not the case (Vinnitskaya 2012).

Figure 17: McAuliffe School – Commons Area.
(Source: Archdaily Dec 2012)

In the case of learner's physical health, a stimulating sensory experience is provided through natural light as well as bold, bright colours on the various aspects of the building. Large high level windows are placed throughout the building promoting the penetration of natural light. Different colours induce different emotions such as calmness and excitability. These colours are carefully placed throughout the school to achieve the desired effect (Vinnitskaya 2012).

Figure 18: McAuliffe School – View into Art Room
(Source: Archdaily Dec 2012)

Natural ventilation and adequate mechanical air circulation has been implemented which also contributes to a healthy environment where alertness and attention is greatly improved for both the learners and staff (Vinnitskaya 2012).

Acoustic treatment to the spaces reduce reverberation and echo's, thus enabling a child to hear words clearly without interference which enables the learner to absorb what is being said more efficiently (Vinnitskaya 2012).

Figure 19: McAuliffe School – Art Room
(Source: Archdaily Dec 2012)

6.1.3 Conclusion

From what has been brought forth in this design as well as the principles incorporated into the design of the three Concord elementary schools, one can safely assume that adequate research has been done before beginning the design process.

Figure 20: McAuliffe School – View into Reading Room.
(Source: Archdaily Dec 2012)

There is also an apparent link in the research undertaken in the design of these three schools to that which has been discussed in the literature review and have proven successful, hence, becoming a suitable precedent for future Elementary/Primary school design. Examples can be seen in the figure illustrations (Fig 12 – Fig 24)

A Promotional video for the schools is also available on YouTube; *Not Old School Architecture in Support of Learning*

Figure 21: McAuliffe School – Second Floor
(Source: Archdaily Dec 2012)

Figure 22: McAuliffe School – Reading Room
(Source: Archdaily Dec 2012)

Figure 23: MillBrook School – Main Entrance
(Source: Archdaily Dec 2012)

Figure 24: MillBrook School – Project Area
(Source: Archdaily Dec 2012)

6.2 PRECEDENT STUDY No. 2: DESIGNING WITH THE INVOLVEMENT OF CHILDREN

6.2.1 Introduction

The Ballifield Primary School, located in Sheffield, United Kingdom designed by Prue Chiles and Howard Evans of Prue Chiles Architects in collaboration with the Bureau of Design Research - School of Architecture at The University of Sheffield, Postgraduate Architectural Diploma students at the University of Sheffield, The Sheffield Local Authority and the Ballifield Primary School staff and learners. Designing with Children (N/A).

Figure 25: Ballifield Primary School – New Entrance (Source: Prue Chiles Architects, 2014)

The British government invested a large quantity of money in order to upgrade, refurbish or rebuild primary schools around the country. This gave birth to the *Classrooms of the future* programme, where designers, learners, school staff and the community worked together to produce a unique building typology that would change children's experience and perception of their learning environment for the better. Designing with Children (N/A).

In the case of the Ballifield Primary School, a six week long series of collaborative workshops began in which learners placed cards with descriptive words around their school, expressing their feelings about the various spaces. The learners also gave tours to the adults to show them what they perceived to be the most interesting parts of the school. Simple questionnaires were given to the learners as homework, in which they had to state in their opinion, what would make their learning environment a better place for them. Problems around the school were discussed with teachers in order to arrive at a solution which translated into design drawings.

Figure 26: Ballifield Primary School – New Classroom (Source: Prue Chiles Architects, 2014)

For the entrance of the school, children were asked to imagine what they would like to see when they arrived at their school entrance. This was portrayed through drawings, collages and models. The playground shelter was conceived through a modelling workshop with the children, which encompassed the use of sticks, paper and plaster. This was an educational exercise in which the children learned about basic

Figure 27: Ballifield Primary School – New Classroom (Source: Prue Chiles Architects, 2014)

structure and construction. The children took part in further activities as a mapping exercise in order to map out the usage and traffic patterns around their school. Designing with Children (N/A).

6.2.2 Building Outcome

The existing run down classroom units were replaced by two new classrooms placed at the school's entrance, Toilets and change rooms were refurbished, a shelter and seating area was built near the sports field playground and stepping stones were laid with the learner's handprints cast into them. Designing with Children (N/A).

Figure 28: Ballifield Primary School – Corridor
(Source: Prue Chiles Architects, 2014)

According to Prue Chiles Architects (2014), nature and technology were the predominant themes on which the building design was centred. Natural materials were used in the construction of the buildings as well as up-to-date construction technologies. The classrooms enabled the learners to experience sensory as well as natural aspects of their surroundings and encourage the learning environment to be expanded by its intimate relationship with the external spaces (Prue Chiles Architects 2014).

6.2.3 Conclusion

The most important aspect of the Ballifield Primary school as a precedent study, is the way in which the project was approached as well as the inclusion of and collaboration with the learners enrolled at the school. Figures 25 - 32 illustrate some of the outcomes of the project. Simply viewing these images in comparison with the old

model C primary schools in South Africa, one can gain an understand why an approach like this is necessary by simply acknowledging the emotional response beckoned by these images.

Figure 29: Ballifield Primary School –
Work area – inside/outside integration
(Source: Prue Chiles Architects, 2014

Figure 30: Ballifield Primary School –
New Toilets
(Source: Prue Chiles Architects, 2014)

Figure 31: Ballifield Primary School –
Clasroom
(Source: Prue Chiles Architects, 2014)

Figure 32: Ballifield Primary School –
Item storage
(Source: Prue Chiles Architects, 2014)

6.3 PRECEDENT STUDY No. 3
DESIGNING WITH PHILOSOPHIES

6.3.1 Introduction

Figure 33: Fuji Kindergarten - aerial view
(Source: en.rocketnews24.com)

The Fuji Kindergarten is located in Tachikawa (near Tokyo), Japan, designed by Tezuka Architects, and completed in 2007.

The brief for the building was simple, the directors of the kindergarten wanted a “Roof house for five hundred kindergarten pupils” (McManus, D. 2014) [the roof house is a previous work by Tezuka Architects which serves as an open plan residence with the roof top being used for various activities by the family throughout the year]

6.3.2 The Building

The design of the building is in the shape of an Oval with and open space in the middle, very few walls and many trees. The main aim of the school is to let children be free without trying to control them and babying them (Akcasu 2015).

In a TED talk, given by Takaharu Tezuka (2014), he states that the building was designed as a circle to have endless circulation, he adds that young children like to dray circles.

Figure 34: Fuji Kindergarten – View from the courtyard
(Source: en.rocketnews24.com)

The roof was kept as low as possible so the roof could be more visible in order to see the children. If the roof was too high, all that would be visible is the ceiling (Tezuka 2014). *See figure 34.*

Throughout the year, the building is completely open (*see figure 35)*, with no internal or external boundaries. There are no boundaries between classrooms and no acoustic barriers. Tezuka (2014) states that placing children inside a box causes them to get nervous, but when you remove the boundaries, there is no reason for them to get nervous.

Figure 35: Fuji Kindergarten – The learning spaces (Classrooms)
(Source: en.rocketnews24.com)

Tezuka (2014), highlights the importance of noise factors. He states that children sleep better in a noisy environment rather than in a quiet place. He states that the children in the school show amazing concentration in class. Children should be able to talk to one another and should not be in silence (Tezuka 2014).

Tezuka (2014) stated that the principal of the school did not want handrails within the school and rather have a net that the children can fall into. Tezuka (2014) advised that this was not possible due to the local authorities. However, he incorporated the ideas of having a net into the building by installing nets between the holes in the building for children to play in and have a connection to the ground floor below. *See figure 36.*

Figure 36: Nets between buildings and trees on the roof area

(Source: en.rocketnews24.com)

Tezuke (2014), states that the teachers do not force the children to stay in their designated classroom areas, as they eventually return to their respective spaces due to the circular form of the building. He states that the control that the world is trying to impose on people should not be the case with children within reason.

The annexing building (*see figure 37)* is what we in South Africa would classify as a kind of Jungle gym, where children may play on in whichever way they wish. There is a risk of injury in areas such as this, however, Tezuka (2014) states that children need to sustain a degree of injury as this makes them learn how to live in our world.

Figure 37: Fuji Kindergarten – Annexing building

(Source: en.rocketnews24.com)

6.3.3 Conclusion

The Fuji Kindergarten has pushed the boundaries in what modern architecture and research as considered appropriate for a learning environment, however, very little of this research, such as that which is contained in the literature review, has been put into practice. This bold endeavor to design a learning environment of this nature has proven successful.

One of the key components of this precedent study is the removal of the *Control* aspect. Children learn their responsibilities through the freedom to learn by experience and what is deemed acceptable or not. This is one of the key aspects influencing the layout of the design based on this research.

CHAPTER SEVEN: CASE STUDY:

GLENWOOD JUNIOR PRIMARY SCHOOL

7.0 INTRODUCTION

Glenwood Junior Primary School, located at 63 Alan Paton Road, Glenwood, Durban, was established in 1914 originally catering for Grades one, two and three, and has recently added a pre-primary school wing onto it. This particular school was chosen as a case study because the researcher had attended grade's one two and three in this school from 1989 to 1991 and would be able to contribute personal experiences and views of the school's built environment from many years ago and relate to the learners' experience within the school, as is now in 2014.

Figure 38: Glenwood Junior Primary School:
View of the front of the school from the main gate / parking area.
(Source: Author)

The architecture of the original buildings has not changed, there have been a few renovations and refurbishments in order to preserve the old building and some of the small additions, such as an additional grade two classroom that has attempted to followed the traditional architecture, although it is constructed of prefabricated panels, and the classroom itself is significantly smaller than the other grade two classrooms. The new pre-primary wing (*see figure 39)* follows a more modern and softer architecture than the original buildings with the new school hall above them. The old hall has been converted into the library.

Figure 39: Glenwood Junior Primary School – New wing

(Source: Author)

When entering the school grounds off Alan Paton Road through the pedestrian gate, one is greeted by a tarred parking area, which once used to be the designated waiting area for both learners and parents under the shade of a colossal Jacaranda tree, a trademark tree for the school and the surrounding area. Sadly, these majestic trees were removed due to the increasing danger of collapse due to internal rotting. DeWaal (2014). The Parking area is still used to dismiss the children as well as a waiting area for the parents as it was all those years ago, but it is not an aesthetically pleasing space (*See figure 40)*.

Figure 40: Glenwood Junior Primary School – Parking area used to dismiss learners after school. (Source: Author)

The main entrance to the building and reception area and principal's office is located at one of the two main entrances (the left entrance when approaching the school from the main road). The reception area leads into a pleasant, planted courtyard and is enclosed by the grade one classrooms and the library. Two passages on either side of the courtyard lead to the Grade two and three classroom wing with a netball court between the two wings. The playground is located behind the grade two and three classrooms.

The case study began with each child being met at their classroom and walked over to the library where the questionnaire was answered. Following that, the learner took the researcher for a tour around the school to show all the favourite spaces around the school and try explaining why they liked it. After each learner had been interviewed individually, and their individual tour given, the 5 learners in that particular grade were called together to give the researcher a tour as a group. Following that, the researcher spent time in the child's classroom environment in order to observer his or her interactions with others as well as with their environment.

The following is a summary of finding obtained from the questionnaires presented to each sample group, the series of tours given by each sample group and the observations made by the researcher employing the proposed research methods.

7.1 GRADE 1 SAMPLE GROUP

Please see appendix A for questionnaire transcription and summary thereof, as well as details of individual tours.

7.1.1 Grade 1 Questionnaires and Individual Tour Discussion

During the Grade one learners' questionnaires and individual tours, the following had been observed; There is a possibility that learners have not yet learnt that seemingly fixed or permanent structures such as the various building components or the building itself, can be changed or modified in different ways. In the cases where changes have been mentioned by the learners, such as colours or the jungle gym, the learners seem to have an inability to explain exactly what change needs to occur. This could be an indication of a type of detachment or lack of sense of belonging that learners may feel towards their environment (i.e. that they have not thought further than not liking something) or not feeling like any personalization of their environment can take place due to encouragement not being provided by the authority figures in the school.

The theme of the hall (*see figure 41)* is repeated through all the learners' tours, mostly as a favoured space. This along with the one learner's response of

Learner A-1.1 'if there is lots of children she gets scared/shy – feels a little trapped', could be an indication that more open spaces are needed within the learning environment, especially in places where a large number of learners congregate. As the hall is also a meeting place for all grades, it also seems to add importance for the

learners to be able to see as well as interact with other learners beyond just their class or grade. (see precedent study 1 – Elementary schools in Concord, New Hampshire).

Figure 41: Glenwood Junior Primary School – New Hall
(Source: Author)

Another reoccurring area theme that is notable is the Jungle Gym *(see figure 42)*. Although this is primarily a recreational or play area, and would therefore be a preferred area by any learner, it is also another space in which interaction between learners can occur. This allows for a different type of interaction where co-operation would be needed, or basic socialisation skills would be learnt, such as learners taking turns on the slide, allowing other learners to cross the bridge first before running across it, etc. This interaction is limited by a traditional classroom set up. Another notable point is the different level platforms, nooks and creative ways to move from one space to the next within the jungle gym is possibly a needed feature for learners. This concept could be bought into the classroom by means of having raised platforms designated to a particular use, such as a reading area with a mini slide next to some stairs which allows the students to move between the spaces in different ways that suite their state of being at that particular time.

Figure 42: Glenwood Junior Primary School – Grade 1,2&3 Jungle Gym
(Source: Author)

The pool *(see figure 43)* is another common theme which reoccurs amongst the learners. This is once again a recreational space, and reemphasises the need for more interactive spaces within the learning environment. It is worth mentioning at this stage, that considering the fact that the learning environment and recreational environment have two completely different functions, bearing in mind that they are both learning environments – one being social learning and the other being academic learning, there is nothing inhibiting the integration of these environments into one, provided there is harmony or balance within the functions, such that the social learning compliments the academic learning.

Both the pool *(see figure 43)* and jungle gym allow for a change of visual texture as well as being a tactile environment. This brings about a point that interaction with different areas allows for learning, and that the sensory play is an important aspect of learning. However, one learner did mention that he did not like the windows in the classroom as they made the classroom

Learner A-1.5 ‘too bright from the sun’.

This may be a result from direct sunlight affecting the learner. However, natural lighting is important as pointed out by Gelfand and Freed (2010). Natural lighting may be achieved by integrating high level windows, diffusers and orientating large windows southwards to alleviate direct sunlight and glare.

Figure 43: Glenwood Junior Primary School – Swimming Pool

(Source: Author)

There was also an indication that the learners don’t like the passages *(see figure 44)*. This could be because the passages themselves are not incorporated into the learning environment and do not stimulate the learners, they are simply a linear space to move from one space to the next. Therefore, walking along the passages becomes tedious and brings about feelings of

Learner A-1.5 ‘don’t like to walk around so much’.

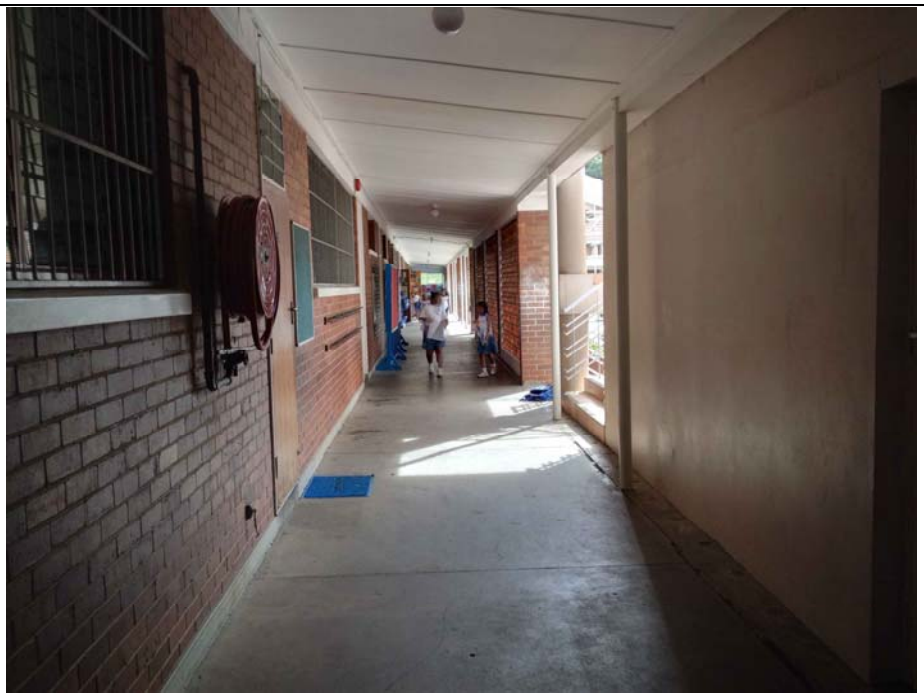

Figure 44: Glenwood Junior Primary School – Typical corridor
(Source: Author)

Three leaners mentioned the desks *(see figure 45)* which they use. Although not more was said other than arrangement should be changed by one of the learners, it is possible that the desks are not conducive to interactive learning as well as providing physical comfort in learning.

Figure 45: Glenwood Junior Primary School – Typical desk arrangement
(Source: Author)

The toilets were an issue for one learner. This was due to them being

Learner A-1.4 ‘dirty, wet and smelly’.

This is a potential issue for learning as learners may rather sit in discomfort than use facilities as well as being a health hazard. This may also cause health issues in the future.

Litter was another concern, as well as the

Learner A-1.4 ‘sandiness’ and ‘dustiness’

of the playground and various spaces around the school. Adding more flowers was also mentioned by a learner. This indicates the need for integration between nature and the built environment.

Another view also expressed by all the learners is that the new hall/grade 0 wing of the school is preferred to the original old building. This may be because the architectural features of the new building are somewhat aesthetically softer and the colours being warmer. Features such as round columns and much larger windows, resulting in less monotonous brickwork may be contributing factors.

The large rugs within the classrooms are also mentioned by two of the learners as an aspect of their classroom *(see figure 46)* that they dislike. The want of more pictures, charts and banners were mentioned by another learner. This could be the need for more stimulating material around the classrooms, instead of just monotone painted classes. However, this must carefully be addressed in order not to create an over stimulating environment for the learners.

The TV area and library *(see figure 47)* is mentioned by all the learners as a preferred space (only one learner does not like the TV area as it is ‘smelly’). This could be an indication that learners need technology within their learning environment. As technology is a prominent attribute of current daily living, it is understandable why the learners are drawn to this area.

Figure 46: Glenwood Junior Primary School – Typical Classroom

(Source: Author)

Figure 47: Glenwood Junior Primary School – Media Centre/TV area/Library

(Source: Author)

7.1.2 Grade 1 Group Tour Discussion

Please see appendix A for details of group tours.

When moving from place to place, each child demonstrated a different way of walking. This differed from balancing on the concrete up-stand of the flowerbed, to walking beside the researcher to running, jumping, skipping as well as the desire to slide down the balustrades. The children also seemed to enjoy climbing over as well as through different places of the school (such as the tuck shop / juice area counter opening or over / under the balustrades). This indicates a need for interaction between the children and the school building. More interesting and varied ways for learners to move around the school should is a concept that should be explored through design.

There was also a mechanical and basic physics interest shown by some of the children. This indicates that more physics / mechanical based structures / concepts / toys are needed in the school's recreational spaces. This conclusion was made by the fascination by a modified beach buggy idling in the driveway in which the engine was exposed and the moving parts could be seen as well as the excitement over hula hoops and a toy which involves trajectory and force (a beanbag catapult). A desire for a swing set by the jungle gym on the main field was also expressed. These basic physics concepts, although they may not be understood by the learner at this age level, though these principles will help them at a later stage in their lives as they would have already had practical experience with ideas and the concepts would not be foreign to them. This could also aid reasoning, actions, reactions and consequences.

The distraction and fascination by something new could also indicate that the school environment should allow for some fluidity in its function spaces. It should be able to easily change in various ways in order to create an ever changing and stimulating environment.

In general, the school has a lot of exposed hard surfaces (notably lots of plain, unpainted plastered walls and retaining elements around the Grade 1 jungle gym. The main field has a badly weathered concrete podium with very dated precast concrete balusters with badly weathered concrete sports stands). It was pointed out by one of the learners, that he did not like walking up and down the large risers of the sports stand and preferred the normal steps of the podium.

The sports stands *(see figure 48)* do not have enough regulation steps at regular intervals in order to circulate vertically between them. The school building and surrounding spaces are aesthetically as well as physically hard, which in turn creates the perception of a harsh environment. This harsh environment appears to lessen the children's desire to play, as seen by the lack of desire to play on the grade 1 jungle gym which is surrounded by hard concrete surfaces, located atop a steep embankment and faces a side of the school where there are exposed drain pipes and air conditioning units and a service road. In contrast to this, the space considered to be the grade 0 play area with its own jungle gym, where access to grade 1's is restricted to after school unless otherwise specified, has various murals painted on the columns, it is also surrounded by green fencing covered in creeping vegetation and potted plants along its length. There is AstroTurf used to create interesting patterns and a contrasting texture to the precast pavers and surrounding brickwork. Although the jungle gym in the grade 0's play area is a lot smaller, the children were happier to climb on it and play there than their designated jungle gym. This could indicate a need of comfort, perhaps in a sort of semi-enclosed space rather than being isolated in an open space, integrated by a mixture of elements the built environment as well as the natural environment.

Figure 48: Glenwood Junior Primary School – Field and sports stands
(Source: Author)

The sand used to surround the jungle gyms is course and not mouldable. It is also a monotone colour and adds to the dull, structured appearance of the school. It therefore does not enhance the educational value of the play area, nor does it add to it as a pleasant texture. A simple solution would be to add brightly coloured river stones to the sand, and designate an area where extremely fine, mouldable sand may be contained for the learners to create sculptures.

There also seems to be a need for more technology integration in the day to day school lives of the children. This is notable when the children realised that they were being recorded for data purposes and started dancing and acting for the camera. The learners then expressed interest in watching themselves on the video as well as wanting to play with the recording equipment. This along with the drawing the researcher's attention to learners' work that was displayed in an obscure corridor and showing where each individual learner's picture was printed in a newspaper article

indicates that the learners themselves feel a need to take pride in their work, not only as a class or grade unit, but in a general capacity.

The love of the library re-emphasizes this point as it is a multi-disciplined environment comprising of books, a TV area, computers, tables and a stage (as it was once the old hall). It is a large space with hexagonal tables that allow for group interaction on a more equal level. However, it is interesting to note that one of the learners would of likes to rearrange the library to have the bookshelves along the one wall and the television along another with the tables situated in the middle. This could indicate the more communal and social need in the library as well as increasing the feeling of 'more space', as there is currently a long bookshelf that physically divides the floor space and relocating this bookshelf would open up the floor space. In order to designate area that may be needed in such an area, non-physical boundaries, raised platforms, etc., may be used to designate areas as a substitute.

The re-emphasis of the need for and integrated environment is suggested by the learners being particularly interested in the pool (which they have restricted access to due to safety concerns) where one learner suggested that a waterslide be installed. Interest in the grade one garden / courtyard with a fountain was also prominent. The garden also has restricted access; therefore, the students rarely experienced the garden fully, only on occasions such as during Easter time, where an Easter egg hunt takes place. A simple solution would be to incorporate pathways through the garden which will allow the learners to experience the garden to a greater capacity while at the same time preserving the gardens integrity. Once again, pathways need not be linear or solid, but may be organic in form with staggered stepping stones.

The few original trees around the school that still exist, show obvious signs of wear cause by learners climbing them. This re-emphasizes the need for more areas where the learners need to climb in various ways in order to get into their various spaces. It also emphasizes the need for integration of nature within the recreational and learning areas.

7.2 GRADE 2 SAMPLE GROUP

Please see appendix B for questionnaire transcription and summary thereof, as well as details of individual tours.

All the grade 2 learners are seven years old and are less shy than the grade one's though they did say they were a little nervous as to what the questions were, therefore as with the grade one's, I attempted to build rapport with the learner before commencing with the questions by talking to them about the school, their teachers, what they enjoy doing, etc.

Unlike with the grade one's, the learners' vocabulary is a little broader, attention to detail, being greater. There was a little more initiative taken by the learners to answer the questions without using as many trigger words, or any kind of assistance in answering the question. This proved a little easier for the researcher to obtain data during the questionnaires and during the tours around the school.

7.2.1 Grade 2 Questionnaires and Individual Tour Discussion

During the individual tours, the field is one of the most common reoccurring themes. The field *(see figure 48)* offers lots of space, different types of interactions and play, as well as the ability to climb the smaller trees. This places emphasis on the need for space and outdoor integration within the learning environment.

The next reoccurring theme is that of the jungle gym, to which the learners of this age, according to what they have said, do not have access except for special occasions and after school during aftercare. There is an expressed need to still be able to climb, swing and move around on different levels. There is also a need expressed to be able to use the sand around the jungle gyms to make things;

Learner A-2.3 – ‘don’t like sand… it has stones in it …’

‘Prefer grade 0 jungle gym *(see figure 49)* it is nice and has smooth sand’

Learner A-2.4 – ‘like the sand pit for building different things’

It was also noted that the jungle gyms were dull in colour (a regular timber finish), with the grade one jungle gym being expressed as dull. It was suggested that around this jungle gym there should be painted murals on the retaining walls as well as the tyres to be painted different colours other than black. There was also an expressed requirement for more trees to surround this particular jungle gym. There is also a need for a swing set as expressed by the learners.

Figure 49: Glenwood Junior Primary School – Grade 0 Jungle Gym

(Source: Author)

The hall is also favoured by the majority of the students. This is probably due to the afore-mentioned need for space as well as the interaction between grades. There are also pictures in the hall which are considered

Learner A-2.5 ‘colourful and playful’

The hall also encompasses a stage *(see figure 50)* on which students can perform, climb and explore (The back of the stage, the backstage access steps, the backstage store room and toilet, the dividing walls, stands and the stage itself – all the nooks). It has more little nooks for the students to discover, however the students were not happy that these areas were not kept clean, especially the access steps. Two learners mentioned the lights for the stage and commented on their aesthetic attractiveness – this is due to the different colours of the lights.

Figure 50: Glenwood Junior Primary School – Hall stage
(Source: Author)

The pool is also a firm favourite, especially as this is where students swim. However, the area surrounding the pool is made from a rough concrete surface that has weathered over time and is unpainted. Although this is to prevent slipping when wet, it is unpleasant feeling for the learners under their feet and restricts speed. The sports stands also need smaller steps to access each row of seats as they are hard for learners to climb up. A learner did express that the exposed stones within the concrete (from weathering), the in the stands are interesting and nice to look at. This could be due to the different colours of the stones as well as the different texture they afford.

The library is a large space and fulfils a multidisciplinary function. Learners seemed to be attracted to the library because of factors such as the T.V., the books, the computers, the open spaces and desk layout. This emphasizes the need for large social areas in which learning can take place using a variety of teaching methods. However, it has been expressed that the colour of the library walls should be changed as

Learner A-2.2 'they are all brown'

All the learners commented on the facebrick school building as being monotonous. They all expressed interest in changing the colours around the school to brighter colours; such as red, purple, pink, blue and green.

Learner A-2.5 – 'some of the bricks are grumpy… some are cracking and different'

There is also an expressed need for contrasting colour as mentioned by a learner when talking about the black and white contrast of the stove and cupboards in the tuck shop space under the hall.

There was a concern raised about the fact that there was a need for teachers to shout over other learners. This was re-emphasized by the fact that one student does not like it when other learners talk during class. This could be due to bad acoustics in the classrooms and may need to be treated with sound absorbing surfaces in order to reduce midrange and high frequency reverberation.

There was also a need for the classes to be shifted around as some of the classes are much smaller than others, especially the new stand-alone grade two classroom block. However, this classroom may be of similar floor area as the other classrooms, but the "smaller" feel to the space may be because of the low ceiling.

There is also an expressed dislike for the parking lot area at the front of the school. A suggestion was made that this area should rather be paved as it is currently tarred. Paving would provide the opportunity of patterns and colours being included.

Once again the art on the boards *(see figure 51)* around the library and corridors were mentioned, indicating that the learners still felt a need to show and feel pride in their work. In conjunction with this, the learners enjoy learning and reading from posters on the walls in classrooms and library. However, they feel that these posters are not changed often enough to allow for constant stimulation.

Figure 51: Glenwood Junior Primary School – Art boards in corridors
(Source: Author)

A complaint was also made about where the air handlers from the air-conditioning units are placed. This is because they blow directly onto some of the learners causing them to feel cold, which is not ideal to maintain an equal temperature throughout the classroom.

The restriction of access to certain areas is also a concern for the learners. This inability to move freely throughout their environment inhibits certain social interactions, as well as prevents learners from seeing other learners working. This hinders the ability for the learners to learn from one another, not just from the teachers.

The use of the service road *(see figure 52)* in order to gain access to certain areas of the school is not liked by learners due to having to share the road with motor vehicles. The aesthetically harsh nature of the service road may cause a deterring effect on the learner through their subconscious perception of it - This area is the area in front of the Grade one jungle gym, and contains exposed rainwater drain pipes, air-conditioning units and service hatches to the under floor void beneath the school. This goes in conjunction with the undercover walkways roofs – fibreglass sheeting, they are deteriorating.

Figure 52: Glenwood Junior Primary School – Access road

(Source: Author)

Another issue is that the chairs in the classrooms are old, some are unstable and there have been instances of them breaking. The chairs in the hall are considered pleasant but a little uncomfortable.

Within the classrooms, the carpet / rug is considered ugly and dusty as well as an issue with it being “old”. This may be due to a psychological association with the colour; brown or beige, denoting age, and the style of the carpet pile. It is highly likely that the learners have been exposed to modern interior finishes with bright contrasting colours and a variety of carpet pile textures and resulting in these associations.

It has been expressed by the learners that the netball courts need new nets, a refurbished playing surface *(see figure 53)* and marking paint. This is due to the nets appearing to be broken and the floor being weathered precast concrete paving, which is not ideal for netball, or any other sport that uses a hard surface with the marking paint chipping off the floor. It has also been expressed that these courts should serve a dual function; as both netball courts as well as tennis courts. There is also a need for more plants around the courts.

Figure 53: Glenwood Junior Primary School – Netball Court Surface

(Source: Author)

7.2.2 Grade 2 Group Tour Discussion

Unfortunately, when doing the Grade two group tour, there was a time limit of ten minutes due to various activities around the school which was compulsory for all the learners to attend, it was therefore a little difficult for the learners to show all the places that they like under this pressure. However, there was a very good group dynamic that enabled an efficient tour to take place. It is possibly due to this time constraint that the Grades two's identified and worked as a unit. Although, this group dynamic may also have been due to prior friendships, socialisation and playing together.

As with the Grade ones' group tour, the Grade two's went to the Grade one Jungle Gym first. However, unlike the Grade one's, these learners preferred to climb up the embankment. This was expressed to be fun, especially when the learners ran down the bank and jumped off the retaining wall at the end. It was stated by one of the learners that they needed to be careful. This is noteworthy as it highlights a need for learners to be able to run up and down various planes at various angles.

Next the learners quickly ran to the pool. Despite the fact that the gate was locked, the learners were eager to show off the pool. They did express that they were only allowed in the shallow end. However, while standing outside the gates, the learners all found different ways of leaning against, pushing themselves up and hanging off the balustrade. This was all except one learner who was hanging from the actual gate for the pool. Once again, there is a need for areas where a variety of ways in which the learners may stand, sit, etc. These should be integrated into the various school spaces, depending on their function.

While passing the field, which was another favourite place but not one where the group stopped, the students explained the various sports they could play at the school. Areas in which learners can play sports, and thus learn healthy competition as well as physical fitness are important.

The learners were eager to go to the Grade zero Jungle gym, however the visit was cut short when they realized that the Grade zero's were on break. The leaners then just indicated that only the younger learners were allowed to play in this area.

The learners also like the library, and were quick to follow instruction to sit at one of the tables. They seemed to enjoy the group talking, and were courteous enough to each other to allow each learner a chance to talk. It was during this time that the learners expressed a need for a trampoline, swings and a larger pool. It is perhaps a possibility to have a pool with either a 'shallower' deep end or extended shallow end in schools catering for formative years, or even a partitioned pool.

The learners also had various methods of getting from one place to another. These methods included running, skipping, twirling, jumping as well as acting like mice when passing the reception area (which denoted place based behaviour). This once again contributes to the fact that there is a need for different ways and means for the learners getting around their school environment that are more interesting.

The notable learnt place based behaviour occurred when passing the reception area, as well as the soft voices used in the library. When in the hall, the learners indicated that they enjoyed the musical instruments but weren't allowed to touch them. This was met by looks of awe and guilt when the researcher pressed a key on the piano. The children were then quick to make a getaway.

It was expressed that the learners would have also liked to have gone to the netball fields, but due to the time constraint, this was not possible and the learners returned to their respective class groups.

7.3 GRADE 3 SAMPLE GROUP

Please see appendix C for questionnaire transcription and summary thereof, as well as details of individual tours.

All the grade three learners are eight years old and are the least shy of all the grades and were rather eager to be a part of the research and curious as to what it was about. Rapport, unlike with the grade one and two learners was not an issue, as the grade threes were quite comfortable to speak.

The grade three's vocabulary is also by far the broadest of all the grades, which is to be expected as well as attention to detail. There was also far more initiative taken by the learners to answer the questions without many prompts, but rather further questions for them to elaborate. This proved a little easier for the researcher to obtain data during the questionnaires and during the tours around the school.

7.3.1 Grade 3 Questionnaires and Individual Tour Discussion

In this particular tour, the pool was once again a reoccurring theme for the Grade three learners. This is due to the association of the activities that take place in that space; the learners are able to play, relax, as well as use the toys that are supplied by the school to play with in the water. This could be interpreted as a 'big kid' version of the water trough found outside the Grade zero classrooms (grade zero play area). The need to experience different textures, elemental mediums as well as environmental influences seems to be integral at this phase. Another important note is that the pool starts to symbolize a goal or aspiration for achievement for some learners as there was an expressed desire to excel at swimming.

Surprisingly in the whole study, only two students considered their classrooms to be favourable areas. This was seemed mainly due to the nature of work done in the classroom or the 'fun' activities such as art.

The field is mentioned again, this time by the grade three learners. This is once again due to the ability to

Learner A – 3.1 - ‘run around and play’

This reiterates the different social learning which takes place when interacting in a more physical environment. However, the litter and the ‘steps’ are still an issue for the learners. A need for more shade is prominent as one learner stated;

Learner A – 3.4 – ‘there is sometimes shade from the tree’

This ‘shade’ is isolated to the small podium area in front of the field. Another learner stated that the shade from the carport can be used by the learners instead of the cars.

The hall is mentioned by the students, once again due to the space afforded by it. There is also space for exploration in terms of the stage, stairs, exits and tuck shop situated under the hall as well as the activities offered in the hall, such as singing and music.

The Grade zero jungle gym and play area is still preferred at this grade level as opposed to the Grade one jungle gym. The setup of the jungle gym, combined with the sand pits and pleasant murals make the area more

Learner A-3.2 ‘funner’

The reoccurring theme of ‘old things’ pertaining to the original school building, insinuations of the deterioration of the building through age and weathering (especially in terms of the bricks, balustrades, tiles, walkway roof to name a few) seems to be an issue for the students. This along with the inability to keep the school ‘clean’ from dirt and litter creates a distracting environment.

Glenwood high school’s lower field (also known as the cabbage patch) are mentioned by learners as places that they like. Although this is another school in entirety, it seems that permission has been granted for the use of the cricket and soccer fields. This indicates that more space is required for sports use in the junior school.

7.3.2 Grade 3 Group Tour Discussion

In terms of the learners' individual development as well as social development, the Grade 3's were very different to the Grade one and two groups. This could be seen in their more 'adult-like' approach to the tour and also subtly in the one-on-one interactions with the researcher. During the group tour, the learners would rather walk next to the researcher instead of follow their desire to run / skip. If they did start to run / skip, it was either as a 'race' or was quickly stopped as it was not what the other learners in the group were doing.

When going to the Grade one Jungle gym, the learners commented that the sand was coarse. This indicates that it was not a good choice in sand. Further highlighting this is that some of the sand gets kicked out of the play area onto the walkway causing slipping and falling, as one of the learners did in fact slip on the coarse sand that had been kicked out onto the walkway, fortunately with no injury.

The learners were excited at the prospect of being allowed to play on the jungle gym, but the fact that they had just about physically outgrown the jungle gym inhibited play. It therefore became an ideal of 'showing off' and identifying parts of the jungle gym.

For most of the tour it was one learner showing off or trying to outsmart another learner. This could be seen from one learner bringing a tennis ball along on the tour

Learner A-3.5 'just to hold'

Then, practise bowling with it, to another learner showing off the necklace which doubled as a watch. The learners were more interested in telling stories of how they could visit other countries due to family living there as well as giving the researcher exaggerated answers which the learners felt the researcher wanted to hear. This could stem from the personality development taking place during this stage of life. This phase could be difficult to interpret due to the way in which each individual perceives themselves in relation to others.

An example of this was the one learner was constantly relocating to be near the researcher and away from the other learners. This particular learners' mannerisms and speech always came across as far more mature than his age would depict, and tried to maintain a composure where the others were louder, and almost performing roles for the researcher.

When surrounded by younger learners, the Grade three learners quickly became more serious. They would complement or criticise the younger learners work. This behaviour almost mimicked that of a teacher giving approval of a learner. A possible reason for this is that the school only goes up to Grade three and there may be unintentional pressure on these grade three learners to be more like adults, examples or role models for the younger learners. This could be from comments such as 'that was something you did in Grade one', and 'you are older now so you should behave as such'.

This circumstantial pressure on the grade threes' may be alleviated with the integration of the school, allowing the different grades to interact while working in order to convey the affirmation that all learners are equal as humans and the only differentiating aspect would be the level of work and their grade.

Although allowing for the normal development to gradually increase in increments is appropriate, there seemed to be a giant gap between the Grade two learners and the Grade three learners in terms of mannerisms. It is possible that this pressure to be 'role models' to the younger learners creates an environment where these learners now 'know better' as they are older and have completed the work. This may be due to the lower grades not being exposed to the higher grades work – another reason why the integration of learning spaces would be a good idea.

As seen in the precedent study; Elementary schools in New Hampshire, one way to make this growth and developmental period more transitional rather than rushed is by having an integrated school. This will allow for the older learners to take on a more

mentorship role rather than that of teacher. It will also help them to be better role models as the younger learners will be able to see them in typical work situations. This could be better both academically and socially as the learners will never feel superior to another learner.

Another noticeable difference is that these learners seemed to need, is a time limit in order for them to focus on the assigned task of speaking about the building, and what they like and dislike about it. It was only when the researcher imposed a time limit, that the learners stopped their individual performances and tried harder to be more attentive and group orientated. This illusion was shattered quickly upon entering the grade one courtyard garden *(see figure 54)* area where some of the learners had made little coloured clay 'tiles' in grade zero and had been embedded in the ground around the fountain in this middle of the garden, whereas with the other learners that had only started at this particular school in Grade one, this was not the case. This divide became very apparent, although it should not have made a difference. This may be something that should be considered as an exercise that all learners entering the school should take part in. In order to encourage a sense of belonging to the school, more than simply being a learner, the learners should produce something that becomes a permanent part of the aesthetic components in the school. The inclusion of learner's hand prints in stepping stones as seen in precedent study 2; Balliefield Primary school, may result in enforcing this sense of belonging as witnessed here, however, due to no post project research of this manner being conducted, one may only assume a similar result.

Figure 54: Glenwood Junior Primary School – Courtyard
(Source: Author)

During the tour, the group was also quick to talk about their different races, and quickly segregated the minority race from the 'main group'. Although many years removed from any major racial divides in South Africa, it is interesting that this group would identify so quickly in this manner.

The only notable architectural points raised by the learners was the fact that the parking lot was situated in the front of the school and the cars were parked too close to where they came into the school and waited for their parents at home time and that the sand in the grade one jungle gym sand pit was too coarse and fill of stones.

7.4 LEARNER OBSERVATION

7.4.1 Introduction

Each learner from the entire sample group was observed for ten minutes in their respective classrooms in order observe behaviour as well as experience the classroom environment while in use. This time constraint was based on the number of learners in the sample group and influencing factors such as the amount of time permitted with the learners as well as school operating hours.

7.4.2 Observation

While observing the various learners in their respective classes, it became apparent that the different teachers had different methods of managing their classroom environment in terms of discipline and work ethic. According to the school principal, DeWall (2014), the different methods of managing the classrooms do not affect the average academic outcome of the respective classes. However, learners are different with different abilities and there will be a few exceptions on both ends of the academic scale.

The following classroom environments were observed;

Chaotic: In this classroom state, learners appeared to wonder around aimlessly while talking excessively loudly to others, although, there was some degree of work being done. As the researcher, this particular classroom was unpleasant to be in. The learners did not seem phased by the fact that there was an outsider in their space. However, some of them were eager to show off their work and how they work. This falls very much in line with the outcomes of the individual and Group tour. The reverberation in the classroom seemed to amplify the noise level which made it

unpleasant. The learners' did not seem to be bothered with the noise, as it is in a child's nature to be noisy, especially the younger children.

Well balanced: In this classroom state, the learners were working relatively quietly at their desks, some would get up, walk around and look at each other's work or sharpen their pencils (according to the class teacher, this was not a problem unless they were told otherwise). One learner went to the door and put a "toilet pass" sign around his neck, went to the toilet and returned promptly. The noise level in this classroom was low, however the reverberation within the classroom did make the low noise level seem higher.

According to previous studies, this is the kind of environment with this level of discipline is best suited for a school.

Strict: In this classroom state, the learners were all at their desks in absolute silence. The learners needed permission to get up and move around and had to raise their hand for attention. This environment is without a doubt, effective in producing results, though the interactions that occur between the teacher and learner in order to achieve this state may have long term effects on the child.

The grade zero classrooms were investigated after finding that almost all learners preferred these classrooms as well as the new building wing as a whole to the original building and to their current classrooms. It was noted that the grade zero classrooms were far larger than any of the other classrooms within the old school building, with much larger windows, were painted vibrant colours, with different finishes. As opposed

to the classrooms in the original building that were painted a pale blue in the grade one and white in the grade two and three classrooms. Grade zero teacher, Armstrong, K (2014) stated that each grade zero classroom has its own toilets and that the classroom is split into different use area that can be rotated throughout the day, depending on the activity. These activities ranged from learning activities to recreational activities that serve as an incentive.

7.4.3 Learner Photography

Due to the learners being of a young age, the photographs that were taken by them were not able to be used as they mainly photographed each other and themselves. The places that they were photographed were of poor quality due to them being blurred and distorted, therefore not adequate to present in this study. As an alternative measure, the researcher took photographs on the learners' behalf of the places they wished to photograph.

Figures 38 - 54 contain photographic representations of area that the learners wished to have photographed as their favourite places during their tours. Figures 38 - 54 also include areas of the school that are disliked by the learners as well as various aspects of the build environment that are concerns of a negative nature to the learners as well as comparisons between the good and the bad, for example, a comparison between the type of sand contained in the sand pits of the grade 0 jungle gym and the grade 1 jungle gym (Figure 42 and figure 49)

All areas and aspects of the school environment, both liked and disliked by the learners, have been photographed unless access to particular areas at the time of photography taking place was not possible.

CHAPTER EIGHT: SUMMARY OF FINDINGS

8.0 INTRODUCTION

This section is a summary of the analysis and findings from the case study; Glenwood Junior Primary school (Chapter 6), that highlight the key aspects that pertain to the key questions as well as variable influencing aspects outside the scope of research.

8.1 SUMMARY OF FINDINGS

8.1.1 Summary of learners' Positive/Neutral and Negative responses to aspects of the school environment.

As can be seen in the tables summarising the contents of the questionnaires (Appendix A, B and C). The following table (Table 1) represents the positive/Neutral and negative responses from the standard questionnaire that the learners answered regarding different aspects of the school. Each value is representative of each learner's response to a question, as well as the area mentioned. The table is sorted by the amount of negative responses from highest to lowest.

	Positive (0 = neutral)	Negative
Building Aesthetics	0	11
Desks	1	6
Carpet	0	5
Classmates	0	5
Colours	1	4
Grade 1 Jungle Gym	1	4
Hall	1	3
Corridors	0	3
Toilets	0	3
Chairs	0	3

Classroom	0	2
Aircon	0	2
Field	0	2
Netball Courts	0	2
Walkway	0	2
Teachers	2	2
School Work	0	2
Other	0	2
Liking of School	14	1
School Building	14	1
Liking of the School Building	14	1
Library	0	1
Liking of the classroom	14	1
Restricted access	0	1
T.V. Room	0	1
Posters	0	1
Floors	1	1
Chalk board	0	1
Toys	0	1
Lighting	0	1
Technology	0	1
Grade 0 Jungle Gym	0	1
Parking Area	0	1
Sports stands	0	1
Area behind new grade 2 building	0	1
Service road	0	1
Classes	1	1
Personal	0	1
Outdoors	0	0
Swimming pool	1	0
Social	0	0
Glenwood High School	1	0

Table 1: Summary of positive/neutral and negative responses in questionnaires.

It is clear from this table (table 4) as to which aspects of the school should be addressed. However, this is merely a guide to what the learner sees as negatives and positives. These positives and negatives should be considered as a rating scale with regards to school design.

8.1.2 Summary of case study.

In younger learners, the built environment seems to be accepted as it is, as they do not seem to grasp the concept that the built environment can be changed in almost any way imaginable. They are also not able to clearly verbally communicate any changes, likes or dislikes efficiently without visual aids.

The older learners however, are more easily able to verbally explain their likes and dislikes with regards to their school environment, however, visual aids such as the tour, help in affirming their ideas and suggestions.

As mentioned by Augustin (2009), human behaviour and emotion is affected by information acquired through one's senses. Therefore, we can deduce that when learners speak about various aspects of their school environment, weather it is something they like, or dislike, there is either a positive or negative emotional response present. This is not only portrayed in their spoken words, but in their tone of voice and body language.

Considering the fact that the goal of this research is to find out what the positive emotional responses are in learners, aspects in an existing school environment should be addressed in order to alleviate the negatives and precedent should be set for future school design based on these principals.

The following aspects are a summary of the findings in the case study (Chapter 6) based on previous research contained in the Literature review (Chapter 3) and personal experience with the sample group as the researcher. Recommendations are

also based on findings within the case study (Chapter 6), previous research in the literature review (Chapter 3) and eight years of experience practicing in the architecture industry as well as life experience.

Colours: Carefully chosen colours should be incorporated in to the areas depending on their use. This is taking into account all aspects of the spaces, from walls, to fixtures and furniture, etc…

Finishes: The use of modern, yet hard wearing finishes should be incorporated into a school, as traditional finishes carry a *dated* aesthetic. A school should symbolise movement forward, traditional finishes may create the perception of being trapped in time, whereas modern finishes would represent the present and the future. Hard wearing surfaces will maintain their aesthetic properties and therefore maintain the *newness* of the school. Different finishes should also be integrated to form playful, yet technical patterns to invoke intrigue in learners, this also promotes cognitive function in learners by them establishing links in patterns, etc.

Space: adequate space should be provided for learners in order to alleviate negative emotional responses, such as the feeling of *being trapped*. An open plan space with sub-spaces should be considered. Barriers in areas that do not protect learners from harm provoke a negative response. Given the fact that children are far smaller in size than adults, features of the learner's environment should be in proportion to the learners' size rather than that of an adult.

Spaces: Spaces for use by learners that may require isolation, should be aesthetically pleasing to the learner and that they may feel comfortable in that space by considering all possibilities mentioned in this section to achieve this comfort. Even isolated spaces should invoke the notion of *being part* of the other spaces.

Furniture: Furniture that is aesthetically pleasing and comfortable should be used and should be carefully arranged within the space to promote wellbeing and interactive learning.

Sensory play: Recreational facilities for young learners should be flexible with mechanical parts and a variety of tactile aspects to promote understanding of physics as well as body mechanics. These recreational environments also serve as a place for social and experiential learning through their recreational environment. Consideration in the choice of materials in this environment also needs to be carefully considered, such as the sand in the sand pits. The sand should be fine, mouldable and comfortable to play with, as opposed to coarse sand with stones.

Integration: Learners from different grade should be integrated in a way that without compromising their learning groups, they still have access to other learning groups from other grades - A structured open plan learning environment with individual spaces and minimal physical barriers. Spaces should also be flexible and interchangeable to suite different needs and activities. The integration of spaces with different uses creates a multi-functioning environment which is a common fancy among learners. Integrated spaces promote good group dynamics.

The integration of the different grades will also promote equality among learners regardless of their grade and alleviate the possibility of learner superiority by affirming the fact that they are in different grades.

Movement: Young learners should be freed from traditional linear corridors and should instead move from place to place through an interactive stimulating environment. This approach to movement should be

considered for every space in a school, however, adults moving within the spaces also need to be considered.

Children also enjoy exploration, therefore the environment should encompass various places of exploration that also serve a function.

Tactile: Spaces within the school environment should offer a variety of textures and finishes to promote *self-learning.*

Lighting: Natural light is crucial to the human body's circadian rhythm and therefore should be incorporated as much as possible into the learning environment without causing visual discomfort through glare. In the case where artificial lighting is required, light intensity and light colour temperature need to be considered depending on the use of the space.

Ventilation: Natural ventilation should be incorporated into the spaces without causing discomfort. Elements such as wind should be controlled without compromising the natural flow of air through a space. In the case of a hot climate, where air conditioning is required, a semi-recirculating system should be used where there is a constant flow of fresh air. Air diffusers should also be positioned so that they do not blow directly on learners as this may cause discomfort.

Hygiene: Areas such as ablution facilities need to be addressed and child-friendly fixtures used. Clinical finishes that are aesthetically pleasing should be considered for these spaces. Cleanliness is also crucial to these spaces and should not be compromised due to school upkeep issues.

Ablutions: Having many small ablution areas within the school environment would be better than a few large ones, as this would afford more privacy to the learners, as well as not needing to travel far when they need the toilet.

By reducing the number of toilets in one area, it will also reduce the size of the space, hence, reducing reverberation and may produce a homelier feel if addressed properly.

Nature: The integration of nature into the built environment is an important factor in the promotion of well-being. This can be achieved by incorporating plants and greenery into the learning environment as well as maximising the vegetation outside the school building and providing large windows in order to view them. Large windows also create the feeling of space by reducing the amount visual barriers such as walls. Essentially, nature should be incorporated into every possible aspect of the school environment while maintaining a good balance between natural and man-made elements.

Shade is also an important aspect of the natural and integrated environment, as comfort is essential for learners to fully experience their environment without hindrance.

Learners should be free to explore the natural environment as they wish. This also promotes experiential self-learning through the natural environment.

Acoustics: Learning spaces need to be acoustically treated in order to alleviate reverberation and reduce noise. Young learners are not able to ignore irrelevant sounds as well as adults. Klatte, Bergstrom and Lachman (2013). Therefore, in a learning environment, it is crucial to eradicate noise of any kind to the maximum extent to maximise attention of the learner.

Technology: The integration of technology with regards to modern learning and teaching methods with traditional ones, such as old fashion books, pen

and paper should be incorporated into the learning environment, as technology is a prominent part of modern life.

Vehicles: Parking areas and access roads should be completely separate from spaces used by learners. Roads and parking areas are not conducive to achieving positive emotional responses. There are also the dangers for children associated with vehicles, therefore vehicle areas should be treated accordingly regarding safety, aesthetics and function.

Access: Places with restricted access to learners should be minimised and where it is necessary, the use of transparent barriers should be used in order to maintain the integration of the learner with the school to promote a sense of belonging.

Stairs: Adequate means of vertical travel should be provided for children as some of the aspects, such as sports stands require more effort from a child to climb than an adult and therefore stairs suitable for children should be incorporated.

Safety: Every aspect of the learners' environment should have safety in mind when designing. For example, areas that are conducive to slipping, such as the around the swimming pool, the surface should be that of a *non-slip* kind without causing discomfort to the underside of learner's bare feet.

Activities: A variety of activities should be provided for, such as music, dance, drams, various sports, etc… all spaces should be addressed to promote these activities by considering all aspects mentioned in this section and research document as a whole.

CHAPTER NINE: CONCLUSION AND RECOMMENDATIONS

9.1 SIGNIFICANCE OF THE FINDINGS

The findings contained in this study validate the hypothesis that there are without a doubt, aspects that can be addressed in the built environments of learning institutions in Southern Africa in order to increase the standards of academic performance of learners. All these finding run more or less in parallel with previous independent studies that have been conducted as stated in the literature review (Chapter 3) which have yielded positive results supporting the hypothesis.

9.2 CONCLUDING STATEMENTS

This research proposal outlines an ambitious intent, and it is driven by a passionate motivation to improve upon the education standards in South Africa, an aspect of society that has far-reaching consequences and meaningful impact in the event of success for future generations as well as the future of South Africa. Each of the aspects brought to light have a place in society and should be implemented in future school design of government model C learning institutions. Projects to refurbish and renovate existing government model C learning institutions should also be implemented. With this in mind, private schools will also benefit from these findings and should also consider them for future projects.

9.3 RECOMMENDATIONS

It is recommended that further study be done in pre-primary schools, senior primary schools and high schools. The reason for this is that every aspect in every learning institution has an effect on those that inhabit it and should receive the same approach when designing or renovating these institutions so that the well-being of the learners as well as their academic performance is constantly improved throughout their school career with the aid of their carefully designed learning environment.

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APPENDICIES

All questionnaires have been asked orally and filled in by the researcher.

An audio recording has been made of the questionnaire being asked as well as the conversations during the individual tours and available on request by authorised persons.

A video recording has been made of the group tours in order to document interactions among the learners and is available on request by authorised persons.

Please note that all completed questionnaires and signed consent letters are available for viewing on request by authorised persons only, as these documents contain personal or identifying information about the staff, parents and learners.

As part of a confidentiality clause within the forms, no personal information will be published unless authorised by the person in question, names of persons under the names of eighteen years of age may not be publicized as in accordance with the South African laws.

No copies of the documents/media will be made, only one soft copy of the interviews and tours (audio and video) contained on DVD's and the original documents will be available, therefore any request for documents/media containing personal or identifying information will be required to be signed for with full identification, thereafter full responsibility for the safe keeping of the documents/media in question will fall upon the individual who has requested and signed for the information. All raw information/media will be destroyed after five years as in accordance with the south African laws.

Only a sample of the permission/consent letter for the gatekeeper and learner/parents are included within this section.

APPENDIX A: Case Study 1 - Grade ONE Standard Questionnaires

APPENDIX A1.1: Learner A-1.1 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 6 years old

3. What Grade are you in?

A: Grade 1

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: Nothing

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: The colours

8. What do you think about the school building?

A: It's nice

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: Nothing

11. Do you like the colours?

A: Yes

12. Do you like how it's arranged?

A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.

A: The Jungle Gym but would like to change it.

14. Is there anything else you'd like to say about your school building or classrooms?

A: I like my teacher

APPENDIX A1.2: Learner A-1.1 – Individual Tour

Place 1: Grade 1 Jungle gym – The learner plays there every day but has to take turns playing there with the other grade 1 classes

Place 2: Swimming Pool – no reason given

Place 3: Hall – The learner enjoys singing there

Place 4: Kitchen – no reason given

The learner mentioned that she gets shy/scared when there are lot of children around her and feels a little bit trapped. She also prefers the classrooms in the new building wing to the classrooms in the original old building.

APPENDIX A2.1: Learner A-1.2 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 6 years old

3. What Grade are you in?

A: Grade 1

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: I don't like the work

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: The Desks, (Q: how?) A: rearrange them

8. What do you think about the school building?

A: It's nice

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: Nothing

11. Do you like the colours?
A: Yes

12. Do you like how it's arranged?
A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: The parking area (makes a disapproving face) I would change it, I don't like the parking area.

14. Is there anything else you'd like to say about your school building or classrooms?
A: I like my class and I like everything here in the building.

APPENDIX A2.2: Learner A-1.2 – Individual Tour

Place 1: Swimming pool – The learner likes to be in the pool, both playing and swimming.

Place 2: Hall – The learner like assemblies

Place 3: Field – The learner plays there, runs and sometimes plays a game called monster with her friends.

The learner was asked whether she likes the original building or the new wing, she says that she like both buildings, but prefers the new one. The learner would change the parking area by planting flowers and leave the cars parked there.

APPENDIX A3.1: Learner A-1.3 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 6 years old

3. What Grade are you in?

A: Grade 1

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: I don't like my school bag, the carpet and my teacher

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: I would changes schools because I don't like it when the teachers shout at us. I would change the toys.

8. What do you think about the school building?

A: I like it

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: Nothing

11. Do you like the colours?

A: Yes

12. Do you like how it's arranged?

A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.

A: Nothing

14. Is there anything else you'd like to say about your school building or classrooms?

A: No

APPENDIX A3.2: Learner A-1.3 – Individual Tour

Place 1: Grade 0 classrooms – The learner likes the pictures on the walls, the star charts and the way the tables are arranged.

Place 2: Field – The learner plays there, they can play there during aftercare in their civilian clothing.

Place 3: Hall – the learner likes the pictures in the hall, one in particular, mostly yellow with a tree on it. The learner also enjoys singing and likes the piano.

Place 4: Grade 1 Jungle gym – The learner enjoys playing there with friends as well as by herself. The learner particularly likes the slides.

Place 5: Swimming pool – The learner likes swimming

Place 6: Most favourite place is on the playground behind the grade 2 classrooms by the fence with a scene from “finding Nemo” painted on it – The learner likes the picture and the surrounding area. The learner gets to play hide and seek and has the freedom to do what she likes without restrictions. She loves playing with her friends, sometimes they fight, but then they forgive each other and play together again.

Place 7: Netball courts – No reason given

Place 8: Grade 0 Jungle gym – The learner likes it there, but she is not allowed to play there because it is for the grade 0 learners. The grade 0 learners play together there after school.

Place 9: Behind the green and purple houses – The learner plays hide and seek around the houses.

Place 10: TV area in the library – The learner watches TV with her friends after school.

Place 11: Juice area – The learner likes the juice drinking routine, there is a courtyard area there too where they celebrate birthdays.

Place 12: Teardrop Banners at the main entrance – Because of the pictures on them. They are more exciting to look at than the things at home.

Place 13: Hula-hoops – The learner enjoys playing with them.

Place 14: Grade 1 garden – Sometimes they play there and have Easter egg hunts.

The learner does not like sitting alone, far from her class, but the learner does not like the idea of the all the classes being together because it would be too crowded. The learner's main dislike that was repeated often, is the fact that teachers often shout. The learner also likes the birds that fly around the school and scrounge for food. The learner also enjoys running on the field.

APPENDIX A4.1: Learner A-1.4 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 6 years old

3. What Grade are you in?

A: Grade 1

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: The work and the desks

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: The desks and chairs because they are uncomfortable

8. What do you think about the school building?

A: It's good

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: I don't like the playground, the toilets and the TV room

11. Do you like the colours?
A: Yes

12. Do you like how it's arranged?
A: No

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: The Colour

14. Is there anything else you'd like to say about your school building or classrooms?
A: Lots of things, I don't like my classroom - books and the work. I don't like the playground because it is dirty – it is full of litter and it's sandy. I don't like the toilets are dirty, wet and smells bad, the TV room is smelly every day. I like the library.

APPENDIX A4.2: Learner A-1.4 – Individual Tour

Place 1: Field – The learner likes to play with his friends on the podium area in front of the field. The learner also likes to play soccer and likes to run races there.

Place 2: Grade 1 Jungle gym – The learner likes to play there because there are no rules.

Place 3: TV room(also a classroom, therefore restricted access) – The learner likes the TV room, but does not like the smell.

Place 4: Hall – The learner like it because of the large screen where he watches TV programs and other funny things.

The learner says that the playground behind the grade 2 and 3 classrooms is too small and is always dirty and full of litter. He would like this particular playground to be bigger, he also does not like the “finding Nemo” picture. The learner also prefers the new building instead of the original old one. The toilets by the grade 3 classrooms are the ones he dislikes and would change every in them to make it new. He also thinks that the security gates should be painted black because the current white paint is chipped off and the white paint shows the dirt. Black paint would look better.

APPENDIX A5.1: Learner A-1.5 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 6 years old

3. What Grade are you in?

A: Grade 1

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: The windows (Q: why?) A: they are too bright from the sun

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: The wall colours and carpets, they are horrible.

8. What do you think about the school building?

A: I think it's nice

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: The passages, I don't like to walk around so much

11. Do you like the colours?
A: Yes

12. Do you like how it's arranged?
A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: Change the books, colours and tables (the learner likes the colours, but would still change them)

14. Is there anything else you'd like to say about your school building or classrooms?
A: No

APPENDIX A5.2: Learner A-1.5 – Individual Tour

Place 1: Field – The learner likes the field because there is a lot of space to play.

Place 2: Grade 1 Jungle gym – The learner likes it because there are a lot of things to play with and he enjoys playing there with friends.

Place 3: The bench behind the grade 2 classroom, located on the far end – It is the place where the learner eats his lunch. he likes it because there are a lot of benches.

APPENDIX A6: Table summary of Grade 1 questionnaires

The following tables is a summary of the of the grade 1 questionnaires that encompasses all elements and aspects spoken about by each learner in order to better understand the similarities among the learners in their answers.

Learner Number	A-1.1	A-1.2	A-1.3	A-1.4	A-1.5
Age	6 years old	6 years old	6 years old	6 years old	6 years old
Grade	Grade 1	Grade 1	Grade 1	Grade 1	Grade 1
Liking of School	Yes	Yes	Yes	Yes	Yes
School Building	It's nice	It's nice	I like it	It's good	I think it's nice
Liking of the School Building	Yes	Yes	Yes	Yes	Yes
Building Aesthetics				(change) The Colour	Change the books, colours and tables
Library				I like the library	
T.V. Room				I don't the TV room TV room is smelly every day	
Corridors					The passages, I don't like to walk around so much
Toilets				I don't the toilets	
				toilets are dirty, wet and smells bad	
Liking of the Classroom	Yes	Yes	Yes	I don't like my classroom	Yes
Desks		rearrange them		(don't like) the desks they are uncomfortable	Change the books, colours and tables

Colours	(would change) The colours				The wall colours and carpets, they are horrible
Carpet			I don't like the carpet		The wall colours and carpets, they are horrible
Chairs				they are uncomfortable	
Toys			I would change the toys.		
Lighting					The windows (Q: why?) A: they are too bright from the sun
Outdoors					
Grade 1 Jungle Gym	(I like) The Jungle Gym but would like to change it			I don't like the playground it is dirty – it is full of litter and it's sandy	
Parking Area		The parking area (makes a disapproving face) I would change it, I don't like the parking area			
Social					
Teachers	I like my teacher		I don't like my my teacher		

			I would changes schools because I don’t like it when the teachers shout at us		
School Work		I don’t like the work		(don't like) The work	
Personal			I don’t like my school bag		

Table 2: Summary of Grade 1 questionnaires (Appendix A)

APPENDIX B: Case Study 1 - Grade TWO Standard Questionnaires

APPENDIX B1.1: Learner A-2.1 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 7 years old

3. What Grade are you in?

A: Grade 2

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: A little

6. What don't you like about your classroom?

A: When the children are naughty, then everyone gets shouted at.

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: The Tables and chairs (Q: why?) A: some sit in the middle, some sit on the side, some sit on their own.(rearrange the desks in the classroom). Change the colours (Q: how) A: make one side pink, one side light blue, the back purple and the front can stay as it is.

8. What do you think about the school building?

A: It's big and nice with nice flowers. The school is having its birthday.

9. Do you like your school building?
A: Yes

10. What don't you like about your school building?
A: The field. (Q: Why) A: I prefer it if there was a jungle gym on the one side and swings on the other side.

11. Do you like the colours?
A: No, because they are just bricks

12. Do you like how it's arranged?
A: No

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: The classrooms, I would shuffle them around because our class is too small (the new prefab building)

14. Is there anything else you'd like to say about your school building or classrooms?
A: No.

APPENDIX B1.2: Learner A-2.1 – Individual Tour

Place 1: Grade one courtyard – It's nice and big and has nice flowers

Place 2: Field – we play games there, but would like a jungle gym to be added to the field

Place 3: Hall – Because of assemble and singing. The learner likes the chairs, but they are a little uncomfortable.

Place 4: The area in front of the stage in the hall – the learner does ballet there.

Place 5: Little wooden stands – the learner likes to sot on them even though they are hard.

Place 6: The lights on the stage – because they're colourful

Place 7: The steps behind the stage – The learner likes going up, down and under them and enjoys skipping down them. They are dirty and the learner would like to change their colour.

Place 8: Store room behind the stage – The learner like it because they get toys and things from there to play with.

Place 9: The main stands on the stage – The learner likes it there because she can sit high at the top.

Place 10: Glenwood high school field – because its big (not part of the school)

Place 11: Swimming pool – the learner used to swim there, but doesn't anymore. The learner also likes swinging on the railings by the stairs near the pool. The learner does not like when the pool is dirty.

Place 12: Grade 1 Jungle Gym – It is fun to play on, the learner likes the ropes.

Place 13: The parking area – The learner does not like the parking area

Place 14: The uniform shop – The learner likes it there because new uniforms can be bought for school

Place 15: The library – The learner likes the computers, the TV and the book

Place 16: Mrs Wesselss' class – Because of the stock room and the way it is arranged. The learner likes all the grade one classrooms.

Place 17: Passages – The learner does not like the passages when they are dirty

Place 18: Photocopy room – The learner likes everything about it

Place 19: Pin boards in corridors – The learner like them because of all the learner art that is displayed there, particularly the ones along the grade 1 corridor.

Place 20: The reception offices – The look nice and sometimes things are changed around the room.

The learner, while showing the researcher her favourite places, also stated negative aspects of the favourite spaces, such as the stairs behind the stage in the hall, they are fun to play on, but always dirty. However, at times, a dirty space did not seem to be an issue, possibly due to the fact that the positive aspects of the space outweigh the negative aspects. There were no places mentioned in particular that the learner dislikes. This particular learner was also attentive to cleanliness.

APPENDIX B2.1: Learner A-2.2 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 7 years old

3. What Grade are you in?

A: Grade 2

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: The words that are up on the walls, It would be nice to have new words each week

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: Wall colours, would make them red(favourite colour), blue, green and orange

8. What do you think about the school building?

A: Love it (said excitedly)

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: The bricks, they are ugly

11. Do you like the colours?
A: Yes (mediocre)

12. Do you like how it's arranged?
A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: Colours of the library wall because they are all brown, would like new ceiling fans, but would prefer air-conditioning. Paint the grade 0 jungle gym because its boring.

14. Is there anything else you'd like to say about your school building or classrooms?
A: Undecided.

APPENDIX B2.2: Learner A-2.2 – Individual Tour

Place 1: Field – The learner likes the grass and says its nice and ticklish, likes how the surrounds are planted with new small trees, likes the teachers that come to the field, like to play on the field. The learner does not like the sprinkler and the stands because they are old and a horrible colour.

Place 2: Grade 0 Jungle Gym – The learner likes the new AstroTurf to what they had there before. The learner says that it is a nice and playful area and likes the paintings on the wall. The learner prefers this jungle gym to the grade 1 jungle gym.

Place 3: Grade 1 Jungle gym – The learner likes the colour of the rope netting for climbing on the jungle gym, the ropes, the slides and the bridge. The

learner would change the colour of the walls around the jungle gym by painting pictures on them. The learner would also change the colour of the tyres on the jungle gym because black is not a nice colour. The learner would also prefer more trees, but likes to look at the school.

Place 4: Swimming pool – The learner likes swimming and swimming classes but does not like the stands because they look old and ugly. The learner would make them new and paint them different colours.

The learner does not like the small netball section on the play area behind the grade 2 classrooms because of the chipped paint markings on the floor and would rather put a tennis court there instead. The learner does not like the stairs behind the stage because they are dirty. The parking are – The learner does not like the parking area because of the face brick retaining wall, it is not ha happy place and would change the rat and make it look better with paving. The area surrounding the new grade 2 building – the learner does not like the floor (precast pavers), they look old and ugly, the seats are ugly. The learner only likes new clean things as well as colourful things and pays particular attention to the condition of paintwork.

APPENDIX B3.1: Learner A-2.3 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 7 years old

3. What Grade are you in?

A: Grade 2

4. Do you Like School?

A: No, because sometimes I feel lazy in the mornings

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: The children talk all the time, and the floors because they're brown

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: put tiles on the floor – pink or blue

8. What do you think about the school building?

A: Don't like it

9. Do you like your school building?

A: No

10. What don't you like about your school building?

A: Feel angry inside because you're not allowed to walk in certain places

11. Do you like the colours?

A: No (Q: what don't you like?) A: I don't like the peach colours and bricks. Put red(favourite colour) and yellow

12. Do you like how it's arranged?

A: I'd like to put the jungle gym closer and feel shy in the office.

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.

A: Would knock the whole building down to put new bricks that look better colours

14. Is there anything else you'd like to say about your school building or classrooms?

A: Don't like when the teacher shouts at us

APPENDIX B3.2: Learner A-2.3 – Individual Tour

Place 1: Swimming pool – The learner says it is nice and cool when they play. Sometimes they use kickboards and likes it when the water is blue. The learner does not like the scratchy surfaces and they are not allowed to run around the pool because they might fall and scratch their knees. The learner does not like the deep end, but like the toys that they keep in the shed. The learner also thinks that the stands are too high.

Place 2: Grade 1 Jungle Gym – The learner likes the slides, the wobbly bridge and the monkey bars. The learner does not like the sand because it has stones in it and would prefer smooth sand. The learner prefers the grade 0 jungle gym because it is nice and has smooth sand, also, when the sun shines, the sand is warm and when the wind blows, it is cool. The learner

prefers the greenery, paintings and general layout of the grade 1 jungle gym. The learner would like more trees by the grade 1 jungle gym and would like to paint the bare walls.

Place 3: Library – The learner likes the library because of all the books and because the teachers read stories to the learners in the library. Sometimes they learn zulu in the library. The learner likes the computers and TV and prefers the library to the classrooms because it is bigger.

The learner speak about anger that seems to stem from conflict with siblings that is somehow projected onto the school environment and is triggered by the restriction of not being able to walk everywhere at any time. Having said that, integration of the school by enabling the learners to be a part of every space, not necessarily being physically present, even just visually would easily instil a sense of belonging to the school.

The learner does not like the face brick retaining wall along the service road under the grade 1 jungle gym because it is too high. The learner would make his wall shorter and the whole area flat. The learner does not like the precast pavers along the opposite side of the service road and does not like the Rainwater down pipes along the building façade. This learner also included some of the negative aspects of the spaces that she liked.

It is therefore clear that this particular learner has a very negative outlook on life. This may stem from parental influence or his daily surroundings, both within and outside the learning environment.

APPENDIX B4.1: Learner A-2.4 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 7 years old

3. What Grade are you in?

A: Grade 2

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: Chairs, they are wiggly and some of them break

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: Carpet, because its dusty. Don't like the colour, I like red-ish/purple-ish

8. What do you think about the school building?

A: Its big

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: The sports stands because they are too high(riser) and are pokey(uncomfortable) but I like the little coloured stones in the carpet (attention to detail)

11. Do you like the colours?
A: Yes, but they are too plain

12. Do you like how it's arranged?
A: No, (no reason given)

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: change the colours to make the school brighter and put new nets at the netball court behind the grade 3 classrooms, put new colours on the floor of the court and put plants around the court area.

14. Is there anything else you'd like to say about your school building or classrooms?
A: In the classroom, I like how the desks are, like the tiles and like the colours.

APPENDIX B4.2: Learner A-2.4 – Individual Tour

Place 1: Netball courts – Likes it because the learner plays netball there and plays matches. Does not like the precast concrete floor pavers and would change them.

Place 2: Hall & hall balcony/passage – The learner likes to look off the balcony, likes to sing, likes to walk around the balcony and likes the pictures on the walls inside the hall.

Place 3: Field – The learner likes to play around and see the trees and see friends. The learner likes the different kind of birds that fly by. Likes it

because it is big and wide and likes to look at all the different cars on the road.

Place 4: Grade 0 area – The learner likes the jungle gym because she can climb and play lots of games. The learner likes the sand pit for building different things and because they get given different toys to play with in there. The learner likes the AstroTurf area to play netball on and because it was the learners' space in grade 0.

This particular learner has not mentioned negative things about the places liked, unless it is possibly overbearing, such as the precast pavers mentioned by the netball court. The learner also likes all the teachers and likes how they teach.

APPENDIX B5.1: Learner A-2.5 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 7 years old

3. What Grade are you in?

A: Grade 2

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: Don't like it when people and speak when the teacher is speaking.

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: Carpet, because its old, dirty and dusty. The chair back, because its tearing and would like to change the colour. Change the location of the air conditioning because it blows on people and makes them cold. (move it to a different location so that it does not directly blow on anyone.

8. What do you think about the school building?

A: It's fine, I like it

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: Some of the bricks are grumpy, some are cracking and different.

11. Do you like the colours?

A: Yes

12. Do you like how it's arranged?

A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.

A: The covered walkway fibreglass roof sheeting on both passages between the grade one's and grade 2 / 3 wing because it is changing colour, cracking, dusty and ugly.

14. Is there anything else you'd like to say about your school building or classrooms?

A: No.

APPENDIX B5.2: Learner A-2.5 – Individual Tour

Place 1: Field – The learner likes the fact that there is a lot of ground to play on, the learner like the few plants that give shade and likes the bird bath, even though no birds go there. (It is most likely because it is in a major child-traffic area.

Place 2: Hall – The learner likes the toilets, the video projector screen, the stage because the lights make it "more beautiful" The learner like the way the chairs are sometimes stacked on top of each other, the black curtains and all the pictures on the wall because they are colourful and playful.

Place 3: The tuck shop/juice area under the hall – The learner likes the roller shutter doors, the white cupboards, the stove because of the contrasting black and white monotones of it. The learner also likes the wall colours (light moav)

Place 4: Library – The learner likes the books, stories and colourful pictures. The learner also likes the computers and the TV.

This particular learner seems to notice weathered components of the building such as walkway's fibreglass roof and weathered/cracked bricks, but does not mention anything negative about the liked spaces, even when prompted.

APPENDIX B6: Table summary of Grade 2 questionnaires

The following tables is a summary of the of the grade 2 questionnaires that encompasses all elements and aspects spoken about by each learner in order to better understand the similarities among the learners in their answers

Learner Number	A-2.1	A-2.2	A-2.3	A-2.4	A-2.5
Age	7 years old	7 years old	7 years old	7 years old	7 years old
Grade	Grade 2	Grade 2	Grade 2	Grade 2	Grade 2
Liking of School	Yes	Yes	No, because sometimes I feel lazy in the mornings	Yes	Yes
School Building	It's big and nice with nice flowers. The school is having its birthday	Love it (said excitedly)	Don't like it	Its big	It's fine, I like it
Liking of the School Building	Yes	Yes	No	Yes	Yes
Building Aesthetics	No, because they are just bricks	The bricks, they are ugly	I don't like the peach colours and bricks. Put red(favourite colour) and yellow Would knock the whole building down to put new bricks that look better colours	change the colours to make the school brighter	Some of the bricks are grumpy, some are cracking and different

Library		Colours of the library wall because they are all brown would like new ceiling fans, but would prefer air-conditioning			
Restricted Access			Feel angry inside because you're not allowed to walk in certain places		
Classroom	The classrooms, I would shuffle them around because our class is too small				
Liking of the Classroom	A little	Yes	Yes	Yes	Yes
Desk	The Tables and chairs (rearrange them)			I like how the desks are	

Colours	Change the colours make one side pink, one side light blue, the back purple and the front can stay as it is.	Wall colours, would make them red(favourite colour), blue, green and orange		like the colours	
Posters		The words that are up on the walls, It would be nice to have new words each week			
Floors			(don't like) the floors because they're brown put tiles on the floor – pink or blue	like the tiles	
Carpet				Carpet, because its dusty. Don't like the colour, I like red-ish/purple-ish	Carpet, because its old, dirty and dusty

Chairs				Chairs, they are wiggly and some of them break	The chair back, because its tearing and would like to change the colour
Aircon					Change the location of the air conditioning because it blows on people and makes them cold
Outdoors					
Grade 0 Jungle Gym		Paint the grade 0 jungle gym because its boring			
Grade 1 Jungle Gym			I'd like to put the jungle gym closer		
Field	(don't like) The field. I prefer it if there was a jungle gym on the one side and swings on the other side				

Sports Stands				The sports stands because they are too high(riser) and are pokey(uncomfortable) but I like the little coloured stones in the carpet (attention to detail)	
Netball Field				put new nets at the netball court behind the grade 3 classrooms, put new colours on the floor of the court and put plants around the court area.	
Walkway					The covered walkway fibreglass roof sheeting on both passages between the grade one's and grade 2 / 3 wing because it is changing colour, cracking, dusty and ugly
Social					

Teachers			Don’t like when the teacher shouts at us		
Classmates	When the children are naughty, then everyone gets shouted at		(don't like that) The children talk all the time		Don’t like it when people and speak when the teacher is speaking.
Other			feel shy in the office		

Table 3: Summary of Grade 2 questionnaires (Appendix B)

APPENDIX C: Case Study 1 - Grade THREE Standard Questionnaires

APPENDIX C1.1: Learner A-3.1 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 8 years old

3. What Grade are you in?

A: Grade 3

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: I like it

6. What don't you like about your classroom?

A: The desks (Q: why?) A: The are too small inside and can't fit all my book and things, so some of my things have to go inside my bag.

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: The carpets and desks(Q: Why?) A: I would make the carpets smaller and more colourful and would make the desks blue.

8. What do you think about the school building?

A: It's nice, and I like the garden very much (Grade one courtyard garden)

9. Do you like your school building?
A: Yes

10. What don't you like about your school building?
A: The banks by the grade 1 jungle gym (Q: Why?) A: They are dangerous and should be made flat.

11. Do you like the colours?
A: Change the bricks to another colour and the wall colours should be green and yellow. The bricks should be black.

12. Do you like how it's arranged?
A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: I would change the toilets by putting the boys and girls toilets next to each other and closer to the classroom.

14. Is there anything else you'd like to say about your school building or classrooms?
A: Nothing.

APPENDIX C1.2: Learner A-3.1 – Individual Tour

Place 1: Grade 1Jungle gym - The learner would like to change the colours and paint pictures on the unpainted walls. The learner would also like a garden in the grassy are next to the jungle gym. The Learner would also like the sand pit walls to be higher so the other learners cannot kick the sand out of the pit.

Place 2: Grade 0 Jungle gym area – The learner likes everything the way it is and would not change anything.

Place 3: The little green house – The learner likes this because it is a kid's salon where they can do each other's makeup and hair and likes it the way it is.

Place 4: Field – The learner like it because there is space to run around and play.

The learner does not like the car park area and would like the cars to park separately and for them to have their own driveway separate to where the learners walk in, wait and get dismissed. In other words, separate the learners area from the cars completely.

APPENDIX C2.1: Learner A-3.2 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 8 years old

3. What Grade are you in?

A: Grade 3

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: When the others leave a mess behind them. The walls are a boring colour and don't like it.

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: Wall colours – I would make them pink, purple and red because I like them.

8. What do you think about the school building?

A: It's nice.

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: The carpets on the walls for pinning stuff up, It ruins everything because the charts are colourful. I don't like the colour of the carpet, it should be purple, pink or red.

11. Do you like the colours?

A: No, I don't like the bricks, they are boring. I would like it if the bricks were red.

12. Do you like how it's arranged?

A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.

A: The road (service road), because of the traffic. Add a path for the children and a road for the cars.

14. Is there anything else you'd like to say about your school building or classrooms?

A: No.

APPENDIX C2.2: Learner A-3.2 – Individual Tour

Place 1: Swimming pool – The learner likes this area because they can play and relax. The can also find things to play with in the shed in the pool area.

Place 2: The Hall – The learner likes the stands in the hall when there is no place to sit. The learner also likes the instruments (piano and keyboard). The learner likes to play the mini bongo drums and sing.

Place 3: Grade 0 Jungle gym – The learner prefers this jungle gym to the grade 1 jungle gym because it is "funner" than the other one because of the way it is set up. The learner likes the slides and the way it is set up. The

learner also stated that she likes it because when people play they wait for each other to have turns to prevent fights.

This learner seems to realise the importance of safely when it comes to vehicular traffic on the school grounds and presents a solution for the problem of vehicular traffic. The learner also displayed the need for cooperation between learners in order to prevent fights breaking out. The perception of safety may be a result of the learner's parents instilling this notion as well as being educated about this in school. The cooperation may be due to daily interaction with other learners and witnessing fights due to the lack of cooperation and therefor rationalising cause and effect.

APPENDIX C3.1: Learner A-3.3 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 8 years old

3. What Grade are you in?

A: Grade 3

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: Sometimes it's a bit noisy.

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: I would put in a TV.

8. What do you think about the school building?

A: It's nice and clean.

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: I don't like the litter.

11. Do you like the colours?
A: Yes

12. Do you like how it's arranged?
A: Yes

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: I would change the field. (Q: Why?) I would change it to have a lot of shade.

14. Is there anything else you'd like to say about your school building or classrooms?
A: I like the school very much because the teachers are nice and we get to play with toys in the morning in class before school starts. (Q: Anything else?) A: I like the music lessons.

APPENDIX C3.2: Learner A-3.3 – Individual Tour

Place 1: Learner's Classroom – The learner likes it because she gets to talk to her friends, gets to do art, gets to write stories about her holidays and gets to read books.

Place 2: Swimming pool – The learner always wanted to be an Olympic swimming champion (enjoys freestyle). The learner states that the pool is very clean and very wide and they sometimes get to play with the toys in the pool.

Place 3: The Hall – The learner likes this area because it is nice and clean and smells very nice, not sure of the smell, but a little like bubble-gum (it is

the cleaning detergent used to wash the floors) The learner likes the toys behind the stage and that there is a secret exit.

Place 4: The Grade 0 Jungle gym area – The learner likes this area because of the sand pits, slides and paintings on the walls. The learner stated that half of the grade 0's know her and likes playing there with her little sister.

This learner points out classroom factors with "noisy" which denotes a reverberation factor that may be eliminated with acoustic treatment. The learner also associates ambitions with place, such as the swimming pool. The "secret exit" enforces the fact that the learner likes to explore places that are different, essentially going off the beaten path, which calls for areas that satisfy the exploratory needs of children.

APPENDIX C4.1: Learner A-3.4 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 8 years old

3. What Grade are you in?

A: Grade 3

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes

6. What don't you like about your classroom?

A: Sometimes the aircon is off and it gets hot and feel hot.

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: Nothing, I like it the way it is.

8. What do you think about the school building?

A: I like it.

9. Do you like your school building?

A: Yes

10. What don't you like about your school building?

A: Not really sure, I don't like the hard play area at the back of the school (area behind the grade 2 and 3 classrooms)

11. Do you like the colours?
A: Yes

12. Do you like how it's arranged?
A: Sometimes when there are meetings in the hall, everyone has to go to the back of the school (the previously mentioned hard area behind the grade 2 and 3 classrooms)

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: Nothing

14. Is there anything else you'd like to say about your school building or classrooms?
A: No.

APPENDIX C4.2: Learner A-3.4 – Individual Tour

Place 1: Tuck shop under the hall – The learner likes this area because when the learners are hungry and thirsty, the staff prepares food and drink for the learners.

Place 2: Learner's classroom – The learner likes her classroom because their teacher lets them play games and lets them do fun things.

Place 3: Field – The learner likes this are because they get somewhere to play and likes the podium because there is sometimes shade there provided by the big tree behind it.

Place 4: Grade 1 Jungle gym – The learner states that its “something about playing”, that she likes. It is fun and they get to enjoy playing there with friends afterschool.

This particular learner seems to primarily focus likes and dislikes based on personal comfort. Things such as classroom temperature, the shade under the tree and eating and the discomfort provided by the hard surfaces in the play area that is disliked support this notion. As with all the learners, they enjoy recreational social interaction with other learners. This learner’s negative associations are also related to physical comfort rather than other aspects such as aesthetics, etc…

APPENDIX C5.1: Learner A-3.5 – Standard Questionnaire

1. What is your Name?

A: Withheld to maintain anonymity

2. How old are you?

A: 8 years old

3. What Grade are you in?

A: Grade 3

4. Do you Like School?

A: Yes

5. Do you like your classroom?

A: Yes, mostly because my teacher gives me maths to do. The only thing is that there is no clock in the classroom and we don't know how much time is left to do our work. In grade 2 and 3 we used to have clocks. None of the grade 3's don't have clocks.

6. What don't you like about your classroom?

A: I don't like sitting away from the board because I can't see properly. Today, my teacher put me at the back because all the people that do all their work in time sit at the back. (Q: do you wear glasses?) A: No.

7. If you could change your classroom, what would you change? (colours, furniture, etc…)

A: First I would put a clock in the class and I would try taking all the desks at the back and put them in the front so that children with eyesight problems can see properly.

8. What do you think about the school building?

A: It's fine and wonderful except the passage by the corridor (covered walkways between grade 1 area and grade 2 and 4 area) roof, it has small holes and when it rains, the water comes through.

9. Do you like your school building?

A: Yes, especially the pool, because then I go to my uncle's house, they show me the trophies and would like to swim like them and I also like the cricket nets on the big field (Glenwood high school). (Q: but the cricket nets are in the other school) A: we used them too because a part of our school. It was ours in the first place and then they built the other school and it became theirs, but is ours too.

10. What don't you like about your school building?

A: I like everything except the toilets because the boys toilets, when they clean the, they don't clean them properly.

11. Do you like the colours?

A: Yes , except some of the bricks, they are faded and look old. (Q: so you don't like old faded cracked stuff?) A: I don't like dirty stuff and old stuff. Some of the stuff is nice but like some of the doors, the paint is chipped and pieces of the doors are chipped off. And on the classroom doors, people write stuff on it like "I love my teacher" so it looks too old.

12. Do you like how it's arranged?

A: Like I said before, the way they arrange the desks is like. And outside, sometimes the teachers would leave the paintings outside and they fall on the floor and messes on the floor, they should keep them in the classroom by the windows. (Q: what about the rest of the school?) A: I don't like the classrooms because all thegrade 3's are supposed to be together, All the grade 3's are supposed to be in one section and at the bottom there are supposed to be all the grade 00's, all the grade 0's, just the grade 1's and just the grade 2's. The only thing I don't like about the school is that there is no

grade 4 upwards, if there was, I would like the school, so I could stay in the school and stay with my brother, he's only in grade 00 and he cant.

13. If you could change anything about the school building, colours, furniture, etc… What would it be? You can change more than one thing.
A: What I would do is, where the netball courts, where the stones are (the one between the grade 1 and grade 2 and 3, I would put the field there. If it was a bit bigger and if the field with the grass was there, and the actual netball courts was somewhere else, it would be a bit better. (Q: why would you like it that way?) A: because it would be closer to the classrooms. Because when it's far away and we go to break, people fall on the stones and get hurt. I like the new soccer nets (temporary)

14. Is there anything else you'd like to say about your school building or classrooms?
A: Yes, it's very nice, there's nothing wrong with the school. The only bad stuff is what I told you before.

APPENDIX C5.2: Learner A-3.5 – Individual Tour

Place 1: Swimming Pool – The learner likes the pool because of his aspirations to win trophies for swimming like his uncle. He does not like the concrete palisade fence around the pool area. He does not like the stands because they are dirty. The learner mentioned that he can see the dirt on the floor around the pool. The learner likes the grass area and the pool itself because it's clean. The learner thinks that it is not safe to have the access gate on the road side of the pool because people can pick the lock and come inside. (iron gate) The learner stated that sometimes, when the wind blows, the sand from the empty planter boxes and eroded areas gets blown around the pool area and into the pool, he therefor recommends that plants should be planted where there is sand to stop the sand from blowing around and it would also make the area neat. The

learner also stated that the shed where the toys and pool related items are kept should be cleaned. The learner mentioned that the stands in the pool should have little steps running up the middle because the risers are too high and he walks up the bank to get to their row. He also recommends that the stands be redone.

Place 2: Glenwood high school soccer field. – The learner was told that the research was to do with Glenwood Junior primary. The learner likes all the space on this field, he also stated that it is bigger than the whole primary school. He proceeded to show me the cricket nets and they use tennis balls to play cricket and that the AstroTurf by the nets should extend past the nets so that the bowler does not have to run on eroded and uneven ground. He explained where they play soccer and that the field is split up so that six games can be played concurrently.

Place 3: Field – The learner enjoys playing soccer on the field, he emphasised that the arrangement of the temporary goal post has been changed to reduce the sides of the playing area. The learner also pointed out that the ground was eroded where the podium steps met the grass and that sometimes children drop their lunch and fall into the sand, they have to throw their lunch away. The learner recommends that the cars parked under the shaded carports should park with the other cars so that the learners can take advantage of the shade. The learner does not like the fact that the bin area is so close to the field, because its very dirty and smells bad. The learner also stated that the fence along the road side of the field because when they play soccer, the ball goes over the fence easily or gets popped when it hits the spikes on top of the fence.

Place 4: The grade 1 & 2 Classrooms – The learner likes these classrooms because it reminds him of his previous years at the school. He showed me that some of the classrooms are messy and some are neat. He would

rather prefer proper bins for pencil sharpening's over a regular bucket that is used.

Place 5: Hall – The learner likes the fact that there is more space here than in the rest of the building as well as the activities that take place there, such as music lessons, etc… He pointed out the fact that there are large gaps in the metal balustrading on the hall's balcony and that rope has been used to close the gaps, but it should be metal and the rope doesn't look nice. Inside the hall, the learner likes the little wooden stands on the side of the stage when there isn't space on the main stands and benched. The learner showed the area behind the hall where they keep the toys and stated that it is untidy and dirty. He recommended that all the things in the store room should be put in designated areas on shelves that are labelled like the lost property buckets outside the hall's entrance.

Place 6: Reception, principal offices and photocopy rooms – The learner like them because the floors are neat and the walls are neat and clean.

Place 7: Behind the grade 2 classroom building(the standalone building) – The learner likes this area because it's quiet and they do their homework here and because the place is used by teachers to help children with their work in this area.

Place 9: Fence behind the grade 0 play area – The learner wanted to show me this area because the ground is eroded and the fence is too small.

Place 8: Grade 0 Jungle gym area – This is the learner's favourite place and instead of telling me where we were going, he said "it's a surprise". The learner likes to walk in the sand in this place. He simply stated that he likes the area because it is quiet and can play there. He showed me the toilet in this area and pointed out the flaws in the wall tiles, the toilet

paper balls on the ceiling and the dirt on the walls. He like that the sand is clean. He was prompted about the jungle gym, followed by a confirmation that he did like it, though he did not seem phased too much about it.

Place 9: Grade 2 & 3 Toilets – the learner pointed out the fact that the toilets are not cleaned properly.

Place 10: The sports storeroom under the hall – The learner likes this space because of all the sports equipment that is kept there.

This particular learner pays great attention to detail, as well as upkeep of the school and pointed out various aspects of the school that need to be addressed, both in the questionnaire and during his individual tour that did not pertain to his favourite places. The learner mentioned the netball court between the grade 1 classrooms and grade 2 and 3 classrooms, that the tar has weathered and little stones are scattered everywhere and that the girls, when they play there, they wear skorts, and fall, they get hurt by the little stones. (he gave me an example of someone that got very badly hurt because of it). He also mentioned the condition of the floor in general around the school at various times and pointed out little potholes and areas where the ground has weathered. The learner states that in order to get to places, they take shortcuts up the banks when the teacher is not looking, which indicates that learner traffic should be addressed in order to preserve the banks.

The learner explained that the “G” classes are the good classes and that if any learner is misbehaved, they get sent to the “G” class so they learn how to behave.

During the tour, the learner stated that the Glenwood high school pupils are horrible to the primary school learners when there are no teachers present by passing comments and swearing at them and say things such as “why are you going up there, it’s our

school”. This is problematic and should be addressed as it may affect the primary school learners at a subconscious level.

This learner prefers the new wing to the original building because there is more space inside and it is also higher up than the original school. He also preferred the wheelchair ramps to stairs because they are easy to walk up.

The learner also appears to have an obsession with time because he keeps mentioning clocks around the school and which one’s work and don’t work.

The learner recommends that the school be fumigated because of the ant problem and at a time in the year where crickets come out of the holes in the walls and floors and sometimes there are animals that live under the school floor (suspended floor)

The learner noticed that the door handles are lower at the school than in other places and asked for confirmation if it was because the learners are shorter than adults.

APPENDIX C6: Table summary of Grade 3 questionnaires

The following tables is a summary of the of the grade 3 questionnaires that encompasses all elements and aspects spoken about by each learner in order to better understand the similarities among the learners in their answers

Learner Number	A-3.1	A-3.2	A-3.3	A-3.4	A-3.5
Age	8 years old	8 years old	8 years old	8 years old	8 years old
Grade	Grade 3	Grade 3	Grade 3	Grade 3	Grade 3
Liking of School	Yes	Yes	Yes	Yes	Yes
School Building	It's nice, and I like the garden very much (Grade one courtyard garden)	It's nice	It's nice and clean.	I like it.	It's fine and wonderful
Liking of the School Building	Yes	Yes	Yes	Yes	Yes
Building Aesthetics	Change the bricks to another colour and the wall colours should be green and yellow. The bricks should be black	No, I don't like the bricks, they are boring. I would like it if the bricks were red	I don't like the litter		Yes , except some of the bricks, they are faded and look old. (Q: so you don't like old faded cracked stuff?) A: I don't like dirty stuff and old stuff. Some of the stuff is nice but like some of the doors, the paint is chipped and pieces of the doors are chipped off. And on the classroom doors, people write stuff on it like "I love my teacher" so it looks too old.

Hall				Sometimes when there are meetings in the hall, everyone has to go to the back of the school	
Corridors		The carpets on the walls for pinning stuff up, It ruins everything because the charts are colourful. I don't like the colour of the carpet, it should be purple, pink or red			sometimes the teachers would leave the paintings outside and they fall on the floor and messes on the floor, they should keep them in the classroom by the windows
Toilets	I would change the toilets by putting the boys and girls toilets next to each other and closer to the classroom				the toilets because the boys toilets, when they clean the, they don't clean them properly

Classroom					I don't like the classrooms because all thegrade 3's are supposed to be together, All the grade 3's are supposed to be in one section and at the bottom there are supposed to be all the grade 00's, all the grade 0's, just the grade 1's and just the grade 2's.
Liking of the Classroom	I like it	Yes	Yes	Yes	Yes, mostly because my teacher gives me maths to do.
Desks	The are too small inside and can't fit all my book and things, so some of my things have to go inside my bag and would make the desks blue				I would try taking all the desks at the back and put them in the front so that children with eyesight problems can see properly

Colours		The walls are a boring colour and don't like it. Wall colours – I would make them pink, purple and red because I like them			
Carpet	I would make the carpets smaller and more colourful				
Aircon				Sometimes the aircon is off and it gets hot and feel hot	
Chalk Board					I don't like sitting away from the board because I can't see properly. Today, my teacher put me at the back because all the people that do all their work in time sit at the back. (Q: do you wear glasses?) A: No
Technology			I would put in a TV		
Outdoors					

Grade 1 Jungle Gym	The banks by the grade 1 jungle gym (Q: Why?) A: They are dangerous and should be made flat.				
Field			I would change the field. (Q: Why?) I would change it to have a lot of shade		
Swimming Pool					Yes, especially the pool, because then I go to my uncle's house, they show me the trophies and would like to swim like them

Netball Field					where the netball courts, where the stones are (the one between the grade 1 and grade 2 and 3, I would put the field there. If it was a bit bigger and if the field with the grass was there, and the actual netball courts was somewhere else, it would be a bit better. (Q: why would you like it that way?) A: because it would be closer to the classrooms. Because when it's far away and we go to break, people fall on the stones and get hurt.
Area Behind New Grade 2 Buildings				I don't like the hard play area at the back of the school	
Walkway					the passage by the corridor (covered walkways between grade 1 area and grade 2 and 4 area) roof, it has small holes and when it rains, the water comes through.

Service Road		The road (service road), because of the traffic. Add a path for the children and a road for the cars			
High School					I also like the cricket nets on the big field (Glenwood high school). (Q: but the cricket nets are in the other school) A: we used them too because a part of our school. It was ours in the first place and then they built the other school and it became theirs, but is ours too
Social					
Teachers			I like the school very much because the teachers are nice and we get to play with toys in the morning in class before school starts		

Classmates		(don't like) When the others leave a mess behind them.	Sometimes it’s a bit noisy		
Classes			I like the music lessons.		The only thing I don’t like about the school is that there is no grade 4 upwards, if there was, I would like the school, so I could stay in the school and he’s only in grade 00 and he cant
Other					The only thing is that there is no clock in the classroom and we don’t know how much time is left to do our work. In grade 2 and 3 we used to have clocks. None of the grade 3’s don’t have clocks
					I would put a clock in the class

Table 4: Summary of Grade 3 questionnaires (Appendix C)

APPENDIX D: Sample Parent Consent Form and Introductory Letter

Experiential learning spaces in government primary schools: a proposed school for the Durban Metropolitan Centre. To gain an understanding on how children experience their learning environment and to develop a learning environment design to enhance their academic performance.

Dear Parent/Guardian

I am conducting research as part of my Master's Degree in Architecture. The aim of the study to formulate a building design standard that promotes concentration, academic performance and well beings in children attending pre-primary governmental institutions
Your child has been identified as a possible participant for this research as they attend ……. (school name).

There are two main objectives. The first objective is to study the psychological effects and responses that various educational institutions have on children at the pre-primary level and to implement design interventions into existing buildings. The second objective is to establish basic guidelines to follow when designing a new educational institution in order to achieve a certain "mind-set" such as concentration or creativity, "Behaviours" such as keeping calm, and the "well-being" of people in their environment.

The data collection involves a semi-structured interview where your child will be asked about the schools physical environment. Your child will be observed in class as well as asked to take the researcher around the school for a tour of the school. This will be worked out with the relevant teacher in order not to disrupt your child's school day.

Participation within this study is completely voluntary and you are allowed to withdraw your child from the study at any time. Refusal to participate in the study, or withdrawal

from the study, will involve no penalty or loss. No identifying information will be required of you or your child at any given stage of the study, therefore, complete anonymity and confidence will be maintained.

When working with the information provided, the interviews will be assigned numbers which will assure complete confidentiality and anonymity. All collected data will be stored in a locked safe and will be destroyed via shredding of the transcripts after five years.

Although no monetary or material compensation will be provided to students who participate, there is very little anticipated risk as the area of research does not delve into any deeply personal or traumatic experiences. The researcher will, however, be available to discuss any issues or concerns that you may have as they arise as well as refer you to appropriate counselling facilities should you feel the need.

For any further information please feel free to contact the researcher or supervisor of the study.

If you have any queries about the rights of research respondents please contact Ms. Phumelele Ximba in the Humanities and Social Science Research Ethics Office.

Contact Details:

Philippe Yavo	**Ms. Phumelele Ximba**	**Mr. Peter Oravecz**
Supervisor	**Ethics Officer**	**Researcher**
Tel: (031) 260-7973	**Tel: (031)-2603587**	**Tel: 076-449-4338**

Kind regards,
Peter Oravecz

_____

Declaration of Informed Consent

I _____ (parent/guardian name) have been informed about the nature, purpose and procedures for the study: Experiential learning spaces in government primary schools: a proposed school for the Durban Metropolitan Centre. To gain an understanding on how children experience their learning environment and to develop a learning environment design to enhance their academic performance. I have also received, read and understood the written information about the study. I understand everything that has been explained to me and I consent for my child to take part in the study.

I understand that I am at liberty to withdraw my child from the project at any time, should I so desire and that the information that I provide will be anonymous and confidential and only be used for research purposes.

Childs Name:

_____

_____

Signature (parent/guardian) Date

_____

Signature (Witness/ Research Assistant) Date

APPENDIX E: Sample Gate Keeper Permission Letter

Experiential learning spaces in government primary schools: a proposed school for the Durban Metropolitan Centre. To gain an understanding on how children experience their learning environment and to develop a learning environment design to enhance their academic performance.

To Whom this may Concern

I am conducting research as part of my Master's Degree in Architecture. The aim of the study to formulate a building design standard that promotes concentration, academic performance and well-being in children attending pre-primary governmental institutions. I have identified your school as a potential participant of the study.

There are two main objectives. The first objective is to study the psychological effects and responses that various educational institutions have on children at the pre-primary level and to implement design interventions into existing buildings. The second objective is to establish basic guidelines to follow when designing a new educational institution in order to achieve a certain "mind-set" such as concentration or creativity, "Behaviours" such as keeping calm, and the "well-being" of people in their environment.

The data collection involves a semi-structured interview where five children from each class be asked about the schools physical environment. The child will be observed in class as well as asked to take the researcher around the school for a tour. This will be worked out with the relevant teacher in order not to disrupt the children's school day.

Participation within this study is completely voluntary and withdrawal is permitted from the study at any. Refusal to participate in the study, or withdrawal from the study, will involve no penalty or loss. No identifying information will be required of the school or

the children at any given stage of the study, so complete anonymity and confidence will be maintained.

When working with the information provided, the interviews will be assigned numbers which will assure complete confidentiality and anonymity. All collected data will be stored in a locked safe and will be destroyed via shredding of the transcripts after five years.

Although no monetary or material compensation will be provided to anyone who participates, there is very little anticipated risk as the area of research does not delve into any deeply personal or traumatic experiences. The researcher will, however, be available to discuss any issues or concerns that you may have as they arise as well as refer any participants to appropriate counselling facilities should you feel the need.

For any further information please feel free to contact the researcher or supervisor of the study.

If you have any queries about the rights of research respondents please contact Ms. Phumelele Ximba in the Humanities and Social Science Research Ethics Office.

Contact Details:

Philippe Yavo	**Ms. Phumelele Ximba**	**Mr. Peter Oravecz**
Supervisor	**Ethics Officer**	**Researcher**
Tel: (031) 260-7973	**Tel: 031-2603587**	**Tel: 076-449-4338**

Kind regards,
Peter Oravecz

_____

Declaration of Informed Consent

I _____ (gatekeeper) from _____ (schools name) have been informed about the nature, purpose and procedures for the study: Experiential learning spaces in government primary schools: a proposed school for the Durban Metropolitan Centre. To gain an understanding on how children experience their learning environment and to develop a learning environment design to enhance their academic performance. I have also received, read and understood the written information about the study. I understand everything that has been explained to me and I consent for my school to be part of the study.

I understand that I am at liberty to withdraw my school from the project at any time, should I so desire and that the information that I provide will be anonymous and confidential and only be used for research purposes.

_____

Signature (gatekeeper) Date

_____

Signature (Witness/ Research Assistant) Date

GLOSSERY OF TERMS

PASSIVE OBSERVATION - The researcher does not actively engaging in the activity.

PARTICIPATORY OBSERVATION - the researcher taking part in the learners activities, allowing the researcher to experiencing what the learners experience.

COLOUR TEMPERATURE – The measurement in Degrees Kelvin that indicates the specific hue of a light source. The lower the Degrees Kelvin, the warmer the hue Eg: 10000K is a very blue hue, whereas 1500K is very red. Birn, J (2003)

DAYLIGHTING – This is the introduction of either diffused or direct sunlight into a man-made space.

DISPLACEMENT VENTILATION – The introduction of fresh air into an enclosed space at ground level and expelled at a higher level such ceiling height

ENVIRONMENTAL STEWARDSHIP – when one takes responsibility for the environment and its uses through sustainable practice and conservation

PLACE-BASED BEHAVIOUR – When a particular behaviour is associated with a place and one therefore behaves accordingly. For example, in a library, one would behave in a manner that minimises any kind of noise that may arise from their presence and activity therein.

PSYCHOMOTOR VIGILANCE – this relates to one's ability to sustain attention and one's reaction time in response to visual stimulus.

SUBSYNDROMAL SEASONAL DISORDER – This is also known as winter or summer depression, where people experience normal moods through most part of the year and experience symptoms of depression during winter or summer.

PARASYMPATHETIC NERVOUS SYSTEM - The part of the involuntary nervous system that serves to slow the heart rate, increase intestinal and glandular activity, and relax the sphincter muscles. The parasympathetic nervous system, together with the sympathetic nervous system, constitutes the autonomic nervous system.

SYMPATHETIC NERVOUS SYSTEM – The part of the involuntary nervous system that accelerates the heart rate, constricts blood vessels, and raises blood pressure. The sympathetic nervous system, together with the parasympathetic nervous system, constitutes the autonomic nervous system.

PSYCHOACOUSTICS - the branch of psychology concerned with the perception of sound and its physiological effects.

IRRELEVANT SOUND-EFFECT (ISE) - This is the term given to continuous broadband noise or babble noise at low intensities.

LIFE-WORLD - This consists of all the immediate experiences, activities, and interactions that make up the world of an individual's or group of individual's life.

COSMOLOGICAL - (cosmology) the field of study that brings together the natural sciences, especially astronomy and physics, in an effort to understand the physical universe as a unified whole. In the case of this research, cosmological occurrences impact life on the earth's surface.

TEMPORAL - aspects pertaining to the world. For example, the ocean is a temporal entity.

GENIUS LOCI - The Latin word for: “spirit of place”. The genius loci is the prevailing character or atmosphere of a place.

EXISTENTIAL - a philosophical theory which emphasizes the existence of the individual person as a responsible for determining their own development through acts of their own free will.

BEHAVIOURISM – This is the term given to the fact that humans respond to the environment in the same way as other organisms, either through reaction or adaptation to their environments.

COGNITIVE - The term given to an approach to psychology that emphasizes internal mental processes.

DESIGN REPORT

SENSORY PERCEPTION AS AN INFORMANT IN BUILT FORM DESIGN PROCESS:
A PROPOSED PRIMARY SCHOOL FOR THE DURBAN NORTH AREA

Peter Oravecz

Design report submitted to the School of Built Environment and Development Studies, University of KwaZulu-Natal, in partial-fulfilment of the requirements for the degree of Master in Architecture

Durban 2016

TABLE OF CONTENTS

CHAPTER FOUR: DESIGN

CHAPTER FIVE: PLANNING

CHAPTER SIX: ENVIRONMENTAL PERFORMANCE

CHAPTER SEVEN: TECHNICAL RESOLUTION

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Most people spend their lives in buildings, with their thoughts being shaped by the walls around them, yet they do not really know why they are unable to concentrate, why they feel cold, yet it is not, or why they are never comfortable at their desk yet they have a nice chair, a nice desk, a neatly painted wall. These occurrences are all phenomenological aspects of architecture.

The psychology of the Architectural Environment can be separated into two main elements: “Understanding” – how one notices their environment – and “Perception and cognitive” – how one cognitively maps what they experience based on what they know or think they know about their environment. Environmental psychology studies people’s motivations illustrating the fact that people naturally seek out places where they will feel competent, productive, confident, where they will feel comfort or enjoyment.

These principles apply to not only every scenario in life, but throughout one’s life. There is always a prevalent influence of the environment on humans; whether is it out in nature, or in a basement parking lot. It is therefore crucial to address issues pertaining to the psychological effects of the built environment that will impact on children as well.

1.2 MOTIVATION FOR THE PROPOSAL

The performance of learners in South Africa has deteriorated drastically over the years as indicated by the South African Department of Education’s Annual National assessment. South African Department of Education (2013). This has far-reaching consequences, impacting negatively on the economy and leading to a general

degradation of society. This may seem contradictory since the Matric pass rate has gone from 60.6% in 2009 to 67.8% in 2010, followed by 78.2% in 2013. It has not been considered that the criteria for passing matric has a role to play in these figures as well as the massive dropout rate. The learners that obtained their matric in 2013 began grade one in 2002 with a number of 1 261 827, and by 2013, only 562 112 learners had completed all their years of schooling to write their matric examinations. The minister of higher education is also endeavouring to reduce the matric pass mark to 30% John, V: 2014. This suggests that 70% of the knowledge taught at schools is essentially unnecessary knowledge.

There are other influencing factors that may also be contributing to this deterioration in academic performance; factors such as the financial situations in the learners' families, nutritional needs of learners' limited support from families, lack of motivation by teachers due to low salaries, the negative effects of information technology causing a detachment from the physical world, etc… The abovementioned influencing factors are extremely broad and require individual attention, however, in the case of this research, the aspects of the built environment are being addressed in order to narrow the scope of research.

These few facts beg the question of whether or not their school environment plays a role in their motivation in completing their schooling career stemming from their elementary school years. How can a learning environment promote concentration, discipline and performance?

If a child feels uncomfortable or unhappy in their learning environment, how are they able to concentrate, and more importantly, how long will it take them to feel at ease? This may take days, months or even years. One may ask if this initial negative impression of educational institutions be a lingering factor affecting the child through their entire educational phase? How can this be prevented? How can well-being and concentration be promoted by the child's learning environment?

This research will outline an ambitious intent to propose a building typology that addresses the issue of promoting learner well-being and the desired psychological responses that ultimately translate to a better educational system.

CHAPTER TWO: THE CLIENT

2.1 THE CLIENT

The background research and case studies focus on grades one, two and three in model C government educational institutions. The proposed school in all that it is will serve as a “building guide” for future schools throughout South Africa. It can therefore be determined that for the client would be the South African Department of basic education.

2.2 CLIENT REQUIREMENTS

The Department of Education has developed a set of design guidelines (see appendix A) based research provided by the council for Scientific and Industrial research (see appendix B) which outlines the requirements for Primary school design along with neighbouring functions surrounding the school.

With all this in mind, the proposed school, being a pilot project driven by research based on the sensory perception of children aged 6 – 8 years old and therefore, there may be some exceptions to these guidelines as they do not fit the parameters dictated by the research.

2.3 USERS AND FUNCTIONS OF THE BUILDING

The proposed building comprises private, public, semi-public and integrated uses.

In this case, the term “private” refers to the learning spaces within the building that are exclusively for use by the learners and the teaching staff in order to carry out the day to day learning and teaching activities as required. These “private” spaces are

sensitive areas that be affected negatively if the public was to roam freely throughout and therefore access control is required at points of entry into these spaces.

The semi-public spaces are areas of administration, where staff offices are located and may be accessed by the public, although access to these spaces are regulated.

The public space consists of the Sports field, which may be used by the local community to host sporting events. Although the field is an integrated component of the school, it is still an independent entity that is physically separated in order to eliminate possible negative effects on the learning spaces.

Public commercial spaces line the edge of the site and area accessed by the public on the site edges, not from within the site boundary. These commercial functions also form a physical boundary to the site, promoting security for the activities within.

The school hall serves both as a community hall and a school hall with access from the “private” and “semi-public” spaces as well as the road. Depending on what use the hall is required for, partitions are used to separate uses as required.

2.4 DETAILED BRIEF

Based on the information gathered in chapter three and chapter six of the research document, the following key aspects need to be addressed in order to truly translate the essence of the findings of the research into built form.

Colours: Carefully chosen colours should be incorporated in to the areas depending on their use. This is taking into account all aspects of the spaces, from walls, to fixtures and furniture, etc…

Red, is to be avoided at all cost.

Hues around green should be used with moderately contrasting colours to not be too energising.

Colours should not be too saturated either, but enough to maintain a degree of the energizing effect.

Finishes: The use of modern, yet hard wearing finishes should be incorporated into a school, as traditional finishes carry a *dated* aesthetic. A school should symbolise movement forward, traditional finishes may create the perception of being trapped in time, whereas modern finishes would represent the present and the future. Hard wearing surfaces will maintain their aesthetic properties and therefore maintain the *newness* of the school. Different finishes should also be integrated to form playful, yet technical patterns to invoke intrigue in learners, this also promotes cognitive function in learners by them establishing links in patterns, etc.

Space: adequate space should be provided for learners in order to alleviate negative emotional responses, such as the feeling of *trappedness*. An open plan space with sub-spaces should be considered. Barriers in areas that do not protect from harm provoke a negative response. Given the fact that children are far smaller in size than adults, features of the learner's environment should be in proportion to the learners size rather than that of an adult.

Spaces: Spaces for use by learners that may require isolation for various class tasks, should be aesthetically pleasing to the learner and that they may feel comfortable in that space by considering all possibilities mentioned in this section to achieve this comfort. Even isolated spaces should invoke the notion of *being part* of the other spaces.

Furniture: Furniture that is aesthetically pleasing and comfortable should be used and should be carefully arranged within the space to promote wellbeing and interactive learning.

Sensory play: Recreational facilities for young learners should be flexible with mechanical parts and a variety of tactile aspects to promote understanding of physics as well as body mechanics. These recreational environments also serve as a place for social and experiential learning through their recreational environment. Consideration in the choice of materials in this environment also needs to be carefully considered, such as the sand in the sand pits. The sand should be fine, mouldable and comfortable to play with, as opposed to coarse sand with stones.

Integration: Learners from different grade should be integrated in a way that without compromising their learning groups, they still have access to other learning groups from other grades - A structured open plan learning environment with individual spaces and minimal physical barriers. Spaces should also be flexible and interchangeable to suite different needs and activities. The integration of spaces with different uses creates a multi-functioning environment which is a common fancy among learners. Integrated spaces promote good group dynamics.

The integration of the different grades will also promote equality among learners regardless of their grade and alleviate the possibility of learner superiority by affirming the fact that they are in different grades.

Movement: Young learners should be freed from traditional linear corridors and should instead move from place to place through an interactive stimulating environment. This approach to movement should be considered for every space in a school, however, adults moving within the spaces also need to be considered.

Children also enjoy exploration, therefore the environment should encompass various places of exploration that also serve a function.

Tactile: Spaces within the school environment should offer a variety of textures and finishes to promote *self-learning.*

Lighting: Natural light is crucial to the body's circadian rhythm and therefore should be incorporated as much as possible into the learning environment without causing visual discomfort through glare. In the case where artificial lighting is required, light intensity and light colour temperature need to be considered depending on the use of the space. Artificial lighting with a colour temperature of 10 000k should be used and balanced out with small splashes of light with colour temperature between 4000k and 5000k

Ventilation: Natural ventilation should be incorporated into the spaces without causing discomfort. Elements such as wind should be controlled without compromising the natural flow of air through a space. In the case of a hot climate, where air conditioning is required, a semi-recirculating system should be used where there is a constant flow of fresh air. Air diffusers should also be positioned so that they do not blow directly on learners as this may cause discomfort. Ablutions with are to be mechanically ventilated.

Hygiene: Areas such as ablution facilities need to be addressed and child-friendly fixtures used. Clinical finishes that are aesthetically pleasing should be considered for these spaces. Cleanliness is also crucial to these spaces and should not be compromised due to school upkeep issues.

Ablutions: Having many small ablution areas within the school environment would be better than a few large ones, as this would afford more privacy to the learners, as well as not needing to travel far when they need the toilet. By reducing the number of toilets in one area, it will also reduce the size of the space, hence, reducing reverberation to produce a more “homely” feel.

Nature: The integration of nature into the built environment is an important factor in the promotion of well-being. This can be achieved by incorporating plants and greenery into the learning environment as well as maximising the vegetation outside the school building and providing large windows in order to view them. Large windows also create the feeling of space by reducing the amount visual barriers such as walls. Essentially, nature should be incorporated into every possible aspect of the school environment while maintaining a good balance between natural and man-made elements.

The building is removing from nature, therefore nature should be replaced by providing a green roof.

Shade is also an important aspect of the natural and integrated environment, as comfort is essential for learners to fully experience their environment without hindrance.

Learners should be free to explore the natural environment as they wish. This also promotes experiential self-learning through the natural environment.

Integration with the surrounding nature reserve is therefore essential.

Acoustics: Learning spaces need to be acoustically treated in order to alleviate reverberation and reduce noise. Young learners are not able to ignore irrelevant sounds as well as adults. Klatte, Bergstrom and Lachman (2013). Therefore, in a learning environment, it is crucial to eradicate noise of any kind to the maximum extent to maximise attention of the learner.

Technology: The integration of technology with regards to modern learning and teaching methods with traditional ones, such as old fashion books, pen and paper should be incorporated into the learning environment, as technology is a prominent part of modern life.

Vehicles: Parking areas and access roads should be completely separate from spaces used by learners. Besides the dangers for children associated with vehicles, roads and parking areas are not conducive to achieving positive emotional responses. Vehicle areas should also however be treated accordingly regarding aesthetics and function.

Access: Places with restricted access to learners should be minimised and where it is necessary, the use of transparent barriers should be used in order to maintain the integration of the learner with the school to promote a sense of belonging. Examples of this are; The staff room, admin offices and adult meeting areas.

Vertical circulation: Adequate means of vertical travel should be provided for children as some of the aspects, such as sports stands require more effort from a child to climb than an adult and therefore stairs suitable for children should be incorporated. Ramps with gradients that conform to building regulations are also be incorporated into the design where necessary. Lifts are to be provided where stairs or ramps are not a possibility.

Safety: Every aspect of the learners' environment should have safety in mind when designing. For example, areas that are conducive to slipping, such as the around the swimming pool, the surface should be that of a *non-slip* kind without causing discomfort to the underside of learner's bare feet.

Activities: A variety of activities should be provided for, such as music, dance, drams, various sports, etc… all spaces should be addressed to promote these activities by considering all aspects mentioned in this section and research document as a whole.

2.5 SCHEDULE OF ACCOMODATION

The following schedule of accommodation is a reflection of the immovable spaces within the building. As most of the building is open plan, areas may be used as fit for various function by means of movable partitions as required for multiple uses. An example of this is; if a completely isolated area is required, interlocking modular screens may be arranged to form an enclosure.

2.5.1 ADMINISTRATION

2.5.1.1 RECEPTION AREA

Function:	Main entrance / controlled access for Adults and learners
Quantity:	1
No. of occupants:	1 – 2 receptionists
Area: (m²)	approx. 130m²
Requirements:	- Open plan - Easily accessible with display areas - Waiting area with seating and tables - Close proximity to offices and meeting areas

2.5.1.2 OFFICES

Function:	Principal's office, ancillary offices for administrative use as required.
Quantity:	5
No. of occupants:	1 – 3 Staff per office
Area: (m²)	approx. 45m² per office
Requirements:	- Open plan desk/workstations with seating and partitions as required - Visually permeable with the option of curtain blinds as required

2.5.1.3 MEETING AREAS

Function:	Regular meetings may be held
Quantity:	2 (enclosed and open plan)
No. of occupants:	1 – 8 people
Area: (m²)	approx. 50m² per meeting room / area
Requirements:	- AV interface with screen - Curtain blinds as required (enclosed room only)

2.5.1.4 STAFF ROOM

Function:	Canteen area for staff
Quantity:	1
No. of occupants:	1 – 25 adults
Area: (m²)	approx. 140m²
Requirements:	- Fitted Kitchen with fridge, stove, oven, Microwave And cupboard storage.

2.5.1.5 ADULT ABLUTIONS

Function:	Male,female & paraplegic ablution facility
Quantity:	1 male, 1 female, 2 paraplegic
No. of occupants:	8 male, 5 female, 2 paraplegic
Area: (m²)	approx. 26m² male, 26m² female, 4m² paraplegic
Requirements:	- Male ablutions to have 5x WC's, 3x urinals, 3x WHB's with hand dryers - Female ablutions to have 5x WC's, 3x WHB's with hand dryers - ducted piping with mechanical ventilation as required - to conform to building regulations

2.5.1.6 SICK BAY

Function:	to facilitate sick learners as required
Quantity:	1
No. of occupants:	3 (1x nurse & 2x sick learners)
Area: (m²)	approx. 40m²
Requirements:	- 1x nurses office - 1x WC with WHB - 1x bed area with 2 beds

2.5.2 EDUCATION

2.5.2.1 GRADE 1 LEARNING SPACE

Function:	Main class learning space
Quantity:	5
No. of occupants:	40x learners, 1x teacher
Area: (m²)	approx. 204m²
Requirements:	- desks and chairs as per spec.
	- General storage
	- Teachers area
	- Ablutions for learners
	- Lockers for learners

2.5.2.2 GRADE 2 LEARNING SPACE

Function:	Main class learning space
Quantity:	5
No. of occupants:	40x learners, 1x teacher
Area: (m²)	approx. 204m²
Requirements:	- desks and chairs as per spec.
	- General storage
	- Teachers area
	- Ablutions for learners
	- Lockers for learners

2.5.2.3 GRADE 3 LEARNING SPACE

Function:	Main class learning space
Quantity:	5
No. of occupants:	40x learners, 1x teacher
Area: (m²)	approx. 204m²
Requirements:	- desks and chairs as per spec.
	- General storage
	- Teachers area
	- Ablutions for learners
	- Lockers for learners

2.5.2.4 GROUPWORK AREA

Function:	To facilitate small learner groups
Quantity:	10
No. of occupants:	8x learners
Area: (m²)	approx. 30m²
Requirements:	- seating and worktops as required

2.5.2.5 MEDIA CENTER

Function:	Library, reading computer literacy
Quantity:	1
No. of occupants:	up to 200 people total (incl. staff)
Area: (m²)	approx. 2600m²
Requirements:	- modular book shelves
	- modular movable partitions
	- reading areas
	- computer workstations
	- server area
	- book scanning area
	- book security at entrance/exits

2.5.2.5 OUTDOOR GROUPWORK / READING AREA

Function:	shaded seating for group teaching / reading
Quantity:	9
No. of occupants:	up to 20 people total (incl. staff)
Area: (m²)	approx. 80m²
Requirements:	- shading devices, seating as required

2.5.3 AFTERCARE

2.5.3.1 AFTERCARE CENTER

Function:	after school care / activities for learners
Quantity:	1
No. of occupants:	up to 200 people total (incl. staff)
Area: (m²)	approx. 400m²
Requirements:	- shading devices, seating as required - access controlled entrance to pick-up area

2.5.4 SPORTS AND RECREATION

2.5.4.1 GRADE 1 PLAYGROUND

Function:	Grade 1 learners break / play area
Quantity:	1
No. of occupants:	200x learners, 1 - 2x teachers
Area: (m²)	approx. 1 435m²
Requirements:	- open grassed area - jungle gym & other motor skill development apparatus - Sand pit

2.5.4.2 GRADE 2 & 3 PLAYGROUND

Function:	Grade 2 & 3 learners break / play area
Quantity:	1
No. of occupants:	400x learners, 1 - 2x teachers
Area: (m²)	approx. 1 600m²
Requirements:	- open grassed area - jungle gym & other motor skill development apparatus - Sand pit

2.5.4.3 HALL

Function:	Host school / community assemblies, Indoor sporting events and various other events
Quantity:	1
No. of occupants:	approximately 1200 occupants
Area: (m²)	approx. 2 000m²
Requirements:	- un-obstructed open space - space allocation for various stage assemblies - ablutions - entrance from school building - entrance from road - entrance lobby (multi-function) - storage space

2.5.4.4 SOCCER FIELD

Function:	Host various field and track events
Quantity:	1
No. of occupants:	up to 10 000 occupants depending on the event
Area: (m²)	approx. 108 000m² (designated full size soccer field only.
Requirements:	- un-obstructed, grassed open space with - soccer goals on either side - ablution and changing facilities

2.5.4.5 SPORTS PAVILION

Function:	Host spectators and community members as well as various indoor functions
Quantity:	1
No. of occupants:	up to 200 occupants depending on the nature of the event
Area: (m²)	approx. 760m²
Requirements:	- Unobstructed panoramic view of the field - ablution facilities for members of the publis - ablution and changing facilities for sporting event participants - kitchen area - bar style counter / server - admin office

NOTE: Parking requirements are as per zoning requirement application.

CHAPTER THREE: SITE ANALISYS

3.1 SITE ANALISYS

3.1.1 INTRODICTION

Due to the nature of the research and the findings, the site required for the proposed school needed to be relatively flat with a very green context, preferably residential so that the peak traffic times around the proposed school do not conflict with the activities around it and cause congestion. Being a school, the default location would be in an urban settlement and preferably free of restrictions to accommodate the nature of this project.

The selected site, is Remainder of 3193, Virginia, Durban North. It is currently owned by the municipality and is home to the local football club. The site also is home a model train track and its respective building which will remain unaffected by the development.

The site is also bordered by Danville park nature reserve which is ideal, as it is a required by the research for the building to be integrated with nature. The parts of the nature reserve that border the road network are fenced off and therefore no random access to the reserve and site is possible other than where it is designated with access control. This is essential from a security perspective.

Due to the site being municipality owned, there option for allocating an “education” zoning is possible with minimal effort.

3.1.2 LOCATION

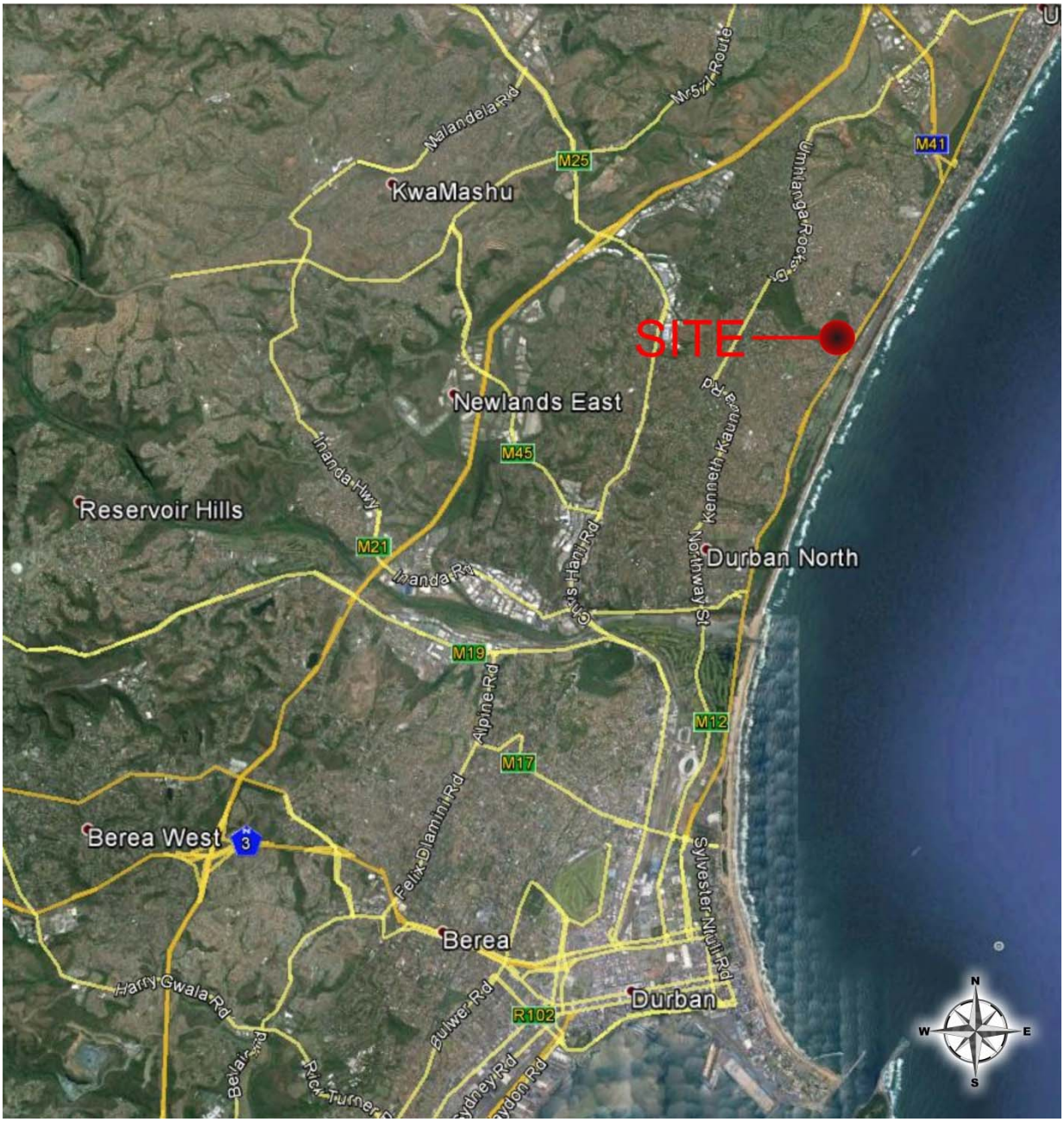


Fig. 3.1.2.1: Site location, macro scale, showing Durban Metropolitan area (source: Google Earth 2014)

The above figure shows the site location approximately 13km to the North of the Durban CBD

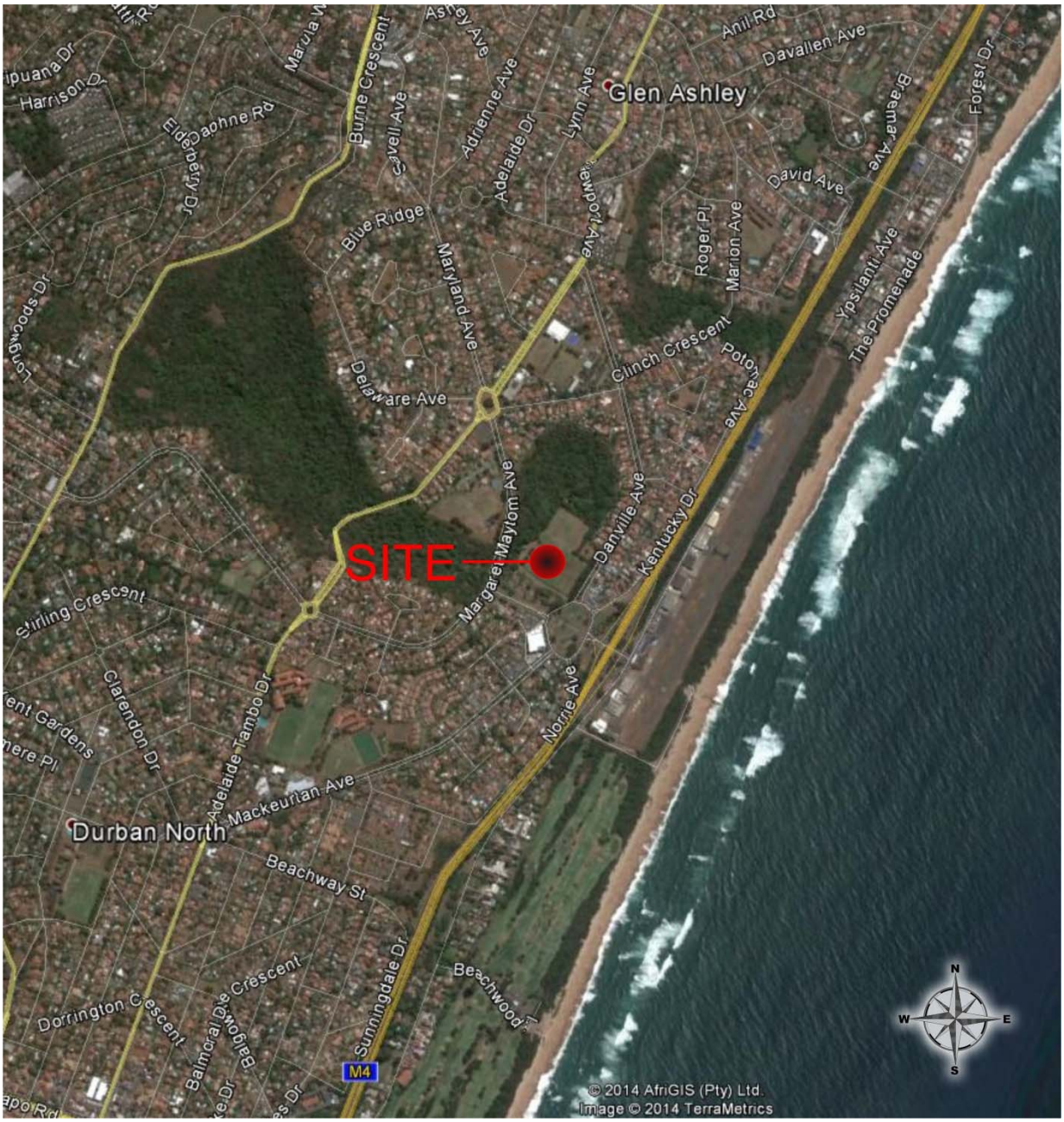


Fig. 3.1.2.2: Site location, macro scale, showing Durban North area (source: Google Earth 2014)

The above figure shows the site location within the Durban North area

3.1.3 FIGURE GROUND ANALYSIS

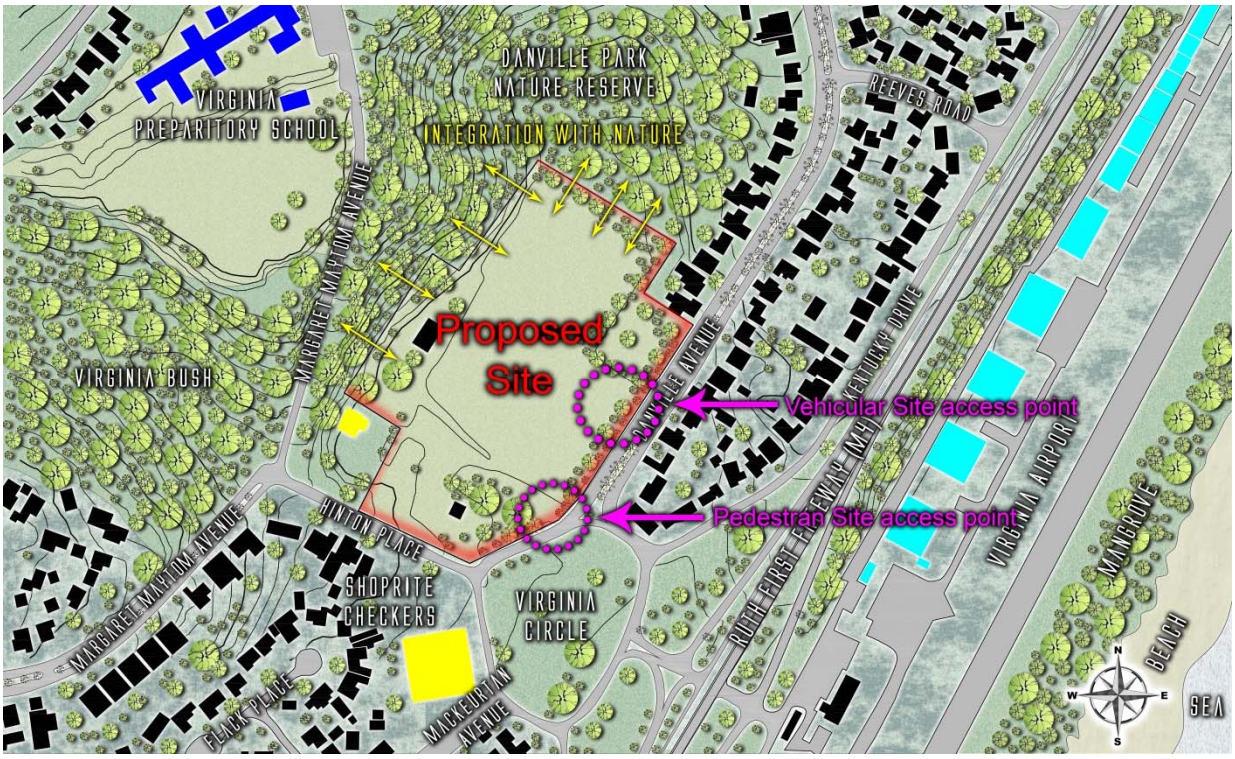


Fig. 3.1.2.3: Figure ground diagram
(source: Author 2014)

ZONING KEY

- COMMERCIAL
- EDUCATIONAL
- AERONAUTIC
- RESIDENTIAL

3.1.4 ZONING

The figure ground diagram above illustrates the zoning Being primarily residential with the green trees indicating the nature reserve / ecologically protected area.

3.2 ACCESSIBILITY

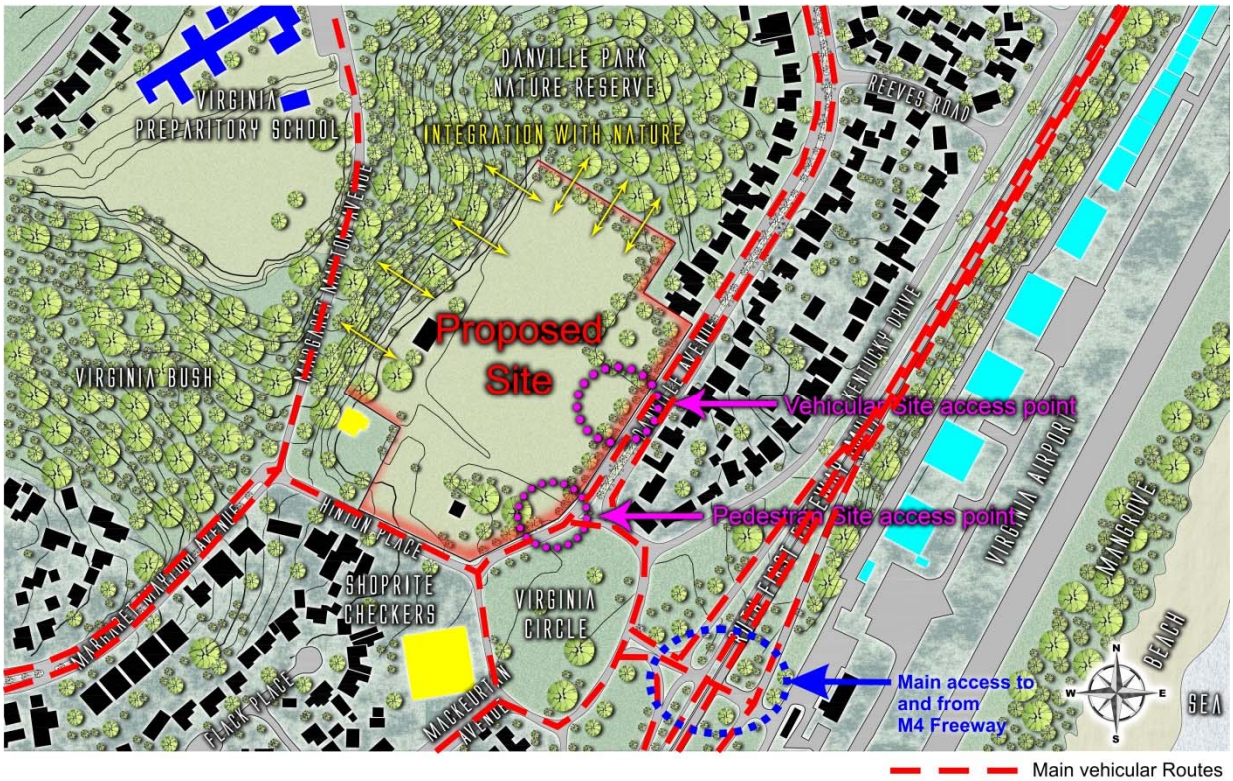


Fig. 3.2.1: Vehicular routes
(source: Author 2014)

Access to the site will be in two forms, one being vehicular and the other being pedestrian at two locations off the main roads. The figure above highlights the main access from the M4 / Ruth First Freeway as well as the main vehicular circulation routes for the immediate area.

With the site being located in a primarily residential area, there will be no problematic traffic congestion, as the proposed school operates out of peak traffic times

3.3 CONECTIVITY

As can be seen in figure 3.1.2.4, the site is situated in close proximity to the M4 / Ruth First Freeway which is the one of two main vehicular arteries that link Durban central

to areas along the coast to the North. This freeway is easily accessible from various points throughout the Durban metropolitan area, thus providing access to potential users of the building with easy access to the site.
The Main roads illustrated with red dotted lines are also fairly easily accessed by the surrounding residential area due to their relatively central location.

3.4 SITE RESTRICTIONS AND OPPORTINITIES

Due to the site being owned by the municipality and without a zoning allocation, this allows the opportunity to lodge a zoning application for “educational” to accommodate the proposed school. There are currently no restrictions in place for the site, as it is a remainder of a residential lot.

3.5 PROXIMITY

As can be seen in the Figure 3.1.2.3, the site is located within close proximity to residential developments as well as a Shoprite checkers, being commercial. This is Ideal, as the primary users of the building will be minors, with their daily commute being to school and back, unlike their parents who will more than likely be commuting to a commercial district, making the site location ideal for its use.

3.6 SUMMARY

To conclude this chapter, it has been established that the site and its location has met all the criteria required by the research document in order to achieve the desired outcome and performance of the building. There will be a harmony achieved between the building and its context.

The following photos show the site from various locations which will allow the reader to gain a better understanding of why the site was chosen.

Fig. 3.6.1: proposed school location (source: Author 2014)

Fig. 3.3.2: proposed field location (source: Author 2014)

Fig. 3.6.3: Pond in nature reserve (source: Author 2014)

Fig. 3.6.4: Road along site access points (source: Author 2014)

CHAPTER FOUR: DESIGN

4.1 DESIGN INTENTIONS

- To take an “outside in” approach to designing a school with the starting point being the macro context

- To formulate a building design typology containing aspects that promote concentration, academic performance and well-being in learners through architectural design principles derived from the research.

- To create an environment that is informal, yet formal yet structured so that the learners may feel relaxed and as comfortable as possible.

- To design a space that is open to promote integration by blurring boundaries without compromising the integrity of the traditional “classroom”.

- To promote collaboration amongst the building’s users

- To design a site that is secure without the use of fences

- To create a space that safe for both pedestrians and motorists.

- To design a space, of which it’s various functions interact with the local community through both along the street edge as well as on the site itself.

4.2 DESIGN CONCEPTS

4.2.1 SENSORY PERCEPTION AS A LEARNING TOOL

The physical and mental well-being of a child is his or her learning environment is a concept that is often overlooked by designer of learning spaces, the traditional classroom with four walls is a functional space that is used to carry out a variety of tasks in a school curriculum, however, this can be improved upon.

The concept of sensory perception refers to information received by the senses of their surrounding environment which form an overall “feel” of the environment. The combination of information received through the senses have far reaching consequences of one’s well-being. For instance, using the “warm” colours from the spectrum may convey a “warmer” feel about a space, but is does not stop there. The colour “red” does not only feel “warm”, it is also energizing, and may even promote aggression. Furthermore, the colour “red” reduces the ability for the brain to absorb new information as well as recalling long term stored information, and therefor should be avoided at all costs.

By integrating the principles outlined in the detailed brief in this document will result in a building that addresses all aspects of sensory perception to promote a positive architectural environment with minimal, or no negative effects.

(image source: platosacademic.wordpress.com 2014)

4.2.2 INTEGRATION AND ASSIMILATION

The integration by definition, is the incorporation of multiple individual entities to form a whole. These entities, may be tangible, such as solid units, or intangible, such as activities.

In the case of the proposed school, the research highlights the importance of integration of learners within their learning environment, as this is crucial in promoting social learning.

The key entities of integration are as follows;

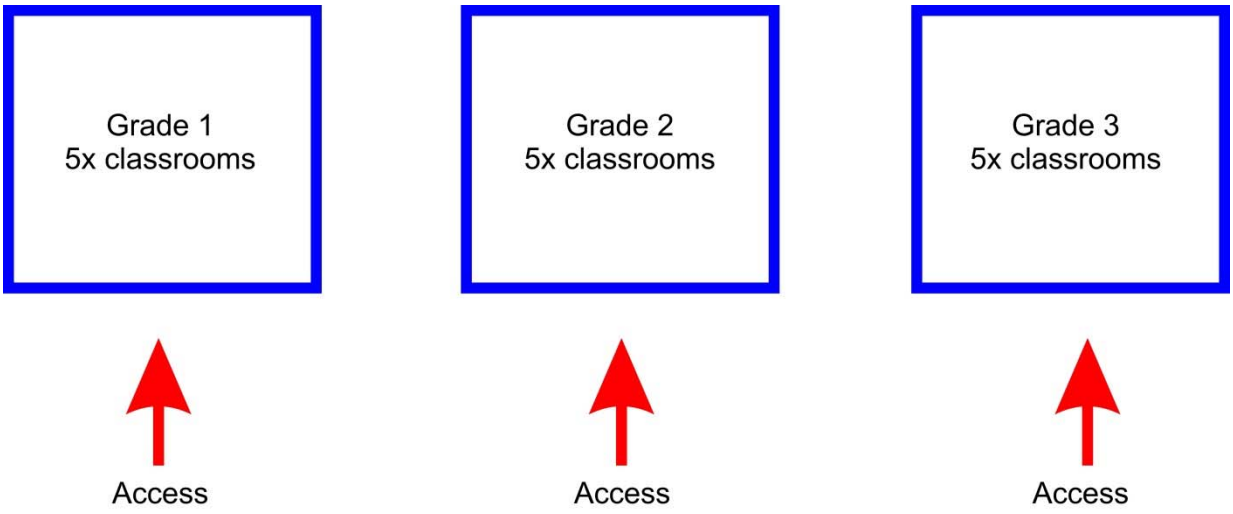
- Integration of the learners throughout the building
- Integration of the spaces within the building
- Integration of the building with nature
- Integration of the building with the surrounding context

The secondary intention of integration is that the proposed building achieves balance and harmony with the spaces around which it will occupy. The nature of anything that is placed somewhere is that ultimately takes away from that space in one way and therefore should give back in another.

Integrating Classrooms;

The integration and assimilation of classrooms begins with looking at traditional school layouts and their classroom arrangements according to their grades.

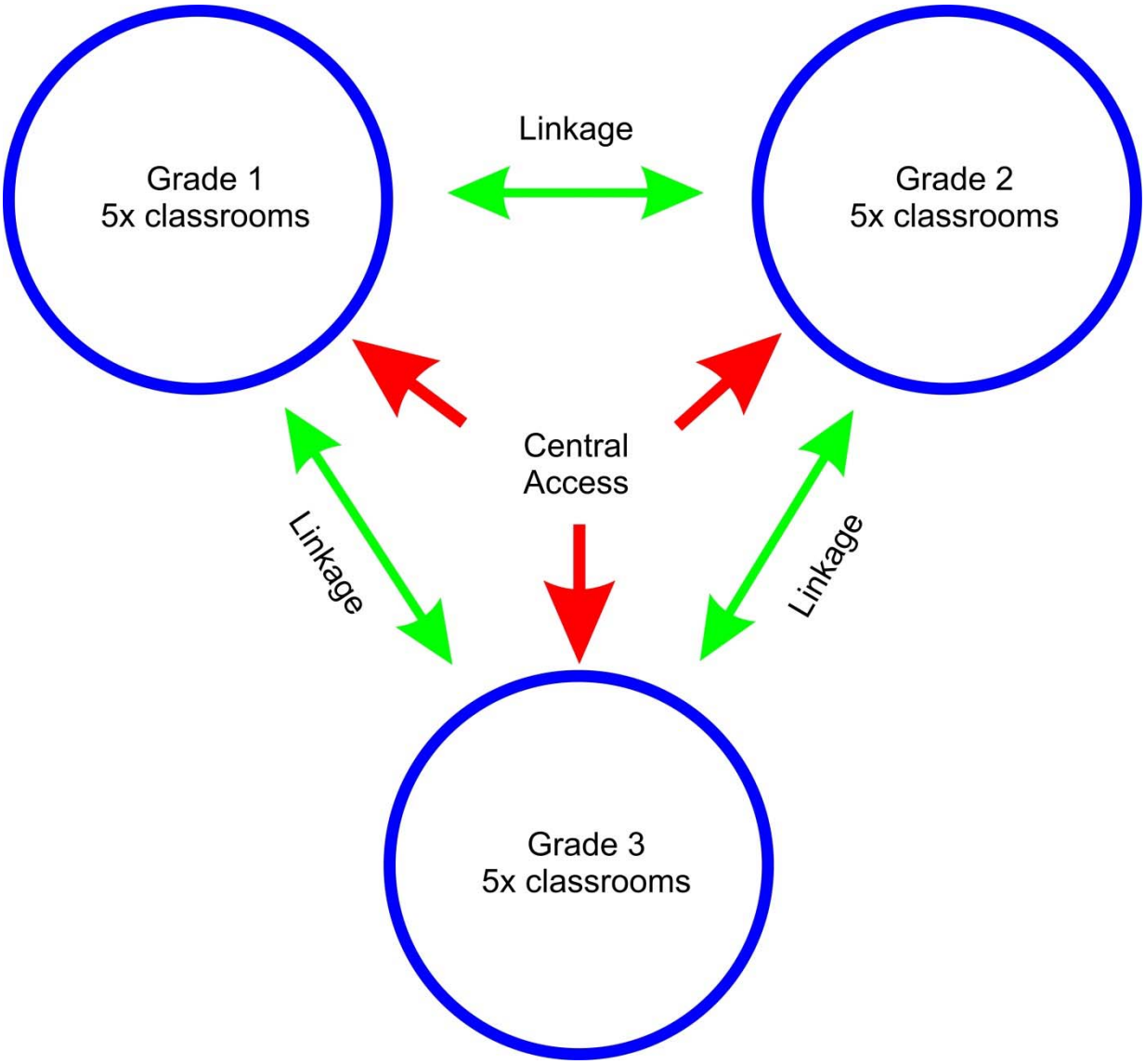
Traditional Linear classroom cluster layout:



The above diagram is an example of a traditional layout, with each classroom cluster in linear arrangement according to grade accessed from a single side off a linear corridor.

These classroom clusters are isolated from each other with no concept of integration or linkage between them as they are traditionally separated by means of masonry walls with a single access point.

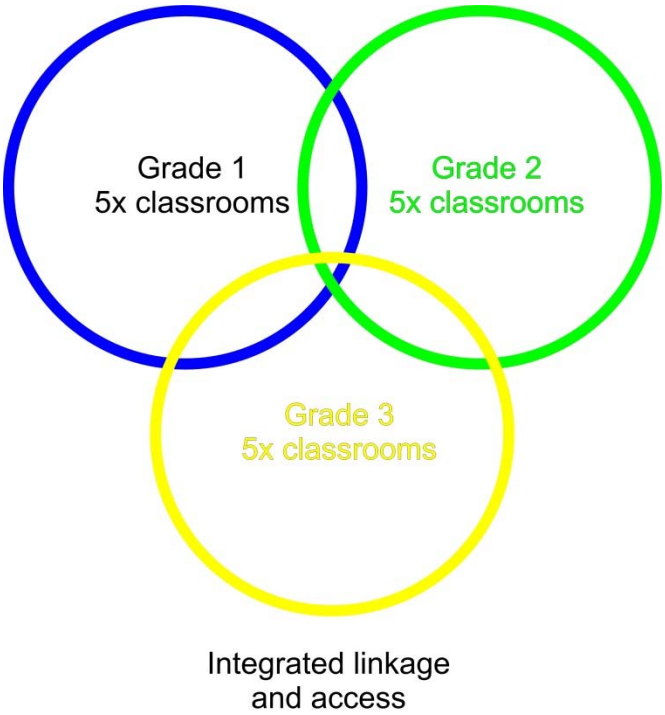
Circular classroom cluster layout



The above diagram explores the concept of a circular arrangement of classrooms according to their grade. This arrangement is now able to provide a central access point to all clusters with the possibility of linkages between them.

The classroom clusters in this arrangement still remain isolated from each other, albeit an improvement from the traditional linear layout.

Integrated classroom cluster layout



The above diagram explored the concept of integration, a key concept to the research and proposed building.

Here, one can see that by integrating the classroom cluster, there is no need for access points in a particular position as it may be accessed from multiple points and there is no need for linkages as they are now integrated or assimilated into a collective or as a whole.

This is a key concept.

INTEGRATION

4.2.3 FLEXIBILITY

Flexibility within the learning environment is vital to achieving a space that is ideal for a particular function. The proposed school is designed with open spaced that may be partitioned off with freestanding interlocking modular partitions that may be arranged as required.

Despite the open plan nature of the building, the integration of recessed areas work area still allows a degree of separation from the main spaces without the need for physical barriers. If the need for complete isolation is required, these areas may be closed off with partitions.

Flexibility does not end with at the learning spaces within the school building, but rather with the various functions and activities throughout the entire site.

As previously mentioned, the proposed development comprises; private, public, semi-public and integrated uses

The flexibility of these uses are as follows:

The Private space is exclusively used for by learners for completing their educational curriculum

The public space is for use by the public. These spaces are multi-purpose commercial spaces.

The semi-public spaces have controlled access and may be used on a private or public capacity. These uses may vary with times of day or specific functions allocated at a particular point in time.

The integrated spaces are for use by the local community and by the school for formalised activities and may be separated from either the public or private domains by means of partitioning.

CHAPTER FIVE: PLANNING

5.1 THE LEARNING SPACES

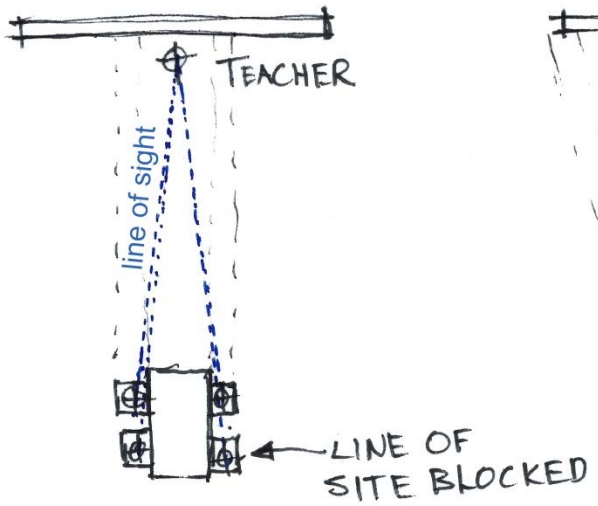
5.1.1 THE “CLASSROOM”

Within almost all elementary learning spaces, there is an arrangement of desk, that seat learners in group manner. There is a board for teaching and a teacher.

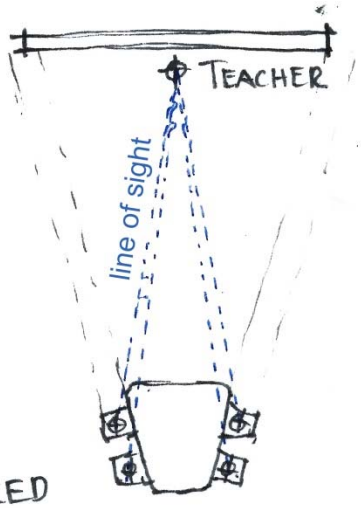
Here, the design of the learning space begins with the individual learner. As can be seen in the diagram below, the traditional rectangular desk and chair setup does not create and equal visual opportunity for the learners seated farthest from the teacher.

Instead, a custom trapezoidal desk is proposed in order to widen the viewing angle for the learners in the group creating an equal viewing opportunity for all. The only setback for any seating arrangement is distance from the teacher as only one entity can occupy the same space.

Tradition learning group

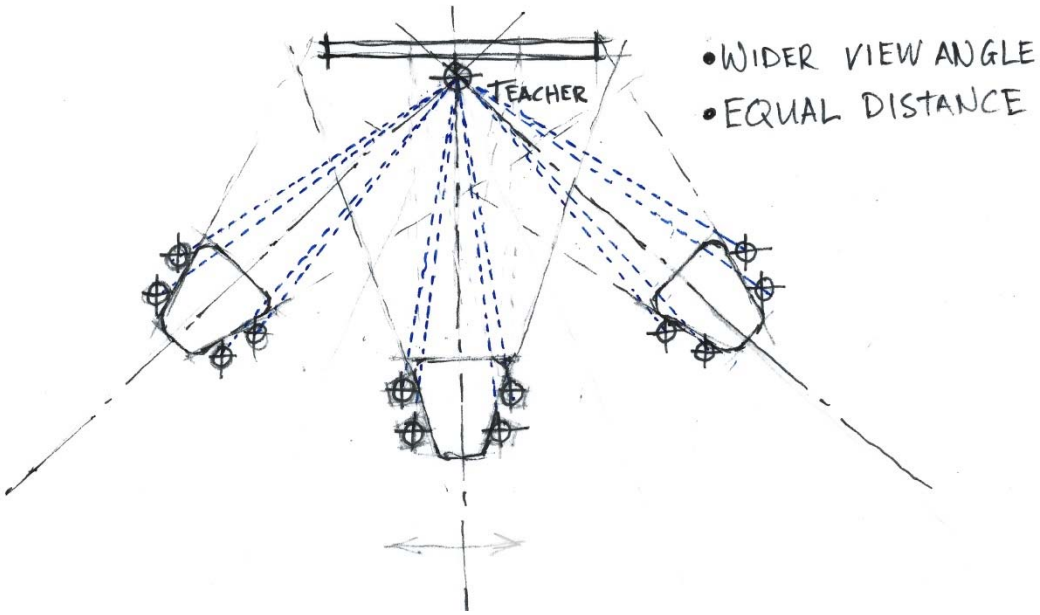


Proposed learning group



With the above in mind, the following diagram shows a radial arrangement for multiple desks of which the same viewing angle may be achieved. More desks may be added to this arrangement as required, provided they are offset along the radials to prevent obscured viewing by the learners.

This is the principle has been created and adopted in the design of the proposed school.



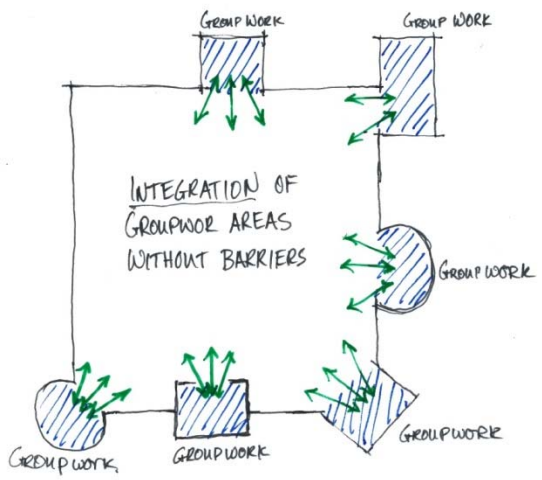
Furthermore, each grade (grades 1, 2 and 3) have a sense of hierarchy that is achieved through different ceiling heights at 1m increments, with Grade 1's being the lowest at 3m floor to ceiling and the grade 3's at 5m floor to ceiling.

This is because they are the newcomers to the school and will have a better sense of emotional and physical security as they are now on their own in the first year of their schooling career. This more "enclosed" space will help ease the transition from being looked after in pre-primary school to becoming independent individuals.

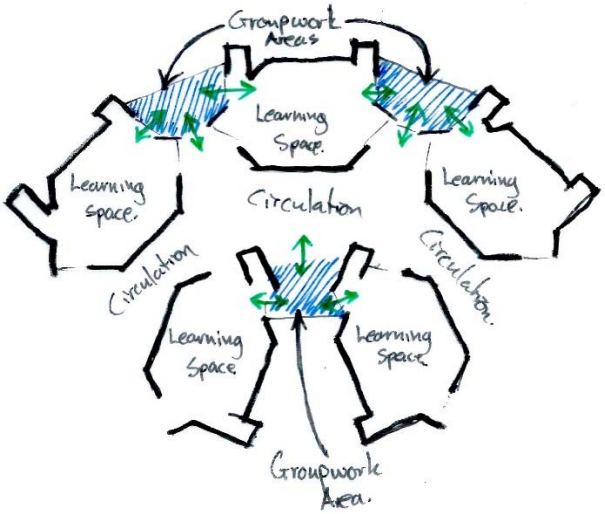
5.1.2 GROUP WORK AREAS

Group work areas are spaces in which small groups of learners may gather to complete various tasks as required. In a traditional sense, these areas may be in a separate room, isolated from the main classroom, or simply have a small area of the classroom allocated to these group activities.

In the proposed building, the integration of these areas with the rest of the spaces is essential. The goal of these spaces is for them to have a degree of separation without complete isolation. This is achieved with the spaces being recessed areas from the main spaces.



The above diagram illustrates the various ways that the recessed group work areas may be integrated into the main space without physical barriers separating the spaces.



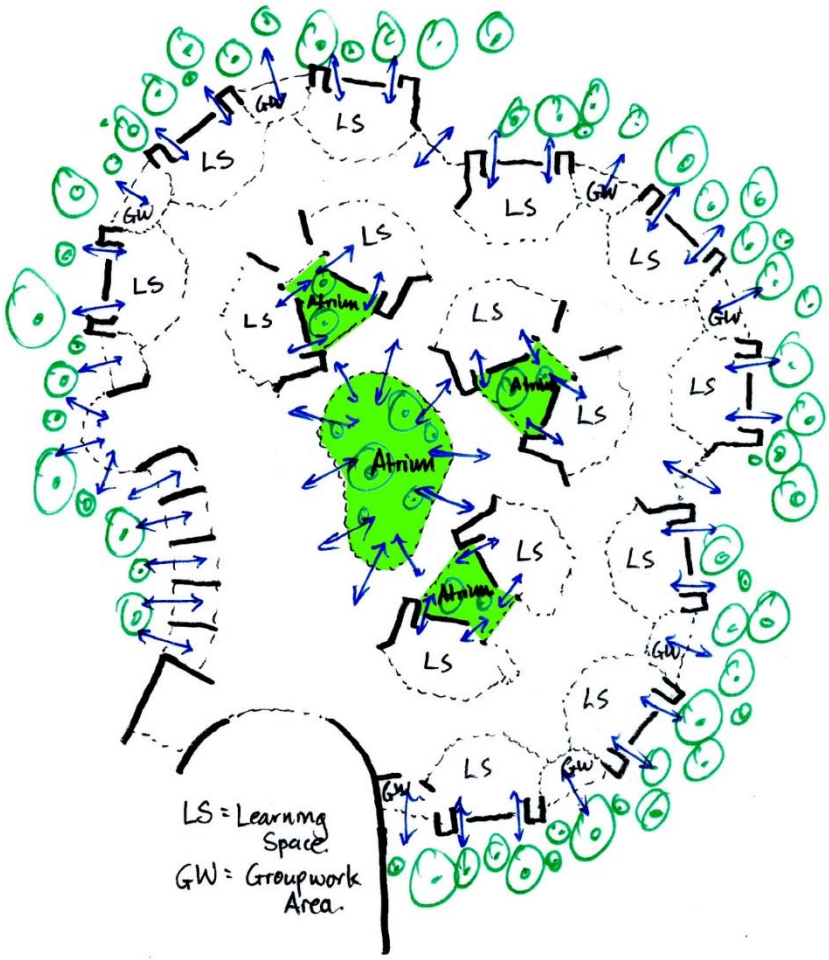
The above diagram shows the concept in practice in the initial layout of the various spaces in which these group work areas will be located in relation to the learning spaces.

5.1.3 ATRIA

Another key concept highlighted by the detailed brief, is the need for the spaces to be integrated with nature, hence the location of the site.

Nature is essential in promoting wellbeing at a psychological level in learners.

The other concept is for the building to “give back” to the area on which it is located. This concept is therefore incorporated by bringing as much of the surrounding existing plant life to be brought into and around the school to achieve a park-like feel.



The diagram above indicates the location of the atria within the building. These atria are positioned in a way that allows all the learning spaces to have a view of nature, both on the perimeter of the building and within the building.

5.1.4 OUTDOOR AREAS

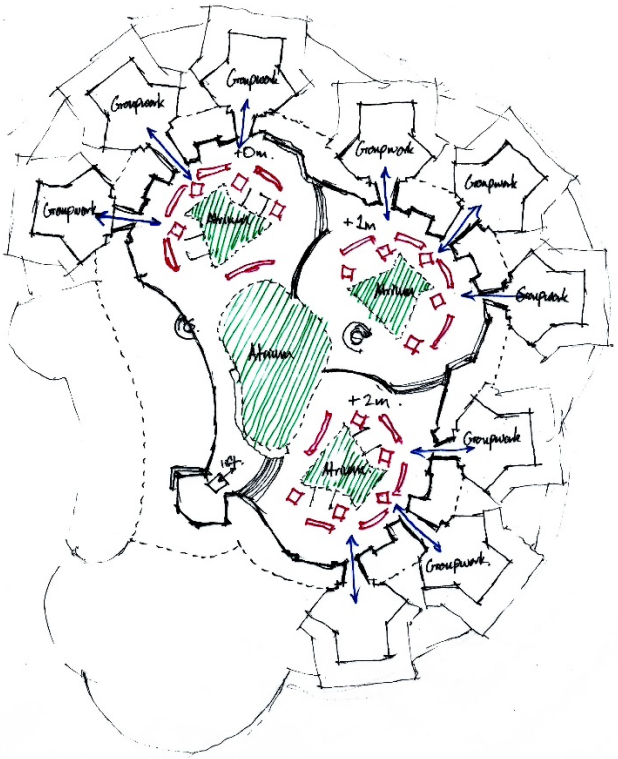
Outdoor areas pertaining to group work or completing task required by the curriculum have been provided on the first floor. These areas are located on the roof of the learning spaces on the upper ground floor and can be accessed from the multi-media area. The reason for the location of these spaces is so that the learners may be contained in a particular area. Adequate shading is to be provided for these areas.

5.1.5 MULTI-MEDIA FLOOR

In the proposed building, the multi-media floor is a 3 tiered open plans space. The reason for the open plan nature is so that the space may be flexible in use and may be partitioned as required. The different levels are achieved from the hierarchy of ceiling heights of the learning spaces below which allows a degree of separation without the use of physical barriers.

The Multi-media level is accessed from the floor below by means of 3 staircases and a lift. The different tiers on this level are access by stairs and a ramp in the case of a paraplegic.

Outdoor reading / group work areas can be accessed from this level.



The above diagram illustrates the basic planning principles of the multi-media floor with outdoor areas.

5.2 ADMINISTRATION

The administration area forms a part of the building perimeter and borders the outdoor plat area. All administration / staff areas have a view of the play area as well as aftercare space. The location of these spaces is in aid of additional supervision as well as close proximity to the main entrances.

Other administrative functions such as the sick bay and adult ablutions are all in close proximity to one another.

5.3 COMMUNITY INTEGRATED USES

5.3.1 SPORTS FIELD

The sports field is for use by both the school and community, this includes the local sports club that is currently located on the site. Access to the sports field through 2 entrances is restricted to certain entrances at certain times and days, depending on the event taking place.

5.3.2 HALL

The hall is primarily for use by the school, it has an entrance the feeds directly from the main school building's interior, which may be partitioned off.

The hall's secondary function is for that of community events, of which the entrance is from the street edge. At this time, the entrance from the school building will be closed in order to separate the hall from the school.

5.3.3 COMMERCIAL SPACES

In order to integrate the site and promote social development throughout the community, a series of multi-use spaces have been provided along the street edge that. These spaces and their possible functions do not interfere with the activities taking place within the site.

Possible uses for these spaces may range from retail, to restaurants.

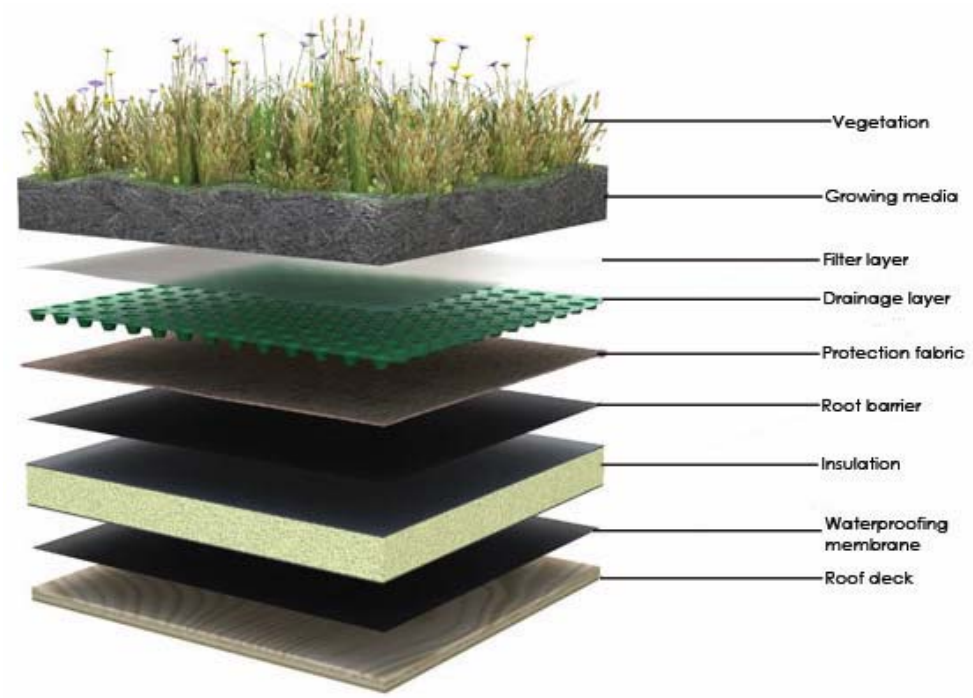
CHAPTER SIX: ENVIRONMENTAL PERFORMANCE

6.1 THE BUILDING FORM

The proposed building form, as depicted earlier, has been developed from the inside out. Green roof spaces have been implemented to the majority of the roof space in order to restore the green state of the horizontal plane on which the building will be constructed.

The implementation of green roofs will also promote a natural cooling affect within the building as well as reduce the “heat island affect”

The following image is a breakdown on how to achieve a green roof with shallow growing medium.



(http://dcgreenworks.org)

Greywater management is important complement to stormwater management, especially in a building of this size.

Greywater is defined as the water, excluding sewage or black water, produced by domestic activities. One of its most important uses is irrigation. So having an infrastructure to capture water after it is used in a facility allows further conversation of potable water.

The water collected on these roofs will be filtered and stored in underground tanks and pumped as required to various point in and around the building.

6.2 CIRCULATION AND ACCESS

Access to the building is through is controlled by means of a circulation buffer or external lobby area and internally by a reception area.

The circulation within the building is intended to be in a clockwise direction. As mentioned before with the learning space hierarchy, movement throughout the building is representative of a child's development and progression through his or her life.

The circulation is also rather unrestricted within the building due to its open plan nature.

6.3 SHADING AND ILLUMINATION

Large overhangs and performance glazing are the primary mechanisms incorporated into the proposed building from a shading perspective. Performance glazing eliminates glare as well as irradiates infrared radiation and ultraviolet light from penetrating the building.

The added benefit of performance glazing is that on the multi-media floor, the books will not be at risk of damage by ultraviolet light.

Illumination is achieved primarily natural sunlight that is either direct or diffused by means of reflection off surfaces. High level windows offer additional natural illumination throughout the buildings.

In the case of artificial lighting, low voltage LED lighting will be incorporated as required. The use of Minimum 10000k T5 tubes will also be incorporated into the learning spaces. As mentioned in the research, this aids cognitive function and performance by learners in completing the tasks required.

6.4 VENTILATION

Ventilation throughout the building will be primarily natural ventilation through the use of openable windows positioned so that they will not cause discomfort among the learners. Elements such as wind are controlled without compromising the natural flow of air through a space.

In tha case of the hot Durban, An HVAC system is required and therefore, a semi-recirculating system will be used where there is a constant flow of fresh air. Air diffusers will also be positioned so that they do not blow directly on learners as this may cause discomfort.

Ducting for the HVAC system will be exposed and painted in accordance with air flow for the reasons of creating an interesting and educational visual spectacle for learners within the building. Ablutions with no windows are to be mechanically ventilated.

CHAPTER SEVEN: TECHNICAL RESOLUTION

7.1 MATERIALS

The primary structure of the building consists of reinforced concrete columns and reinforced concrete floor slabs. The concrete used here will be that which consists of 55% flyash and recycled building rubble as aggregate with rebar that is made up of at least 40% recycled steel. This is in order to reduce the carbon footprint of the building.

The infill panels / masonry walls throughout the building are constructed of compressed stabilised earth block that will be manufactured on site. These blocks are to be manufactured with the flyash based cement mentioned above.

7.2 STRUCTURE

The structural elements that primarily comprise the proposed school are circular reinforced concrete columns of varying diameter and length, reinforced concrete floors slabs and stairs.

There are 2 different inclinations of the columns relating to the horizontal plane. 75 ° and 90°. These are as per construction details.

The reinforced concrete floor slabs are all horizontal with no inclination, except for the paraplegic ramps which are to be at a 1:12 gradient as per the national building regulations.

7.3 ACOUSTIC CONTROL

As outlined in the research and the detailed brief, acoustic control is an extremely important aspect of design to be considered in an open plan space with activities and users of the space being sensitive to noise.

Acoustic treatment with high absorption coefficients are to be used in panels, any solid partitioning panels as well as any walls of which the angle of sound reflection will directly interfere with adjacent spaces that require a degree of sound separation.

These acoustic treatments are not only to prevent sound from travelling between learning spaces, but also to reduce the reverberation throughout the building to an acceptable level which is outlined in the research.

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APPENDICIES

The following appendices are extracts from documents provided by the CSIR and Department of Education in South Africa containing the relevant information pertaining to this research and proposed school.

APPENDIX A: SPACE PLANNING NORMS AND STANDARDS FOR PUBLIC SCHOOLS – KwaZulu-Natal Department of Education

KwaZulu-Natal Department of Education

SPACE PLANNING NORMS AND STANDARDS FOR PUBLIC SCHOOLS

Version 7
August 2011

TABLE OF CONTENTS

Abbreviations

ABET	Adult Based Education and Training
ECD	Early Childhood Development
FET	Further Education and Training
FTE	Full Time Equivalent
GET	General Education and Training
HE	Higher Education
IE	Inclusive Education
OBE	Outcome Based Education
R	Reception Year
NCS	National Curriculum Statement

Glossary

Circulation space refers to corridors and covered walkways used to move between spaces in a school.

Foundation Phase refers to Grades R (Reception year) to Grade 3

A **Full Time Equivalent (FTE)** represents a measure of the occupation of the building. One FTE represents 1 learner occupying space for on full school day. A part-time learner only occupies space for half a school day, and would therefore be represented as a 0,5 FTE.

The **Further Education and Training (FET)** band encompasses the FET schools phase (Grades 10 to 12) and FET colleges (vocational) phase.

Garden plots are portions of agricultural land within the school site, which may be used by the school or local community to cultivate produce. This produce may be used by the school as part of a feeding scheme.

The **General Education and Training (GET)** band encompasses the foundation (Grades R to 3), the intermediate (Grades 4 to 6) and the senior (Grades 7 to 9) phases.

The **hall** refers to an area covered by a roof, with walls and the size of approximately four classrooms or more, used for assemblies, examinations or any other event where learners or community members gather.

An **informal social area** refers to the space used by older learners to socialise and younger learners to play and interact during break times.

The **Intermediate Phase** refers to Grades 4 to 6.

A **laboratory** refers to the space designed and equipped to teach specialist science and technology learning programmes.

The **Media Centre** is an organized collection of diverse materials, *viz.*, print media, such as books, journals, and newspapers; visual media, such as pictures and models; audiovisual media such as, video, television and films and electronic media such as, CD-ROMs and Internet that is well-patronised by both teachers and learners for effective teaching and learning. Often also referred to as resource centres of libraries.

A **Classroom** refers to the learner space available for general teaching.

An **Outcome Based Education (OBE)** is an approach to teaching and learning. It has an emphasis on participatory, learner-centred and activity-based education. The approach allows considerable room for creativity and innovation on the part of teachers in interpreting what and how to teach.

An **outdoor teaching area** refers to a covered outdoor space used to facilitate practical learning for the lower grades. This space can be regarded as a specialist teaching area for younger learners – i.e. Grades R to 6.

Parking area refers to the area designated for parking by the staff and visitors.

Play areas are informal social areas used by younger learners. They should cater for different age groups and interests, provide stimulating/educational equipment (i.e. climbing frame, sandpit, hopscotch markings, etc.) for younger learners, especially in the foundation and intermediate phases.

A **primary school** is a school that accommodates Grades R to 7.

The **school site** refers to the area used by the school.

A **secondary school** is a school that accommodates Grades 8 to 9 (GET schools) and Grades 10 to 12 (FET General – schools).

The **Senior Phase** refers to Grades 7 to 9.

Space categories refer to the types of spaces within a school's facilities. These include:

- The **general teaching area**, which refers to spaces used for general teaching and learning, such as classrooms, excluding storage.
- The **specialist teaching area**, which refers to spaces used for specialist teaching and learning such as laboratories and workshops (for Grades 4 to 12) and covered outdoor learning areas for dirty/messy activities(for Grades R to 6).
- The **independent learning area**, which refers to spaces where learners can work independently on set projects or self-directed study. Spaces include halls, computer centres, learning resource centres, outdoor covered demonstration areas, teaching areas (for Grades 7 to 12) and libraries.
- **Non-teaching areas** include spaces used exclusively by the staff (i.e. admin/office space, staff rooms), general storage areas (i.e. teaching/learning, storage areas, and other allocated storage areas), a strong room, a sick bay, and a hall kitchen for a feeding scheme (for Grades R to 7)
- The **balance**, which refers to space used for toilets, non-allocated storage (i.e. building maintenance and cleaning storage), internal circulation (including waiting areas), covered external circulation and hall storage.

Sports areas refer to space used for sporting activities, such as netball courts and soccer fields. Sporting facilities can be situated inside or outside the school site. If located outside the school site, these facilities can be shared with the community.

Staff accommodation refers to space provided for staff – for administration, lesson preparation, meeting and leisure.

Storage refers to the space provided for the safe storage of equipment, materials for projects, teaching/learning materials and work in progress.

A **workshop** is a classroom designed and equipped for practical learning programmes, such as electrical/mechanical technology.

1 Introduction

This document provides norms and standards for public schools in KwaZulu-Natal. These guidelines have been developed for physical planners, designers and managers to assist in ensuring that minimum standards are achieved. The document aims to support effective and efficient accommodation for high-quality education. It should be reviewed to ensure alignment within the new curriculum, technology and policy.

This document focuses on the spatial requirements of public schools and does not investigate environmental issues or detailed design aspects of the school infrastructure.

The norms and standards in this document address the majority of public schools in KwaZulu-Natal, however there is a range of schools, such as special schools, special schools as resource centres, full-service schools or teacher centres, which have not been addressed to the same extent in this document.

The norms and standards outlined in this document are limited to Grades R to 12 and do not cover Early Childhood Development, pre-Grade R years, Further Education and Training (vocational) colleges, Higher Education or Adult Basic Education and Training.

These norms and standards should be used in conjunction with the guideline and / or standard drawings developed for the Departments of Education.

1.1 Structure of the Document

This document is structured as follows:

- The **Background** section provides a summary of the key factors that have influenced the development of the Space Planning Norms and Standards for Public Schools.

- The **Key Design Principles** section lists a number of design principles, which should be used to guide space planning and management.

- The **Norms and Standards** section sets out norms and standards for primary and secondary schools, including recommended area per full-time equivalent (m^2/FTE) and proportions (%) of different space categories that should be achieved in schools.

2 Background

Education in South Africa is changing. Since 1994 the Department of Education has introduced a new Outcome Based Education (OBE) curriculum, developed policy that supports devolved management through the Schools Act and embarked on large-scale capital-works programmes to address accommodation and service backlogs.

Policy such as the White Paper 6 on Inclusive Education aim to ensure schools accommodate diversity, promote equitable access and become more responsive to their local communities.

Increasingly, technology is seen as a key component of education. Information and communications technology programmes are being implemented to enable schools to use computers, the Internet and E-mail in new and exciting ways in order to support up-to-date teaching and learning.

There are, however, still large backlogs. Some schools still lack basic services such as water or adequate sanitation. Many classrooms are overcrowded. Maintenance in a large number of schools has not been carried out regularly, leading to poor-quality and, in some cases, dangerous accommodation.

Internationally, school infrastructure strategies often focus on effective local management of facilities and flexible and adaptable buildings. These effectively help accommodate fluctuating learner numbers, changes in curricula, and teaching and learning methodologies.

2.1 Structure of South African Schools

The diagram below indicates the structure of South African schools. There are two bands within the schooling systems, namely:

General Education and Training band
- Foundation phase (Grades R – 3)
- Intermediate phase (Grades 4 – 6)
- Senior phase (Grades 7 – 9)

Further Education and Training band
- FET phase (Grades 10 – 12)

For the purpose of this document, these phases have been separated into two commonly used groups – the primary schools (i.e. Grades R – 7) and secondary schools (i.e. Grade 8 to 12).

Age (yrs)	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Grade	**R**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Phase	**Foundation**												
					Intermediate								
								Senior					
											FET		

Band	**GET Band**	**FET**

School	**PRIMARY**	**SECONDARY**

Structure of South African Schools

2.2 National Curriculum Statement

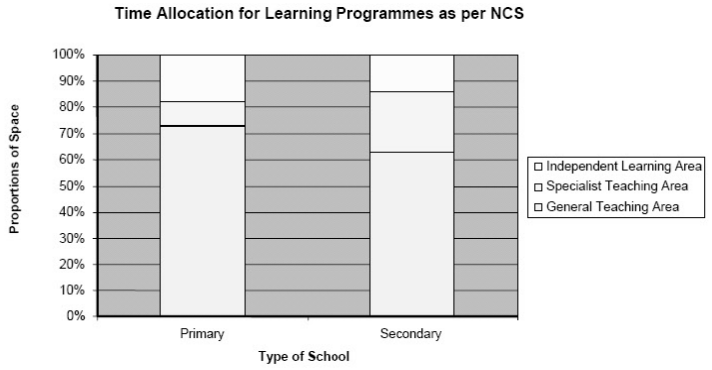
The National Curriculum Statement (NCS) provides time allocations for eight learning areas for Grades R to 9, and various subjects for Grades 10 to 12, as shown below.

NCS SUBJECTS	LEARNING AREAS
Agricultural Management Practices	Agriculture & Nature Conservation
Agricultural Science	
Agricultural Technology	
Accounting	Business, Commerce & Management
Business Studies	
Economics	
First Additional Language	Communication Studies & Language
Home Language	
Second Additional Language	
Dance Studies	Culture & Arts
Dramatic Arts	
Music	
Visual Arts	
Geography	Human & Social Studies
History	
Life Orientation	
Religious Studies	
Civil Technology	Manufacturing , Engineering & Technology
Electrical Technology	
Engineering Graphics and Design	
Mechanical Technology	
Computer Applications Technology	Physical, Mathematical, Computer & Life Sciences
Information Technology	
Life Sciences	
Mathematical Literacy	
Mathematics	
Physical Sciences	
Consumer Studies	Services
Hospitality Studies	
Tourism	

Subjects and Learning Areas as per New Curriculum Statement

The time allocations for these learning programmes have been split into the teaching/learning space categories for the area analysis (see description in Glossary), namely general teaching, specialist teaching and learning.

Graph 1 represents the proportions of time for primary schools and secondary schools as defined in the Glossary.



Graph 1: *Proportions of time for the teaching/learning space categories*

3 Key Design Principles

The following principles should be followed in the planning, procurement and management of school buildings:

- **Design and management of teaching/learning spaces:** when designing and managing teaching and learning spaces, one should ensure that these spaces are aligned to the proportions of time allocations for learning programmes indicated in the NCSs of both Grades R to 9 and 10 to 12.

- **Environmental quality:** Learning and teaching spaces should have excellent environmental conditions. In particular, care should be taken to achieve good natural day lighting, comfortable thermal conditions and adequate ventilation through the careful design and proactive building requirements and the use of passive environmental control strategies. In addition, the outside or other classrooms can be utilised to enhance the learning environment.

- **Fit:** Effective school management procedures, including timetabling, are required to ensure that space is used efficiently and effectively. This should focus on ensuring that the "fit" between requirement and provision of spaces is close, on an ongoing basis, and that overprovision and overcrowding is minimized.

- **Fittings and finishes:** Robust, hardwearing, low-maintenance fittings and finishes should be used. These should be easy to clean and of a quality that fosters care and pride by learners and educators.

- **Flexibility and adaptability:** School buildings must be able to accommodate change easily and inexpensively. They should also allow different uses at different times, for instance, classrooms may be used by school learners in the daytime and by adult learners in the evenings for Adult Based Education and Training (ABET) classes. This consideration should be reflected in the specification of furniture and fittings and spatial, service and structural strategies.

- **Health and safety:** Schools facilities and grounds should be healthy and safe to use. All schools should have adequate sanitation and access to clean water. Careful design and effective management should ensure that crime and hazards such as sharp edges, unsafe structures and dangerous level differences are minimized.

- **Inclusion:** School facilities and grounds should be inclusive. This requires minimum standards in areas such as physical access, signage, lighting, provision of equipment and management capacity to be achieved in order to ensure that barriers to learning for the full diversity of learners (including learners with disabilities) do not exist.

- **Learning resources:** Where possible, learners should be provided with access to learning material and resources such as books, learning materials and computers which they can use to teach themselves at their own pace. Where possible, access should be provided to these resources out of school hours. This is particularly important in areas where there may not be space and resources for learning at home.

- **Lifecycle costs**: The operational costs of school facilities, such as maintenance, security, water and energy costs should be carefully considered and, where appropriate, minimized.

- **Shared use**: School accommodation and grounds should be designed and managed to benefit the whole community. Therefore, shared use of facilities such as the media centre, computer room, sports facilities, classrooms and hall should be encouraged.

- **Teaching and learning**: Schools should be able to accommodate a range of different teaching and learning methods. These include outcomes-based approaches, as well as conventional "chalk and talk", learner-directed and group work modes.

4 Space Planning Norms and Standards for Public Schools

The Space Planning Norms and Standards for Public Schools that follow have been presented in two groups, namely those for primary schools and those for secondary schools. This separation accommodates the requirements of each school type as shown in point 2.2 National Curriculum Statement on page 6.

Each group contains a table, which provides the following information:

A. Overall space use: this provides a summary of the information that follows in B (i.e. total area per FTE and the *learning/teaching space*: *non-teaching/balance space* ratio) and C (i.e. overall proportions, represented as percentages, for the learning/teaching and non-teaching/balance sets).

The learning/teaching and non-teaching area/balance sets are generally split into a 70:30 ratio.

B. Norms and standards: these provide the guidelines (represented as area per FTE, in m^2/FTE, per space category (i.e. general teaching, specialist teaching, independent learning area, non-teaching area and balance)), as well as design issues relevant for each category. The guidelines in this section are provided as bands, allowing some flexibility.

School site: this suggests minimum guidelines for various elements required on a school site – namely the informal social/play areas, sports facilities, parking area and garden plots.

C. Proportions of Space: these represent the proportions (%) of the norms and standards provided above per space category. In this portion of the table, the location issues of various spaces within the space categories are investigated.

4.1 Space Planning Norms and Standards for Public Primary Schools

The norms and standards below provide guidance on the area per FTE for the space category listed, as well as the proportions of space for primary schools.

A. Overall space use	between (m^2)	
Total area per FTE	**2.2**	**3.2**
Learning/Teaching per FTE	**1.5**	**2.1**
Non-teaching/Balance per FTE	**0.7**	**1.1**

B. Norms and standards			
Space category	**m^2/FTE band between**		**Design issues**
General teaching Space	**1.0**	**1.2**	The design of classroom space should be flexible and adaptable. Modular standard furniture should be used. Some storage for materials and equipment should be provided in or near classrooms.
Specialist teaching space	**0.1**	**0.3**	Space and equipment should be provided that can be used for specialist teaching. Access to outside spaces and facilities for practical learning should be provided, such as planting, painting, and experiments.
Learning space	**0.4**	**0.6**	Access should be provided to space, materials and equipment, such as books and computers, to enable learners to conduct learning at their own pace for an adequate amount of time each week. This can be provided, in order to allow large group learning/teaching events and theatre or music performances.
Non-teaching space	**0.3**	**0.5**	Ensure there is adequate space for educators to work together in groups in order to prepare joint lessons and co-coordinated learning events. Space should be provided for the healthy and safe preparation and serving of food where schools accommodate feeding schemes.
Balance	**0.4**	**0.6**	Ensure that all commonly used routes are easily accessible and safe for all learners, including those in wheelchairs.

School site	m^2/FTE	
Site area	**See Section 5**	A key consideration should be the proximity of the school to the learners that use it.
Informal social/play area	**min. 1.5**	Provide stimulating/educational play equipment/material, such as climbing frames, and sandpit where possible.
Sports area	**min. 7.4**	Ensure that a range of sporting events can be accommodated that will cater for the interests of all learners. This should include, as a minimum, football and netball, even if full-size pitches are not provided.
Parking	**min. 0.3**	Parking for staff vehicles and a small number of visitors should either be on site or adjacent to the school site.
Garden plots	**min. 0.3**	Provided a portion of agricultural land within the school site, which may be used by the school or local community to cultivate produce. This produce may be used by the school as part of a feeding scheme.

C. Proportions of space			
Space category	**% of total area between**		**Location issues**
General teaching space	45	38	Ensure that the noise between classrooms is not disruptive and views from windows are not distracting.
Specialist teaching space	5	9	Equipment, services and space for more specialist teaching, such as practical experiments, should be provided within or near classrooms.
Learning space	18	19	This should be located centrally or in classrooms, and learners encouraged to use this in their free time – i.e. during break or after school.
Non-teaching space	14	15	Locate admin/staff area to ensure good supervision of school entrance and grounds.
Balance	18	19	Toilets should be provided as per National Building Regulations (See Tables 5, 6 & 7) and located where they can be easily supervised by staff.

Taking the these norms into consideration, the following tables for Public Primary Schools (Tables 1 – 2) have been developed for infrastructure planners, designers and managers to assist in ensuring that the minimum standards are achieved.

Typical Accommodation Schedules for One-, Two- and Three-Stream Primary Schools, accommodating 320, 640 and 960 learners respectively are also shown at the end of this document.

Table 1: Primary School Accommodation for Personnel and Learners

PRIMARY SCHOOL PERSONNEL, LEARNERS AND ACCOMMODATION

SCHOOL SIZE	MANAGEMENT AND ADMIN PERSONNEL						ADMINISTRATION / SUPPORT SPACES										SNP	LEARNING / TEACHING SPACES						
Enrolment Range	Total Educators (1:35)	Principal	Deputy Principal	HoD	Admin Support	Management + Admin	Offices	Strong room	Admin Store Room in Admin Block	Printing Room	Staff room - • 25 m² • 50 m² • 64 m²	Sickbay	HOD Offices + Small Store (12,5m² + 12,5m²)	Counselling Office (Linked to Standard Classroom)	Large Store Room (25 m²)	Garden Store (25 m²)	School Nutrition Programme Kitchen with Storage/ Tuckshop	General Classrooms (50m ²)	Multi Purpose Classrooms with Store (75+25)m ²	Computer Room with Store (75+25)m² / Multimedia Centre (130 m²)	Media Centre with Store (130 m²) / Multimedia Centre (130 m²)	Team Teaching Room (130 m²)	Total Learning Spaces	Learner Classroom Ratio Range
20 - 60	2	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	½	0	1	0	0	0	1	20 - 60
61 - 80	2	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	½	1	1	0	0	0	2	31 - 40
81 - 100	3	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	½	2	1	0	0	0	3	27 - 33
101 - 140	4	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	1	3	1	0	0	0	4	25 - 35
141 - 180	5	1	0	1	0	2	1	1	1	0	½	0	1	0	0	0	1	4	1	0	0	0	5	28 - 36
181 - 220	6	1	0	1	1	3	2	1	0	0	½	0	1	0	1	0	1	5	1		1	0	7	26 - 31
221 - 260	7	1	0	1	1	3	2	1	0	0	½	0	1	0	1	0	1	6	1		1	0	8	28 - 33
261 - 300	9	1	0	1	1	3	2	1	0	0	½	0	1	0	1	0	1	7	1		1	0	9	29 - 33
301 - 340	10	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	8	1	1	1	0	11	27 - 31
341 - 380	11	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	9	1	1	1	0	12	28 - 32
381 - 420	12	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	10	1	1	1	0	13	29 - 32
421 - 460	13	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	11	2	1	1	0	15	28 - 31
461 - 500	14	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	12	2	1	1	0	16	29 - 31
501 - 540	15	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	13	2	1	1	0	17	29 - 32
541 - 580	17	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	14	2	1	1	0	18	30 - 32
581 - 620	18	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	15	2	1	1	0	19	31 - 33
621 - 660	19	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	16	2	1	1	0	20	31 - 33
661 - 700	20	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	17	2	1	1	0	21	31 - 33
701 - 740	21	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	18	2	1	1	1	23	30 - 32
741 - 780	22	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	19	2	1	1	1	24	31 - 33
781 - 820	23	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	20	2	1	1	1	25	31 - 33
821 - 860	25	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	21	2	1	1	1	26	32 - 33
861 - 900	26	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	22	2	1	1	1	27	32 - 33
901 - 940	27	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	23	2	1	1	1	28	32 - 34
941 - 980	28	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	24	2	1	1	1	29	32 - 34
981 - 1020	29	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	25	3	1	1	1	31	32 - 33
1021 - 1060	31	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	26	3	1	1	1	32	32 - 33
1061 - 1100	32	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	27	3	1	1	1	33	32 - 33
1101 - 1140	34	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	28	3	1	1	1	34	32 - 34
1141 - 1180	35	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	29	3	1	1	1	35	33 - 34
1181 - 1220	36	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	30	3	1	1	1	36	33 - 34

Table 2: Space Planning Norms and Standards for Public Primary Schools

SPACE PLANNING NORMS AND STANDARDS FOR PUBLIC PRIMARY SCHOOLS

SCHOOL SIZE	LEARNING SPACE/EDUCATOR DIFFERENCE			GENERAL TEACHING AREA				SPECIALIST TEACHING AREA				LEARNING AREA				TOTAL TEACHING AND LEARNING AREA						
Enrolment Range	Total Educators (1:35)	Total Learning Spaces	Learning Spaces/ Educator Difference	Unit	Unit	$1m^2$ / Lnr	@$50m^2$ per Unit	Unit	Unit	$0.1m^2$ / Lnr	@$75m^2$ per Unit	Unit	Unit	$0.4m^2$ / Lnr	$130m^2$ per Unit	Units	Units	Units	$1.5m^2$ / Lnr	m^2	m^2	m^2
				Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Difference	Lower Norm	Model	Lower Difference	Upper Difference
20 - 60	2	1	-1	1	0	60	0	0	1	6	75	0	0	24	0	2	1	-1	90	75	-15	-51
61 - 80	2	2	0	2	1	80	50	0	1	8	75	0	0	32	0	2	2	0	120	125	5	-43
81 - 100	3	3	0	2	2	100	100	0	1	10	75	1	0	40	0	3	3	0	150	175	25	-35
101 - 140	4	4	0	3	3	140	150	0	1	14	75	1	0	56	0	4	4	0	210	225	15	-69
141 - 180	5	5	0	4	4	180	200	0	1	18	75	1	0	72	0	5	5	0	270	275	5	-103
181 - 220	6	7	1	4	5	220	250	0	1	22	75	1	1	88	130	5	7	2	330	455	125	-7
221 - 260	7	8	1	5	6	260	300	0	1	26	75	1	1	104	130	6	8	2	390	505	115	-41
261 - 300	9	10	1	6	7	300	350	0	1	30	75	1	1	120	130	7	9	2	450	555	105	-75
301 - 340	10	12	2	7	8	340	400	0	2	34	150	1	1	136	130	8	11	3	510	680	170	-34
341 - 380	11	13	2	8	9	380	450	1	2	38	150	1	1	152	130	9	12	3	570	730	160	-68
381 - 420	12	14	2	8	10	420	500	1	2	42	150	1	1	168	130	10	13	3	630	780	150	-102
421 - 460	13	15	2	9	11	460	550	1	3	46	225	1	1	184	130	11	15	4	690	905	215	-61
461 - 500	14	16	2	10	12	500	600	1	3	50	225	2	1	200	130	12	16	4	750	955	205	-95
501 - 540	15	17	2	11	13	540	650	1	3	54	225	2	1	216	130	13	17	4	810	1005	195	-129
541 - 580	17	18	1	12	14	580	700	1	3	58	225	2	1	232	130	14	18	4	870	1055	185	-163
581 - 620	18	19	1	12	15	620	750	1	3	62	225	2	1	248	130	15	19	4	930	1105	175	-197
621 - 660	19	21	2	13	16	660	800	1	3	66	225	2	1	264	130	16	20	4	990	1155	165	-231
661 - 700	20	22	2	14	17	700	850	1	3	70	225	2	1	280	130	17	21	4	1050	1205	155	-265
701 - 740	21	23	2	15	18	740	900	1	3	74	225	2	2	296	130	18	23	5	1110	1255	145	-299
741 - 780	22	24	2	16	19	780	950	1	3	78	225	2	2	312	130	19	24	5	1170	1305	135	-333
781 - 820	23	25	2	16	20	820	1000	1	3	82	225	3	2	328	130	20	25	5	1230	1355	125	-367
821 - 860	25	26	1	17	21	860	1050	1	3	86	225	3	2	344	130	21	26	5	1290	1405	115	-401
861 - 900	26	27	1	18	22	900	1100	1	3	90	225	3	2	360	130	22	27	5	1350	1455	105	-435
901 - 940	27	28	1	19	23	940	1150	1	3	94	225	3	2	376	130	23	28	5	1410	1505	95	-469
941 - 980	28	30	2	20	24	980	1200	1	3	98	225	3	2	392	130	24	29	5	1470	1555	85	-503
981 - 1020	29	31	2	20	25	1020	1250	1	4	102	300	3	2	408	130	25	31	6	1530	1680	150	-462
1021 - 1060	31	32	1	21	26	1060	1300	1	4	106	300	3	2	424	130	26	32	6	1590	1730	140	-496
1061 - 1100	32	33	1	22	27	1100	1350	1	4	110	300	3	2	440	130	27	33	6	1650	1780	130	-530
1101 - 1140	34	34	0	23	28	1140	1400	2	4	114	300	4	2	456	130	28	34	6	1710	1830	120	-564
1141 - 1180	35	35	0	24	29	1180	1450	2	4	118	300	4	2	472	130	29	35	6	1770	1880	110	-598
1181 - 1220	36	36	0	24	30	1220	1500	2	4	122	300	4	2	488	130	30	36	6	1830	1930	100	-632

4.2 Space Planning Norms and Standards for Public Secondary Schools

The norms and standards below provide guidance on the area per FTE for the space category listed, as well as the proportions of space for secondary schools.

A. Overall space use	between (m^2)	
Total area per FTE	**2.6**	**3.6**
Learning/Teaching per FTE	**1.9**	**2.5**
Non-teaching/Balance per FTE	**0.7**	**1.1**

B. Norms and standards			
Space category	**m^2/FTE band**		**Design issues**
General teaching Space	**1.1**	**1.3**	The design of classrooms spaces should be flexible and adaptable. Modular standard furniture should be used. Some storage for materials and equipment should be provided in or near classrooms.
Specialist teaching space	**0.5**	**0.7**	Specialist teaching spaces should be as multipurpose as possible. This can be achieved through careful design, furniture and equipment specification and storage and servicing strategies. In this way capital costs can be reduced by improving ulilisation rates and the number of spaces required.
Independent learning space	**0.3**	**0.5**	Access should be provided to space, materials and equipment, such as books and computers, to enable learners to conduct learning at their own pace for an adequate amount of time each week. This can be provided, in a media centre, with computers and books, that is open throughout the day and can be easily used by learners during free / out of school time. If possible a space where more than one class can be accommodated should be provided in order to allow larger group learning/teaching events including activities such as theatrical and musical performance.
Non-teaching space	**0.3**	**0.5**	Ensure there is adequate space for educators to work together in groups in order to prepare joint lessons and co-ordinated learning events. Space should be provided for the healthy and safe preparation and serving of food where schools accommodate feeding schemes.
Balance	**0.4**	**0.6**	Ensure that all commonly used routes are easily accessible and safe for all learners, including those in wheelchairs.

School site	m^2 /FTE	
Site area	**See Section 5**	A key consideration should be the proximity of the school to the learners that use it.
Informal social/play area	**min. 1.7**	Provide spaces and furniture for informal social interaction
Sports area	**min. 7.4**	Ensure that a range of sporting events can be accommodated that will cater for the interests of all learners. This should include, as a minimum, football and netball, even if full-size pitches are not provided.
Parking	**min. 0.3**	Parking for staff vehicles and a small number of visitors should either be on site or adjacent to the school site.
Garden plots	**min. 0.3**	Provided a portion of agricultural land within the school site, which may be used by the school or local community to cultivate produce. This produce may be used by the school as part of a feeding scheme.

D Proportions of space			
Space category	**% of total area between**		**Location issues**
General teaching space	42	36	Ensure that the noise between classrooms is not disruptive and views form windows are not distracting.
Specialist teaching space	19	19	Specialist teaching spaces should be clustered in order to share servicing and storages where possible. Where noisy or smelly activities will be accommodated, spaces should be located to minimize distraction in other areas of the school.
Independent learning space	12	14	This should be located centrally and should be learners encouraged to use this in their free time i.e. during break or after school. Spaces like halls and media centres should also be located where they can also be easily and safely used by other schools and the local community.
Non-teaching space	12	14	Locate admin/staff area to ensure good supervision of school entrance and grounds. Storage for valuable material should be located where this can be easily secured and access controlled.
Balance	15	17	Toilets should be provided as per National Building Regulations (See Tables 5, 6 & 7) and located where they can be easily supervised by staff.

Taking the these norms into consideration, the following tables for Public Secondary Schools (Tables 3 – 4) have been developed for infrastructure planners, designers and managers to assist in ensuring that the minimum standards are achieved.

Typical Accommodation Schedules for One-, Two-, Three-, Four- and Five-Stream Secondary Schools, accommodating 200, 400, 600, 800 and 1000 learners respectively are at the end of this document.

Table 3: Secondary School Accommodation for Personnel and Learners

SECONDARY SCHOOL ACCOMMODATION FOR PERSONNEL AND LEARNERS

SCHOOL SIZE	STAFF	MANAGEMENT AND ADMIN PERSONNEL					ADMINISTRATION / SUPPORT SPACES										SNP	LEARNING / TEACHING SPACES						
Enrolment Range	Educators (1:35)	Principal	Deputy Principal	HoD	Admin Support	Management + Admin	Offices	Strong room	Admin Store Room	Printing Room	Staff room - • 25 m² • 75 m²	Sickbay	HOD Offices + Small Store (12,5m² + 12,5m²)	Counselling Office - Linked to Standard Classroom (25 m²)	Large Store Room (25 m²)	Garden Store (25 m²)	Tuckshop	General Classrooms (50m ²)	Multi Purpose Classrooms with Store (75+25)m ²	Computer Room with Store (75 + 25) m² / Multimedia Centre with Store (130 m²)	Media Centre with Store (130 m²)	Team Teaching Room (130 m²)	Total Learning Spaces	Learner Classroom Ratio Range
20 - 60	2	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	½	0	1	0	0	0	1	20 - 60
61 - 80	2	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	½	1	1	0	0	0	2	31 - 40
81 - 100	3	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	½	2	1	0	0	0	3	27 - 33
101 - 140	4	1	0	0	0	1	1	1	1	0	½	0	0	0	0	0	1	3	1	0	0	0	4	25 - 35
141 - 180	5	1	0	1	1	3	2	1	0	0	½	0	1	0	1	0	1	4	1	0	0	0	5	28 - 36
181 - 220	6	1	0	1	1	3	2	1	0	0	½	0	1	0	1	0	1	5	1	1		0	7	26 - 31
221 - 260	7	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	6	2	1		0	9	25 - 29
261 - 300	9	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	7	2	1		0	10	26 - 30
301 - 340	10	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	8	2	1	1	0	12	25 - 28
341 - 380	11	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	9	2	1	1	0	13	26 - 29
381 - 420	12	1	0	2	1	4	4	1	1	1	1	2 x 2 beds	0	1	1	1	1	10	2	1	1	0	14	27 - 30
421 - 460	13	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	11	3	1	1	0	16	26 - 29
461 - 500	14	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	12	3	1	1	0	17	27 - 29
501 - 540	15	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	13	3	1	1	0	18	28 - 30
541 - 580	17	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	14	3	1	1	1	19	28 - 31
581 - 620	18	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	15	3	1	1	1	20	29 - 31
621 - 660	19	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	16	4	1	1	1	22	28 - 30
661 - 700	20	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	17	4	1	1	1	23	29 - 30
701 - 740	21	1	1	3	1	6	4	1	1	1	1	2 x 2 beds	2	1	1	1	1	18	4	1	1	1	24	29 - 31
741 - 780	22	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	19	4	1	1	1	25	30 - 31
781 - 820	23	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	20	4	1	1	1	26	30 - 32
821 - 860	25	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	21	5	1	1	1	28	29 - 31
861 - 900	26	1	1	4	1	7	4	1	1	1	1	2 x 2 beds	3	1	1	1	1	22	5	1	1	1	29	30 - 31
901 - 940	27	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	23	5	1	1	1	30	30 - 31
941 - 980	28	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	24	5	1	1	1	31	30 - 32
981 - 1020	29	1	2	4	1	8	4	1	1	1	1	2 x 2 beds	4	1	1	1	1	25	5	1	1	1	32	31 - 32
1021 - 1060	31	1	2	5	1	9	4	1	1	1	1	2 x 2 beds	5	1	1	1	1	26	6	1	1	1	34	30 - 31
1061 - 1100	32	1	2	5	1	9	4	1	1	1	1	2 x 2 beds	5	1	1	1	1	27	6	1	1	1	35	30 - 31
1101 - 1140	34	1	2	5	1	9	4	1	1	1	1	2 x 2 beds	5	1	1	1	1	28	6	1	1	1	36	31 - 32
1141 - 1180	35	1	2	5	1	9	4	1	1	1	1	2 x 2 beds	5	1	1	1	1	29	7	1	1	1	38	30 - 31
1181 - 1220	36	1	2	5	1	9	4	1	1	1	1	2 x 2 beds	5	1	1	1	1	30	7	1	1	1	39	30 - 31

Table 4: Space Planning Norms and Standards for Public Secondary Schools

SPACE PLANNING NORMS AND STANDARDS FOR PUBLIC SECONDARY SCHOOLS																						
SCHOOL SIZE	LEARNING SPACE/EDUCATOR DIFFERENCE			GENERAL TEACHING AREA				SPECIALIST TEACHING AREA				LEARNING AREA				TOTAL TEACHING AND LEARNING AREA						
School Size	Total Educators (1:35)	Total Learning Spaces	Learning Spaces/ Educator Difference	Unit	Unit	1.1m² / Lnr	@50m² per Unit	Unit	Unit	0.5m² / Lnr	@75m² per Unit	Unit	Unit	0.3m² / Lnr	130m² per Unit	Units	Units	Units	1.9m² / Lnr	m²	m²	m²
				Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Norm	Model	Lower Difference	Lower Norm	Model	Lower Difference	Upper Difference
20 - 60	2	1	-1	1	0	66	0	0	1	30	75	0	0	18	0	2	1	-1	114	75	-39	-75
61 - 80	2	2	0	2	1	88	50	1	1	40	75	0	0	24	0	2	2	0	152	125	-27	-75
81 - 100	3	3	0	2	2	110	100	1	1	50	75	0	0	30	0	3	3	0	190	175	-15	-75
101 - 140	4	4	0	3	3	154	150	1	1	70	75	0	0	42	0	4	4	0	266	225	-41	-125
141 - 180	5	5	0	4	4	198	200	1	1	90	75	0	0	54	0	6	5	-1	342	275	-67	-175
181 - 220	6	7	1	5	5	242	250	1	1	110	75	1	1	66	130	7	7	0	418	455	37	-95
221 - 260	7	9	2	6	6	286	300	2	2	130	150	1	1	78	130	8	9	1	494	580	86	-70
261 - 300	9	10	1	7	7	330	350	2	2	150	150	1	1	90	130	9	10	1	570	630	60	-120
301 - 340	10	12	2	7	8	374	400	2	3	170	225	1	1	102	130	11	12	1	646	755	109	-95
341 - 380	11	13	2	8	9	418	450	3	3	190	225	1	1	114	130	12	13	1	722	805	83	-145
381 - 420	12	14	2	9	10	462	500	3	3	210	225	1	1	126	130	13	14	1	798	855	57	-195
421 - 460	13	16	3	10	11	506	550	3	4	230	300	1	1	138	130	14	16	2	874	980	106	-170
461 - 500	14	17	3	11	12	550	600	3	4	250	300	1	1	150	130	15	17	2	950	1030	80	-220
501 - 540	15	18	3	12	13	594	650	4	4	270	300	1	1	162	130	17	18	1	1026	1080	54	-270
541 - 580	17	19	2	13	14	638	700	4	4	290	300	1	2	174	260	18	20	2	1102	1260	158	-190
581 - 620	18	20	2	14	15	682	750	4	4	310	300	1	2	186	260	19	21	2	1178	1310	132	-240
621 - 660	19	22	3	15	16	726	800	4	5	330	375	1	2	198	260	20	23	3	1254	1435	181	-215
661 - 700	20	23	3	15	17	770	850	5	5	350	375	2	2	210	260	22	24	2	1330	1485	155	-265
701 - 740	21	24	3	16	18	814	900	5	5	370	375	2	2	222	260	23	25	2	1406	1535	129	-315
741 - 780	22	25	3	17	19	858	950	5	5	390	375	2	2	234	260	24	26	2	1482	1585	103	-365
781 - 820	23	26	3	18	20	902	1000	5	5	410	375	2	2	246	260	25	27	2	1558	1635	77	-415
821 - 860	25	28	3	19	21	946	1050	6	6	430	450	2	2	258	260	27	29	2	1634	1760	126	-390
861 - 900	26	29	3	20	22	990	1100	6	6	450	450	2	2	270	260	28	30	2	1710	1810	100	-440
901 - 940	27	30	3	21	23	1034	1150	6	6	470	450	2	2	282	260	29	31	2	1786	1860	74	-490
941 - 980	28	31	3	22	24	1078	1200	7	6	490	450	2	2	294	260	30	32	2	1862	1910	48	-540
981 - 1020	29	32	3	22	25	1122	1250	7	6	510	450	2	2	306	260	32	33	1	1938	1960	22	-590
1021 - 1060	31	34	3	23	26	1166	1300	7	7	530	525	2	2	318	260	33	35	2	2014	2085	71	-565
1061 - 1100	32	35	3	24	27	1210	1350	7	7	550	525	2	2	330	260	34	36	2	2090	2135	45	-615
1101 - 1140	34	36	2	25	28	1254	1400	8	7	570	525	3	2	342	260	35	37	2	2166	2185	19	-665
1141 - 1180	35	38	3	26	29	1298	1450	8	8	590	600	3	2	354	260	36	39	3	2242	2310	68	-640
1181 - 1220	36	39	3	27	30	1342	1500	8	8	610	600	3	2	366	260	38	40	2	2318	2360	42	-690

Table 5: Sanitation Requirements for Public Schools

SANITATION REQUIREMENTS FOR PUBLIC SCHOOLS

Enrolment Range	Girls WC	Girls Basins	Enrolment Range per Gender	Boys WC	Boys Urinals	Boys Basins	Disabled WC & Basin/ Staff	Female Staff WC	Female Staff Basin	Male Staff WC	Male Staff Urinal	Male Staff Basin	TOTAL TOILETS
20 - 60	2	1	10 - 30	1	1	1	1	◄ Combined Block for Staff and Learners or separate freestanding toilets					5
61 - 80	2	1	30 -40	1	1	1	1						5
81 - 100	2	1	40 - 50	1	1	1	1						5
101 - 140	4	2	50 - 70	2	2	2	1	◄ Separate Blocks for Learners and separate Disabled/Staff WC					7
141 - 180	4	2	70 - 90	2	2	2	1						7
181 - 220	4	2	90 - 110	2	2	2	1	2	1	1	1	1	13
221 - 260	4	2	110 - 130	2	2	2	1	2	1	1	1	1	13
261 - 300	6	4	130 - 150	2	2	2	1	2	1	1	1	1	15
301 - 340	6	4	150 - 170	2	2	2	1	2	1	1	1	1	15
341 - 380	6	4	170 - 190	2	2	2	1	2	1	1	1	1	15
381 - 420	6	4	190 - 210	2	2	2	1	2	1	1	1	1	15
421 - 460	8	6	210 - 230	3	3	2	1	2	1	1	1	1	19
461 - 500	8	6	230 - 250	3	3	2	1	2	1	1	1	1	19
501 - 540	8	6	250 - 270	3	3	2	1	2	1	1	1	1	19
541 - 580	8	6	270 - 290	3	3	2	1	2	1	1	1	1	19
581 - 620	8	6	290 - 310	3	3	2	1	2	1	1	1	1	19
621 - 660	10	6	310 - 330	4	4	3	2	3	2	1	2	1	26
661 - 700	10	6	330 - 350	4	4	3	2	3	2	1	2	1	26
701 - 740	10	6	350 - 370	4	4	3	2	3	2	1	2	1	26
741 - 780	10	6	370 - 390	4	4	3	2	3	2	1	2	1	26
781 - 820	10	6	390 - 410	4	4	3	2	3	2	1	2	1	26
821 - 860	12	8	410 - 430	5	5	3	2	3	2	1	2	1	30
861 - 900	12	8	430 - 450	5	5	3	2	3	2	1	2	1	30
901 - 940	12	8	450 - 470	5	5	3	2	3	2	1	2	1	30
941 - 980	12	8	470 - 490	5	5	3	2	3	2	1	2	1	30
981 - 1020	12	8	490 - 510	5	5	3	2	3	2	1	2	1	30
1021 - 1060	14	10	510 - 530	6	6	4	2	3	2	1	2	1	34
1061 - 1100	14	10	530 - 550	6	6	4	2	3	2	1	2	1	34
1101 - 1140	14	10	550 - 570	6	6	4	2	3	2	1	2	1	34
1141 - 1180	14	10	570 - 590	6	6	4	2	3	2	1	2	1	34
1181 - 1220	14	10	590 - 610	6	6	4	2	3	2	1	2	1	34

TABLE 7 of SABS 0400-1990

1	2	3	4	5	6
For a population of up to –	Number of sanitary fixtures to be installed relative to population given in Column 1				
	Males			Females	
	WC pans	Urinals	Washbasins	WC pans	Washbasins
a) Facilities subject to peak demand					
50	1	1	1	2	1
100	1	2	1	3	2
150	1	3	1	5	3
250	2	4	2	7	4
500	3	7	3	12	6
1000	3	12	4	16	7
1500	4	15	5	20	8
	For a population in excess of 1500 add 1 WC pan for every 500 persons	For a population in excess of 1500 add 1 urinal for every 300 persons	For a population in excess of 1500 add 1 washbasin for every 500 persons	For a population in excess of 1500 add 1 WC pan for every 150 persons	For a population in excess of 1500 add 1 washbasin pan for every 500 learners
b) Facilities not subject to peak demand					
50	1	–	1	1	1
100	1	1	1	2	1
150	1	2	1	3	2
250	2	3	2	5	3
500	2	4	3	6	4
1000	2	6	5	8	6
1500	3	7	6	10	7
	For a population in excess of 1500 add 1 WC pan for every 1000 persons	For a population in excess of 1500 add 1 urinal for every 500 persons	For a population in excess of 1500 add 1 washbasin for every 700 persons	For a population in excess of 1500 add 1 WC pan for every 300 persons	For a population in excess of 1500 add 1 washbasin pan for every 700 persons

***NB**. In using Tables 7 and 8 the population referred to in Column 1 of the tables is the population of the particular sex for which the minimum provision is to be determined. Unless the population of each sex is otherwise known this will be one half of any total number of persons or total population.*

TABLE 8 of SABS 0400-1990

1	2	3	4	5	6	7	8
For a population of up to –	Number of sanitary fixtures to be installed relative to population given in Column 1						
	Males			Females			
	WC pans	Urinals	Washbasins	Showers	WC pans	Washbasins	Showers
10	1	1	1	2	2	1	2
20	1	2	2	2	3	2	2
30	2	2	3	3	5	3	3
40	3	3	3	3	6	3	4
60	3	4	4	5	7	4	5
80	4	5	5	5	9	5	5
100	4	6	5	6	10	5	6
	For a population in excess of 100 add 1 WC pan for every 100 persons	For a population in excess of 100 add 1 urinal for every 100 persons	For a population in excess of 100 add 1 washbasin for every 100 persons	For a population in excess of 100 add 1 shower for every 40 persons	For a population in excess of 100 add 1 WC pan for every 80 persons	For a population in excess of 100 add 1 washbasin pan for every 80 persons	For a population in excess of 100 add 1 shower for every 40 persons

5 Guidelines for the Provision of Sites for Public Primary and Secondary Schools

While the guidelines, below, may appear to be applicable specifically to formal township developments, they are equally appropriate to rural areas.

5.1 Number of School Sites

5.1.1 The number of families and the average size of these families determine the number of primary and secondary school sites to be provided in new residential areas or in extensions to existing residential areas, as indicated in the table below:

Socio-economic category of residential area	Average size of family	Number of families per primary school	Number of families per secondary school
High	4	1000	1500
Middle	6	750	1500
Low	8	500	1500

Number of families generating schools sites

5.1.2 The number of school sites required will be rounded off to the nearest whole number (e.g. 2,5 becomes 3, and 2,4 becomes 2). In areas where the number of families to be accommodated generates less than 0,5 of a school site, a school site may be provided at the discretion of the department, bearing in mind that any settlement will generate a school-going population.

5.1.3 The number of families and school sites in new extensions should be considered together with those in adjacent residential areas to determine whether sufficient school sites are available for the residential area as a whole.

5.2 Size of School Sites

5.2.1 Single sites

The minimum size, provided that the area to be utilised can accommodate the school buildings as well as sports grounds, is as follows:

Primary school : 2,8 ha
Secondary school : 4,8 ha

5.2.2 Shared sites

Sports facilities may be shared between primary schools as well as between a school (primary or secondary) and the community, with the necessary community consent:

(a) Two primary schools with shared sports ground:

Primary school #1 : 1,4 ha
Sports ground : 2,0 ha
Primary school #2 : 1,4 ha
TOTAL **4,8 ha**

(b) Schools sharing community sports facility:

Primary school : 1,4 ha
Secondary school : 2,6 ha

5.3 General Conditions for School Sites

5.3.1 The following considerations should be observed:

(a) School sites should as far as possible be evenly distributed within the residential area. To locate a primary school and secondary school next to each other is not acceptable to all communities. Two primary schools located next to one another should have sports grounds to separate them.
(b) The locating of school sites should as far as possible be done in consultation with the local community.
(c) School sites should not be located next to cemeteries, business centres, railway stations, taxi ranks, hostels, beerhalls, municipal dumps or sewerage works.
(d) The nature of the soil must be such as not to involve excessive additional costs when buildings and sports grounds are constructed. Some examples of problematic soil conditions are turf, clay, dolomite, refuse dump fillings, etc.
(e) The removal of existing vegetation should not involve excessive additional costs.
(f) Vegetation worthy of preservation, e.g. mature trees, etc., should not be removed.
(g) The existence of servitudes and stormwater routes must not compromise the safety of the learners, locating of buildings or the utilisation of sports grounds.
(h) Locating schools next to high-class roads (20m wide or more) and/or high volume roads is discouraged. Entrances to school sites must comply with the prescriptions of the local authorities concerned.

5.3.2 School sites should in appearance be as follows:

(a) The school buildings and sports grounds should fit onto the site in such a manner as to allow for correct orientation. (Windows and doors of classrooms and length of sportsfields to be on a north/south orientation.)
(b) Ideally, at least 50% of the boundary of school sites should face a street front and not adjoin the backs of residential or other sites.
(c) The slope of the proposed sites should ideally not exceed 1 in 40 and definitely not 1 in 15 over the area likely to be built on. The latter concession is specifically for developments in undulating terrain and not intended to compromise the department.
(d) School sites should not be situated below the 1-in-50-year flood line – buildings must always be placed above the flood line.

5.3.3 When plans are submitted to the department for final approval, the following information/documents is/are required:

(a) The number of residential sites and the average size of these sites.
(b) The anticipated socio-economic category of the residential area.
(c) Whether the area is a formal or less-formal settlement area.
(d) The number of primary and secondary school sites provided.
(e) The size of each school site.
(f) An identification number for each school site (these may be provisional).
(g) Contours and servitudes
(h) The number and date of the plan, as well as the scale and geographical orientation to north.
(i) A geotechnical report for the area.
(j) A locality map clearly showing the proposed development in relation to other existing developments.
(k) Existing school sites (developed and vacant) in a 5km buffer around the proposed development will assist in determining the exact educational requirements for the new development.

5.4 Procedures for the Approval of School Sites

5.4.1 The District Planning Subdirectorates, in the relevant District of the Department, act as nodal points for the recommendation/approval of proposed new layouts for new residential areas and extensions to residential areas.

5.4.2 Plans are to be presented in duplicate to the relevant District Planning Subdirectorates, who are responsible for:
(a) Assessing and evaluating the need for school sites in the proposed development.
(b) Referring the plans to the Department of Public Works for the approval in principle of the suitability of the proposed school sites.
(c) Referring the plans to the Director: Infrastructure Planning at Head Office for approval.
(d) Informing the relevant applicant of the Department's recommendations or approval.

5.5 Procedures for the Acquisition of School Sites

5.5.1 Offers to the State to purchase a school site should be addressed to the relevant District Planning Subdirectorate. The package offer must contain the following information:
(a) A map indicating the full site with the site number, site size, contours, servitudes, etc.
(b) The Surveyor-General's maps indicating the site.
(c) The name of the registered owner or agent of the land.
(d) A copy of the proclamation/authorisation as a township.
(e) The price per site.
(f) The geotechnical report.

5.5.2 The relevant District Planning Subdirectorate determines whether it is necessary to purchase the site.

5.5.3 The relevant District Planning Subdirectorate seeks authorization from Head Office, via the Director: Infrastructure Planning to acquire the site.

5.5.4 The relevant District Planning Subdirectorate is responsible for making final arrangements with the Department of Public Works: Real Estates Section to purchase the site.

5.5.5 Depending on the conditions for the establishing of a particular township, the Department may be required to purchase the proposed school sites before it actually has concrete plans to build a new school. Where only some of the school sites are recommended for purchasing, the District Office concerned must submit sufficient justification as to why the remaining school sites should not be purchased with due consideration that such school sites may then be made available for other purposes.

5.5.6 Under the above circumstances, the recommendations of the District Office deal exclusively with the question of whether or not to acquire the school sites, and **not** with the timing of the acquisition. On that point the Department is bound by the relevant conditions for establishing the township and the actions to be taken by the Department of Public Works.

6 Schools for Learners with Special Education Needs

6.1 Planning Principles for Schools for Learners with Special Education Needs

The development and provision of facilities and resources for all levels of learners with barriers will be informed by the *Three/Five-Year Operational Plan for the Education Provision/Support of Learners with Barriers*, in keeping with the Department's fiscal resources and policies.

In the short-term, physical planning and provision must be made to systematically:

- Extend, develop and sustain the special/support facilities and resources needed in mainstream schools (ramps, toilets, etc.).
- Establish and develop additional Full-Service Schools while maintaining those already established.

  A full-service school will be equipped and supported to provide for a broad range of learning needs. As needs and barriers to learning vary, it is obvious that full-service schools would have to develop capacity and potential flexibly. A full-service school may not necessarily have all forms of learner support in place, but it should have the potential and capacity to develop and provide them;
- Establish and develop additional Special Schools while maintaining those already established.

  The notion of strengthening special schools does not mean that more and more special schools should be built. Within the framework of unlinking site from support, it would be much better to make more support programmes available at local level in full-service schools and through site-based support teams to ordinary neighbourhood schools. Consideration can even be given to eventually transform some existing special schools into full-service schools providing for learners requiring low, moderate and high levels of support.
- Establish any physical structures required to strengthen and diversify the existing Special School's capacity to provide for a wider range of education to learners with barriers (*viz.* provide ramps etc. in Special Schools previously inaccessible to learners in wheelchairs.)

6.2 FULL SERVICE SCHOOL SPECIFICATIONS

The following specifications were drawn up and used as the standard to upgrade Full Service Schools in South Africa. These specifications provide a useful consideration when building public primary and secondary school, with a view to ensuring schools accommodate diversity, promote equitable access and become more responsive to their local communities.

Ref	Upgrading Interventions Required			
			Standard of Inclusiveness	
	Item	Specification	Basic	Optimum
C	Car Parking			
	Accessible Parking Bay	2400mm x 4800mm, with a 1200mm route at side and front, per bay	1 bay for staff, one bay for visitors/parents, within 50m of admin block	5% of total capacity within 50m of admin block
		Suitable surface type	3600mm x 6000mm	Y x (3600mm x 6000mm), where Y = 5% of total number of bays
		Road paint, which contrasts with the surface in all weather conditions	To mark bay, put sign on bay	To mark bay, put sign on bay
		Wheelchair sign	-	Position vertically at front of bay
	External lighting	External lighting	-	Providing at least 150 lux of light after darkness
DR	Drop-Off			
	Accessible drop off point for cars/school buses	2400mm x 4800mm, with a 1200mm route at side and front	1 per school	1 per school
		Suitable surface type	3600mm x 6000mm	3600mm x 6000mm
		Road paint, which contrasts with the surface in all weather conditions	To mark bay, put sign on bay	To mark bay, put sign on bay
		Drop-off sign	-	Position vertically at front of bay
	External lighting	External lighting	-	Providing at least 150 lux of light after darkness
SS	Switches, Sockets and Fittings			
	Light switches	At 1000mm high	As specification	As specification
	Sockets	At 500mm, 450mm from the corner	-	As specification
	Lighting	Overhead lighting providing 200 lux lighting on desk surface, even spread	As specification	As specification
	Window catches	Lever type, no higher than 1200mm	-	As specification
	Windows in classrooms	Vertical blinds	-	Fit on all classroom windows next to teaching area

W	Wayfinding/Signage			
	Road sign	Sign contrasting with the background against which it is viewed. Matt non-reflective finish	As specification	As specification, plus
		Font used a mixture of upper and lower case, of sans serif type, ranged right and with wide inter-line spacing, contrasting with sign background		Well lit during day, night and all weather conditions. Signs using symbols
		Height of sign-pole depends on situation. No lower than 2300mm and no higher than 4000mm.	-	-
		Assume 6m viewing distance, letter height of between 150-225mm, depending on length of text required	-	-
	School sign	-	As specification W1	As specification W1
	Building block sign		As specification W1	As specification W1
	Wheelchair car park sign		As specification W1	As specification W1
	Drop-off sign		As specification W1	As specification W1

SU	Surfaces			
	Accessible play/gathering area	Levelled, compacted earth	As specification	As specification
	Renovate existing	Replace damaged paving	As specification	As specification
	Suitable surface types	*Carpet: thin pile*	-	-
		Clay pavers		
		Clay tiles		
		Clay tiles (carborundum finish)		
		Clay tiles (textured finish)		
		Concrete		
		Concrete (power float finish)		
		Concrete interlocking paving (texture finish?)		
		Granolithic		
		Linoleum		
		Cork tiles		
		Mastic asphalt		
		Profiled ceramics		
		PVC, enhanced slip resistance		
		Resin, enhanced slip resistance		

RO	Corridors/Walkways/Paths			
	Classroom verandahs	Add screed	L x 1500mm, where L = length of verandah	L x 1800mm, where L = length of verandah
		Add width to verandahs	L x (1500mm - CW), where L = length of verandah, CW = current width clear of door swing	L x (1800mm - CW), where L = length of verandah, CW = current width clear of door swing
	Warning edge for raised verandah	Paint edge with durable paint	As specification	As specification, plus tactile paving whole length, 400mm wide
	Lighting	Lighting provided during darkness on routes. Even spread	-	150 lux
	Cover	-	-	Cover to all external walkways
	New path	*See notes on surfaces*	1500mm x L, where L = required length	1800mm x L, where L = required length
	Lighting	Lighting provided during darkness on routes. Even spread	-	150 lux
	Cover	-	-	Cover to all external walkways
	Route from accessible car parking and drop-off to admin block	-	Suitable surface type, 1500mm wide, maximum 50m in length	Suitable surface type, 1800mm wide, maximum 50m in length. 1. Pavement with dropped kerb for car parking spaces and tactile indication
		-	-	Suitable surface type, 1800mm wide, maximum 50m in length. 2. Level path with tactile indication adjacent to vehicle
	Lighting	Lighting provided during darkness on routes. Even spread	-	150 lux
	Cover	-	-	Cover to all external walkways

S	Steps			
	Flight of steps			
	Risers	All same height, 150mm - 170mm	As specification	As specification
	Going	All same length, 250mm - 300mm	As specification	As specification
	Landing	1200mm at top and bottom steps clear of door swing	As specification	As specification
	Handrail	50mm diameter handrails stainless steel/wood	One by each step or stair. Continuous on flight of steps	Either side of each step or stair. (Two) Continuous on flights of stairs
				Ensure handrail contrast with background
		Extends 300mm at top and bottom of step/stair or has a positive return	As specification	As specification
	Nosing	Strips (can be painted) which contrast with the background against which they are viewed	25mm on riser and going	25mm on riser and going
		Rubber nosing that contrast with tread and riser	-	Add to provide additional grip on staircase
	Lighting	Lighting provided during darkness on steps. Even spread	-	150 lux
	Threshold step	If greater than 15mm, the surrounding route should be raised	As specification	As specification

R	Ramps			
	Ramps through level change	1:15 - 1:20, suitable surface finish	As specification	As specification
		Level landing of 1500mm, clear of door swing at top and bottom and at 5m intervals along the ramp's surface	As specification	As specification
		Minimum 1500mm wide	As specification	1800mm wide
		Cross fall of 1:50	As specification	As specification
		Kerb edge on exposed side 75mm high	As specification	As specification
	Handrail	50mm diameter handrails stainless steel/wood	Two, either side of ramp. Continuous on flight of ramps	As specification
		Extends 300mm at top and bottom of step/stair or has a positive return	As specification	As specification
	Lighting	Lighting provided during darkness on steps. Even spread	-	150 lux
	Threshold ramps: when threshold is between 5 -15mm	Chamfered or pencil rounded	As specification	As specification

L	Lifts			
	Lift	Internal car dimensions: 1500mm x 1500mm minimum	Through floor type platform lift	Passenger lift
		Door opening 800mm clear open width	-	-
		Easy-to-use embossed buttons, with Braille	-	-
		Light signal on lift buttons: external and internal	-	-
		Audible signal when lift is level with floor	-	-
	Lighting	Overhead lighting providing 150 lux lighting, even spread inside and outside lift car	As specification	As specification
	Lift shaft	To provide lift as specified above	As specification	As specification

D	Doors			
	Classrooms doors			
	Vision panel	Remove existing and substitute with doors with vision panel, with safety/shatterproof glass	Vision panel providing a zone of visibility between 700mm to 1350mm	Vision panel providing a zone of visibility between 700mm to 1350mm
	Operational force	Remove or adjust doors with heavy operational force	As specification	As specification
	Clear opening width less than 750mm	Replace door/adjust door opening mechanism	As specification	As specification
	Door opens outwards onto walkway (except wheelchair accessible WC)	Re-hang doors to open inwards into the classroom	As specification	As specification
	Door handles	Lever or 'D' handle at least 150mm in length and 20mm in diameter	As specification	As specification plus
		The door lever/handle positioned at 1000mm above finished floor level, and at 50mm from the edge of the doorframe, protruding from the door by 45mm		Ensure that handle contrasts with the colour of the door
	Security doors	-	Hold back on catches against wall	replace and fit with secure classroom doors
	Lighting	Lighting provided during darkness on routes. Even spread	-	150 lux

BU	Building Upgrade			
	Classroom blocks	Sound proofing on classrooms adjacent to sources of conflicting background noise (e.g. motorway)	As specification	As specification
	Lockable storage space	Spare secure storage	As specification	As specification
		Space equivalent of a standard metal office cupboard	-	-
	Room for assessment, therapy, Braille facilities, with sink	Spare room, minimum 3m x 3m with inward opening door placed in corner	Existing space available or use existing teacher's office/ staffroom	Add new

DE	Desks, Counters, Seating, Furniture			
	Accessible reception counter	Counter: 700mm deep, clear access both sides. Clear knee space of 750mm high and 600mm deep. Reception desk at 800mm	As specification plus 900mm wide, clear space in front of counter	As specification plus 1800 wide, clear space in front of counter
	Lighting	Overhead lighting providing 200 lux lighting on counter surface, even spread	As specification	As specification
	Colour contrast	Tonal contrast between counter surface and surround, matt finish	-	-
	Accessible class chairs	Chair: seat height 320mm with an adjustable range of 75mm above and below 320mm. Arms on chairs	4	All
	Accessible class tables	Desk at 700mm high. Clear knee space underneath of 650mm high, 600mm deep	1 per school	All
	Accessible teachers' chairs	Chair: seat height 410mm with an adjustable range of 75mm above and below 410mm. Arms on chairs	-	-
	Accessible teachers' tables	Desk at 800mm high. At least 700mm deep. Clear knee space underneath of 750mm high, 600mm deep	As specification	As specification
	Additional storage	Provide new cupboard equivalent to a standard metal office cupboard	-	-

E	Drinking/Eating			
	Accessible water fountain	Free standing water fountain with a water spout and control at 900mm height from the floor of the fountain	1 per school	1 per water fountain facility
		Clear knee and turning space, lever control	-	Change existing, if it does not conform to the specification
		Suitable surface type, with a fall of 1:40 - 1:60 to drain off concrete surface	1800mm x 1800mm. No steps or thresholds on or off facility	Y x (1800mm x 1800mm), where Y = number of water fountain facilities. No steps or thresholds on or off facility
		Overhead cover	Shade	Protection from sun and rain
	Accessible eating area	With water fountain as part of facility	-	All
		Fixed external seats and tables. Space at table for learner in wheelchair	One table, four chairs and two wheelchair spaces per school, space each end of table for learner in wheelchair	All tables and chairs as specification
		Suitable surface type	3m squared surface area	3m squared surface area
		Chair	4	All
	Wheelchair users	Table: height 850mm, space underneath 750mm high, 600mm deep	1	All
		Overhead cover	Shade	Protection from sun and rain

SP	Sports and Other Facilities			
	Accessible football field	Levelled, compacted earth	-	-
	Accessible netball field	Levelled, compacted earth	-	-
	Spectator area	Seating	-	Chairs provided for spectators
		Overhead cover: shade trees	-	Protection from sun and rain covering the spectator seating
	Route	Levelled, compacted earth	-	As specification

WC	WCs			
	Accessible WC			
	VIP type	WC pan with lid	1 per school if VIP type specified	1 per provision of WCs or every 50m travelled, whichever is higher
		1800mm x 1800mm (internal cubicle space after wall fittings)		
		Outward opening door		
		3 x grab rail: wall adjacent to WC, wall at rear of WC, positioned vertically on door		
	Flush type	WC pan with lid	1 per school if VIP type specified	1 per provision of WCs or every 50m travelled, whichever is higher
		Extended lever handle on flush		
		1800mm x 1800mm (internal cubicle space after wall fittings)		
		Outward opening door		
		3 x grab rail: wall adjacent to WC, wall at rear of WC, positioned vertically on door		
	Colour contrast	Tonal contrast between fixtures, fittings and surround, matt finish	As specification	As specification
	Lighting	Tonal contrast between fixtures, fittings and surround, matt finish	As specification	As specification
	Additional general WCs	Tonal contrast between fixtures, fittings and surround, matt finish	As specification	As specification

APPENDIX B: CSIR GUIDELINES FOR THE PROVISION OF SOCIAL FACILITIES IN SOUTH AFRICAN SETTLEMENTS

CSIR GUIDELINES FOR THE PROVISION OF SOCIAL FACILITIES IN SOUTH AFRICAN SETTLEMENTS

First Edition: August 2012

CSIR Mandate

The Council for Scientific and Industrial Research (CSIR) was established on 5 October 1945.

The CSIR's mandate is as stipulated in the Scientific Research Council Act (Act 46 of 1988, as amended by Act 71 of 1990), section 3: Objects of CSIR:

"The objects of the CSIR are, through directed and particularly multi-disciplinary research and technological innovation, to foster, in the national interest and in fields which in its opinion should receive preference, industrial and scientific development, either by itself or in co-operation with principals from the private or public sectors, and thereby to contribute to the improvement of the quality of life of the people of the Republic, and to perform any other functions that may be assigned to the CSIR by or under this Act."

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education services

Primary School

PLANNING

Private

Provincial Department of Education

IMPLEMENTATION

Private

Provincial Department of Education

See table overleaf for site sizes of different school types (proposed by National Dept. of Education)

POPULATION THRESHOLD RANGE (OPTIMAL)	7 000 people (for large primary school); 1 000 people for Settlement Type H
ACCESS DISTANCE	5 km; 10 km for Settlement Type H
SITE SIZE *(KwaZulu-Natal Department of Education Feb 2009)* **NB:** Permission for deviations if the site size is smaller than the minimum can be obtained from the Department of Education (see Minimum Requirements below)	Minimum 2.8 ha (including sports fields); If sharing community sports fields – 1.4 ha/two primary schools, each of 1.4 ha and sharing sports ground of 2.0 ha – 4.8 ha
SCHOOL SIZE	960 learners for a threshold of 7 000 people
CLASS SIZE	20 - 30 learners – Grade R 40 learners – other grades

Description

Public and non-public schools offering Grades R – 7 (age group 5 - 12).

Minimum Requirements

Smaller site sizes than the stated minimums may be desirable and achievable but permission from the National Department of Basic Education is then required. Such submissions for smaller site sizes should ideally be supported by concept design plans showing how the minimum requirements of the Department are still being met on the smaller site size.

No differences in the level of provision across high-density and low-density locations, although design standards may differ.

education services

Primary School

Proposed that land within the school site be set aside for use by school or community for cultivation of produce; minimum 0.3 m² per full-time learner in primary and secondary schools *(KwaZulu-Natal Department of Education, Feb 2009)*.

Facility Sharing and Clustering – recommended

Increasingly, the benefits of schools and communities sharing facilities such as sports fields, halls and other facilities are being recognised. Unless a primary school can share nearby sports facilities with another primary school or with the community (municipal provision), it should be provided with the basic minimum space for a soccer or rugby field and space for netball or volley ball (0.9 ha). For effectiveness, this minimum should be doubled. Sharing of sports fields between schools and with the community is strongly supported, but ideally every school should have two sports fields of its own.

Locating primary and high schools in close proximity to each other is not acceptable to all communities.

A primary school may be clustered with:

- a library;
- another primary school;
- a secondary school;
- a community hall;
- local sports fields;
- neighbourhood and district parks;
- a swimming pool;
- urban agriculture;
- a primary health care centre;
- a worship centre.

Threshold Issues

Of the total population, about 14% is of primary school-going age; therefore a large-sized primary school of about 960 learners would serve a population of 7 000. A population of 4 000 to 4 500 would support a medium-sized school of 600 learners.

The then National Department of Education proposed specific minimum and maximum numbers of learners for certain school prototypes and associated with these certain minimum and maximum site sizes (see table overleaf). It advocates 620 learners as an optimal primary school size.

education services

Primary School

Proposed National Primary School Types

SCHOOL PROTOTYPES	MINIMUM CAPACITY (no. of learners)	MAXIMUM CAPACITY (no. of learners)	NO. CLASSES per grade	MINIMUM SITE SIZE (ha) – includes sports fields of 0.9 ha	OPTIMUM SITE SIZE (ha) – includes sports fields of 1.8 ha
Small primary school	135	310	1	1.9	3.2
Medium primary school	311	620	2	2.8	4.4
Large primary school	621	930	3	3.5	6.2

(National Department of Education, 2008)

With respect to the above, the small primary schools would be suitable for areas with low development densities and for schools targeting a specialised small target group. Medium-sized schools would be appropriate in medium-density areas while large schools are the more appropriate vehicle to manage the backlog of schools in high-density areas. In the metro context, a primary school of approximately 960 learners is a more effective size with respect to land use and distribution.

Two-session schooling, while not ideal, may need to be considered.

Density and Development Context

Residential densities are a critical factor in the provision of accessible facilities to communities. The following table provides illustrative access distances for a primary school of 960 learners serving a local community of 7 000 people (generally primary school population constitutes an average of 14% of the total population and household sizes are assumed to be an average of four people).

Accessibility standards are indicative only since consumer choice and increasing levels of mobility result in people choosing to use facilities outside their local community. In addition few areas have regular land use patterns and shapes and facilities that are evenly distributed.

TYPICAL RESIDENTIAL NEIGHBOURHOOD DENSITIES* REQUIRED TO ACHIEVE CERTAIN ACCESS DISTANCES FOR A 960-LEARNER PRIMARY SCHOOL	
PERSONS PER HA (PPHA)/ DWELLING UNITS PER HA (DU/HA)	DISTANCE (KM)
65 ppha/16 du/ha	0.5
16 ppha/4 du/ha	1.0
7 ppha/1.8 du/ha	1.5

**The residents per hectare within residential areas plus internal distribution roads, local shops, schools, service facilities, parks and open space serving only local needs*

Other information sources:

The 'Red Book' – Guidelines for Human Settlement Planning and Design. 2000. (available free online at **www.csir.co.za/Built_environment/RedBook/**)

Government Gazette, 21 November 2008, Notice 1439 of 2008, Department of Education, South African Schools Act 84 of 1996, Calls for comments on national minimum uniform standards for school infrastructure

education services

Grade R
Early Childhood Development (ECD)

GRADE R Class of 20 children (5 - 6 years old) preferably as part of a primary school	
POPULATION THRESHOLD	1 class per 1 000 people
ACCESS DISTANCE	2 km preferred; 5 km
SITE SIZE	See National Department of Education guidelines for Primary Schools
FACILITY SIZE	See National Department of Education guidelines for Primary Schools

PLANNING

Private

Provincial Department of Education

IMPLEMENTATION

Private

Provincial Department of Education

Description

Grade R is a compulsory pre-school year for learners aged 5 - 6 years and critically prepares children for Grade 1 and ensures school readiness.

Threshold Issues

Demand is influenced by the age profile of the community.

Location Factors

Same as for Primary Schools. Important considerations include avoiding high levels of traffic and socially unacceptable behaviours (such as from bars or taverns) in the near vicinity.

Other information sources:

The 'Red Book' – Guidelines for Human Settlement Planning and Design. 2000. (available free online at www.csir.co.za/Built_environment/RedBook/)

Department of Social Development and UNICEF. May 2009. Guidelines for early childhood development services [Online], available at: www.info.gov.za/view/DownloadFileAction?id=70066 [Accessed on: 12 March 2010].

Government Gazette, 21 November 2008, Notice 1439 of 2008, Department of Education, South Africa Schools Act 84 of 1996, Calls for comments on national minimum uniform standards for school infrastructure.

education services

Crèche
Early Childhood Development (ECD)

PLANNING
Private

IMPLEMENTATION
Private

CRÈCHE Small (capacity: 35 children younger than 5 years) Large (capacity: 35 - 150 children younger than 5 years)	
POPULATION THRESHOLD (demand highly dependent on age structure of community and usage rates)	2 400 - 3 000 people Higher income areas may require fewer facilities
ACCESS DISTANCE	2 km
SITE SIZE	Varies but a minimum of 0.02 ha could accommodate 100 children; No special allocation of land required, requires registration and permitted use permission
FACILITY SIZE *(National Department of Social Development)*	Indoor play area – at least 1.5 m² per child; Outdoor play area – 2 m² per child; If there is no outside space, 1 m² per child must be added to indoor area; Where crèches have small play area, they should preferably be in close proximity to open play areas/ parks; If over 50 children enrolled full day then separate office, sickbays and staffroom required

Description
Provides a programme for the care of more than six young children - can include day-care centre, crèche, nursery school, play school and after-care.

Threshold Issues
Demand is very dependent on social structures within communities and may vary widely.

Location Factors
Important considerations include avoiding high levels of traffic and socially unacceptable behaviours (such as from bars or taverns) in the near vicinity. Clustering in a community precinct is advisable. Where land is scarce, explore options of having crèche on nearest school premises with Department of Education.

Other information sources:
The 'Red Book' – Guidelines for Human Settlement Planning and Design. 2000. (available free online at www.csir.co.za/Built_environment/RedBook/)

Department of Social Development and UNICEF. May 2009. Guidelines for early childhood development services [Online], available at: www.info.gov.za/view/DownloadFileAction?id=70066 [Accessed on: 12 March 2010].

Draft Policy on Early Childhood Development, City of Cape Town 2010.

education services

Resource Hub and Care Centre Early Childhood Development (ECD)

RESOURCE CENTRE A facility catering for 250 - 400 children	
POPULATION THRESHOLD (demand highly dependent on age structure of community and usage rates)	20 000 people
ACCESS DISTANCE	5 km
In addition to a resource centre, 6 - 8 small crèches are required to cater for an additional 300 children to fully provide for 20 000 people. If 400 children per facility cannot be achieved for any reason, may need to increase the number of small crèches in the vicinity.	
SITE SIZE	Approx 0.1 ha. Generally requires a minimum of 0.02 ha per 100 children
FACILITY SIZE *(National Department of Social Development)*	Indoor play area – at least 1.5 m² per child; Outdoor play area – 2 m² per child; If no outside space, 1 m² per child must be added to indoor area

PLANNING

Municipality

IMPLEMENTATION

Municipality

Description

A facility equipped for the care and development of children less than five years of age. Such centres encompass care facilities, provide a centre for outreach services to the community and surrounding smaller crèches, and acts as a training and resource centre with respect to ECD in the community.

Threshold Issues

Demand is dependent on social structures within communities and may vary widely. This is a critical component to improving education in society and services should be more universally and affordably available.

Location Factors

Important considerations include avoiding high levels of traffic and socially unacceptable behaviours (such as from bars or taverns) in the near vicinity.

Other information sources:

The 'Red Book' – Guidelines for Human Settlement Planning and Design. 2000. (available free online at www.csir.co.za/Built_environment/RedBook/)

Department of Social Development and UNICEF. May 2009. Guidelines for early childhood development services [Online], available at: www.info.gov.za/view/DownloadFileAction?id=70066 [Accessed on: 12 March 2010].

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parks and recreation services

Public Open Space
Types and Definitions

NB: In this report, standards have only been provided for the public open space components in respect of:

- Parks (District and Community including neighbourhood parks);
- Sports Fields and Facilities; and,
- Cemeteries (see facility sheet under Social Services Sector).

Definition of Open Space — Public open space that is provided for the benefit and use of the public. Provision of open space within housing complexes can, in addition to sports facilities and parks, also include cemeteries, detention ponds, nature reserves, river corridors, conservation areas, mountains and road reserves. Although providing visual relief, the latter group of uses is not included in the provision rates specified on the following pages for park space, i.e. this provision is over and above park space provision.

parks and recreation services

Parks

GENERAL PROVISION	0.5 ha* per 1 000 people		
	Three levels of provision	Allocation of total provision/1 000 people	Access distance
HIERARCHY OF PARK TYPES	Neighbourhood Parks Community Parks	0.3 ha*	(1 km) or 20 minutes walk
	District/ Regional Parks	0.2 ha*	10 km or 15 minutes travel time by public transport

* *See Key Issues below*

In low-density areas formal park space may not be required as there are plentiful informal open space areas and there may be other more important demands on public funding.

PLANNING

Municipality

IMPLEMENTATION

Municipality

See table overleaf for site sizes of different park prototypes, possible thresholds and catchment areas

Descriptions

Parks — Landscaped open space with recreational facilities which serve the public. May include passive or active recreational areas but currently excludes sports fields.

Neighbourhood Parks (including pocket parks, public squares and urban parks) are smaller park spaces serving the immediate local community/neighbourhood (within walking distance); focused on informal recreation including play equipment and kick-about areas.

Community Parks are larger landscaped park spaces with informal and formal recreational facilities – generally multifunctional and serving several surrounding local communities or suburbs.

District/Regional Parks are large-scale multi-functional parks, meeting the wide ranging needs of the district/regional community and preserving unique and often extensive landscapes. Some may be considered to be Strategic Parks, such as botanical gardens.

Key Issues

The provision ratios provided in the table above (marked with *) could be lowered if parks are clustered with sports fields. The multi-use of parks also leads to increased levels of security and maintenance in general (Essenwood Park's Flea Market, eThekwini is a good example of this).

The rural community supports the provision of play equipment at other social facilities such as schools and libraries even if actual parks are not provided (CSIR Park Survey conducted in eThekwini in 2009).

The survey also indicated that if parks cannot be well-maintained and proper provision made for them, people would prefer to have access to fewer but larger parks that are better maintained and secure rather than being provided with many small parks that are unkept and that lack facilities.

parks and recreation services

Parks

Illustrative Provision of Parks for 60 000 People

POSSIBLE NUMBER OF NEIGHBOURHOOD AND COMMUNITY PARKS THAT CAN BE PROVIDED FOR 60 000 PEOPLE AT 0.3 HA PER 1 000 PEOPLE AT DIFFERENT LEVELS OF PROVISION			
Park type	Threshold level at which provided	Ha/One facility (optimum size - ha)	Number of parks
Neighbourhood – small	3 000 people	1.0	10
Neighbourhood – large	15 000 people	1.5	3
Community Parks	60 000 people	3.5	1

At a district level, a further 12 ha can be provided for 60 000 people (based on the 0.2 ha/1 000 allocation).

Examples of Park Prototypes

PARK HIERARCHY	PARK TYPE	MINIMUM SITE SIZE (HA)	RANGE OF SITE SIZES (HA)	CATCHMENT AREA (KM)
Neighbourhood Parks	Play/ pocket park	0.04	0.1	0.5
	Playground (including play equipment)	0.4	1.0	0.5
	Local/ neighbourhood	0.8	2.0	0.75
Community Parks		1.5	8 - 20	1.5 - 3
District/Regional Parks		2	40	>10

(Source: PPDC, the 'Red Book' and others)



parks and recreation services

Parks

Sharing and clustering — recommended

A neighbourhood park may be clustered with:

- a library;
- a primary school;
- a community hall;
- a local sports field;
- district and regional parks;
- urban agriculture;
- a primary health care centre;
- a fire station;
- a worship centre;
- a nature conservation area.

A district park may be clustered with:

- a primary school;
- a secondary school;
- tertiary education/trade schools;
- a community hall;
- an indoor sports hall;
- a sports stadium;
- a local sports field (including multi-purpose outdoor courts);
- a neighbourhood park;
- a swimming pool;
- urban agriculture;
- a primary health care centre;
- a fire station;
- a nature conservation area.

A regional park may be clustered with:

- a secondary school;
- tertiary education/trade schools;
- a community hall;
- an indoor sports hall;
- a sports stadium;
- a local sports field (including multi-purpose outdoor courts);
- a neighbourhood park;
- a swimming pool;
- urban agriculture;
- a fire station;
- a nature conservation area.



parks and recreation services

Sports and Recreation
Overall Allocations for Sports Fields and Facilities

PLANNING
Municipality

IMPLEMENTATION
Municipality

See table overleaf for typical facilities that can be provided for 60 000 people at this rate of provision

GENERAL PROVISION	0.56 ha per 1 000 people An additional 0.3 ha per 1 000 in metropolitan areas for higher-order facilities		
POSSIBLE HIERARCHY OF PROVISION – in certain contexts preferable to accumulate and provide higher-order facilities to greater population *(Source: CPA 1989 and CSIR 2007)*	*Scale and level of provision*	*Proportional allocation of total provision/ 1 000*	*Threshold (no. of people)*
	Neighbourhood	0.23 ha	3 000
	Community/ Sub-district	0.21 ha	15 000
	District/ Sub-regional	0.12 ha	60 000
	Metro/Regional	0.3 ha - 0.4 ha	120 000
ACCESS DISTANCE	3 km - 10 km local facilities 10 km - 50 km regional facilities		

Description

Active recreation areas including formally provided and maintained playing fields for soccer, rugby, hockey, etc.; playing courts; indoor sports halls and stadiums. May include ablution facilities, seating, parking, tuck shop and club house.

Sharing with Schools

The use of school facilities by the general public in areas where there is a shortage of sports and recreation facilities may alleviate shortages and improve maintenance and control issues. However, in these areas it is likely that schools will themselves be lacking their own sports fields and facilities and will require access to those provided to the general public. Newly built facilities such as multi-purpose sports halls and complexes that lie adjacent to, close to, or are part of school properties allow for cost and land savings.

Sports Facility Types

In a metropolitan area it is recommended that for each 120 000 persons, a cluster of various sports facility types should be upgraded to a regional facility, i.e. a major sports complex with floodlight facilities and an Olympic size swimming pool or, where appropriate, a water sports centre.

The table overleaf gives an example of the number of sports facilities of various scales that can be developed given a 0.56 ha/1 000 persons land allocation for sports and recreation for a total population of 60 000 people.

parks and recreation services

Sports and Recreation
Overall Allocations for Sports Fields and Facilities

This allocation excludes land provision for community halls, but could include sports halls and other small-scale covered facilities as part of the land allocation.

POSSIBLE NUMBER OF OUTDOOR SPORTS FACILITIES OR EQUIVALENTS* THAT CAN BE PROVIDED FOR 60 000 PEOPLE AT 0.56 HA PER 1 000 PEOPLE AT DIFFERENT LEVELS OF PROVISION

Sports facility types	*Ha/ One facility*	*Number for neighbourhood*	*Number for community/ sub-district*	*Number for district/ sub-regional*	*Total number*
Soccer practice fields	0.55	20	4	0	24
Soccer fields with 500-spectator pavilion	1.5	0	4	4	8
Stadium (soccer field, athletics track and pavilion for 3 000)	3.0	0	0	1	1
Tennis courts	0.065	10	8	2	20
Combi-court	0.065	20	16	0	36
1 cricket oval/1 baseball/2 softball fields	1.6	0	2	1	3
Netball fields	0.065	10	0	2	12
Swimming pools (12.5 m - 25 m)	0.18	0	0	1	1

(Source: CPA 1989 and adapted by CSIR 2007 and 2010)

* *Equivalents: the type of facilities provided would depend on community needs and participation patterns, thus these facility types are not prescriptive but simply demonstrative and any other equivalent facility types in terms of field sizes can be substituted depending on the development context. See below for formal sports field dimensions for common outdoor sports fields.*

Formal Sports Fields Dimensions for Common Outdoor Sports Fields

(Note – not strictly required for informal sporting activities)

SPORTING CODE	FORMAL FIELD DIMENSIONS
Soccer	65 m x 105 m (6 825m²)
Rugby	69 m x 125 m (8 625m²)
Cricket – oval	128 m x 128 m (16 384m²)
Hockey	50 m x 87 m (4 350 m²)
Volleyball	9 m x 18 m (162 m²)
Basketball	14 m x 26 m (364 m²)
Netball	15 m x 30 m (450 m²)

(The 'Red Book' Chapter 5.4, p11)

parks and recreation services

Sports and Recreation
Overall Allocations for Sports Fields and Facilities

Specific Sport Infrastructure Types

TYPE OF SPORTS FACILITY	TYPICAL THRESHOLD (no. of people)	SITE SIZE (ha)	DESCRIPTION
General facilities provided for from the 0.56 ha budget			
Multi-purpose sports halls (see table below for details)	15 000	0.15	Hall for indoor sports, such as badminton, hockey, basketball, etc. and other recreational purposes
Swimming pools	60 000	0.18	Minimum for pool of dimensions 12.5 m x 25 m
Sports complexes	60 000	1.5 - 2.5	Grouping of fields and/or sports facilities
Higher-order facilities provided for from the 0.3/0.4 ha accumulated budget			
Sports stadiums	200 000	3.0	With athletics track and 3 000-spectator pavilion
Regional sports arenas (indoor sports halls)	250 000 - 500 000	0.5	Large-scale indoor arena, may also host non-sporting events
International sports complex	1 500 000	3.0	Capable of hosting national, international and special events



parks and recreation services

Sports and Recreation
Overall Allocations for Sports Fields and Facilities

Sharing and clustering — recommended

An indoor sports hall may be clustered with:

- tertiary education/trade schools;
- a community hall;
- a sports stadium;
- a local sports field (including multi-purpose outdoor courts);
- district and regional parks;
- a swimming pool;
- a primary health care centre.

A local sports field (including multi-purpose outdoor courts) may be clustered with:

- a primary school;
- a secondary school;
- tertiary education/trade schools;
- a community hall;
- an indoor sports hall;
- a sports stadium;
- neighbourhood, district and regional parks;
- a swimming pool.

A sports stadium may be clustered with:

- a secondary school;
- tertiary education/trade schools;
- a community hall;
- an indoor sports hall;
- a local sports field (including multi-purpose outdoor courts);
- district and regional parks;
- a swimming pool.

A swimming pool may be clustered with:

- a primary school;
- a secondary school;
- tertiary education/trade schools;
- a community hall;
- an indoor sports hall;
- a sports stadium;
- a local sports field (including multi-purpose outdoor courts);
- district and regional parks;
- a fire station.



parks and recreation services

Sports and Recreation
Overall Allocations for Sports Fields and Facilities

Multi-purpose Sports Halls – Building Sizes and Capacities

SPORTS HALL configuration*	TYPICAL THRESHOLD (no. of people)	MINIMUM HALL AREA (ha)	BUILDING SIZE (ha)**	DESCRIPTION
Single-court hall	<15 000	0.018	0.042 (no stage) 0.054 (with stage)	Not recommended – limited multi-purpose potential; audience capacity 180
Two-court hall	<15 000	0.036	0.072	Audience capacity >300
Three-court hall	–	0.0486	Not recommended unless site area restricted as four court hall is only 20% larger but far greater potential for range sports	
Four-court hall	15 000 - 25 000^	0.0594	0.094	Good size for range of sports#, sufficient size for school of 400 to 1 100 pupils
Six-court hall	25 000 - 50 000^	0.0918		
Eight-court hall	50 000 - 65 000^	0.1221		Increased ceiling height demands; for sports with limited space requirements (e.g. table tennis) allows for 1 000 seated spectators; often used for non-sports events
Nine-court hall		0.1377		More scope for indoor hockey, football (six-a-side), handball, athletics and gymnastics
Twelve-court hall		0.1782		Small regional arena and spectator venue for local competitions; over 700 seated spectators for e.g. handball, hockey but more for other sports and entertainment

* *Conventionally configured in terms of badminton court dimensions as this is generally the most stringent code operating in these types of facilities*

** *Includes space for storage, ablution facilities, changing areas and stage*

\# *Can house with alternative configurations: four badminton courts, one basketball court, four cricket nets, two gymnastic floors, one indoor hockey pitch, two judo floors, six trampolines, four table tennis tables, one volleyball court*

^ *Typical threshold levels sourced from The Government of the Hong Kong Special Administrative Region (2006)*

Source: Sport England (2010) and as followed by National Department of Sport and Recreation, South Africa (2008)

Other information sources:

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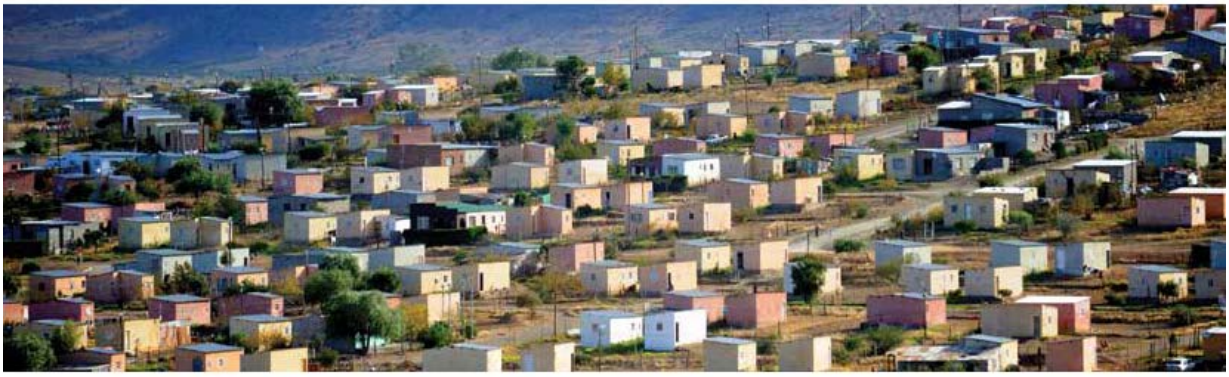

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Appendix A
Matrix of cluster potential of mainly local facilities

Compatible facilities / Compatible facilities	Library	Primary school	Secondary school	Tertiary education/trade schools	Community centre	Indoor sports hall	Sports stadium	Local sports field incl. multi-purpose outdoor courts	Parks: Neighbourhood	Parks: District	Parks: Regional	Swimming pool (25 m - 50 m)	Urban agriculture	Cemetery/Crematorium	Primary health care centre	L1 Hospital	Police station	Fire station	Worship centre	Nature conservation area
Library	■	●	●	●	●				●					●	●				●	
Primary school	●	■	●		●			●	●	●		●	●		●				●	
Secondary school	●	●	■	●	●		●	●		●	●	●	●		●				●	
Tertiary education/trade schools	●		●	■	●		●	●		●	●	●	●		●					
Community centre	●	●	●	●	■	●	●	●	●	●	●	●	●		●		●	●	●	
Indoor sports hall				●	●	■	●	●		●	●	●			●					
Sports stadium			●	●	●	●	■	●		●	●	●			●					
Local sports field incl. multi-purpose outdoor courts		●	●	●	●	●	●	■	●	●	●	●			●					
Parks: Neighbourhood	●	●			●			●	■	●	●		●		●		●	●	●	
Parks: District		●	●	●	●	●	●	●	●	■		●	●		●		●		●	
Parks: Regional		●	●	●	●	●	●	●	●		■	●	●		●		●		●	
Swimming pool (25 m - 50 m)	●	●	●	●	●	●	●	●		●	●	■								
Urban agriculture	●	●	●	●	●					●	●		■		●				●	
Cemetery/Crematorium														■			●	●	●	
Primary health care centre	●	●	●	●	●	●				●	●		●		■	●				
L1 Hospital														●	●	■		●		
Police station														●			■	●		
Fire station					●					●	●	●		●		●	●	■		
Worship centre	●	●	●		●							●							■	
Nature conservation area										●	●	●		●						■

Appendix B
Matrix of functional potential for multiple-use of social facilities

Potential secondary functions → / Primary function of the facility ↓	Library	Community centre	Worship centre	School	Sports hall	Sports stadium	Local sports field	Multi-purpose outdoor court	Nature conservation	Primary health care centre
Place to study	●	●		●						
Meetings/social – small group	●	●	●	●						●
Gatherings – large group		●	●		●	●				
Pension pay out	●	●								
Adult training facilities	●	●		●	●					
Counselling centre	●	●	●	●	●					●
Municipal information sessions	●	●	●	●	●	●				●
Religious services		●	●	●	●	●				
Prayer meetings	●	●	●	●						
Home Affairs (periodic)		●								
Social Welfare (periodic)		●								●
Child Welfare (periodic)		●		●						●
Feeding scheme	●	●	●	●						●
Legal aid	●	●	●							●
Overflow sports for schools					●	●	●	●		
Inter-school events					●	●	●	●		
Bazaars and fetes		●	●	●	●	●	●	●		
ICT access	●	●		●	●					●
Play equipment	●	●		●						●

SENSORY PERCEPTION AS A DESIGN PROCESS INFORMANT

A proposed school for the Durban North Area

By: Peter Oravecz - 205508279

DESIGN PRIMER

01 BACKGROUND

Most people spend their lives in buildings, with their thoughts being shaped by the walls around them, yet they do not really know why they are unable to concentrate, why they feel cold, yet it is not, or why they are never comfortable at their desk yet they have a nice chair, a nice desk, a neatly painted wall. These occurrences are all **PHENOMENOLOGICAL** aspects of architecture.

The psychology of the **ARCHITECTURAL ENVIRONMENT** can be separated into two main elements: "**UNDERSTANDING**" – how one notices their environment – and "**PERCEPTION**" and "**COGNITIVE**" – how one cognitively maps what they experience based on what they know or think they know about their environment.

ENVIRONMENTAL PSYCHOLOGY studies people's motivations illustrating the fact that people naturally seek out places where they will feel competent, productive, confident, where they will feel comfort or enjoyment.

These principles apply to every scenario in life. There is always a prevalent influence of the environment on humans; whether is it out in nature, or in a basement parking lot.

PROBLEMS FACING LEARNERS

The performance of learners has **DETERIORATED** drastically over the years. This has far-reaching consequences, impacting negatively on the economy and leading to a general **DEGRADATION OF SOCIETY**. This may seem contradictory since the Matric pass rate has gone from 60.6% in 2009 to 67.8% in 2010, followed by 78.2% in 2013.

It has not been considered that the criteria for passing matric as a role to play in these figures as well as the massive dropout rate. The learners that obtained their matric in 2013 began grade one in 2002 with a number of 1 261 827, and by 2013, only 562 112 learners had completed all their years of schooling to write their matric examinations. The minister of higher education is also endeavouring to reduce the matric **PASS MARK** to **30%** John, V (2014). This suggests that 70% of the knowledge taught at schools is essentially unnecessary knowledge.

These few facts beg the question of whether or not their **SCHOOL ENVIRONMENT** plays a role in their motivation in completing their schooling career stemming from their elementary school years. How can a learning environment **PROMOTE** concentration, discipline and performance?

If a child **FEELS** uncomfortable or unhappy in their **LEARNING ENVIRONMENT**, how are they able to concentrate, and more importantly, how long will it take them to feel at ease? This may take days, months or even years. One may ask if this initial negative impression of educational institutions be a **LINGERING FACTOR** affecting the child through their entire educational phase? How can this be prevented? How can well-being and concentration be promoted by the child's learning environment – the classroom?

This is an ambitious intent to propose a building typology that addresses the issue of promoting learner well-being and the desired psychological responses that ultimately translate to a better educational system.





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DESIGN PRIMER

01 SENSORY PERCEPTION AS A LEARNING TOOL

The definition of "Sense perception" is understanding one gains through information gathered by the use of the body's five senses such, namely;

SIGHT • HEARING • SMELL • TASTE • TOUCH





Sensory perception does not only pertain to the tangible, but also intangible - The passage of time, light, shadow and transparency, colour phenomena, texture and material – all these aspects combined, participate in the complete sensory experience. In the case of this project, they can apply to architecture.

Only architecture can awaken all the senses – "All the complexities of perception". Holl (2006).

When one enters a building, one experiences it, regardless of its nature. This complete experience can be achieved through purly media. The actual building allows the eye to roam freely among the inventive details; only architecture itself offers the tactile sensations of textured surfaces and natural finishes, the experience of light changing with movement, the smell and resonant sounds of space and bodily relations of scale and proportion.

"The building speaks through the silence of perceptual phenomena". Holl (2006).

For the proposed building, extensive research has been done regarding sensory perception and the psychological implications in children within their developmental phase of life. The research is available in the accompanying documentation of this project.

The Goal of this project is to design a building that takes all the finding from the research, precedent studies and case studies and translate all the positive aspects into built form.

In the literature review contained in the accompanying documentation some crucial insight has been gained pertaining to the various aspects of not just the architectural design of a learning space or institution, but rather a variety of aspects found in everyday life and the kaleidoscope of effects they may have on children, more specifically in the learning environment.

The studies conducted by the various authors mentioned in the literature review literature review have shown astounding results that should not be taken lightly when designing a learning institution.

It is therefore an architect's duty to take these discoveries, rationalise them and implement them into the design of future primary learning institutions in order to ensure maximum results from learners without compromising their well-being but rather promoting it.

There are many aspects of life in general that may affect a learner negatively, such as family life, etc. however, by removing one of possible negative influences such as their learning environment and making it into a place of positive influence, society will have one less aspect of negative influence on the future generation of children, paving the way for future improvements. This ultimately contributes to the improvement, rather than the decline in academic performance.

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02

PRECEDENT STUDY 1

THREE ELEMENTARY SCHOOLS , NEW HAMPSHIRE

Mill Brook School, Abbot-Downing School and McAuliffe School are Three schools in Concord, New Hampshire that have been designed to promote:

- mental health
- social health
- physical health

The aim is not only focused on EDUCATION, but also on LIFESTYLE.

COLLABORATIVE design process included:

- local community
- school administration

The main question raised, was; How can architecture help the development of children's early skills such as creativity and inquisitiveness in order to become inspired adults of the future? The resulting ideas were that COLLABORATIVE LEARNING should be supported by the spaces and should also be easily accessible by learners and staff in order to fully INTEGRATE them into the daily learning experience. The spaces should provide FLEXIBLE ENVIRONMENTS that would host a range of learning activities. The school is constructed of locally produced and recycled materials for a reduced carbon footprint and negative impacts on the environment.

Key design concepts:

- layout is open plan with subdivisions
- implied spaces rather than physical boundaries.
- multi-use learning corridor
- public space that weaves through the building
- promote flexibility in its use for learning.
- discreet nooks or spatial reliefs
- interactive hub amongst both the staff and learners
- Up-to-date technology
- learners are not confined to a classroom
- penetration of natural light.
- carefully chosen coloursto achieve the desired emotional response
- natural ventilation and adequate mechanical air circulation
- acoustic treatment to the spaces reduce reverberation

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DESIGN PRIMER

02

PRECEDENT STUDY 2

BALLIFIELD PRIMARY SCHOOL, SHEFFIELD

The Ballifield Primary School, located in Sheffield, United Kingdom is part of an program to upgrade and refurbish existing schools.

The design of the school was a result of the collaboration of;

- Designers and architects
- Learners
- School staff
- local community

COLLABORATIVE WORKSHOPS began in which learners placed cards with descriptive words around their school, expressing their FEELINGS about the various SPACES. The learners also gave tours to the adults to show them what they PERCEIVED to be the most interesting parts of the school. Simple questionnaires were given to the learners as homework, in which they had to state in their opinion, what would make their LEARNING ENVIRONMENT a better place for them. Problems around the school were discussed with teachers in order to arrive at a solution which translated into DESIGN drawings.

The existing run down classroom units were replaced by two new classrooms placed at the school's entrance, Toilets and change rooms were refurbished, a shelter and seating area was built near the sports field playground and stepping stones were laid with the learner's handprints cast into them.

Key design Concepts / Themes;

- nature
- technology
- Natural materials
- up-to-date construction technologies.
- sensory as well as natural aspects of their surroundings
- encourage the learning environment to be expanded by its intimate relationship with the external spaces.

21

PRECEDENT STUDY 3

FUJI KINDERGARTEN - TACHIKAWA, JAPAN

The Fuji Kindergarten id designed to promote the following:

- mental health
- social health through experiential learning
- physical healt threw exercise

The aim is not only focused on **EDUCATION**, but also on **VALUES**.

The brief for the building was simple, the directors of the kindergarten wanted a "Roof house for five hundred kindergarten pupils" (McManus, D. 2014) [the roof house is a previous work by Tezuka Architects which serves as an open plan residence with the roof top being used for various activities by the family throughout the year]

Key design concepts:

- The overall building shape is an oval - this implies "endless circulation"
- Children should be free without trying to control them
- roofs to be low in order to promote visibility through the levels
- No internal or external boundaries - to remove anxiety
- No acoustic treatment
- promote self discipline
- only essencial safety measures used
- Promote play
- learners are not confined to a classroom

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DESIGN PRIMER

22

The design of the building is in the shape of an Oval with and open space in the middle, very few walls and many trees. The main aim of the school is to let children be free without trying to control them and babying them. (Akcasu, A. 2015)

In a TED talk, given by Takaharu Tezuka (2014), he states that the building was designed as a circle to have endless circulation, he adds that young children like to dray circles (Tezuka, T. 2014).

The roof was kept as low as possible so the roof could be more visible in order to see the children. If the roof was too high, all that would be visible is the ceiling (Tezuka, T. 2014).

Throughout the year, the building is completely open, with no internal or external boundaries. There are no boundaries between classrooms and no acoustic barriers. Tezuka, T. (2014) states that placing children inside a box causes them to get nervous, but when you remove the boundaries, there is no reason for them to get nervous.

Tezuka, T. (2014), highlights the importance of noise factors. He states that children sleep better in a noisy environment rather than in a quiet place. He states that the children in the school show amazing concentration in class. Children should be able to talk to one another and should not be in silence. (Tezuka, T. 2014)

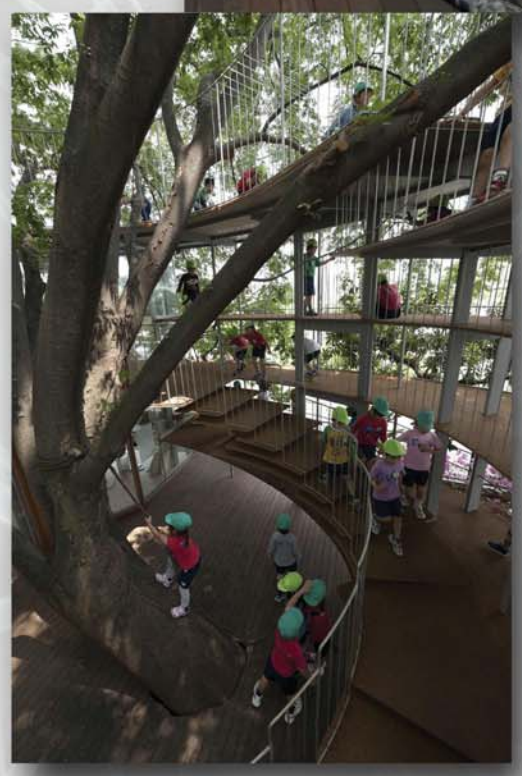
Tezuka, T. (2014) stated that the principal of the school did not want handrails within the school and rather have a net that the children can fall into. Tezuka, T. (2014) advised that this was not possible due to the local authorities. However, he incorporated the ideas of having a net into the building by installing nets between the holes in the building for children to play in and have a connection to the ground floor below.

Tezuke, T. (2014), states that the teachers do not force the children to stay in their designated classroom areas, as they eventually return to their respective spaces due to the circular form of the building. He states that the control that the world is trying to impose on people should not be the case with children within reason.

The annexing building (see figure 37) is what we in South Africa would classify as a kind of Jungle gym, where children may play on in whichever way they wish. There is a risk of injury in areas such as this, however, Tezuka, T. (2014) states that children need to sustain a degree of injury as this makes them learn how to live in our world.

The Fuji Kindergarten has pushed the boundaries in what modern architecture and research as considered appropriate for a learning environment, however, very little of this research, such as that which is contained in the literature review, has been put into practice. This bold endeavor to design a learning environment of this nature has proven successful.

One of the key components of this precedent study is the removal of the Control aspect. Children learn their responsibilities through the freedom to learn by experience and what is deemed acceptable or not. This is one of the key aspects influencing the layout of the design based on this research.



DESIGN PRIMER

CONCLUSION

In conclution, it can be seen that precedent study 1 used purly independant research on sensory perception only in order to develop a design, whereas, precedent study 2, the collaboration between learners and desiners mainly rather than research. It must be kept in mind, that the learners are in fact main focus of a school. Precedent study 3, takes a drastic approach, discards all the norms for school design and has proven successful.

With the above in mind, the design of the proposed school is based on the integration of independant research on the previously highlighted principles as well as interaction with learners in their learning environment and including them in establishing elements of the design process from their point of view. However, designers should think out of the box and design a radical building for children as it is a building primarily for children rather than adults, the building should also serve as "the third teacher" and let children discover themselves by being in the building.

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03 CASE STUDY 1

GLENWOOD JUNIOR PRIMARY SCHOOL, DURBAN

Glenwood Junior Primary School, located at 63 Alan Paton Road, Glenwood, Durban, was established in 1914 originally catering for Grades one, two and three, and has recently added a pre-primary school wing onto it. This particular school was chosen as a case study because, I, the researcher, had attended grade's one two and three in this school from 1989 to 1991 and would be able to contribute my personal experiences and views of the school's built environment from many years ago and relate to the learners experience within the school, as is now in 2014.

The architecture of the original buildings has not changed, there have been a few renovations and refurbishments in order to preserve the old building and some of the small additions, such as an additional grade two classroom that has attempted tofollowed the traditional architecture, although it is constructed of prefabricated panels, and the classroom itself is significantly smaller than the other grade two classrooms. The new pre-primary wing follows a more modern and softer architecture than the original buildings with the new school hall above them. The old hall has been converted into the library.

The School's design;

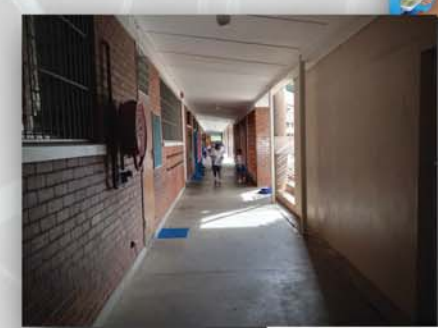
tarred parking area, which once used to be the designated waiting area for both learners and parents under the shade of a colossal Jacaranda tree, a trademark tree for the school and the surrounding area. Sadly, these trees were removed due internal rotting. The Parking area is still used to dismiss the children as well as a waiting area for the parents as it was all those years ago, but it is not an aesthetically pleasing space.

The main reception area and principal's office is located at one of the two main entrances. The reception area leads into a planted courtyard and is enclosed by the grade one classrooms and the library. Two passages on either side of the courtyard lead to the Grade two and three classroom wing with a netball court between the two wings. The playground is located behind the grade two and three classrooms.

A sample group of 5 random children from each grade were selected to take part in the study. All findings are contained in the research document.

Each child was met at their classroom and walked over to the library where the questionnaire was answered. Following that, the learner took the researcher for a tour around the school to show all the favourite spaces around the school and try explain why they liked it. After each learner had been interviewed individually, and their individual tour given, the 5 learners in that particular grade were called together to give the researcher a tour as a group. Following that, the researcher spent time in the child's classroom environment in order to observer his or her interactions with others as well as with their environment.







03 DESIGN CONCEPTS

KEY CONCPTS OF THE DESIGN

SENSORY PERCEPTION

The concept of sensory perception refers to information received by the senses of their surrounding environment which form an overall "feel" of the environment. The combination of information received through the senses have far reaching consequences of one's well-being. For instance, using the "warm" colours from the spectrum may convey a "warmer" feel about a space, but is does not stop there. The colour "red" does not only feel "warm", it is also energizing, and may even promote aggression. Furthermore, the colour "red" reduces the ability for the brain to absorb new information as well as recalling long term stored information, and therefor should be avoided at all costs.

By integrating the principles outlined in the detailed brief in this document will result in a building that addresses all aspects of sensory perception to promote a positive architectural environment with minimal, or no negative effects.

INTEGRATION AND ASSIMILATION

The integration by definition, is the incorporation of multiple individual enitties to form a whole. These enitities, may be tangible, such as solid units, or intangible, such as activities.

In the case of the proposed school, the research highlights the importance of integration of learners within their learning environment, as this is crucial in promoting social learning.

The key enitities of integration are as follows;

- Integration of the learners throughout the building
- Integration of the spaces within the building
- Integration of the building with nature
- Integration of the building with the surrounding environment

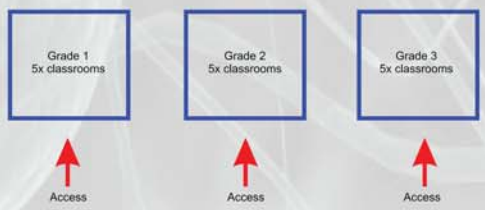
The secondary intention of integration is that the proposed building achieves balance and harmony with the spaces around which it will occupy. The nature of anything that is placed somewhere is that ultimately takes away from that space in one way and therefore should give back in another.

Integrating Classrooms;

The integration and assimilation of classrooms begins with looking at traditional school layouts and their classroom arrangements according to their grades.

INTEGRATION

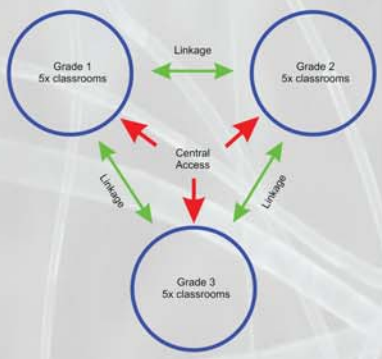
Traditional classroom cluster layout:



This diagram is an example of a traditional layout, with each classroom cluster in linear arrangement according to grade accessed from a single side off a linear corridor.

These classroom clusters are isolated from each other with no concept of integration or linkage between them as they are traditionally separated by means of masonry walls with a single access point.

Circular cluster classroom layout:



This diagram explores the concept of a circular arrangement of classrooms according to their grade. This arrangement is now able to provide a central access point to all clusters with the possibility of linkages between them.

The classroom clusters in this arrangement still remain isolated from each other, albeit an improvement from the traditional linear layout.

Integrated classroom cluster layout:

This diagram explored the concept of integration, a key concept to the research and proposed building.

Here, one can see that by integrating the classroom cluster, there is no need for access points in a particular position as it may be accessed from multiple points and there is no need for linkages as they are now integrated or assimilated into a collective or as a whole.

Flexibility:

Flexibility within the learning environment is vital to achieving a space that is ideal for a particular function. The proposed school is designed with open spaced that may be partitioned off with freestanding interlocking modular partitions that may be arranged as required.

Despite the open plan nature of the building, the integration of recessed areas work area still allows a degree of separation from the main spaces without the need for physical barriers. If the need for complete isolation is required, these areas may be closed off with partitions.

Flexibility does not end with at the learning spaces within the school building, but rather with the various functions and activities throughout the entire site.

As previously mentioned, the proposed development comprises; private, public, semi-public and integrated uses

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04 DESIGN DEVELOPMENT

DETAILED BRIEF

SUMERY OF RESEARCH FINDINGS TO BE INTEGRATED INTO DESIGN

COLOURS: Carefully chosen colours should be incorporated in to the areas depending on their use. This is taking into account all aspects of the spaces, from walls, to fixtures and furniture, etc.... Red, is to be avoided at all cost. Hues around green should be used with moderately contrasting colours to not be too saturated either, but enough to maintain a degree of the energizing effect.

FINISHES: The use of modern, yet hard wearing finishes should be incorporated into a school, as traditional finishes carry a dated aesthetic. A school should symbolise movement forward, traditional finishes may create the perception of being trapped in time, whereas modern finishes would represent the present and the future. Hard wearing surfaces will maintain their aesthetic properties and therefore maintain the newness of the school. Different finishes should also be integrated to form playful, yet technical patterns to invoke intrigue in learners, this also promotes cognitive function in learners by them establishing links in patterns, etc.

SPACE: Adequate space should be provided for learners in order to alleviate negative emotional responses, such as the feeling of trappedness. An open plan space with sub-spaces should be considered. Barriers in areas that do not protect from harm provoke a negative response. Given the fact that children are far smaller in size than adults, features of the learner's environment should be in proportion to the learners size rather than that of an adult.

SPACES: Spaces for use by learners that may require isolation for various class tasks, should be aesthetically pleasing to the learner and that they may feel comfortable in that space by considering all possibilities mentioned in this section to achieve this comfort. Even isolated spaces should invoke the notion of being part of the other spaces.

FURNITURE: Furniture that is aesthetically pleasing and comfortable should be used and should be carefully arranged within the space to promote wellbeing and interactive learning.

SENSORY PLAY: Recreational facilities for young learners should be flexible with mechanical parts and a variety of tactile aspects to promote understanding of physics as well as body mechanics. These recreational environments also serve as a place for social and experiential learning through their recreational environment. Consideration in the choice of materials in this environment also needs to be carefully considered, such as the sand in the sand pits. The sand should be fine, mouldable and comfortable to play with, as opposed to coarse sand with stones.

INTEGRATION: Learners from different grade should be integrated in a way that without compromising their learning groups, they still have access to other learning groups from other grades - A structured open plan learning environment with individual spaces and minimal physical barriers. Spaces should also be flexible and interchangeable to suite different needs and activities. The integration of spaces with different uses creates a multi-functioning environment which is a common fancy among learners. Integrated spaces promote good group dynamics.

The integration of the different grades will also promote equality among learners regardless of their grade and alleviate the possibility of learner superiority by affirming the fact that they are in different grades.

MOVEMENT: Young learners should be freed from traditional linear corridors and should instead move from place to place through an interactive stimulating environment. This approach to movement should be considered for every space in a school, however, adults moving within the spaces also need to be considered.

Children also enjoy exploration, therefore the environment should encompass various places of exploration that also serve a function.

TACTILE: Spaces within the school environment should offer a variety of textures and finishes to promote self-learning.

LIGHTING: Natural light is crucial to the body's circadian rhythm and therefore should be incorporated as much as possible into the learning environment without causing visual discomfort through glare. In the case where artificial lighting is required, light intensity and light colour temperature need to be considered depending on the use of the space.

Artificial lighting with a colour temperature of 10 000k should be used and balanced out with small splashes of light with colour temperature between 4000k and 5000k

VENTILATION: Natural ventilation should be incorporated into the spaces without causing discomfort. Elements such as wind should be controlled without compromising the natural flow of air through a space. In the case of a hot climate, where air conditioning is required, a semi-recirculating system should be used where there is a constant flow of fresh air. Air diffusers should also be positioned so that they do not blow directly on learners as this may cause discomfort. Ablutions with are to be mechanically ventilated.

HYGIENE: Areas such as ablution facilities need to be addressed and child-friendly fixtures used. Clinical finishes that are aesthetically pleasing should be considered for these spaces. Cleanliness is also crucial to these spaces and should not be compromised due to school upkeep issues.

ABLUTIONS: Having many small ablution areas within the school environment would be better than a few large ones, as this would afford more privacy to the learners, as well as not needing to travel far when they need the toilet. By reducing the number of toilets in one area, it will also reduce the size of the space, hence, reducing reverberation to produce a more "homely" feel.

NATURE: The integration of nature into the built environment is an important factor in the promotion of well-being. This can be achieved by incorporating plants and greenery into the learning environment as well as maximising the vegetation outside the school building and providing large windows in order to view them. Large windows also create the feeling of space by reducing the amount visual barriers such as walls. Essentially, nature should be incorporated into every possible aspect of the school environment while maintaining a good balance between natural and man-made elements.

The building is removing from nature, therefore nature should be replaced by providing a green roof.

Shade is also an important aspect of the natural and integrated environment, as comfort is essential for learners to fully experience their environment without hindrance.

Learners should be free to explore the natural environment as they wish. This also promotes experiential self-learning through the natural environment.

Integration with the surrounding nature reserve is therefore essential.

ACOUSTICS: Learning spaces need to be acoustically treated in order to alleviate reverberation and reduce noise. Young learners are not able to ignore irrelevant sounds as well as adults. Klatte, Bergstrom and Lachman (2013). Therefore, in a learning environment, it is crucial to eradicate noise of any kind to the maximum extent to maximise attention of the learner.

TECHNOLOGY: The integration of technology with regards to modern learning and teaching methods with traditional ones, such as old fashion books, pen and paper should be incorporated into the learning environment, as technology is a prominent part of modern life.

VEHICLES: Parking areas and access roads should be completely separate from spaces used by learners. Besides the dangers for children associated with vehicles, roads and parking areas are not conducive to achieving positive emotional responses. Vehicle areas should also however be treated accordingly regarding aesthetics and function.

ACCESS: Places with restricted access to learners should be minimised and where it is necessary, the use of transparent barriers should be used in order to maintain the integration of the learner with the school to promote a sense of belonging. Examples of this are; The staff room, admin offices and adult meeting areas.

VERTICAL CIRCULATION: Adequate means of vertical travel should be provided for children as some of the aspects, such as sports stands require more effort from a child to climb than an adult and therefore stairs suitable for children should be incorporated. Ramps with gradients that conform to building regulations are also be incorporated into the design where necessary. Lifts are to be provided where stairs or ramps are not a possibility.

SAFETY: Every aspect of the learners' environment should have safety in mind when designing. For example, areas that are conducive to slipping, such as the around the swimming pool, the surface should be that of a non-slip kind without causing discomfort to the underside of learner's bare feet.

Activities:A variety of activities should be provided for, such as music, dance, drams, various sports, etc.,., all spaces should be addressed to promote these activities by considering all aspects mentioned in this section and research document as a whole.

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04 DESIGN DEVELOPMENT

SCHEDULE OF ACCOMODATION

ACCOMODATION OF IMMOVABLE SPACES

ADMINISTRATION

RECEPTION AREA

Function:	Main entrance / controlled access for Adults and learners
Quantity:	1
No. of occupants:	1 – 2 receptionists
Area: (m²)	approx. 130m²
Requirements:	- Open plan - Easily accessible with display areas - Waiting area with seating and tables - Close proximity to offices and meeting areas

OFFICES

Function:	Principal's office, ancillary offices for administrative use as required.
Quantity:	5
No. of occupants:	1 – 3 Staff per office
Area: (m²)	approx. 45m² per office
Requirements:	- Open plan desk/workstations with seating and partitions as required - Visually permeable with the option of curtain blinds as required

MEETING AREAS

Function:	Regular meetings may be held
Quantity:	2 (enclosed and open plan)
No. of occupants:	1 – 8 people
Area: (m²)	approx. 50m² per meeting room / area
Requirements:	- AV interface with screen - Curtain blinds as required (enclosed room only)

STAFF ROOM

Function:	Canteen area for staff
Quantity:	1
No. of occupants:	1 – 25 adults
Area: (m²)	approx. 140m²
Requirements:	- Fitted Kitchen with fridge, stove, oven, Microwave and cupboard storage.

ADULT ABLUTIONS

Function:	Male,female & paraplegic ablution facility
Quantity:	1 male, 1 female, 2 paraplegic
No. of occupants:	8 male, 5 female, 2 paraplegic
Area: (m²)	approx. 26m² male, 26m² female, 4m² paraplegic
Requirements:	- Male ablutions to have 5x WC's, 3x urinals, 3x WHB's with hand dryers - Female ablutions to have 5x WC's, 3x WHB's with hand dryers - ducted piping with mechanical ventilation as required - to conform to building regulations

SICK BAY

Function:	to facilitate sick learners as required
Quantity:	1
No. of occupants:	3 (1x nurse & 2x sick learners)
Area: (m²)	approx. 40m²
Requirements:	- 1x nurses office - 1x WC with WHB - 1x bed area with 2 beds

EDUCATION

GRADE 1 LEARNING SPACE

Function:	Main class learning space
Quantity:	5
No. of occupants:	40x learners, 1x teacher
Area: (m²)	approx. 204m²
Requirements:	- desks and chairs as per spec. - General storage - Teachers area - Ablutions for learners - Lockers for learners

2.5.2.2GRADE 2 LEARNING SPACE

Function:	Main class learning space
Quantity:	5
No. of occupants:	40x learners, 1x teacher
Area: (m²)	approx. 204m²
Requirements:	- desks and chairs as per spec. - General storage - Teachers area - Ablutions for learners - Lockers for learners

GRADE 3 LEARNING SPACE

Function:	Main class learning space
Quantity:	5
No. of occupants:	40x learners, 1x teacher
Area: (m²)	approx. 204m²
Requirements:	- desks and chairs as per spec. - General storage - Teachers area - Ablutions for learners - Lockers for learners

GROUPWORK AREA

Function:	To facilitate small learner groups
Quantity:	10
No. of occupants:	8x learners
Area: (m²)	approx. 30m²
Requirements:	- seating and worktops as required

MEDIA CENTER

Function:	Library, reading computer literacy
Quantity:	1
No. of occupants:	up to 200 people total (incl. staff)
Area: (m²)	approx. 2600m²
Requirements:	- modular book shelves - modular movable partitions - reading areas - computer workstations - server area - book scanning area - book security at entrance/exits

OUTDOOR GROUPWORK / READING AREA

Function:	shaded seating for group teaching / reading
Quantity:	9
No. of occupants:	up to 20 people total (incl. staff)
Area: (m²)	approx. 80m²
Requirements:	- shading devices, seating as required

AFTERCARE

AFTERCARE CENTER

Function:	after school care / activities for learners
Quantity:	1
No. of occupants:	up to 200 people total (incl. staff)
Area: (m²)	approx. 400m²
Requirements:	- shading devices, seating as required - access controlled entrance to pick-up area

SPORTS AND RECREATION

GRADE 1 PLAYGROUND

Function:	Grade 1 learners break / play area
Quantity:	1
No. of occupants:	200x learners, 1 - 2x teachers
Area: (m²)	approx. 1 435m²
Requirements:	- open grassed area - jungle gym & other motor skill development apparatus - Sand pit

GRADE 2 & 3 PLAYGROUND

Function:	Grade 2 & 3 learners break / play area
Quantity:	1
No. of occupants:	400x learners, 1 - 2x teachers
Area: (m²)	approx. 1 600m²
Requirements:	- open grassed area - jungle gym & other motor skill development apparatus - Sand pit

HALL

Function:	Host school / community assemblies, indoor sporting events and various other events
Quantity:	1
No. of occupants:	approximately 1200 occupants
Area: (m²)	approx. 2 000m²
Requirements:	- un-obstructed open space - space allocation for various stage assemblies - ablutions - entrance from school building - entrance from road - entrance lobby (multi-function) - storage space

SOCCER FIELD

Function:	Host various field and track events
Quantity:	1
No. of occupants:	up to 10 000 occupants depending on the event
Area: (m²)	approx. 108 000m² (designated full size soccer field only.
Requirements:	- un-obstructed, grassed open space with - soccer goals on either side - ablution and changing facilities

SPORTS PAVILION

Function:	Host spectators and community members as well as various indoor functions
Quantity:	1
No. of occupants:	up to 200 occupants depending on the nature of the event
Area: (m²)	approx. 760m²
Requirements:	- Unobstructed panoramic view of the field - ablution facilities for members of the pubis - ablution and changing facilities for sporting event participants - kitchen area - bar style counter / server - admin office

NOTE: Parking requirements are as per zoning requirement application.

SITE ANALISYS

ASPECTS AND CHARACTERISTICS

INTRODUCTION

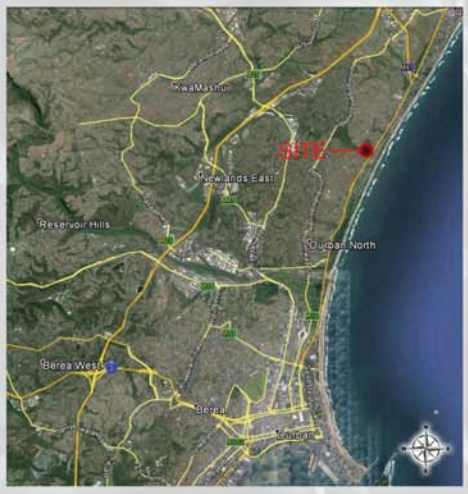
Due to the nature of the research and the findings, the site required for the proposed school needed to be relatively flat with a very green context, preferably residential so that the peak traffic times around the proposed school do not conflict with the activities around it and cause congestion. Being a school, the default location would be in an urban settlement and preferably free of restrictions to accommodate the nature of this project.

The selected site, is Remainder of 3193, Virginia, Durban North. It is currently owned by the municipality and is home to the local football club. The site also is home a model train track and its respective building which will remain unaffected by the development.

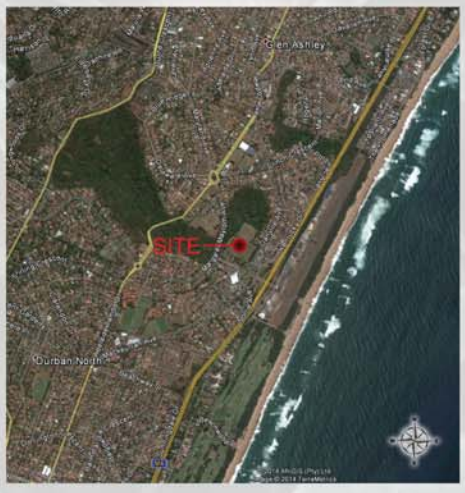
The site is also bordered by Danville park nature reserve which is ideal, as it is a required by the research for the building to be integrated with nature. The parts of the nature reserve that border the road network are fenced off and therefore no random access to the reserve and site is possible other than where it is designated with access control. This is essential from a security perspective.

Due to the site being municipality owned, there option for allocating an "education" zoning is possible with minimal effort.

LOCATION:



The above figure shows the site location approximately 13km to the North of the Durban CBD



The above figure shows the site location within the Durban North area

FIGURE GROUND ANALISYS & ZONING

ZONING KEY
- COMMERCIAL
- EDUCATIONAL
- AERONAUTIC
- RESIDENTIAL

The figure ground diagram above illustrates the zoning being primarily residential with the green trees indicating the nature reserve / ecologically protected area.

ACCESSIBILITY

Access to the site will be in two forms, one being vehicular and the other being pedestrian at two locations off the main roads. The figure above highlights the main access from the M4 / Ruth First Freeway as well as the main vehicular circulation routes for the immediate area.

With the site being located in a primarily residential area, there will be no problematic traffic congestion, as the proposed school operates out of peak traffic times

CONECTIVITY

As can be seen in figure 3.1.2.4, the site is situated in close proximity to the M4 / Ruth First Freeway which is the one of two main vehicular arteries that link Durban central to areas along the coast to the North. This freeway is easily accessible from various points throughout the Durban metropolitan area, thus providing access to potential users of the building with easy access to the site.
The Main roads illustrated with red dotted lines are also fairly easily accessed by the surrounding residential area due to their relatively central location.

SITE RESTRICTIONS AND OPPORTINITIES

Due to the site being owned by the municipality and without a zoning allocation, this allows the opportunity to lodge a zoning application for "educational" to accommodate the proposed school. There are currently no restrictions in place for the site, as it is a remainder of a residential lot.

PROXIMITY

As can be seen in the Figure 3.1.2.3, the site is located within close proximity to residential developments as well as a Shoprite checkers, being commercial. This is Ideal, as the primary users of the building will be minors, with their daily commute being to school and back, unlike their parents who will more than likely be commuting to a commercial district, making the site location ideal for its use.

SUMMARY

To conclude this chapter, it has been established that the site and its location has met all the criteria required by the research document in order to achieve the desired outcome and performance of the building. There will be a harmony achieved between the building and its context.

The following photos show the site from various locations which will allow the reader to gain a better understanding of why the site was chosen


Danville Avenue - SW view of site


Danville Avenue - looking NE


Danville Avenue - looking SW


Danville Avenue - SW view of site


Pond inside nature reserve

Entrance to nature reserve


Soccer field - Proposed site for school


Soccer field - Wil remain as is

06 PLANNING

DEVELOPING THE SPACES

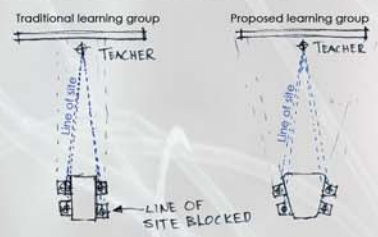
THE LEARNING SPACES

THE "CLASSROOM"

Within almost all elementary learning spaces, there is an arrangement of desk, that seat learners in group manner. There is a board for teaching and a teacher.

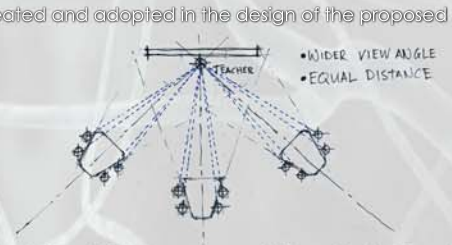
Here, the design of the learning space begins with the individual learner. As can be seen in the diagram below, the traditional rectangular desk and chair setup does not create and equal visual opportunity for the learners seated farthest from the teacher.

Instead, a custom trapezoidal desk is proposed in order to widen the viewing angle for the learners in the group creating an equal viewing opportunity for all. The only setback for any seating arrangement is distance from the teacher as only one entity can occupy the same space.



With the above in mind, the following diagram shows a radial arrangement for multiple desks of which the same viewing angle may be achieved. More desks may be added to this arrangement as required, provided they are offset along the radials to prevent obscured viewing by the learners.

This is the principle has been created and adopted in the design of the proposed school.



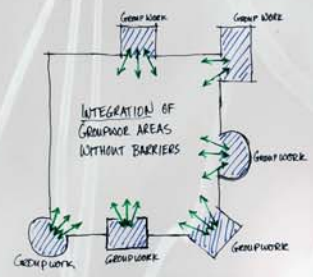
Furthermore, each grade (grades 1, 2 and 3) have a sense of hierarchy that is achieved through different ceiling heights at 1m increments, with Grade 1's being the lowest at 3m floor to ceiling and the grade 3's at 5m floor to ceiling.

This is because they are the newcomers to the school and will have a better sense of emotional and physical security as they are now on their own in the first year of their schooling career. This more "enclosed" space will help ease the transition from being looked after in pre-primary school to becoming independent individuals.

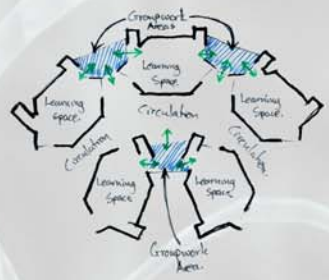
GROUP WORK AREAS

Group work areas are spaces in which small groups of learners may gather to complete various tasks as required. In a traditional sense, these areas may be in a separate room, isolated from the main classroom, or simply have a small area of the classroom allocated to these group activities.

In the proposed building, the integration of these areas with the rest of the spaces is essential. The goal of these spaces is for them to have a degree of separation without complete isolation. This is achieved with the spaces being recessed areas from the main spaces.



The above diagram illustrates the various ways that the recessed group work areas may be integrated into the main space without physical barriers separating the spaces.

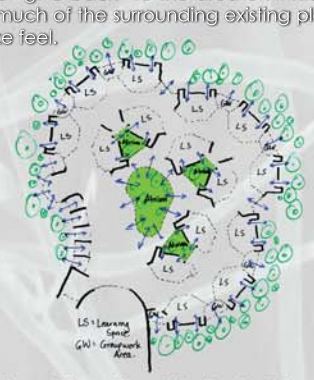


The above diagram shows the concept in practice in the initial layout of the various spaces in which these group work areas will be located in relation to the learning spaces.

ATRIA

Another key concept highlighted by the detailed brief, is the need for the spaces to be integrated with nature, hence the location of the site. Nature is essential in promoting wellbeing at a psychological level in learners.

The other concept is for the building to "give back" to the area on which it is located. This concept is therefore incorporated by bringing as much of the surrounding existing plant life to be brought into and around the school to achieve a park-like feel.



The diagram above indicates the location of the atria within the building. These atria are positioned in a way that allows all the learning spaces to have a view of nature, both on the perimeter of the building and within the building.

07

OUTDOOR AREAS

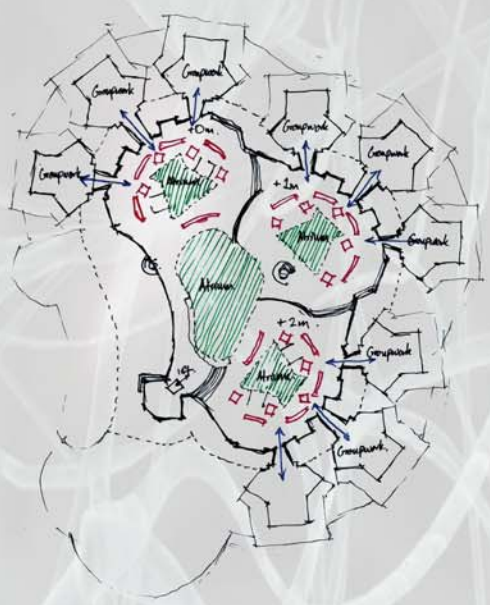
Outdoor areas pertaining to group work or completing task required by the curriculum have been provided on the first floor. These areas are located on the roof of the learning spaces on the upper ground floor and can be accessed from the multi-media area. The reason for the location of these spaces is so that the learners may be contained in a particular area. Adequate shading is to be provided for these areas.

MULTI-MEDIA FLOOR

In the proposed building, the multi-media floor is a 3 tiered open plans space. The reason for the open plan nature is so that the space may be flexible in use and may be partitioned as required. The different levels are achieved from the hierarchy of ceiling heights of the learning spaces below which allows a degree of separation without the use of physical barriers.

The Multi-media level is accessed from the floor below by means of 3 staircases and a lift. The different tiers on this level are access by stairs and a ramp in the case of a paraplegic.

Outdoor reading / group work areas can be accessed from this level.



The above diagram illustrates the basic planning principles of the multi-media floor with outdoor areas.

ADMINISTRATION

The administration area forms a part of the building perimeter and borders the outdoor plat area. All administration / staff areas have a view of the play area as well as aftercare space. The location of these spaces is in aid of additional supervision as well as close proximity to the main entrances.

Other administrative functions such as the sick bay and adult ablutions are all in close proximity to one another.

COMMUNITY INTEGRATED USES

SPORTS FIELD

The sports field is for use by both the school and community, this includes the local sports club that is currently located on the site. Access to the sports field through 2 entrances is restricted to certain entrances at certain times and days, depending on the event taking place.

HALL

The hall is primarily for use by the school, it has an entrance the feeds directly from the main school building's interior, which may be partitioned off.

The hall's secondary function is for that of community events, of which the entrance is from the street edge. At this time, the entrance from the school building will be closed in order to separate the hall from the school.

COMMERCIAL SPACES

In order to integrate the site and promote social development throughout the community, a series of multi-use spaces have been provided along the street edge that. These spaces and their possible functions do not interfere with the activities taking place within the site.

Possible uses for these spaces may range from retail, to restaurants.

With regards to FLEXIBILITY as previously mentioned, The following diagram depicts the designation of uses throughout the development.

By: Peter Oravecz - 205508279

07

DESIGN DEVELOPMENT

BUILDING ASPECTS AND COMPONENTS

DEVELOPING THE BUILDING

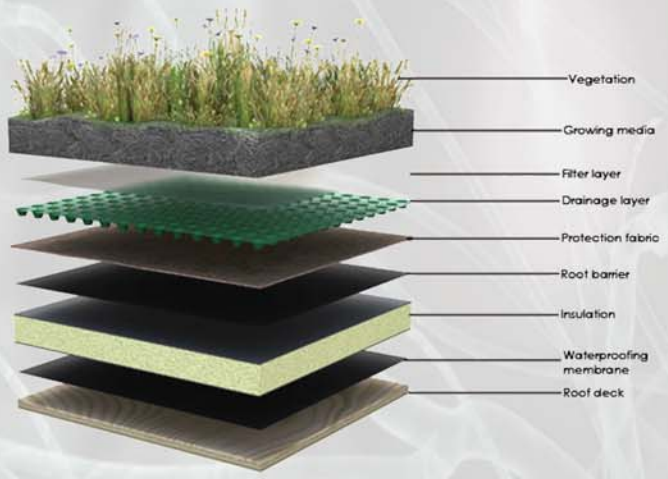
BUILDING PERFORMANCE

SUSTAINABILITY

The proposed building form, as depicted earlier, has been developed from the inside out. Green roof spaces have been implemented to the majority of the roof space in order to restore the green state of the horizontal plane on which the building will be constructed.

The implementation of green roofs will also promote a natural cooling affect within the building as well as reduce the "heat island affect"

The following image is a breakdown on how to achieve a green roof with shallow growing medium.



Greywater management is important complement to stormwater management, especially in a building of this size.

Greywater is defined as the water, excluding sewage or black water, produced by domestic activities. One of its most important uses is irrigation. So having an infrastructure to capture water after it is used in a facility allows further conversation of potable water.

The water collected on these roofs will be filtered and stored in underground tanks and pumped as required to various point in and around the building.

CIRCULATION AND ACCESS

Access to the building is through is controlled by means of a circulation buffer or external lobby area and internally by a reception area.

The circulation within the building is intended to be in a clockwise direction. As mentioned before with the learning space hierarchy, movement throughout the building is representative of a child's development and progression through his or her life.

The circulation is also rather unrestricted within the building due to its open plan nature.

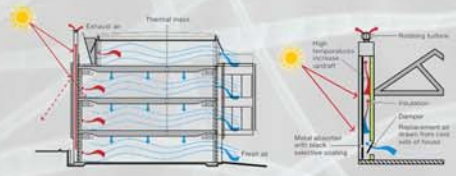
SHADING AND ILLUMINATION

Large overhangs and performance glazing are the primary mechanisms incorporated into the proposed building from a shading perspective. Performance glazing eliminates glare as well as irradiates infrared radiation and ultraviolet light from penetrating the building.

The added benefit of performance glazing is that on the multi-media floor, the books will not be at risk of damage by ultraviolet light.

Illumination is achieved primarily natural sunlight that is either direct or diffused by means of reflection off surfaces. High level windows offer additional natural illumination throughout the buildings.

In the case of artificial lighting, low voltage LED lighting will be incorporated as required. The use of Minimum 10000k T5 tubes will also be incorporated into the learning spaces. As mentioned in the research, this aids cognitive function and performance by learners in completing the tasks required.



VENTILATION

Ventilation throughout the building will be primarily natural ventilation through the use of openable windows positioned so that they will not cause discomfort among the learners. Elements such as wind are controlled without compromising the natural flow of air through a space.

In tha case of the hot Durban, An HVAC system is required and therefore, a semi-recirculating system will be used where there is a constant flow of fresh air. Air diffusers will also be positioned so that they do not blow directly on learners as this may cause discomfort.

Ducting for the HVAC system will be exposed and painted in accordance with air flow for the reasons of creating an interesting and educational visual spectacle for learners within the building. Ablutions with no windows are to be mechanically ventilated.

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08

DESIGN DEVELOPMENT

MATERIALS

The primary structure of the building consists of reinforced concrete columns and reinforced concrete floor slabs. The concrete used here will be that which consists of 55% flyash and recycled building rubble as aggregate with rebar that is made up of at least 40% recycled steel. This is in order to reduce the carbon footprint of the building.

The infill panels / masonry walls throughout the building are constructed of compressed stabilised earth block that will be manufactured on site. These blocks are to be manufactured with the flyash based cement mentioned above.

STRUCTURE

The structural elements that primarily comprise the proposed school are circular reinforced concrete columns of varying diameter and length, reinforced concrete floors slabs and stairs.

There are 2 different inclinations of the columns relating to the horizontal plane. 75 ° and 90°. These are as per construction details.

The reinforced concrete floor slabs are all horizontal with no inclination, except for the paraplegic ramps which are to be at a 1:12 gradient as per the national building regulations.

ACOUSTIC CONTROL

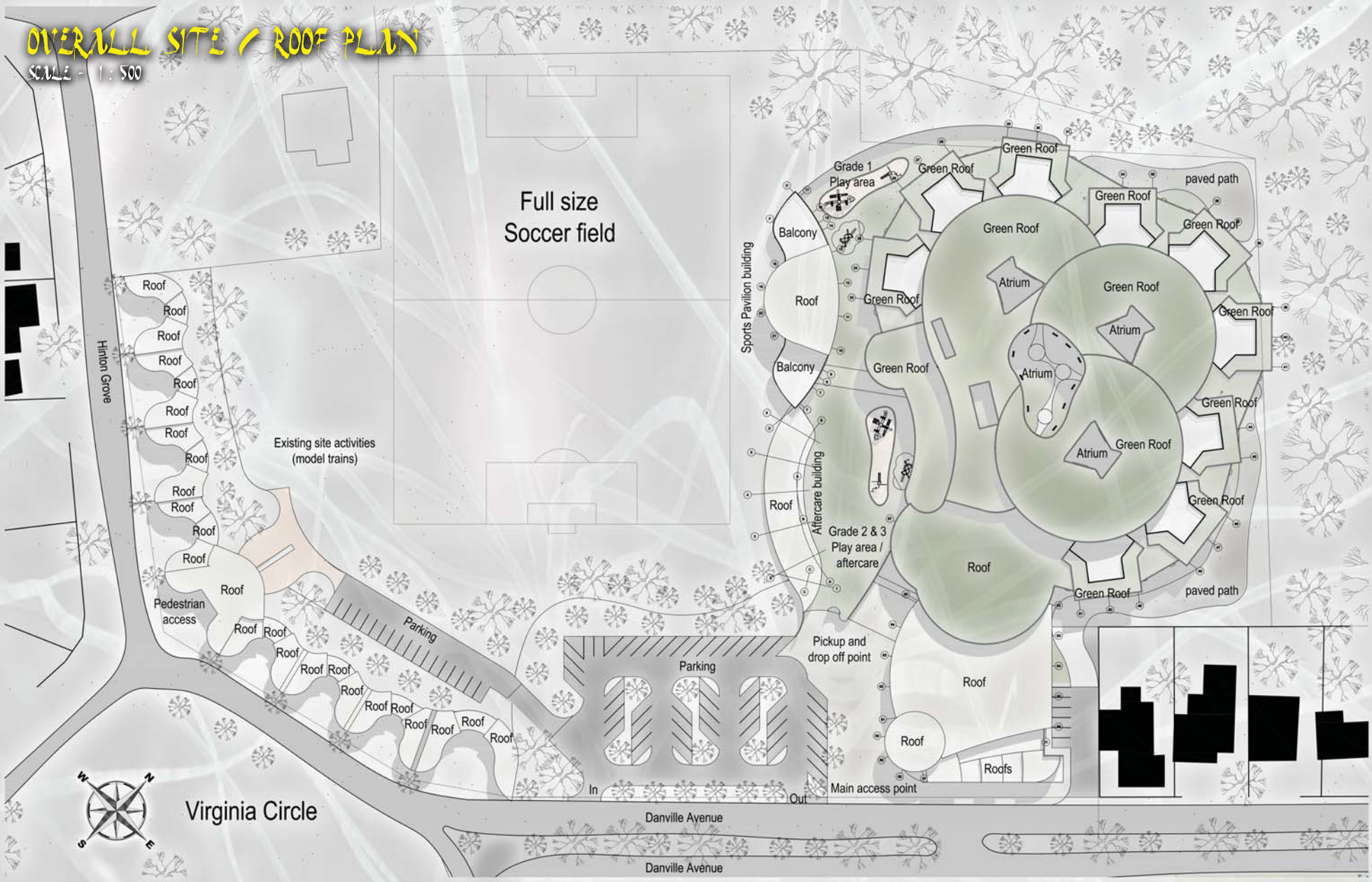
As outlined in the research and the detailed brief, acoustic control is an extremely important aspect of design to be considered in an open plan space with activities and users of the space being sensitive to noise.

Acoustic treatment with high absorption coefficients are to be used in panels, any solid partitioning panels as well as any walls of which the angle of sound reflection will directly interfere with adjacent spaces that require a degree of sound separation.

These acoustic treatments are not only to prevent sound from travelling between learning spaces, but also to reduce the reverberation throughout the building to an acceptable level which is outlined in the research.

OVERALL SITE / ROOF PLAN

SCALE - 1 : 500



08
THE PROPOSED BUILDING
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OVERALL SITE PERSPECTIVE

SCALE - NOT TO SCALE

VIEW OF HALL ENTRANCE
SCALE - NOT TO SCALE

HALL INTERIOR
SCALE - NOT TO SCALE

09
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LOWER GROUND FLOOR
SCALE - 1 : 200

UPPER GROUD FLOOR
SCALE - 1 : 200

10
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UPPER GROUD FLOOR
SCALE - 1 : 200

FIRST FLOOR
SCALE - 1 : 200

FIRST FLOOR
SCALE - 1 : 200

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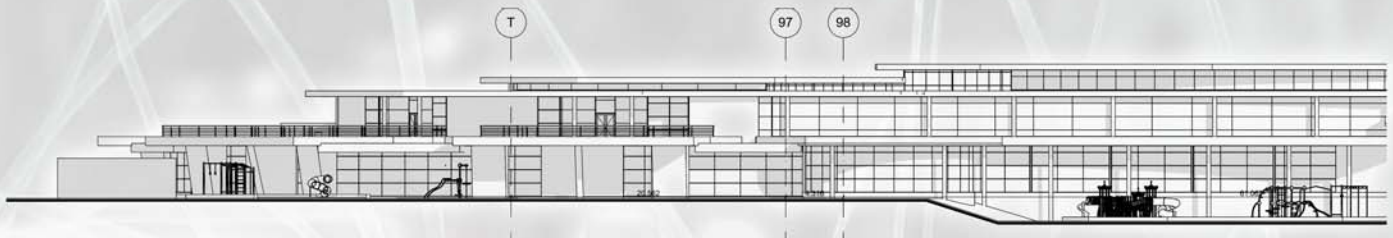
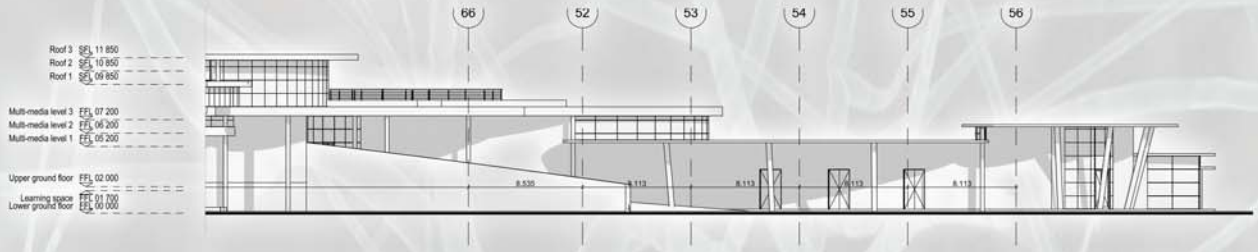


SOUTH WEST ELEVATION
SCALE - 1 : 200

SOUTH WEST ELEVATION - SHADED
SCALE - 1 : 200



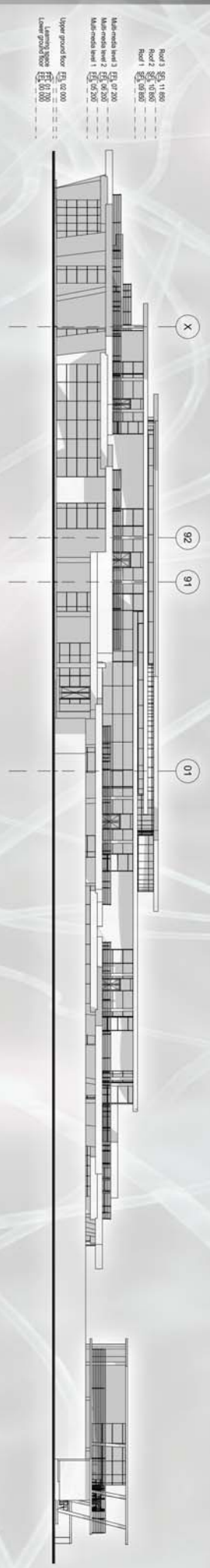
SOUTH EAST ELEVATION
SCALE - 1 : 200

SOUTH EAST ELEVATION - SHADED
SCALE - 1 : 200

SENSORY PERCEPTION AS A DESIGN PROCESS INFORMANT

A proposed school for the Durban North Area

THE PROPOSED BUILDING



NORTH WEST ELEVATION

SCALE - 1 : 200

NORTH WEST ELEVATION - SHADED

SCALE - 1 : 200

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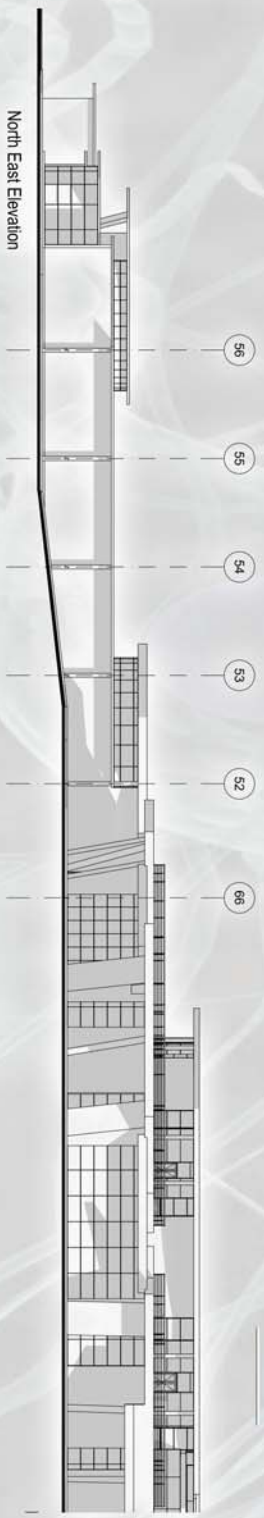
THE PROPOSED BUILDING



NORTH EAST ELEVATION

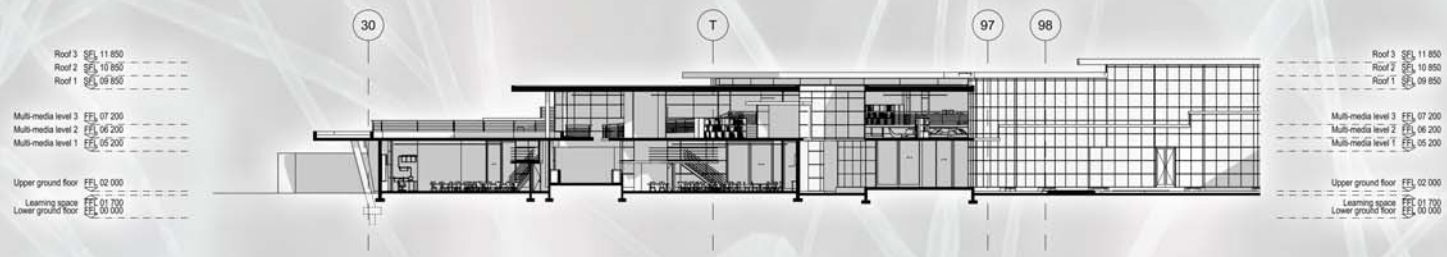
SCALE - 1 : 200

NORTH EAST ELEVATION - SHADED

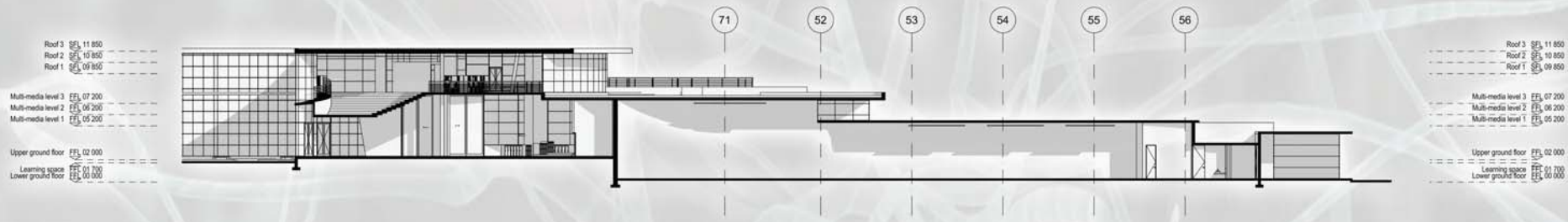
SCALE - 1 : 200

SPORTS PAVILION FRON ELEVATION
SCALE - 1 : 200

SPORTS PAVILION FRONT ELEVATION - SHADED
SCALE - 1 : 200



SECTION A - A
SCALE - 1 : 200



SECTION A - A
SCALE - 1 : 200

SECTION A - A
SCALE - 1 : 200

SECTION A - A
SCALE - 1 : 200

SECTION A - A PERSPECTIVES
SCALE - NOT TO SCALE

13
THE PROPOSED BUILDING
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SENSORY PERCEPTION AS A DESIGN PROCESS INFORMANT

A proposed school for the Durban North Area

THE PROPOSED BUILDING

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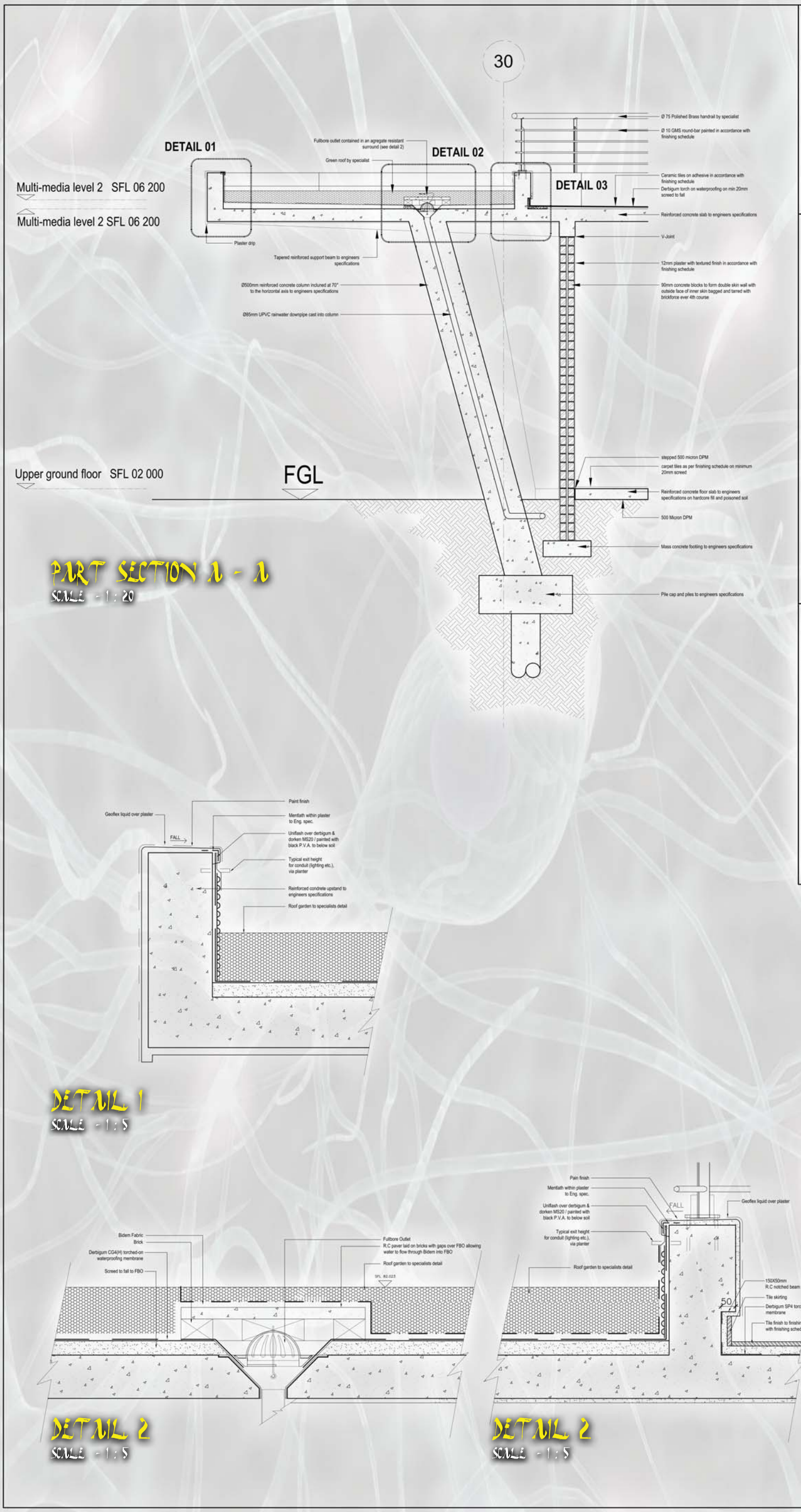


CONSTRUCTION NOTES
(WHERE APPLICABLE)

* ALL LEVELS AND DIMENSIONS TO CHECKED ON SITE BEFORE WORK COMMENCES
* NGL IN APPROXIMATE POSITION ONLY
* WRITTEN DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALING
* ALL REINFORCED CONCRETE, BEAMS, COLUMNS AND SLABS TO BE BUILT STRICTLY IN WITH PROFESSIONAL ENGINEERING DETAILS AND HIS SUPERVISION
* PRECAST LINTELS TO BE PROVIDED OVER ALL DOORS AND WINDOWS
* DPC WHERE NECESSARY
* 5% SOIL POISONED UNDER ALL SURFACE BEDS AND DRIVEWAYS
* ALL GLAZING TO COMPLY WITH PART N OF SANS 10400
* ALL DISCREPANCIES OMMISSIONS TO BE BROUGHT TO THE ARCHITECTS ATTENTION
* NO WALLS OR FOUNDATION TO ENCROACH OVER BOUNDARY
* I.E's TO BE PROVIDED AT ALL BENDS AND JUNCTIONS
* WASTE PIPES AND VENTS TO BE Ø50mm uPVC
* SOIL PIPES AND VENTS TO BE Ø110mm uPVC
* ALL SEWER PIPES ENCASED UNDER CONC. SLAB TO BE Ø110mm CORFLOW
* ALL WATER (SINK/TRAPS) TO BE 'P' TYPES
* ALL VENTS TO BE STUB STACKS
* ALL BUILDING WORK TO COMPLY WITH SANS 10400
* ALL FOUNDATIONS TO BE TAKEN DOWN BELOW NATURAL GROUND LEVEL
* COLOURS WILL CONFORM WITH PLASCON OR EQUIVALENT SPEC

FINISH SPECIFICATION

* ALUMINIUM ROOF SHEETING
* ALL ROOF OVERHANG TO BE MIN 600mm
* ROOF TO BE SINGLE PITCH WITH ANGLE OF 17.5°
* PLASTER AND PAINT EXTERNALLY
* PAINT SPEC TO BE VERIFIED ON SITE
* WINDOWS AND DOORS TO BE BLACK POWDER COATED ALUMINIUM WITH 25 MICRON COVER AND SEAL
* ALUMINIUM TO BE TO AAAMSA REGULATIONS
* GLASS TO BE TO SAGGA & SANS 10400 REGULATIONS
* ALL CONCRETE WORK AND RETAINING TERRAFORCE TO ENGINEERS DETAIL
* ALUMINIUM SUNSCREEN TO SPECIALIST DETAIL
* 1M HIGH (INCLUSIVE OF UPSTAND) TOUGHENED
* GLASS BALUSTRADES WITH HANDRAIL ACCORDING TO SPECIALIST DETAIL WITH ARCH. APPROVAL
* BUILDING PLINTH IN SAND STONE AS WELL AS SELECTED FEATURE WALLS AND CHIMNEY

GREEN NOTE

* ALL ROOF SPACES TO BE INSULATED WITH EITHER
  1.1 THINK PINK AEROLITE OR EQUAL
  1.2 SISILATION K20 OR BUBBLE FOIL- NO UNDERLAY.
* ALL NEW GEYSERS MUST BE SOLAR HYBRID POWERED AND TO BE HOUSED WITHIN THE ROOF SPACE AND MUST BE COVERED IN A GEYSER BLANKET
* ALL DB BOARDS TO BE FITTED WITH TIMER DEVICE FOR EXISTING AND NEW GEYSER
* RAINWATER SHOULD BE HARVESTED IN VQ TANK FOR IRRIGATION OF GARDENS

ARCHITECTS ADDITIONAL STD. RECOMM. SPECS

* ALL FOUNDATIONS REINFORCED AND COMPACTED HARDCORE TO 99% MODASHTO.
* ALL BRICKWORK TO BE CROSS-BONDED EVERY 4 COURSES VERTICALLY, NAMELY PLASTERED AND PAINTED HOUSES.
* SKIRTING TO BE 100MM MERANTI WITH QUADRANT.
* EXTERNAL CILLS TO BE GLAZED WITH DRIP (250 MIC. DPC UNDER).
* INTERNAL CILLS MUST BE MERANTI WITH TRIM.
* ALL ALUMINIUM WINDOWS TO BE SEALED AROUND EDGES WITH POLYSULPHIDE SEALANT.
* ALL WINDOW HEADS TO HAVE DRIP GROOVE.
* ALL PARAPETS WALLS TO HAVE COPING WITH DRIP GROOVE WITH 250 MICRON DPC UNDER, (COPING TO BE IMPERVIOUS TO WATER) AND WATER PROOFED.
* ALL FLASHING TO BE GARANTEED FOR 10 YEARS.
* ALL FLAT ROOF PARAPETS TO HAVE BUILD-ON ALUMINIUM EDGE TRIM.
* ALL WALLS TO HAVE COPING WITH DRIP FALL AWAY FROM FACE WITH DRIP MOULD ON SOFFIT.

FIRE NOTES

FIRE PROTECTION - TO COMPLY WITH SANS 10400
1. TT5 - ALL MATERIALS TO COMPLY
2. TT7 - ALL STRUCTURAL ELEMENTS & COMPONENTS TO COMPLY (J1-120 MIN)
3. TT10 - ALL OPENINGS TO BE PROTECTED TO COMPLY
4. TT13 - ALL CEILINGS TO COMPLY
5. TT14 - ALL FLOOR COVERINGS TO COMPLY
6. TT15 - ALL WALL FINISHES TO BE NON-COMBUSTIBLE
7. TT18 - FEEDER ROUTES TO BE PROVIDED WHEN PARTITION LAYOUTS ARE DESIGNED- TO BE SUBMITTED UNDER DIFFERENT APPLICATION
8. TT19.9 - LOCKS TO ESCAPE & ACCESS DOORS TO COMPLY
9. TT31 - EACH WAREHOUSE TO BE FITTED WITH A FIRE DETECTION ALARM SYSTEM.
10. TT26 - ALL OPENINGS IN FLOORS TO COMPLY
11. TT29, TT32, TT35.4 - SIGNAGE TO COMPLY
12. TT33 & WW5 - FIRE RETICULATION TO COMPLY
13. TT34 - FHRS TO COMPLY (ADDITIONAL FHRS TO BE PROVIDED WHEN PARTITIONING LAYOUTS ARE SUBMITTED, IF REQUIRED)
14. TT35 - FIRE HYDRANTS TO COMPLY
15. TT37 - PORTABLE FIRE EXTINGUISHERS TO COMPLY
16. TT39 - ANY ACCESSIBLE CONCEALED SPACE WITH A MAX. DIMENSION OF MORE THAN 5M TO BE FIRE STOPPED TO COMPLY
17. TT41 - SERVICE PIPES, CONDUITS & SLEEVES TO COMPLY
18. PROVISION TO BE MADE FOR SMOKE VENTILATION IN ACCORDANCE WITH TT42 DESIGNED BY PROFESSIONAL ENGINEER, TO COMPLY WITH TT43 & CERTIFICATE ISSUED ON COMPLETION.
19. TT12 - ROOF ASSEMBLY AND COVERINGS TO COMPLY.
20. TT2 - SAFETY DISTANCE TO COMPLY. MIN 2M SIDE SPACE AND MAX. 10SQM OPENINGS IN ELEVATION.
21. TT16 - ESCAPE ROUTES - TO BE POSITIONED MIN. 45M APART & TO DISCHARGE DIRECTLY OUTSIDE.
22. TT36 - WAREHOUSES TO BE FITTED WITH A SPRINKLER SYSTEM. WATER PRESSURE TO BE MIN. 350KPA & WATER PRESSURE GAUGES TO BE PROVIDED.
23. TT4 - SPRINKLER SYSTEM TO BE INSTALLED AS PER ASIB OR SANS 10400 TO COMPLY.
24. TT30 - LIGHTING OF FEEDER & EMERGENCY ROUTES TO COMPLY.
25. ALL STEEL FRAMES,PORTAL ETC TO BE ADEQUATELY PROTECTED & TO HAVE MIN. 120 MINUTES F.R
26. LIGHTING OF FEEDER & EMERGENCY ROUTES TO COMPLY WITH PART TT30.1 (MIN. LUMINESCENCE OF 50 LUX ON A HORIZONTAL PLANE 100MM ABOVE FLOOR AND TO HAVE A POWER SOURCE INDEPENDENT OF THE MAIN SUPPLY.)
27. PROVIDE 1 X 9KG DRY POWDER EXTINGUISHER PER 100SQM FLOOR AREA & TO OFFICES.

GENERAL NOTES

All relevant details, levels and dimensions are to be checked on site prior to commencement of work. Any discrepancies are to be brought to the attention of the Architect.

The Architectural Professional accepts no responsibility for errors resulting from misinterpration of the drawings.

All work to be carried out strictly in accordance with the national building regulations and local authority regulations.

All dimensions are given in millimeters.

Do not scale this drawing.

OWNERS SIGNATURE	
OWNERS SIGNATURE	

ARCHITECTURAL INNOVATIONS
PETER ORAVECZ
Tel: 076-999-4556/031-201-0999

DEMARCATION OF WORK MATRIX	
OCCUPANCY	
DETAILED DESCRIPTION	
SITE SENSIVITY	

PROJ TITLE:	M.ARCH TECHOLOGY
PROJ DESCRIP:	NEW PRIMARY SCHOOL FOR DURBAN NORTH
ERF:	Lot 1 of 1
LOCATION:	Virginia
CLIENT:	UKZN

STRIP SECTION
A-A & Details
DRAWING

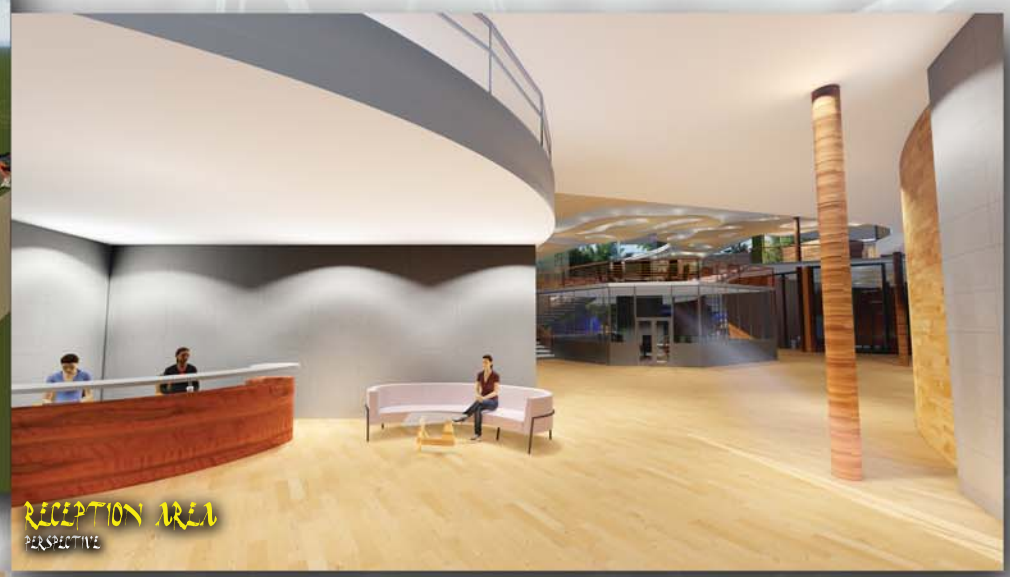
AS SHOWN (SCALE)	JANUARY 2016 (DATE)
PO (DRAWN)	PO (CHECKED)

01-2016 (PROJ. NO)	A1-01 (DRAWING NO)	0 (REV)

THE PROPOSED BUILDING

By: Peter Oravecz - 205508279


THE BUILDING
PERSPECTIVE


RECEPTION AREA
PERSPECTIVE


ADMIN AREA
PERSPECTIVE


STAFF ROOM
PERSPECTIVE


GRADE 1 LEARNING AREA
PERSPECTIVE


MAIN ATRIUM
PERSPECTIVE


MULTI-MEDIA FLOOR LOBBY
PERSPECTIVE


MULTI-MEDIA FLOOR READING AREA
PERSPECTIVE


MULTI-MEDIA FLOOR AREA
PERSPECTIVE


OUTDOOR GROUP WORK AREA
PERSPECTIVE


ROOF WITH OUTDOOR GROUP AREA
PERSPECTIVE


AFTERCARE / GRADE 2 AND 3 PLAY AREA
PERSPECTIVE

15
THE PROPOSED BUILDING
By: Peter Oravecz - 205508279


VIEW OF GRADE 2 AND 3 PLAY AREA
PERSPECTIVE


SPORTS PAVILLION
PERSPECTIVE


VIEW FROM SPORTS PAVILLION
PERSPECTIVE


PUBLIC ENTRANCE TO RESERVE AND COMMERCIAL SPACE
PERSPECTIVE