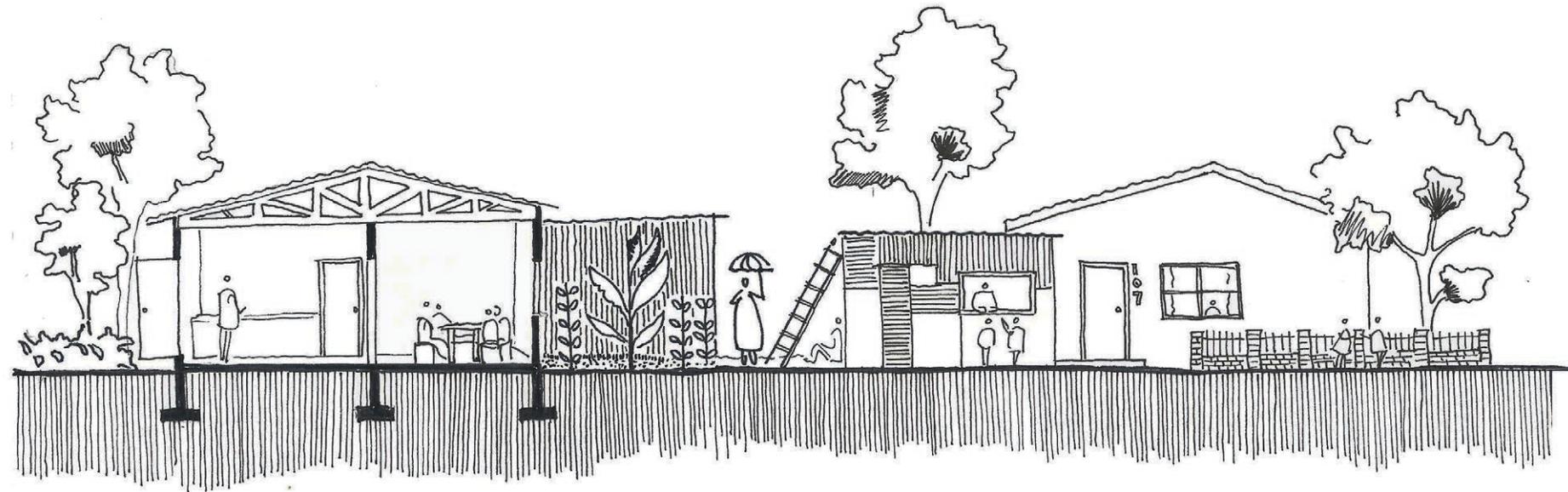


the [ART]isan of Architecture

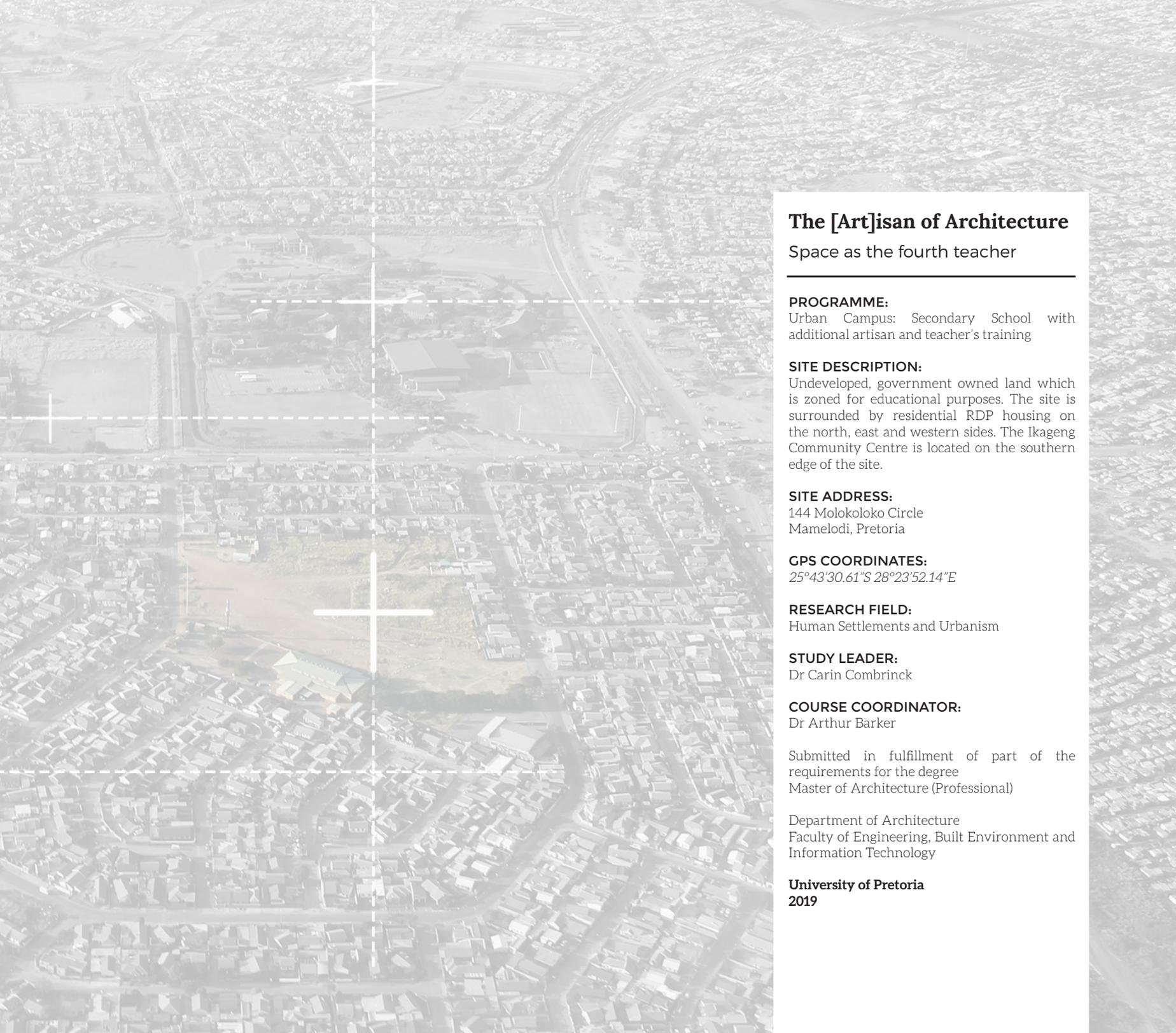
SPACE AS THE FOURTH TEACHER



Architectural Design Dissertation by
Caitlin Porter

University of Pretoria
2019





The [Art]isan of Architecture

Space as the fourth teacher

PROGRAMME:

Urban Campus: Secondary School with additional artisan and teacher's training

SITE DESCRIPTION:

Undeveloped, government owned land which is zoned for educational purposes. The site is surrounded by residential RDP housing on the north, east and western sides. The Ikageng Community Centre is located on the southern edge of the site.

SITE ADDRESS:

144 Molokoloko Circle
Mamelodi, Pretoria

GPS COORDINATES:

25°43'30.61"S 28°23'52.14"E

RESEARCH FIELD:

Human Settlements and Urbanism

STUDY LEADER:

Dr Carin Combrinck

COURSE COORDINATOR:

Dr Arthur Barker

Submitted in fulfillment of part of the requirements for the degree
Master of Architecture (Professional)

Department of Architecture
Faculty of Engineering, Built Environment and
Information Technology

University of Pretoria
2019



“ It takes a village to raise a [*dissertation*] ”

(adapted from an African proverb)

THANK YOU

My heavenly Father, the creator of it all, for surrounding me with an army of people and constantly reminding me to keep my eyes fixed on the light.

Mom & Dad - I am beyond blessed to have two amazing parents like you. Your constant love and support has kept me afloat over these past few weeks (& years) and for that I am ever thankful. Love you mostest.

Decs - You are incredible. Here's to many more ice-cream outings, dinner chats & creepy waves. Love you.

Dr C - Thank you for igniting the spark for co-design in me. Your unending support, knowledge and belief in me has been more than I could ask for.

Professor Ogude, Regina, Nthabiseng, the cafeteria staff, my workshop crew

(Karla, Dhane, Wraz, Ryan, Bryce, Sarah, Henry, Simoni, Decs) and most importantly my co-design team - thank you for coming on this crazy adventure with me.

Cath, Mia, Nins, Sue, Anel, James, Ems & LG 2018 - thank you for believing in me, and loving me, always.



// A MANIFESTO

| Design with the community |
| Design is emotional |
| Design must be humble |
| Design requires focus, time, process
and refinement |
| Design is simple |
| Design needs to be adaptable |
| Design needs to question |
| Design is a constant process |
| Passion shines through |
| Design is people orientated |
| People need to relate to architecture |
| We leave a part of ourselves in every
design |

| Design is everything |

The relationship between people, place, environment and time is ultimately what forms the built environment. After five years of the roller coaster that is architecture school, my standpoint is strongly influenced by the social component of architecture.

Architecture is where life happens and therefore should provide spaces of interaction – places in which the user can leave a little piece of themselves. Architecture is the physical

manifestation of exchanges between people and thus, as designers, we are drawn into this constant narrative – which includes not only the present but also the past and those who are to follow us. As Lynch (1960) states, *“Meaning is not a condition or quality of the building itself; meaning arises from situations. The meaning of a building then must be a meaning for some specific one at some specific time in some specific place.”*

Architecture does not merely entail an object or installation but is a representation of the context and the community – a fact which should be expressed. Spaces become activated when human interaction is considered as a platform to build from (Heringer S.a). The importance of community and community interaction, therefore, also forms a big part of successful architecture. As De Vos (2016) says, *“Every place has a constantly evolving narrative. The best ideas are not those that seek carte blanche, but rather those that attach organically to the already-present narrative of context – thereby offering a path forward.”* This statement

represents my understanding of how successful architecture is not only for the community but a part of the community. I have come to understand that as an architect I have something to offer to the community but that community has so much to offer me.

The balance between the user and the designer, the past and the present, the traditional and the innovative, as well as the general versus the specific, is what gives life and significance to architecture.

Design encompasses everything and thus can never be isolated. It is a collection of the books you read, the films you watch and the songs you listen to. It is a piece of the people you meet and the conversations that you engage in. It is your dreams and your passions and your experiences (Unkown). It is through design that encompasses these things that architecture with impact is created.

Figure: Design is a piece of the people you meet and the conversations you engage in (Photograph by Marsh 2018)



// ABSTRACT

*"Ignorance is liberating
Start where you can: never say can't
Imagine first: reason later
Be reflective: waste time
Embrace serendipity: get muddled
Play games, serious games
Challenge consensus
Look for multipliers
Work backwards, move forwards
Feel good"
(Hamdi 2004: xxvi)*

The problem of authorship in the discourse of architecture has always persisted (Adjaye *et al* 2011). The question arises if what we are doing is relevant and will it remain so tomorrow? (Feireiss & Bouman 2011:14). Questions like these often lead to radical changes. This is especially true within the architectural profession. It is argued that if the profession of architecture is to be celebrated and discussed, then it needs to be a craft that proves its indispensability. This means

that not only the true beauty, but the genuine accomplishments of the architecture should be pointed out (Feireiss & Bouman 2011:15). The aim of this dissertation is to illustrate the impact of collaborative design on the architectural design process. This 'other' way of making architecture (Awan *et al* 2011) is investigated through ten workshops with secondary school learners in Mamelodi East. The study aims to simulate the co-design process in the design of a secondary school and test the impact of the collaboration on the design process within the master's year. For this collaboration, learners of a school going age were selected as co-design partners. A series of ten workshops with 15-35 secondary school learners was designed to simulate the work stages prescribed by South African Council for the Architectural Profession's (SACAP). If the process of making architecture could be an 'act of care' (Auret 2015),

it could be instrumental in the accommodation of life in all forms from the beginning as well as an immeasurable positive influence on all those who use and appropriate it. This will not only add to the vocabulary of the designer and user, but also will also add to the resilience of place through placemaking that is socially and environmentally responsive.

Keywords: *Participatory design, collaboration, co-design, design research, place-making, authorship*

Figure: Mamelodi Contours (University of Pretoria Geography Department, Masters Research Group 2017)



TITLE TRANSLATION

ACKNOWLEDGMENTS

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APPENDICES

Figure (title page): Books (Author 2018)

Figures: Site mapping (Author 2018)

Figures: Site mapping (Department of Architecture Masters Studio 2018)

Figures: GAPP Framework (GAPP 2010)

Figures: Energy Calculations (Ecotech Energy Calculator 2018, www.ecotechenergy.co.za)

Figures: Water Calculations (Water calculator: AAL320 CSIR Workshop, Fourie Pieterse 2016)

Figures: Workshops images (Author 2018, Marsh 2018, Porter 2018)

Fig. 01. Above: Collaborative thinking - making space at the table for different voices Author 2018, adapted from Diagram adapted from Stratos Innovation Group 2016

Fig. 03. Left: Space for experts, realm of collaboration and space for people (Author 2018 adapted from Lee 2008:33)

Table. 03: Different roles (Author 2018 adapted from Lee 2008)

Fig. 07: Above opposite: Including many voices (Author, 2018)

Fig. 08: Collage of design intentions Design intention collage

(Author 2018, Stock images - www.pexels.com, Child painting by Nelson Makamo, Participatory tree - Department of Architecture Honours Mamelodi Studio 2017 with Joyce Bopape)



"I entered the world of architecture with big dreams of changing the city one building at a time. What I did not realise is that the city, specifically Mamelodi, would change me – open my eyes to connections, networks, people and places. I entered this place as an outsider – new to the sights and sounds that filled my senses. What I did not realise was that I was not an outsider. I was invited in, with open arms, to the place they called home. Hours of walking around exploring, and conversations filled with stories, revealed a close knit community. This sense of community was opposite to what I initially believed and what the media portrays. I needed to find out more about this community – their likes and dislikes, patterns and how in a place deemed to be unsuccessful, the community spirit has thrived (Author 2018)."

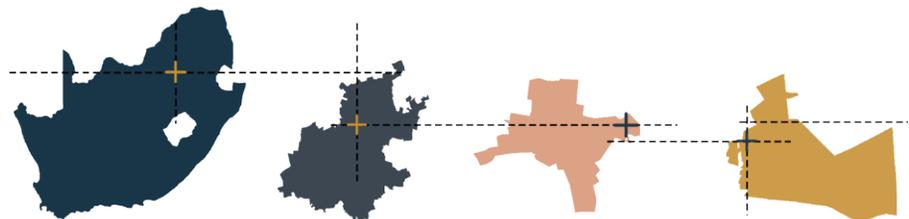
Somewhere in the making of our towns and cities, we have exchanged the human element and human needs to a number of zoning classes which are strung together around a number of roads and basic services. In the local context, finding a place where the street is more than just a road, but the life of the community, is becoming

Figure 1.1 (above): Location map (Author 2018)

harder to find (Küsel 2018:41). There are, however, places in the city where the community spirit surpasses the limitations of place. Mamelodi East is such a place.

The constructed idea of the ideal urban environment gets stripped away as you drive along Solomon Mahlangu into Mamelodi (Küsel 2018:42). Mamelodi is seemingly chaotic, dirty and overcrowded. Yet the atmosphere is vibrant and rhythmic (Küsel 2018:42, Honours Research Group 2017). When you start to recognise and understand these rhythms, you begin to realise that although there are many problems with this place, the sense of community is tangible and that is missing in many of our cities (Küsel 2018:42). As Kotze (2017:2a) states, *"the language of the ordinary is more difficult to read, but if we uncover it, it offers a world of greater and lasting inspiration"*.

welcome to
MAMELODI





welcome to mamelodi

a way of introducing//

chapter one

INTRODUCTION

- 1.1. Background
- 1.2. Objectives & Significance
- 1.3. Research Methodology
- 1.4. Definitions

1.1 // BACKGROUND

Typically, an architectural masters follows a linear pattern: analysis, issue, design, building (Hofstee 2011:3-4). Typically, an architectural masters culminates in a beautiful design that responds to and fixes the issues stated in the beginning. Typically, an architectural masters is a fairly simple process that if done according to 'Constructing a Good Dissertation' (Hofstee 2011) can be finished on time in a structured manner.

The real world is more complicated than that of the typical academic method (Hofstee 2011:4). The diagram in figure 1.3 illustrates a non-linear approach to the design process and introduces a new way of making architecture in which real world situations are represented. This dissertation follows a non-linear approach where real world users are invited to join the process. What started out as a simple mapping exercise in the beginning of 2017, evolved into a project set on challenging not only the architecture of educational facilities, but also the way they are designed and built within the South African context.

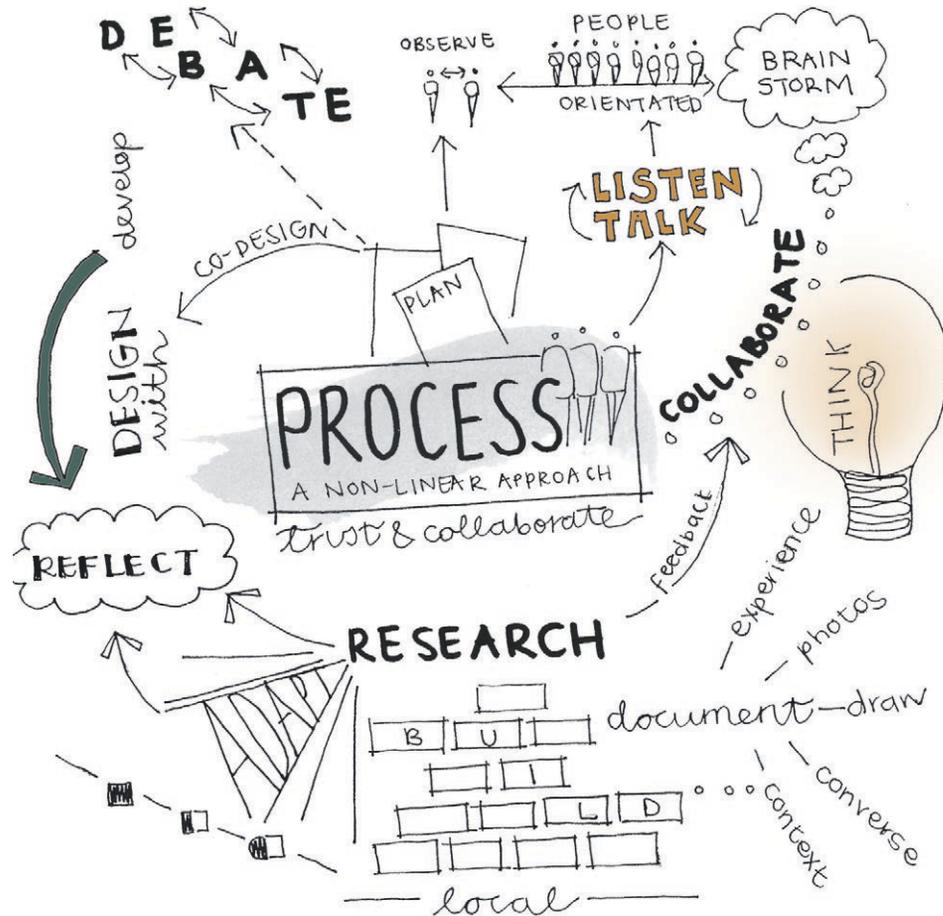


Figure 1.2 (title page): Welcome to Mamelodi (Author 2018)
 Figure 1.3 Process (Author 2018, adapted from Global studio 2014)

1.2 // OBJECTIVES + SIGNIFICANCE

Increasingly, people are taking responsibility for their cities, engaging with their surrounding environments. The call for different people to construct a new urban paradigm driven by proactive attitudes and participation often operates outside the traditional architectural culture (Rosa 2013:1). Intrigued by narratives, people and place, the author aims to use this dissertation to explore the possibilities of co-design in the architectural design process. The layers of people and place are critical informants of the function, narrative and meaning of the architecture created.

The title of this dissertation, 'The [Art] isan of Architecture' is translated from these informants. Firstly, the program, the functional aspect, investigates how school children can actively shape their schools as well as how arts and artisan training can become a more integrated support space within schools. Co-design is used as a method of research to explore how architecture is crafted and how the co-design team can shape their own narrative. Lastly, the technological aspect of this dissertation will explore the crafting of architecture - how

local networks, building methods and materials can be used in order to create contextually relevant, local architecture which gives meaning to place.

By the investigation of a method that is outside the conventional way of making architecture, the author wishes to expand research on how co-design can be implemented in the architectural design process. This method allows the author with the opportunity of grappling not only with the discipline of architecture, but also how people and place can be integrated into the discipline to create grounded architectural resolutions.

The research methodology is outlined in figure 1.4 (following page). The dissertation layout follows this sequence.

1.3 // RESEARCH METHODOLOGY

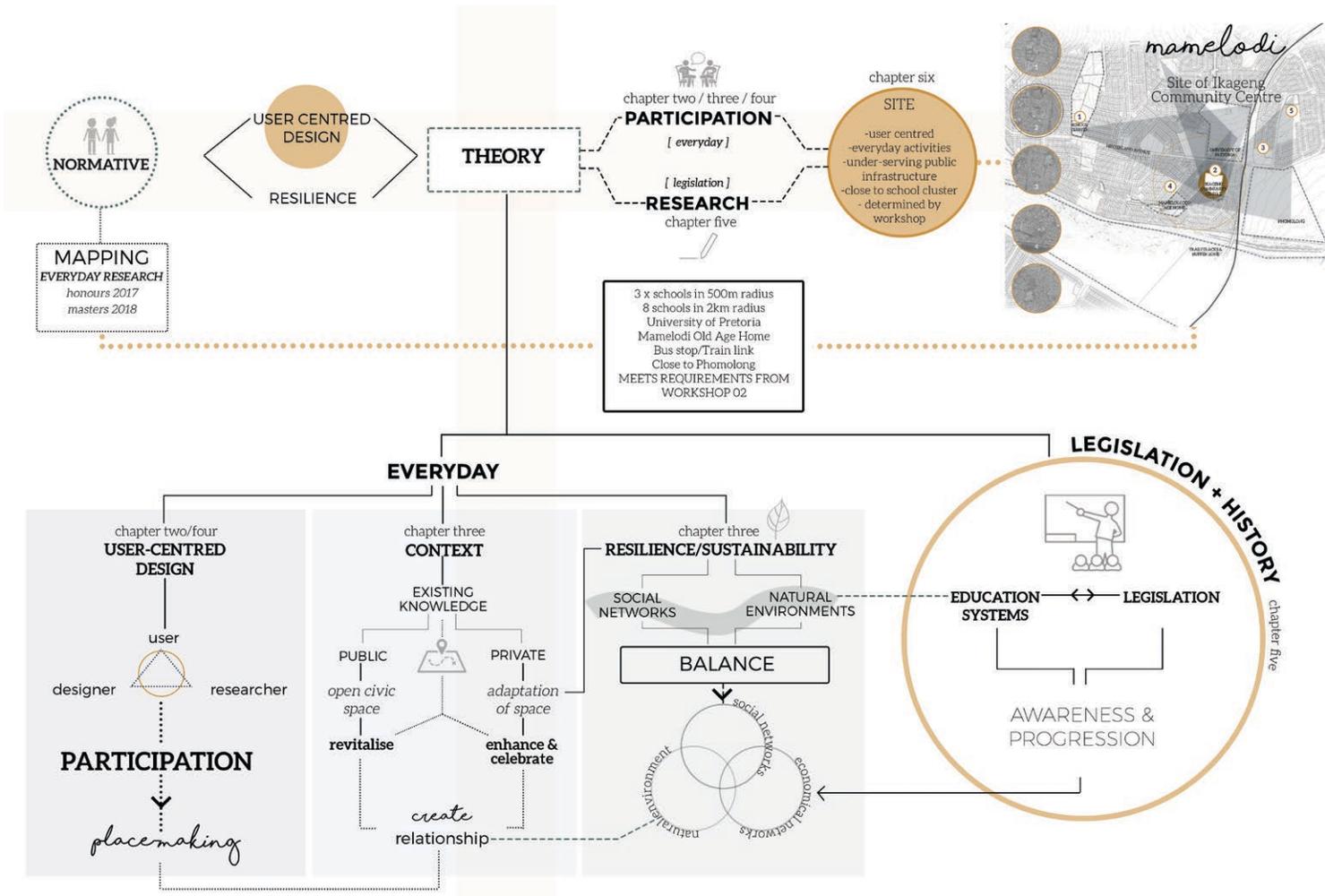


Figure 1.4: Diagram showing approach to dissertation (Author 2018, adapted from layout by Minnaar 2017:32)

1.4 // DEFINITIONS

Agency

The ability of an individual to act independently of the constraining structures of society (Awan et al 2011:30).

Co-creation/co-design

The creativity of designers and people not trained in design working together in the design development and arises in a realm of collaboration which both the professional designers and the other participants need to enter together. Collaborative design is seen as a potential platform from which an authentic design dialogue can take place (Awan et al 2011, Lee 2008:32,33; Teder 2018:2).

Design expert

Individuals whose field of interest, research and/or work is the practice and culture of design (Teder 2018:1).

Empowerment

Process by which people, organisations and communities gain mastery over issues they perceive as concerning them (Hussain 2010:105)

Participatory

Participation is the ability to resonate with the place and the people that surround us (Pantaleo 2014). It involves trying to give expression to the problems that emerge, thus identifying paths and strategies. Collaborative planning is seen as an approach in which direct involvement with the public is desired, attempting to include those who were previously ignored or marginalised in the decision-making process, with an underlying mandate of social transformation (Hamdi 2004; Healey 1997; Teder 2018:2).

Placemaking

"I have preferred to use placemaker in my title (rather than architect, planners or experts) because it is inclusive of all who make and sustain the quality of human settlements; including principally the people and the communities who are the inhabitants. The intelligence of place, I continue to maintain, is in the streets of places everywhere, not in the planning offices of bureaucracy" (Hamdi 2010)

RDP House

Reconstruction and development programme houses provided by the South African government.

Spatial Agency

The agent is one who effects change through the empowerment of others, allowing them to engage in their spatial environments in ways previously unknown or unavailable to them, opening up new freedoms and potentials as a result of reconfigured social space (Awan et al 2011: 32).

User centered design

Advocates the inclusion into the design process of those who may eventually be influenced by such practices. It is rooted in the criticism that conventional designer-centered practices exclude multiple voices (Ho et al 2011:97).



*other ways of making
architecture*

a way of doing //

chapter two

THEORETICAL CONTEXT

2.1. Co-design

2.1.1. Introduction

2.1.2. User centered design

2.1.3. Children in participatory
design

2.1.4. Challenges

2.1.6 Significance of co-design

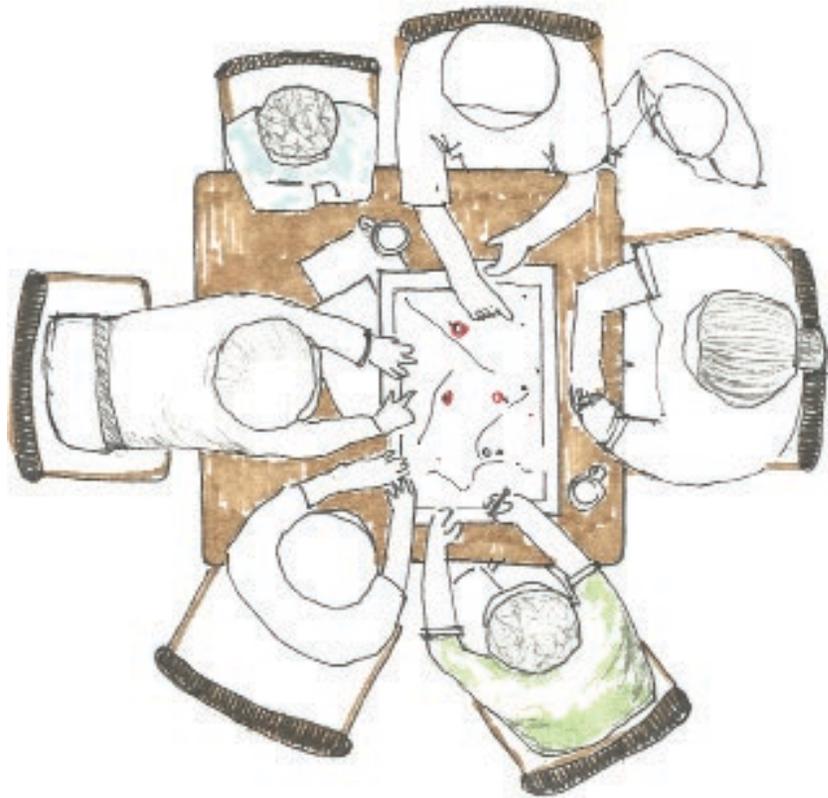


Figure 2.1 (title page): Seated around a table (Author 2018)
Figure 2.2 : Co-design collage (Author 2018, diagram adapted from Stratos Innovation Group 2016)

2.1 // CO-DESIGN

The trialectical thinking of spatiality, historicity and sociality cannot be understood in isolation as they are intrinsically a part of each other. When this trialectic thinking is reduced to the relations between historicity and sociality, as so often happens, spatiality tends to be left behind. Lefebvre's trialectics of space help us understand a third alternative, a third space, to other ways of making practical sense of the spatiality of social life (Soja 1996:73).

In order to understand the concept of third space, one must first understand the concepts of first and second space. First space, according to Soja (1996:76), is the branch of knowledge focused on the material form of things in space, with human spatiality seen primarily as the outcome or product. According to Lehloeny (2016:24), first space can also be identified as the domestic environment in which one identifies themselves. Second space, is the conceived rather than the perceived space. It is made from the projections into the empirical world from the imagined one. It is more

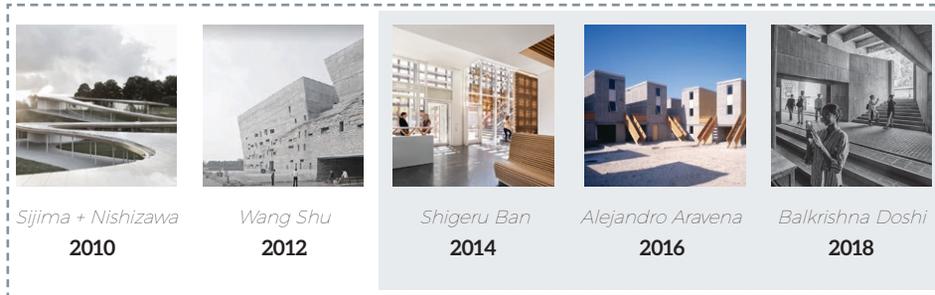
reflexive, subjective, philosophical and individualised (Soja 1996:78). Lehloeny (2016:24) describes the second space as civic space where people from different backgrounds can engage with one another. Third space is derived from the experimental rebuilding of the first and second space duality. It is not a critique on first and second space modes of thought but aims to refresh the approaches taken with new possibilities. Third space is a possibilities machine (Soja 1996:24). It is a hybrid notion where the self and the other meet, where the tangible and intangible collide, and where new uses of space are imagined (Lehloeny 2016:24).

The objective of Third Space was to encourage different thinking about the meanings and significance of space and the related concepts that compose and compromise the inherent spatiality of human life (Soja 1996:1). Co-design is a practice that encourages different thinking about meaning and significance of space.

2.1.1. INTRODUCTION TO CO-DESIGN:

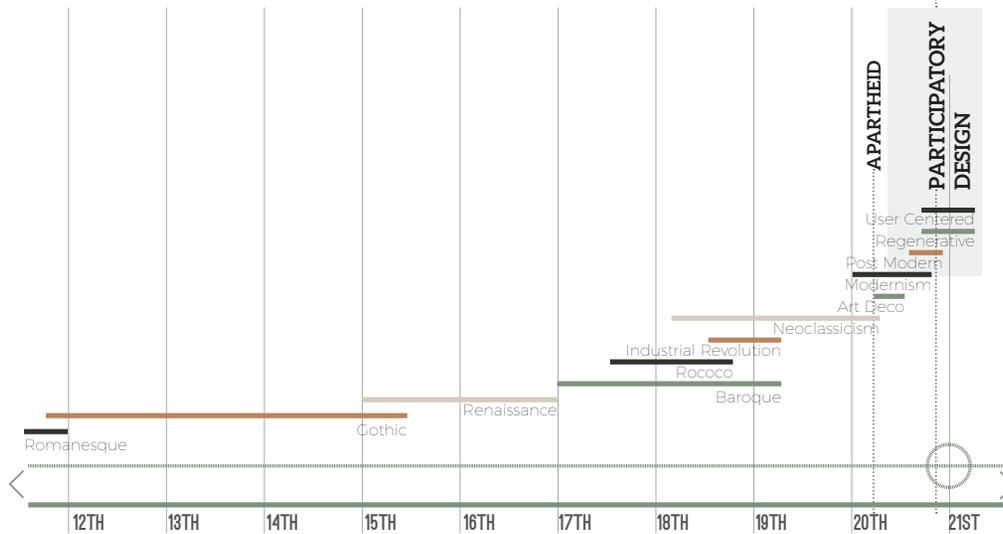
Until 1994, the majority of South Africa's population had been excluded from an official role in decision-making. The result was a society accustomed to top-down planning, labour exploitation and white minority domination, which lacked a tradition of democracy and public participation (Lyons et al 2001:276). The importance of community participation in urban renewal projects has gained currency over the last ten years as a means of empowering communities and making physical improvements more resilient in the long term (Doucet & Coupers 2009:1; Lyons & Smuts 1998: 923; Manzini 2015; Teder 2018).

At the 2010 Design Indaba, Jo Noero (2010) commented that there is an alternative form of practice for architecture that breaks from the traditional 'cover image building'. He stated that this alternative form of practice is to create fine buildings that are socially relevant and make the world a better place. They harness



the energy of the people and context to create purposeful architecture. Through engagement and dialogue with people outside of the design professions, design practice is transforming into a 'creative common for ongoing change' (Teder 2018:2).

In Awan et al (2011:38) it is stated that architecture, or more specifically space, affects and effects social relations in the most profound ways from the very personal, which includes the phenomenological engagement with light and space, to the very political which includes how the dynamics of power are played out in space. Users around the world are becoming more involved in the creative process. The extent of this involvement, however, depends on the way professionals practice design (Teder 2018:1). The key responsibility of the architect therefore lies not just in the refinement of the building, but as a contributor to the creation of empowering spatial and therefore social relationships (Awan et al 2011:38). This shift in perspective acknowledges that there is power in the collective and in collaborative thinking. If the fundamentally individualist nature of the architect shines through in the conventional process of design, one must question whether there are other ways of making architecture (Awan et al 2011) which embrace the power of the collective and of collaborative



Figures 2.3(Above) : Pritzker Prize winners over the years highlighting the past few years of winners that have used participatory design methods (Author 2018 adapted from Hyatt Foundation 2018)
 Figure 2.4 (below) : Timeline showing where participatory design occurs in the continuum (Author adapted from <https://www.thoughtco.com/architecture-timeline-historic-periods-styles-175996>.)

thinking. What distinguishes this literature and what makes it an unusually enlightening terrain is the ability to conceive new ways in the making of architecture.

2.1.2. USER-CENTERED DESIGN: EXPLORING THE SPACE BETWEEN INFORMANT AND DESIGN PARTNER

“Our entire lives are embedded in architecture. From cradle to grave, we are constantly surrounded, affected, and shaped by the structures in which we live – whether consciously perceived or unconsciously experienced. And as much as architecture shapes us, we shape architecture in return – whether professionally trained or not. Buildings simply keep changing, because people either have to or want to rework them to suit the unfolding patterns of their lives,” (Fereiss & Bouman 2011: 20).

/ Discourse of architectural authorship

Throughout the continuum of the architectural discourse, the problem of authorship in architecture has persisted (Adjaye et al 2011). The tension between the architect as an artist, and the architect as a social worker, demands that we broaden the issues to look at how buildings relate to their contexts and communities (Adjaye et al 2011). This becomes a provocative investigation according to Adjaye (2011), as it reflects on how the

architect and the community connect in the practice of architecture.

Henri Lefebvre’s (1974) socio-spatial concept touches on how the world is divided into two worlds of practice: abstract space for experts and concrete space for people. Dating from the era of modernism, these two worlds were separated, with professionalism being held above, and people being treated as subjects for information. When these two worlds re-join, a new in-between space is created called the ‘realm of collaboration’ (Lee 2008:33). More and more designers are designing for the ‘user’ therefore ‘design for users’ has become a design trend. It must be questioned, however, whether the users are merely subjects for analysis or active participants in the design decision making process (Lee 2008: 33).

/ Space for experts

There are many approaches to the architectural process. Most are purely intuitive but scholars agree that the process can be divided into phases and that different people work through these phases in different ways (Heath 1984, Mahmoodi 2001:64). Rooted in the world of experts, design is seen as a sequential process in which the architect is singular, having sole authorship of the building (Lawson 2005:239, Mahmoodi 2001:82).

The South African Council for the Architectural Profession (SACAP),

outlines certain work stages and outcomes for the architectural process based on such a sequential process. This six-stage process takes a project from inception to close out, with the architect being the primary author. The six stages include inception, concept, design development, submission to authority, construction documentation, construction and close out (SACAP 2010:5). The SACAP process is similar to both the Royal Institute of British Architecture’s (RIBA) and the American Institute of Architecture’s (AIA) traditional work stages. These work stages include pre-design, schematic design, design development, construction documents and construction administration. Where these two differ from SACAP’s approach is that there is a work stage for post design and feedback. In these stages a post occupancy study as well as developing user manuals and evaluation research is done (Mahmoodi 2008:83).

The essential skills and knowledge required to practice architecture in a sustainable, socially responsible and financially viable way are grouped into ten specific outcomes (SACAP 2010:3). The ten outcomes include architectural design, environmental relationships, construction technology, building structure, contextual and urban relationships, architectural history and precedent, building services, contract documentation, computer applications and office practice and

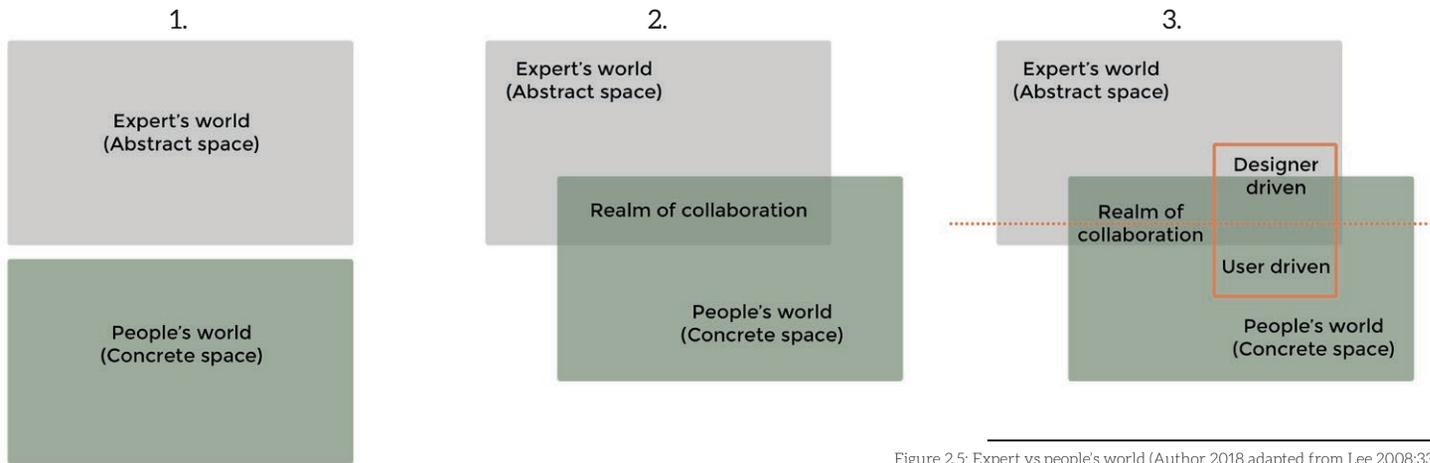


Figure 2.5: Expert vs people's world (Author 2018 adapted from Lee 2008:33)

ethics. The higher the qualification, the higher the level of understanding needed to achieve the outcome. These groupings must allow for the professional to compete and operate on a local, as well as international level, therefore the SACAP learning levels are derived from RIBA's Outline Syllabus (1999). These learning levels include awareness, knowledge, understanding and ability. Each of these learning levels is then applied to the work stage within the architectural process (SACAP 2010:4).

/ Space for people

Reliance on the typically individualised authorship of architectural production contradicts the representation of a collective identity of a community (Combrinck 2017:215). Concrete

space is the everyday world in which people live. Küsel (2018:41) states that somewhere in the making of our towns and cities, we have exchanged the human element for a number of zoning classes which are strung together around a number of roads and basic services. Currently, when human experience is taken into consideration it is understood as the experience that people are supposed to have rather than what they are actually experiencing (Lang 1987:16). Kotze (2017:2a) argues that, 'the language of the ordinary is more difficult to read, but if we uncover it, it offers a world of greater and lasting inspiration'. When architects begin to understand the rhythm of the ordinary, there is a realisation that although there are many problems

with places, the sense of community is tangible and that it is missing in many of our cities (Küsel 2018:42).

Through collaborative design, the role of the everyday user can be exposed through facilitating agency. This is done by relinquishing the role of the primary author. The intention is not to abandon architectural intelligence. It is in fact the opposite. Spatial agency is used to illustrate how intelligence can be exercised in a much broader spatial field that acknowledges the social, global, ecological and virtual networks (Awan et al 2011:31, Mahmoodi 2001:80).

/ Collaborative space

Between these two worlds is the realm of placemaking. Placemaking

started as a reaction against auto-centric planning and has grown into a practice of creating collaborative environments for the improvement of community life and social interaction (Project for Public spaces 2016, Silberberg *et al* 2013 Wyckoff 2014 in Teder 2018:2). The origins of placemaking can be traced back to the writings of Jane Jacobs, Kevin Lynch and William Whyte (Silberberg *et al* 2013:2, Teder 2018:2). Placemaking in a public sphere implies engaging with design beyond the practice of expert culture, connecting various people with their built environments. There is a common belief in the value of the process itself and in collaborations between users. This can be described as participatory design or co-creation. There are many definitions of placemaking. There is, however, a common belief in the value of the creation process itself and in non-hierarchical collaborations (Teder 2018:2).

The participatory design process is an alternative method to the conventional architectural process which aims to bring the users, the people, back into the conversation and give them a voice. The core idea of participatory design is that people who are affected by a decision or an event should have the opportunity to influence all stages of design as

they are experts on their own needs (Hussain 2010:100, Teder 2018: 2). All parties gather field data, initiate ideas, test and develop new prototypes. This uncovers the rich content and hidden meanings in the user's context which allows for deeper and more grounded issues to surface (Taffe 2017:18). The users are the witnesses you need to uncover the quality of good architecture (Fereiss & Bouman 2011: 16).

Participation is not important for its own sake. Rather, it is important because it has the potential to add value to a project and its outcome through empowerment (Hussain 2010:105). Participatory design is about giving the community the tools and the space to allow them to rebuild and regrow the way they want to. It is about building densely interconnected networks, crafting linkages between unlikely partners which facilitates emergence. It builds on what there is and allows it to go to scale (Hamdi 2004: xviii). For advocates of design empathy, designers must not only be informed and inspired by users, but also be able to observe and feel for the users (Ho *et al* 2011:95).

In the collaborative process, architects have to look beyond the design intentions and analysis and listen to the users themselves (Fereiss &

Bouman 2011: 16). This approach looks at the design process as a learning process. There have been a number of attempts to classify levels of participation. These include Arnstein's ladder of participation (1969) and Lindsay's pyramid of user led design (2003). These, however, are intended to create hierarchies rather than encourage interactions. Vaajakallio & Mattelmäki (2014:64) introduce four main purposes and functions for co-design workshops which begin to speak about an interactive framework for co-design. The four purposes include: research, building design competency, empowering users and engaging multiple stakeholders. These are then further split into four main functions: conceptualise, exchange perspectives, understand context and create scenarios (Vaajakallio & Mattelmäki 2014:66). It is important to note that the expression of this spatial agency given to users may lie in something that is physical, such as a building, or in something that is less tangible, for example a map. There is a shift away from the building and the focus lies on the processes that connect the different parts of the production of the built environment. This is not new as it is all a part of spatial production but participation acknowledges the importance of these processes and therefore gives them new significance (Awan *et al* 2011:55).

		What is design participation for?	Relationship between architect and user's space	Role of the users	Role of the architect
Abstract Space	Designer driven	Little/none	Separated as two individual realms	Imagined	Master
Realm of collaboration	Designer driven	Collaboration	Overlapping of two realms	Co-designers	Co-designers
	User driven	Freedom from existing conditions	User taking over expert's space	Creative	Advisers
Concrete space	User driven	Individual motivation	User's exist within expert's space	Active users	Craftsmen

Table 1 shows the relationships between user, space and designer, for the above-mentioned spaces.

2.1.3. CHILDREN IN PARTICIPATORY DESIGN:

The evolution in design research from a user-centered approach to co-designing is changing the landscape of design practice, creating new domains of collective creativity and giving them new significance (Sanders 2008: 5). It is hoped that this evolution will support a transformation towards a more resilient way of living (Gilchrist & Kyprianou 2011). Young people aged 12-18 are the generation that will be most affected by all intractable challenges. Expert and government led initiatives have developed research capability that remains detached from the lives of the poor and the young, who are often most

affected by the negative impacts of change. The consequence is that many opportunities are missed to allow people in poorer communities to develop skills, and to lead innovation in resilient development policy in ways that address the interconnectedness of environmental challenges, whilst reflecting local priorities, cultures and environments (GCRF 2017:2).

This can be explained by looking into the social and historical constructs of children and childhood as well as the spaces allocated to children. Before the eighteenth century, children in the West were protected until the age of six. After this they took part in working life. The beginning of the twentieth century saw the introduction of compulsory primary education. Due to this, children were taken out of labour and public

spaces which created a stronger divide between adults and children. Children became a separate social group and only two places were appropriate, namely home and school (Cunningham 1995; Jans 2004). Current opinions about children's capability of taking part in design are rooted in this background. Children also usually belong to social groups with almost no financial resources and are therefore ignored (Hussain 2010:100).

Inclusion of children and youth in participatory processes started in the 1970's with Lynch's 'Growing Up in Cities' (Lynch 1977 in Derr 2015:120). Participatory projects can be empowering processes resulting in empowered outcomes (Hussain 2010:99). Designers are encouraged to talk to the user group in the design

process, however, when designing for children, designers tend to only consult with carers such as parents and teachers (Ghaziani 2008:225). This is contrary to the current trend of emphasizing user involvement. Empowering children through participation is not about giving them the same role and responsibilities as adults in the design process (Hussain 2010:105). When designing for underprivileged children, participatory work is especially important since the cultural gap between the user and designers is usually large. User participation has the advantage in that the designer does not interpret the collected data from their own cultural vantage point in isolation from the users. Children can be empowered by gaining confidence through experiencing that adult designers are interested in knowing their opinions. The co-design process should enable children to become reflective practitioners who understand how to establish partnerships and communicate with people who hold diverse views (Derr 2015:120).

2.1.4. CHALLENGES OF CO-DESIGN

Working with children in participatory design also involves several challenges. The first challenge of participatory design is how to

recapture the aesthetic processing of design through participation in order to produce better designs. There needs to be clear arrangements and outcomes otherwise the task becomes ambiguous and uncertain and the resultant outcome becomes a laundry list rather than genuine needs of the community (Ho 2011:95). Secondly, participation projects can be empowering as well as disempowering, depending on how the participants are included and treated. It is the designers' responsibility to find methods that fit the skills and competence of the participants so that participants do not become discouraged and frustrated (Hussain 2010:108). Lastly, children do not usually have the time, knowledge or expertise to collaborate with designers as partners in the true sense (Hussain 2010:101). It is suggested that children are given the role of informants at several stages of the project rather than just the beginning or the end.

2.1.5. SIGNIFICANCE OF CO-DESIGN

Educators and practitioners are seeking broader definitions for what architecture can do beyond being just a building (Wright 2017:26). Tackling the many layers that surround the elements of space, practice takes on a different position. If this position is underpinned by the interaction

with society, the process of producing appropriate responses opens doorways that enable a continuous feedback into practice that includes delivering the architecture to broadening the impact of architecture. Each action in this process of design and delivery therefore contributes to nurturing a societal understanding of what architecture really is and does (Wright 2017:27). What distinguishes this literature and what makes it an unusually enlightening terrain is the ability to conceive new ways in the making of architecture. It allows for exploration and connections far above the standard production of architecture.

Figure 2.6: Table 1 showing different roles (Author 2018 adapted from Lee 2008)



welcome to mamelodi

a way of understanding //

chapter three

LEARNING FROM CONTEXT

- 3.1. Education, People and Mamelodi
- 3.2. History of Mamelodi
- 3.3. Development of Mamelodi
- 3.4. Analysis of Urban Fabric
- 3.5. The Fine Grain
- 3.6. Imagining Mamelodi
- 3.7. Precinct Narrative
- 3.8. Resilience of Place
- 3.9. Problem Summary
- 3.10. Research Question
- 3.11. Research Objectives
- 3.12. Delimitations
- 3.13. Limitations
- 3.14. Assumptions

Street:

Defined by an edge that contains multiple destinations and shifts from being merely a connector (Harber et al 2018:5)

Road

Primarily for movement of people or goods from one place to another (Harber et al 2018:5)

3.1 // EDUCATION, PEOPLE & MAMELODI

As stated in the literature, until 1994 the majority of South Africa's population had been excluded from an official role in any decision-making, especially when it came to space and movement (Lyons *et al* 2001:276). Architecture can be seen as a backdrop for life, but is also a reflection of place and the inhabitants, thus becoming an expression of people, time and place - a constantly evolving narrative. This narrative is explored from the general issue through to the specifics of Mamelodi which is explored in two branches - the coarse grain, the public sphere, which is an expression of Apartheid and the fine grain, the residential sphere, an expression of how Mamelodi has adapted over time.



3.1.1 / GENERAL ISSUE:

Obtaining a quality education is the foundation for creating sustainable and resilient development (United Nations 2018). Access to education is a global concern and continues to be a challenge worldwide. The United Nations (2018) lists 'quality education' as fourth on the sustainable development goals for 2030. It is stated that education is the key that will allow many other of the sustainable development goals to be achieved. Education is a tool to reduce inequalities, empower people and foster tolerance between people (United Nations 2018).

Every child has the right to an education (UNICEF 2018). Education offers people, especially children, a ladder out of poverty and the path to a promising future in which they can become active citizens. According to the International Labour Organisation, education is the fundamental building block for a strong and independent individual (van Tonder *et al* 2015:1). Currently, however, there are 617 million youth worldwide lacking in basic mathematics and literacy skills which leaves these learners without the knowledge and skills needed to thrive (UNICEF 2018, United Nations 2018).

In South Africa, programs such as the Accelerated Schools Infrastructure Delivery Initiative (ASIDI), introduced by the Department of Education, aim to provide better and more inclusive education to children, however, there are still many gaps and deficiencies in the education system leaving many children deprived, or restricted to access, to their basic rights. In Mamelodi, children under 18 make up 30% of the population (Wazimap 2018). 18-64-year olds, the working class, make up 68% with those over 64 making up the last 2%. Every day, the street bustles when hundreds of working-class people leave Mamelodi on buses, trains and taxis to journey into Pretoria for work (Honours Research Group 2017, Küsel 2018:42). Mamelodi is located about 25km from Pretoria's CBD. This is too far to walk and too expensive to drive therefore most people rely on public transport (Du Plessis & Peres 2013:9). There is, however, an entire community left behind. From 5am to 5pm, the elderly, unemployed and children tread through the streets of Mamelodi. The towering concrete fences of public infrastructure separate these people from their right to education (Honours Research Group 2017, Masters Research Group 2018).

3.1.2 / GENERAL INTENTION:

According to UNESCO (2014:2), the challenge today is to effectively harness the potential of the secondary school and other community based educational systems. In order to harness this potential, there needs to be a recognition that a sustained and sustainable approach to combating local challenges is '*only truly possible through comprehensive cross-sector effects that begins with education*' (UNESCO 2014:2). Education is to be seen as a vital investment for the future of the world and not a waste of taxpayer's money (Taylor 2009:4). The general intention is therefore to harness the power of education to create accessible and meaningful education for the community of Mamelodi. This not only allows these social spheres to overlap and support each other, but also allows for positive growth towards a sustainable future whilst celebrating a unique sense of place. It is intended that by introducing accessible education that people are empowered to change their futures (United Nations 2018).

Figure 3.1 (title page): An RDP house, typically seen in Mamelodi (Author 2018)

Figure 3.2: Collage depicting the general issue in Mamelodi (Author 2018)

3.2// HISTORY OF MAMELODI

Colonial and apartheid planning have left a negative legacy in South Africa (Sebake 2011:424). The occurrence of separation became evident with the introduction of the 1913 Land Act which prohibited black citizens from owning land outside of the reserves. Mamelodi, meaning 'Mother of Melodies', (van der Waal 2000:1) is located on the periphery of the City of Tshwane and is one of the many consequences of Apartheid planning. Mamelodi is a vibrant and complex place. It is alive with people, culture, talent and diversity. It is, however, also affected by many problems especially those of a social and economic nature (Steyn 2005:1). Mamelodi was established in 1945 on the Vlakfontein Farm 329JR. The design of the Vlakfontein township was conceptualised under a Smuts orientated City Council of Pretoria's Planning department. The initial plan was altered under a Nationalist Council (Bakker *et al* 2002:16). A failed attempt in 1947 to build government-sponsored housing, modeled after the traditional rondavel typology, saw the implementation of a new dwelling typology (Bakker *et al* 2002:19). It is here we see the birth of the NE 51/9 houses that characterise Mamelodi. Spatially, the result of this has been mono-functional neighbourhoods

characterised by low density and fragmentation (Honours Research Group 2017).

Under the 1950 Group Areas Act, black people were moved to Mamelodi from newly proclaimed white areas (Sebake 2011:424, van der Waal 2001:1). These areas for black people were designed to be easily controlled, self-contained areas that functioned separately from the 'white' city (Du Plessis & Peres 2013:3). A residential character, due to Apartheid planning, dominates Mamelodi. Planning did not allow for many public buildings or infrastructure. The first form of infrastructure, after the railway which transported workers into the city, was a school built in 1953. Since then, various other forms of infrastructure have been built which are discussed later in the chapter.

Küsel (2018:68) states that in order to take our cities to the next level we need to hone our observation skills, spend time in the communities to see what is unique and actually occurring as well as adopt inventive ways to work with the locals. These are essential investments if we are to develop sustainable, resilient and healthy communities. To gain further insight into the social, urban

and spatial constructs of Mamelodi East, the 2018 Mamelodi Masters Research Group (Porter, Senekal & Smit) investigated the current urban conditions through intensive mapping, observations and analysis. The findings reveal that Mamelodi is constantly evolving within it inherited spatial legacy, which still impacts the way the city functions today (Du Plessis & Peres 2013:2, Küsel 2018:42). Access and movement is limited as it was designed to be controlled. The inherited landscape is also deprived of public infrastructure that serves the city. This is especially evident in the school and health care systems. This causes the residents of Mamelodi to be reliant on sources outside of the city (Honours Research Group 2017).

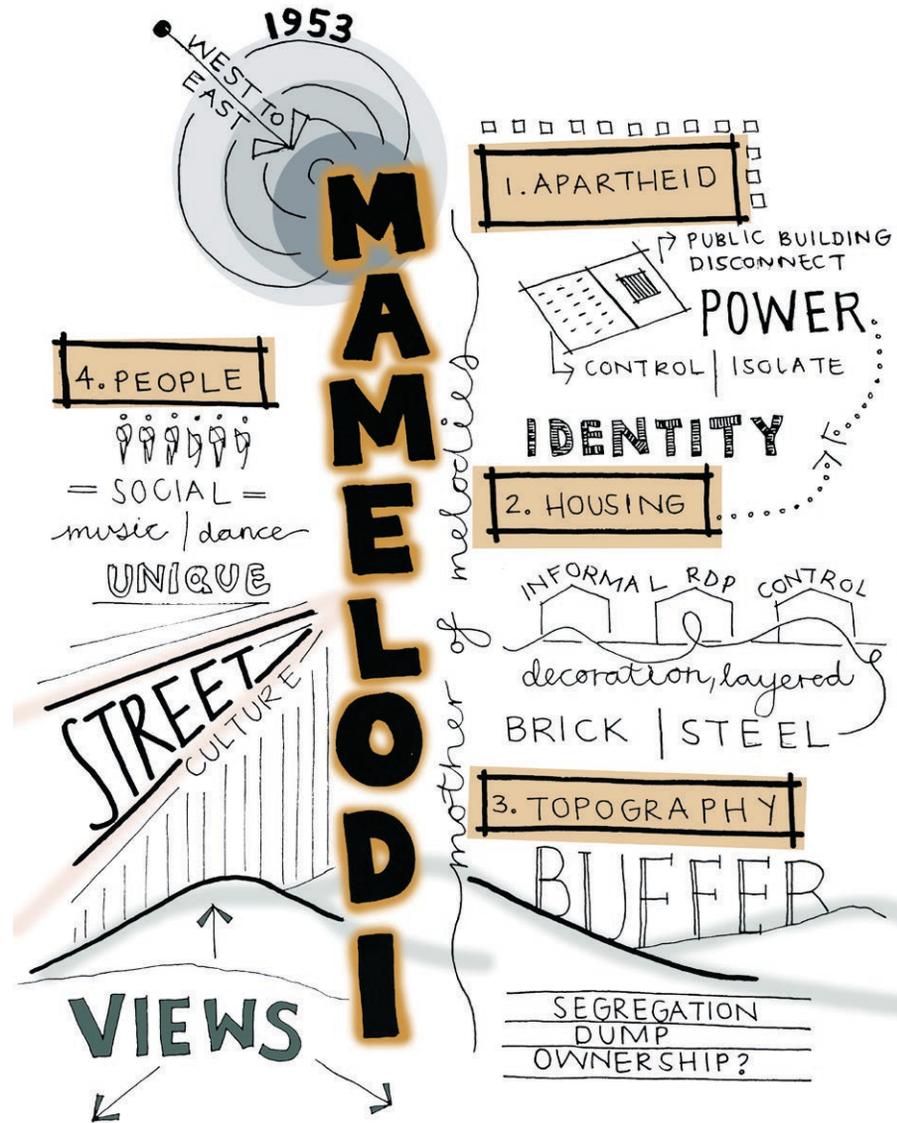


Figure 3.3: Diagrams indicating the scale - urban, precinct, site (Author 2018)
 Figure 3.4: Collage of Mamelodi (Author 2018)

3.3 // DEVELOPMENT OF MAMELODI

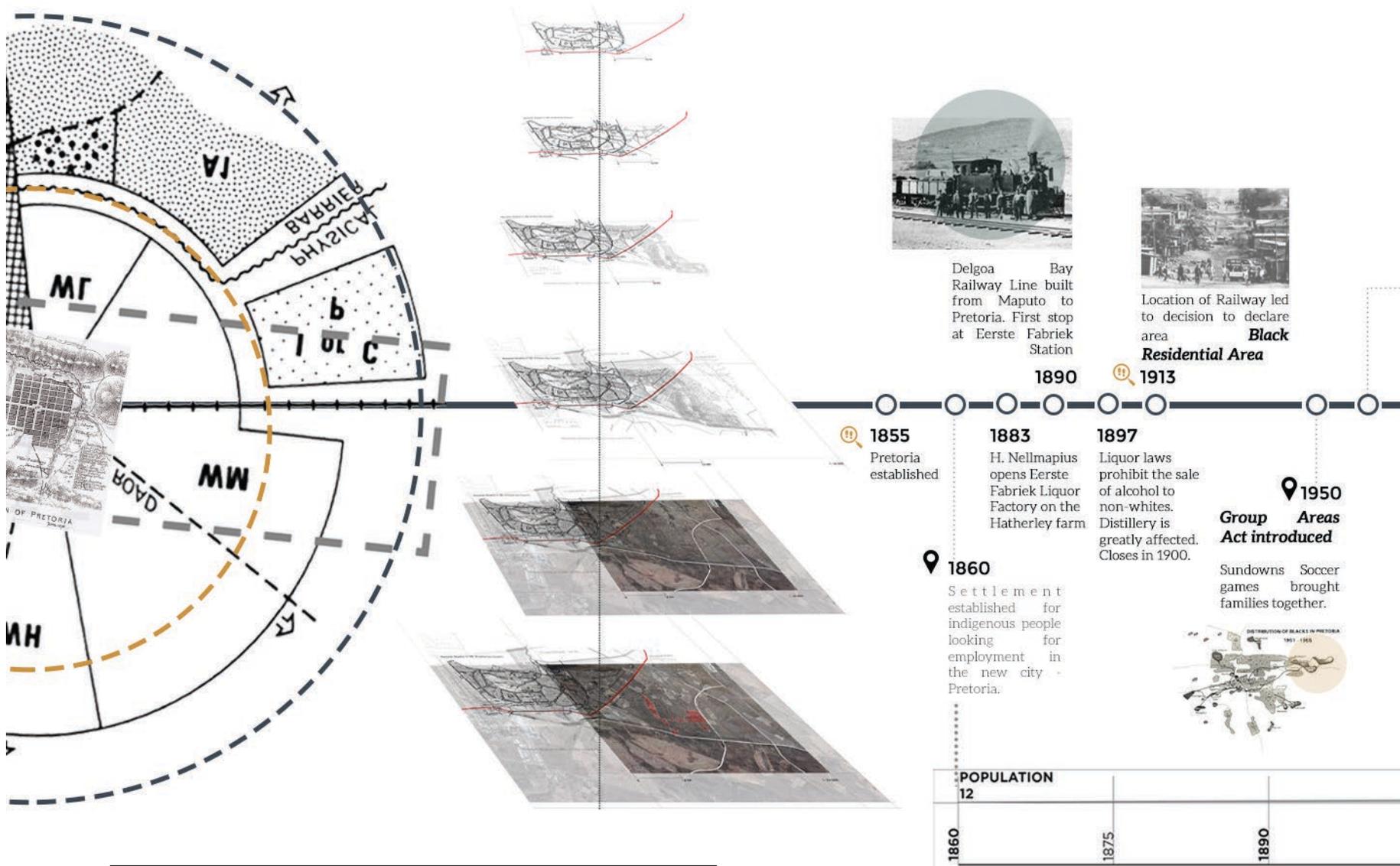


Figure 3.5: Timeline of Mamelodi (Author 2018, Information from: Van Der Waal Collection, Bakker et al 2002, Mamelodi Heritage Routes, Honours Research Group 2017, Masters Research Group 2017 & 2018)

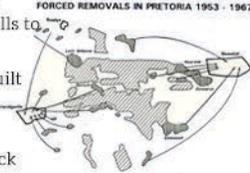
Flakfontein Industrial School

set up to train workers in skills to build houses

First school built in Mamelodi

Formally declared a Black Township

FORCED REMOVALS IN PRETORIA 1953 - 1967



1953

First Crèche opens

1957

1958

Post Industrialisation and Job seeking caused squatter camps forming on the Northern and Western farms

Squatter camps became full and started to expand to the East

Squatter camp full, started to expand to the east. Settlement is **officially named MAMELODI**

1960

1968

First squatter camp in Mamelodi East named Mandela Village



1980

Soccer becomes first non-racial sport in South Africa

Police station and community hall built in Mamelodi

1981

VISTA campus opens

Hospital and hospice built

1983

SOS children's village opens

1985

1987

All formal houses supplied with electricity and sewerage systems



Vista University changed to University of Pretoria Mamelodi

2004

2005

Police Station in M.East is built

Renovations at HM Pitje Stadium begin - Mamelodi Sundowns Soccer Club moves out



2008

'Shack eradication' stance undertaken by government

2010

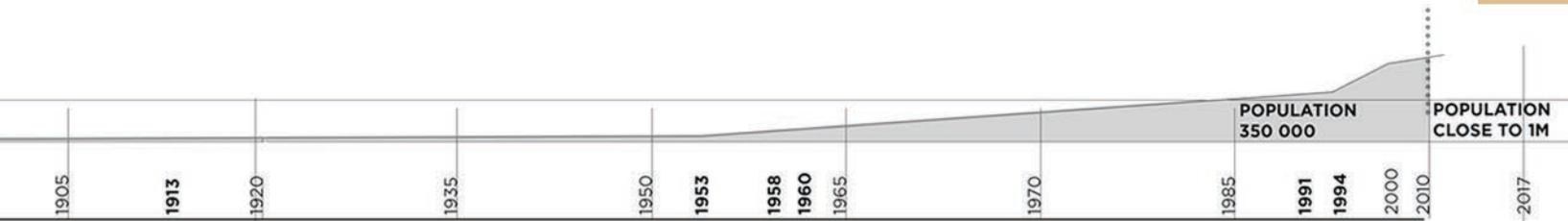
Community Centre built in M.East



DISSERTATION FOCUS

Explore alternative ways to making socially purposeful South African architecture that engages with the surrounding community

2018



3.4 // ANALYSIS OF URBAN FABRIC

3.4.1 / POPULATION DENSITY IN MAMELODI

It is evident after visiting Mamelodi East that there is a high population density (figure 3.6). Mamelodi is expanding, both with informal and formal fabric, each day due the rising population. The current single-use, residential typology is not only causing urban sprawl but spatial, social and economic fragmentation (Steyn 2005:1). This expanding population also places pressure on existing forms of infrastructure to keep up with the demand of the community.

3.4.2. / ACCESS AND MOVEMENT

As a result of many people leaving to work in the city each morning, and returning each evening, the majority of movement happens along the main access roads (figure 3.7). Taxi, train and bus networks are the main transportation means. Formal and informal transportation hubs can be located at the main intersections. A large number of pedestrians are found around the schools in Mamelodi which in turn leads to small informal businesses developing along these routes.

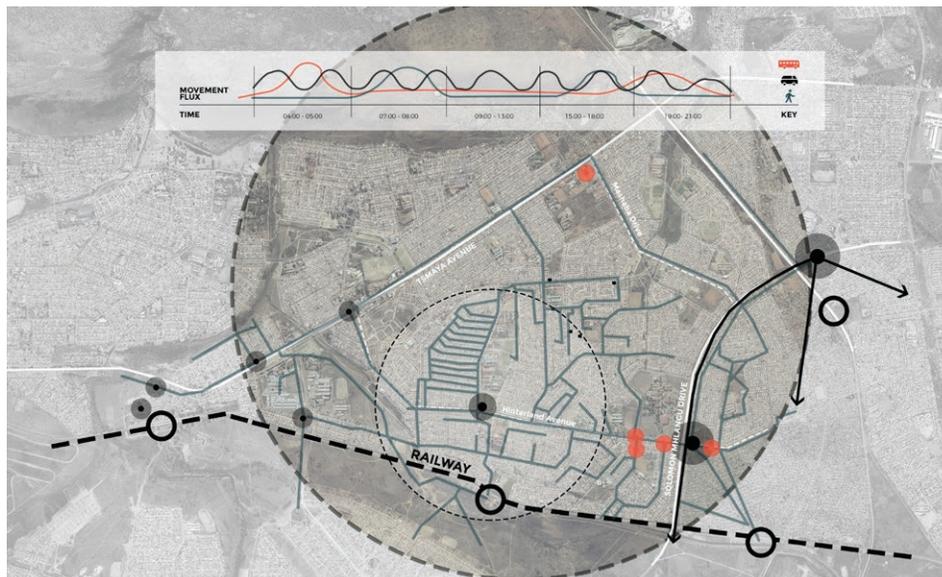


Figure 3.6: Mapping of civic infrastructure - schools and clinics (Masters Research Group 2018)

Figure 3.7: Mapping of access to Mamelodi East (Masters Research Group 2018)

3.4.3 / PUBLIC INFRASTRUCTURE

It is evident from the mapping that Mamelodi is home to a number of public amenities, the most prevalent being schools and healthcare. The existing institutions, such as the schools, clinics, libraries and police stations, act as important anchors to that of everyday practice. These public spaces, however, function in isolation and are a complete contrast to the more private spaces. Mapping evidence shows they remain guarded behind high fences, seemingly shying away from the community. The fenced off boundaries result in hard edges that have little response to the surrounding environment. The architectural language of these institutions is monotonous where a limited material palette is used in a very conventional way. This can usually be seen in the yellow brick, laid in a running bond with a green or maroon sheet metal roofing that dominates the building. The lack of ownership and care for these public spaces is evident in the dirty sidewalks, overgrown gardens and in the absence of trading and social activities that occur around these spaces. Public infrastructure displays an introverted approach, in contrast to the surrounding community's extroverted way of life (Honours

Research Group 2017, Masters Research Group 2018).

Open space in Mamelodi is also perceived as dangerous as no ownership is taken therefore it is overgrown, used as a dumping ground and not utilised to its full potential.

Figures 3.9-3.19 on the following page show examples and locations of public infrastructure in Mamelodi.

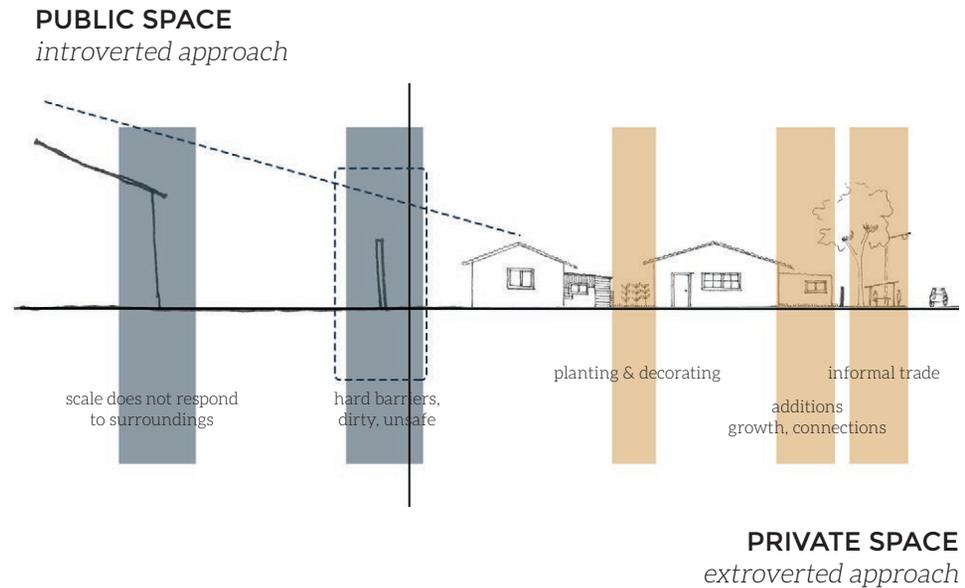


Figure 3.8: Analysis of space in Mamelodi showing contrast between public and private space (Author 2018, Masters Research Group 2018)

1 // UNIVERSITY OF PRETORIA



2 // CLINIC



3 // LIBRARY



Figures 3.9, 3.10, 3.11 (from top): University of Pretoria western fence, Stanza Clinic, Stanza Library (Masters Research Group 2018)

4 // COMMUNITY CENTRES/ SPORTS GROUNDS



Figures 3.12, 3.13, 3.14, 3.15 (from top): Community centre, Ikageng Centre, Mamelodi sports grounds, Children's Centre (Masters Research Group 2018)

5 // MAMELODI EAST POLICE



6 // SCHOOLS



7 // OPEN SPACE



Figures 3.16, 3.17, 3.18 (from top): Mamelodi East police station, Gatang Secondary School, open land in Mamelodi East (Masters Research Group 2018)

Figure 3.19 (opposite): Locality diagram showing infrastructure (Masters Research Group 2018)





3.4.4 / SCHOOLS & HEALTHCARE

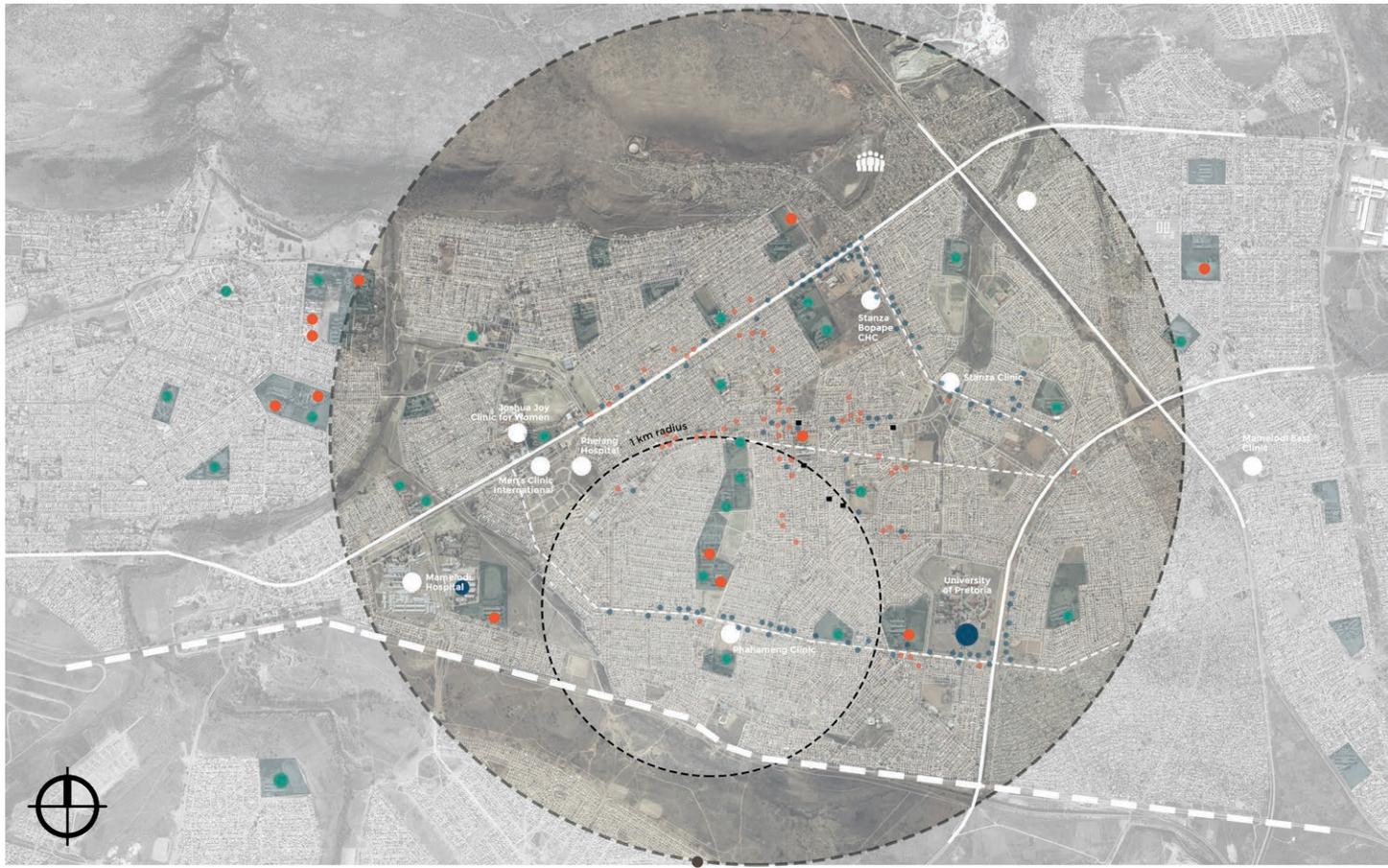
School buildings are a specialised type of public building. They should be designed to make use of space as an educational tool (spatial learning) (Heitor 2005:44). The spatial layout should embody both the learning aspect, as well as the social aspect, through how it localises people and modulates their interactions and experiences of place (Heitor 2005:44). Globally, education is moving towards holistic learning environments where learners should acquire skills, knowledge and values that are necessary to become a responsible citizen and not merely just mathematics and literacy skills.

This shift is not seen in Mamelodi. Schools are some of the most prevalent forms of infrastructure, however, access to education within Mamelodi is still limited where the number of children exceeds the number of schools available (CSIR Red Book, Workshops 2018). Apartheid planning is still evident in the way schools are placed close to each other, creating clusters. These educational cores were created to share resources

and limit government spending. The shared resources, such as the fields, have been fenced off from all the schools rendering these places dirty, uninviting and unsafe (Masters Research Group 2018). As can be seen in the figures 3.20-3.24, the schools in Mamelodi East do not welcome learners or the community into the space.

A positive is that small spaza shops have capitalised on these school clusters. Since the majority of children walk to school, and are going to school in the same area therefore using the same route, small businesses appear alongside these routes (Honours Research Group 2017, Masters Research Group 2018).

Figure 3.20 (left): Gatang Secondary School edge condition (Author 2018, Masters Research Group 2018)
 Figure 3.21 (left,below): Lehlabile container classrooms (Author 2018, Masters Research Group 2018)
 Figure 3.22 (left, third): Edge condition of school cluster (Author 2018, Masters Research Group 2018)
 Figure 3.23: Shared resources between school cluster (Author 2018, Masters Research Group 2018)
 Figure 3.24 (opposite): Map indicating schools, healthcare and economic activity (Masters Research Group 2018)



3.5 // THE FINE GRAIN OF MAMELODI

3.5.1 / PARTICIPATION GAME: BUILD YOUR SPACE

Till (1998:17) argues that community is manifested in the production of space, of which architecture constitutes a part. In order to understand how the community of Mamelodi produces space, as this contributes to the community spirit, an initial mapping exercise was done in 2017 as part of the Department of Architecture Honours Studio. At an honours level the South African Council for the Architectural Profession (SACAP) requires students to have a knowledge of critical urban issues as well as an awareness of urban issues (SACAP 2010:8). New to the context of Mamelodi, this game was used to gain knowledge about the urban context through walking around and getting to know people. The Honours Mapping group (Grootboom, Porter, Senekal & Tuke) walked through the streets of Mamelodi East and asked ten residents to partake in the game. Participants were given 'building blocks' such as walls, a container, a temporary structure and a base RDP house and asked to complete their space, indicating which components would be used for and where they would be placed. These models were then translated into sketches and analysed according to where the component was placed and what the

component would be used for. The same game was played with ten people from the Department of Architecture Honours Studio 2017 as a comparison as all of these participants live in and around Hatfield. This contributed to an awareness of the built environment in different contexts (SACAP 2010:8).

From the results, it can be seen that all of the residents of Mamelodi used the street space as part of their area. This was used predominately for small businesses. Spaces were shared and additional space added to the basic RDP house was for family or friends to come and stay. This is in contrast to the people from the Honours studio who added space for personal interests such as art studios. The game once again revealed the very social nature of the community of Mamelodi.

The results revealed five areas of space which are also evident in the built form of Mamelodi. These spaces, which are further translated into the design concept, are:

- **Permanence (Anchor)** - this is usually the RDP house as it is an existing built form.
- **Emergence (Attach)** - these are usually light weight structures, constructed from timber or steel, that attach to the house on the street side. They are predominately small

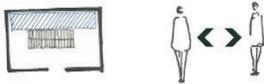
businesses or spaza shops and often used as a threshold space into the more private areas of the house.

- **Sharing** - neighbours often build their houses right to the boundary wall and sometimes share windows for these spaces. Sharing is also expressed through cul-de-sacs where residents develop the middle area as a social point.
- **Gathering (Home)** - gathering occurs under these light weight structures or under trees along the side walk.
- **Expression (Aspiration)**- the sidewalk, gates and street facing walls are usually highly decorated and well kept. It is the expression of the family that resides there.

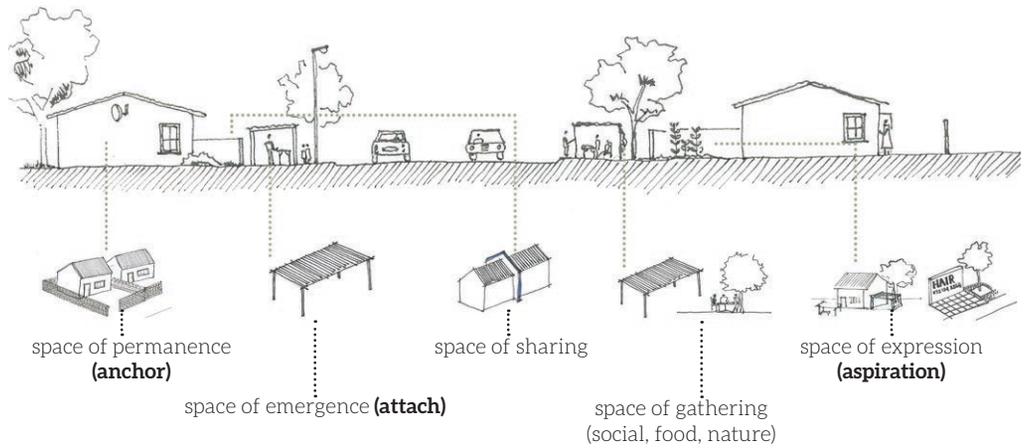
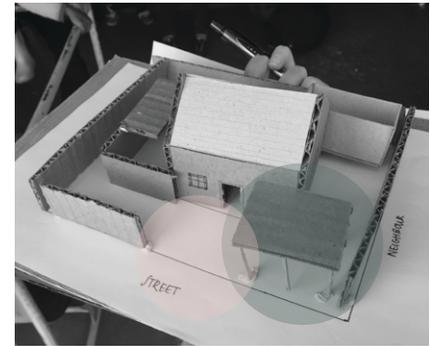
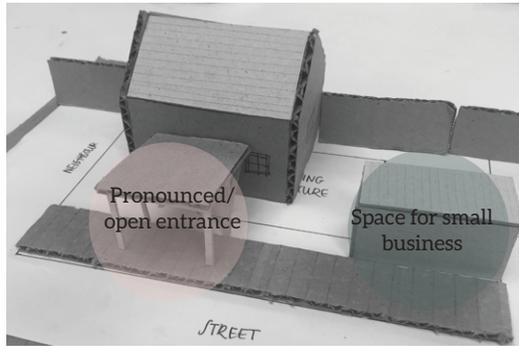
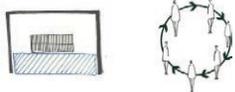
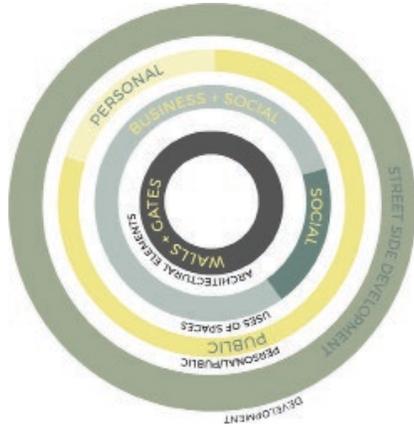
This participation game was part of the inspiration for doing the design workshops with the secondary school learners.

Titled adapted from Kotze 2016
Figure 3.25 (above left): Analysis of space of people in Honours studio (Author 2017)
Figure 3.26 (below left): Analysis of street context from the build your space game (Author 2017)
Figure 3.27 (above, right): Model built by a resident of Mamelodi (Author 2018, Honours Research Group 2017)
Figure 3.28 (above, left): Model built by a resident of Mamelodi, 2 (Author 2018, Honours Research Group 2017)
Figure 3.29 (below, left): Model built by a teacher in Mamelodi (Author 2018, Honours Research Group 2017)
Figure 3.30 (below, right): Security guard building his space (Author 2017, Honours Research Group 2017)
Figure 3.31 (below): Analysis of space of people from Mamelodi (Author 2017)

DEPARTMENT OF ARCHITECTURE
HONOURS STUDIO 2017



RESIDENTS OF MAMELODI





3.5.2 / EDGES & THRESHOLD

Edges and the associated thresholds are important elements in the language of urban space (Hayward & McGlynn 1993 in Küsel 2018:43). Edges can be physical or implied, hard or soft, positive or negative. Since edges are usually associated with pathways, and pathways are movement routes as well as places of social exchange (Küsel 2018:42), edges need to be understood at various scales as they are inherently complex elements.

Successful gathering space is not only made up of a combination of the above typologies but made up of many different people being able to gather together. It is the mixture of the spatial values, as well as the humanistic values, that make space and provide meaning to this space. This is a combination of the individual as well as the collective being catered for. This combination of spaces is evident within the neighbourhoods of Mamelodi. Main roads are primarily used for movement. It is along these streets that informal businesses are found. Smaller secondary streets lead off these main roads to the smaller neighbourhoods. Individual houses within these neighbourhoods display decorated pavements and pathways. They are well-maintained spaces which are individually crafted according to the occupants of the houses alongside. There is a collection

of types and textures that bring a vibrancy to the neighbourhoods.

Threshold in Mamelodi is seen as layered space, with the pavement and street acting as the first threshold. Next, a lightweight structure which is usually used for trading is built. This mediates between the busy street and the quieter home area. The lightweight structures are usually attached to the walls of the houses. Then there is a garden space between the trading structure and house which is well kept and often used to grow food. Following this, the user would enter into the most public space of the house. This would be the lounge or kitchen. In many instances, this area of the house has been turned into a crèche or a small hair salon. Residents of a neighbourhood usually move very freely between these spaces. Food is a very important social aspect within Mamelodi and it is part of the culture of looking after each other to feed your guests (Bopape 2017). Lastly, the bedroom spaces, which are the most private, occur.

SPATIAL PRINCIPLE: Building as series of thresholds

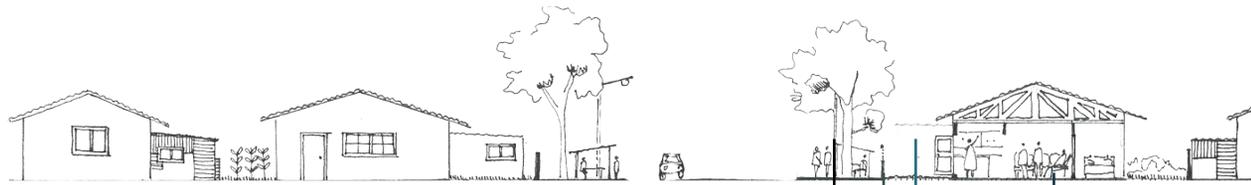
Figure 3.34: Business attached to house (Author 2018)

Figure 3.35: Layers of thresholds(Author 2018)

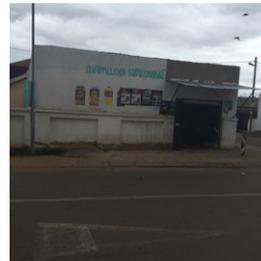
Figure 3.36: Layers of pavement space (Author 2018)

Figure 3.37: Spaza shop (Author 2018, Masters Research Group 2018)

Figure 3.38: JCP E-Park, built by Honours Research Group & community (Author 2018, Masters Research Group 2018)



PERMANENT
ANCHOR



LAYER ONE

LAYER TWO

LAYER THREE

LAYER FOUR

SEMI- PERMANENT
ATTACH



NATURAL
MEDIATE



TEMPORARY
ATTACH



SPATIAL PRINCIPLE:
Building as place of gathering

- Figure 3.39 : Section showing thresholds (Author 2018, Honours Mapping 2017)
- Figure 3.40 : Permanent, anchor spaces (Author 2018, Honours Mapping 2017)
- Figure 3.41 : Semi-permanent spaces that attach (Author 2018, Honours Mapping 2017)
- Figure 3.42 : Natural gathering space (Author 2018, Honours Mapping 2017)
- Figure 3.43 : Temporary business structures (Author 2018, Honours Mapping 2017)
- Figure 3.44 (opposite) : Collage showing urban issues (Author 2018, Honours Mapping 2017)

3.5.3 / STREET & NEIGHBOURHOOD

The private realm, or residential component of Mamelodi shows an extroverted approach. Due to the lack of public infrastructure, the street in Mamelodi has become a place of celebration (Küsel 2018:41, Honours Research Group 2017, Masters Research Group 2018). It is multidimensional. It is a movement corridor, an economic driver, a place of social exchange and a place of recreation (Küsel 2018:41, Honours Research Group 2017, Masters Research Group 2018). Small gatherings emerge, the school children chatter on their way home from school, cars are washed and serviced and small, informal businesses have popped up in every available space (Küsel 2018:42, Honours Research Group 2017, Masters Research Group 2018). The streets are public, robust, multifunctional and dynamic environments that are the heart of Mamelodi (Küsel 2018:41). The busier streets are usually perceived as being safe for children and these are used as the predominant movement routes. Smaller, connecting 'streets' create pathways between neighbourhoods. Space is at a premium therefore every piece is seen as an opportunity. People take charge and experiment with space. The space has fluidity, vibrancy and character (Küsel 2018:42,

Honours Research Group 2017). These spaces are constantly being added to, changed or moved.

Small, RDP houses dot the landscape in Mamelodi East forming small neighbourhoods. These houses have all been adapted and changed - added to or decorated in order to suit the occupant's wants and needs (Honours Research Group 2017, Masters Research Group 2018). The community has taken control of their individual spaces (Küsel 2018:41). The neighbourhoods in Mamelodi East

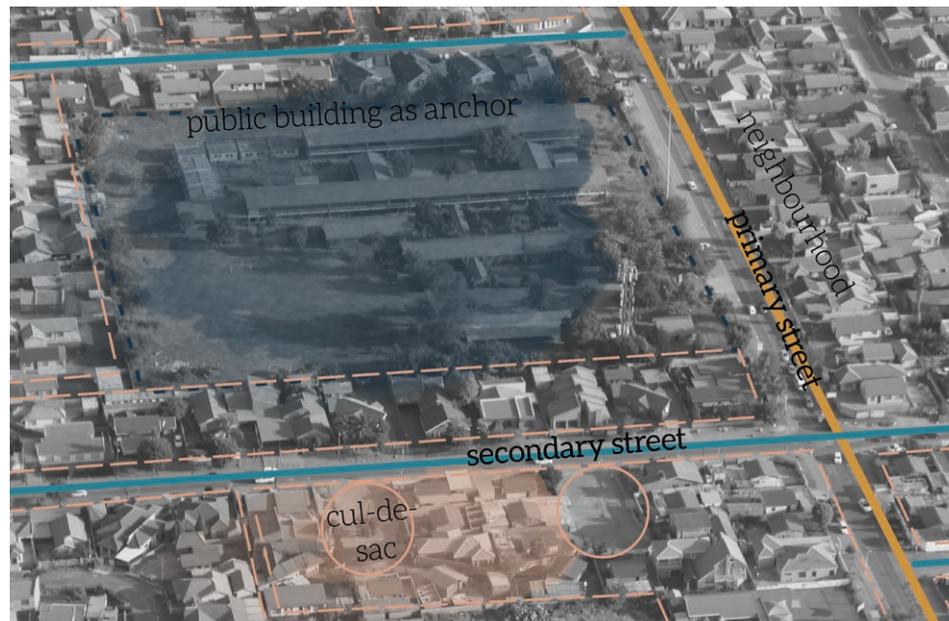
are diverse and multi-functional, consisting of residential, small spaza shops, crèches and schools. They are defined by areas, often around small cul-de-sacs. In these areas the surrounding residents have made the space unique.

SPATIAL PRINCIPLE:

Building as street

Building as neighbourhood

Figure 3.45: Map indicating streets, lanes and neighbourhoods (Author 2018)
Figure 3.46 (opposite): Collage of urban issue (Author 2018)



3.6 // IMAGINING MAMELODI

3.6.1 / URBAN CIVIC SPACE

From the analysis of current urban conditions of Mamelodi, the Master's Research Group 2018 identified public infrastructure not only as a problem but as an opportunity. An urban vision is introduced as an initial approach for intervention to address the issues identified on a larger, urban scale. This creates an overall framework which will serve as a platform for the precinct and architectural intervention proposed in this dissertation.

With public infrastructure identified as an opportunity, the emphasis is placed on urban civic upgrade through architecture that is diverse, celebrates sense of place and is resilient. This is explored through qualities that according to Steyn (2005:2) and Hertzberger (2008:13) make a good African neighbourhood: walkable, compact and mixed-use with a high level of economic self-sufficiency. An opportunity exists within Mamelodi East to transform existing public spaces into mixed and multiple use spaces which will encourage residents to utilize and take ownership. This urban vision aims to conserve, and enhance, the context's unique characteristics by focusing on the strengths within Mamelodi.

3.6.2 / PROPOSED APPROACH

The approach for the urban vision is based on Steyn's (2005:3) principles that make a good African neighbourhood:

1. Medium sized, compact cities
2. Urban villages in super blocks
3. Appropriate boundaries and streets
The boundaries should create a sense of belonging and could consist of recreational facilities, civic amenities (schools and hospitals) and streets. With 60% of the population being classified as poor, and with less the 10% owning cars, it is meaningful to invest in public transport as well as streets that are pedestrian and bicycle friendly (Steyn 2005:4).
4. Mixed use main streets as interfaces
5. Self-sufficient, walkable neighbourhoods
6. Low-rise, medium density, robust with courtyards
7. Small scale and local

Principles learnt from biological growth can also be useful tools for transforming our future cities into more integrated and sustainable settings. *"Growth, as one of the important characteristics of living organisms, is used as a frame for research into systems and principles*



that deliver innovative and sustainable solutions in architecture," (Gruber & Imhof, 2017:1).

Slime mould is an adaptable system that interacts as an intelligent organism by learning, adapting and solving problems. It creates networks that are optimal in efficiency and sensitive to its environmental conditions (Gruber & Imhof, 2017:8). The concept of emergence through the use of activation nodes is evident in the slime mould system. Its patterns are predictable and its behaviour can be anticipated.

Figure 3.47: Slime mould (<http://animalnewyork.com/2012/this-slime-mold-makes-music/>)

3.6.3 / EMTHONJENI

Khayelitsha, Cape Town
2015

The vision of the Violence prevention through Urban Upgrading (VPUU) in Monwabisi Park is to build safe and integrated communities by upgrading the existing settlement without relocating people outside of the area (VPUU 2016). VPUU implemented the Emthonjeni initiative which, by providing a platform for multiple activities, promoted safe public space. The space caters predominately for Early Childhood Development Centres (ECDs) to allow a safe and supervised space for children to play and learn. It also becomes a gathering space for adult socialising and the provision of services such as water and washing points (VPUU 2016).

The built fabric consists of only low walls on which to work and sand-free clean hardened surfaces. A tree, an improved water tap and other small scale measures complement the design. Without reducing public access to the space, the design provide some shade from the sun and shelter from the wind. This small scale structure and service upgrade allowed this open, unsafe space to be activated and become a public platform which contributes to the community and its needs (VPUU 2016).

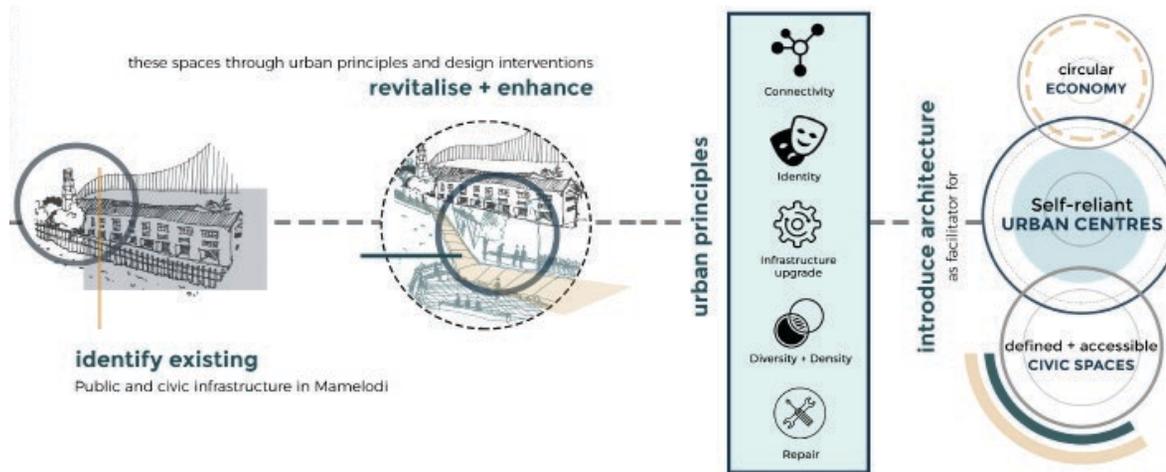


Figure 3.48 (right above): Map indicating Emthonjeni location (Masters Research Group 2018)

Figure 3.49 (right, middle): Site before (<http://vpuu.org.za/success-story/emthonjeni-success-story/>)

Figure 3.50 (right, below): Site after intervention (<http://vpuu.org.za/success-story/emthonjeni-success-story/>)

3.6.4 / URBAN PRINCIPLES



Learning from the principles of Steyn (2005:3) and Hertzberger (2008:13) which make up a successful urban condition, as well as the slime mould and Emothenjani precedents, a series of intentions and principles were developed which could be used to guide in the creation of the urban vision for Mamelodi East:

Principle 1:
Density and diversity

Creating resilient environments through variety and choice. This includes providing links across train tracks, upgrading existing pedestrian routes and creating nodes which strengthen existing programmes

Principle 2:
Infrastructure Upgrade

Infrastructure that contributes to the public realm (Figure 4). Interventions include multi-functional public buildings, landscape interventions that improve the quality of life (e.g. urban agriculture and buildings that ensure inclusion of public realm). This will be done by increasing diversity within public buildings and introducing more options with regard to housing (student, larger homes, flats)

Principle 3:
Repair

Revisiting bad planning aspects within Mamelodi (Figure 2). This is

implemented by connecting isolated aspects of the city as well as the establishment of public routes.

Principle 4:
Connectivity & Accessibility

Strengthening existing networks (Figure 3) by public land that is used in the regeneration of the private sector to increase investment opportunities.

Principle 5:
Identity

Preserve a sense of place (Figure 5) by celebrating the uniqueness of Mamelodi, providing spaces for expression and celebrating the natural environment.

3.6.5 / URBAN MASTER PLAN

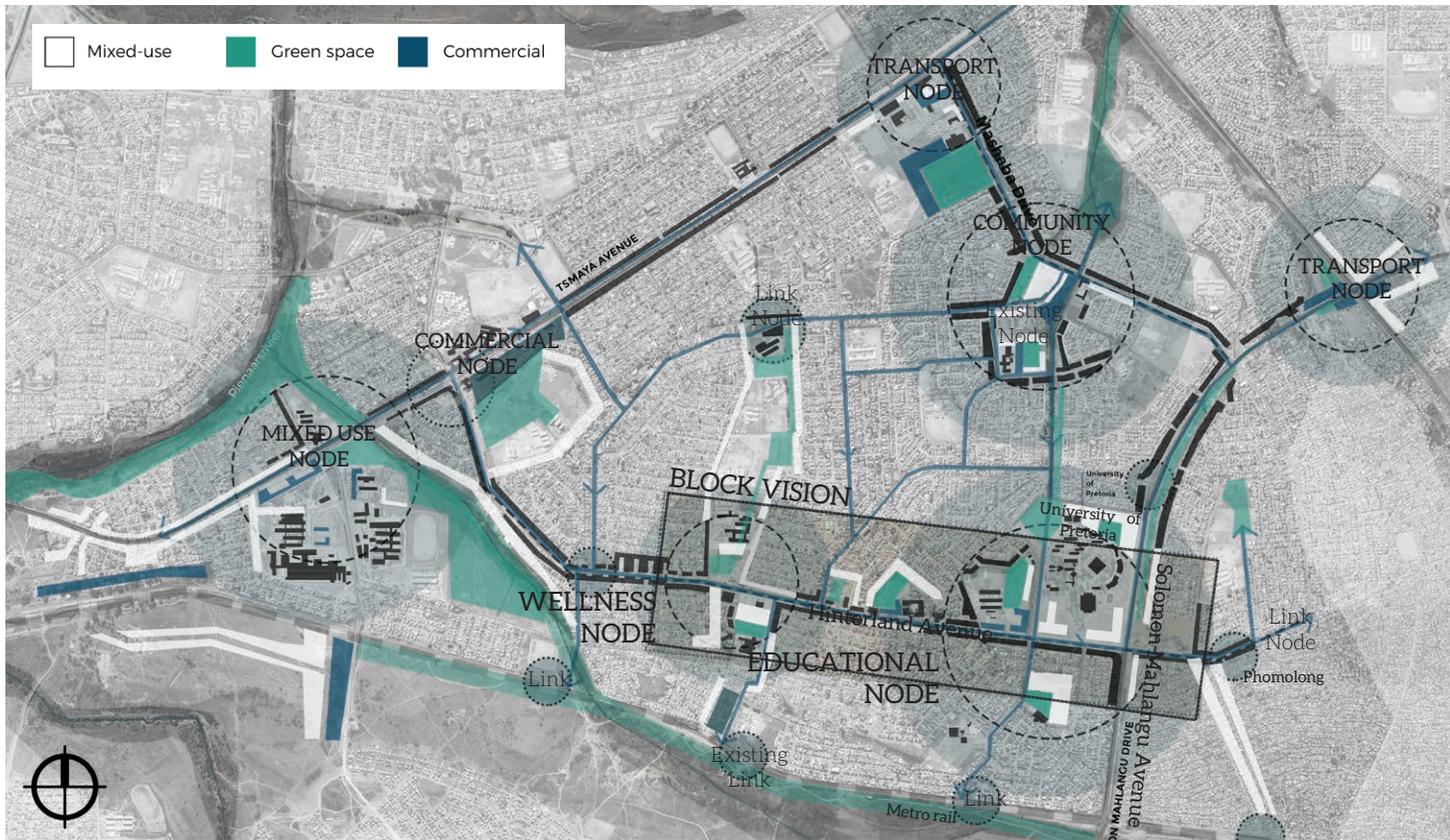


Figure 3.51: Urban vision process (Masters Research Group 2018)
 Figure 3.52: Urban vision master plan (Masters Research Group 2018)



These urban vision collages show a re-imagined street view for each urban principle using actual street views of Mamelodi East as the base. These spaces encourage the community of Mamelodi to utilize and take ownership of these spaces, enhancing the unique community spirit that exists within Mamelodi East (Honours Research Group 2017, Masters Research Group 2018, Küsel 2018:42). Kounkuey Design Initiative (KDI) refers to these spaces as 'productive public spaces' (Hers 2015).



Figure 3.53(opposite): Map showing imagined urban condition images (Mamelodi Masters Research Group 2018)

Figure 3.54: Density & diversity (Author & Senekal 2018)
 Figure 3.55: Identity (Author & Senekal 2018)
 Figure 3.56: Repair (Author & Senekal 2018)

Figure 3.57: Accessibility (Author & Senekal 2018)
 Figure 3.58: Infrastructure upgrade (Author & Senekal 2018)
 Figure 3.59: Connectivity (Author & Senekal 2018)

3.6.6 / IMPLEMENTATION

As a response to the urban issues discovered, and learning from the slime mould organism, the idea of upgrade and further anticipated development is used as a model for the urban vision of Mamelodi. The nodal development will create a sense of emergence in the community and activate further development surrounding these nodes. This strategy is also seen in the VPUU's strategy to upgrade Khayelitsha as seen in the Emothenjani precedent (VPUU 2016). As designers it is important to understand that we cannot control growth, but we can anticipate it and create provision for this occurrence. It is argued in this urban vision that upgrading urban civic space is a useful tool to anticipate and plan for future growth that is inevitable within Mamelodi.

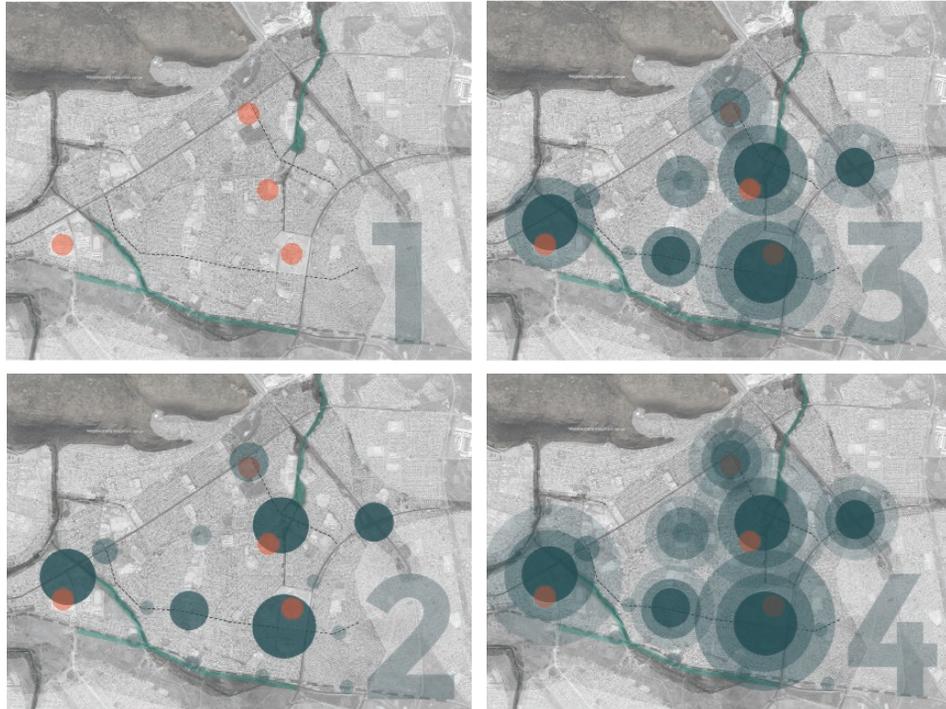


Figure 3.60: Maps indicating how the nodal development will be implemented (Masters Research Group 2018)
Figure 3.61: Precinct vision collage (Author 2018)

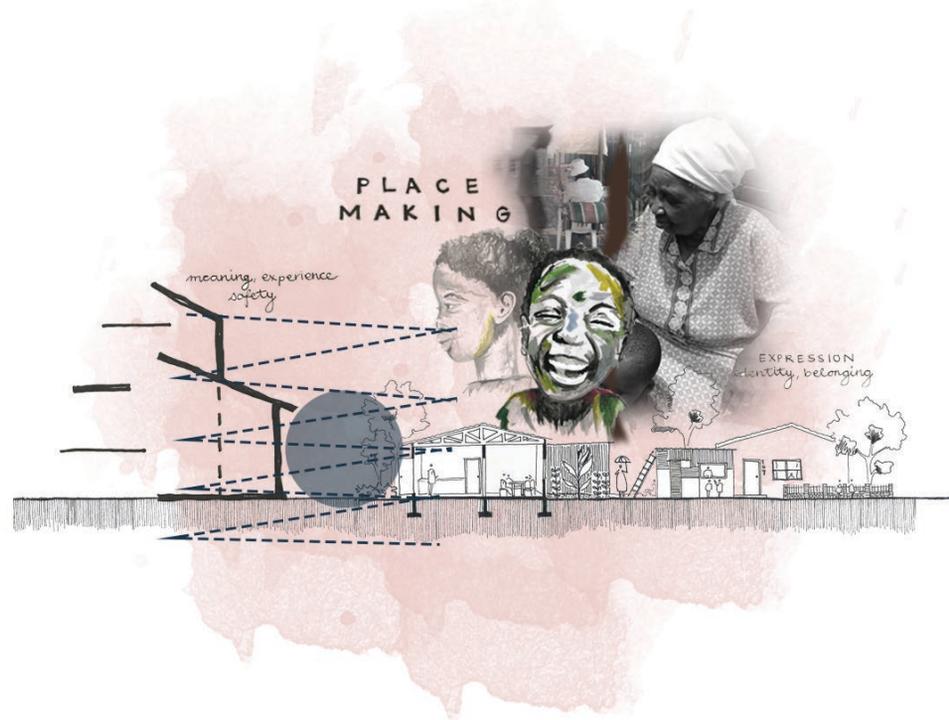
3.7 //PRECINCT NARRATIVE

Having identified the health and educational spaces in Mamelodi as spaces that could potentially have the most impact (Masters Research Group 2018), the study area focuses in on the educational node for the proposed architectural intervention. Five site options were identified which were in and around these nodes. The final site choice is further discussed in Chapter Six.

The educational node consists of an existing community centre, the University of Pretoria, Mamelodi Old Age Home as well as the main access road into Mamelodi East. The bus stop from which the buses leave Mamelodi to go to the city each morning is also located in this precinct. There are many different age groups located in this precinct. The intention of the precinct is therefore to connect and inspire people of all ages through the program of education.

It is proposed that the new train stop, as proposed in the urban vision, is connected to the site and continues to the University and sports grounds through street upgrade which includes a new pedestrian path, street lighting

and small scale interventions. This path ends at the sports grounds which will be shared by the surrounding school network. This pathway will run past the Old Age Home thereby giving the elderly people and their caregivers a safe walking route. The dissertation focuses on a secondary school within the educational node.



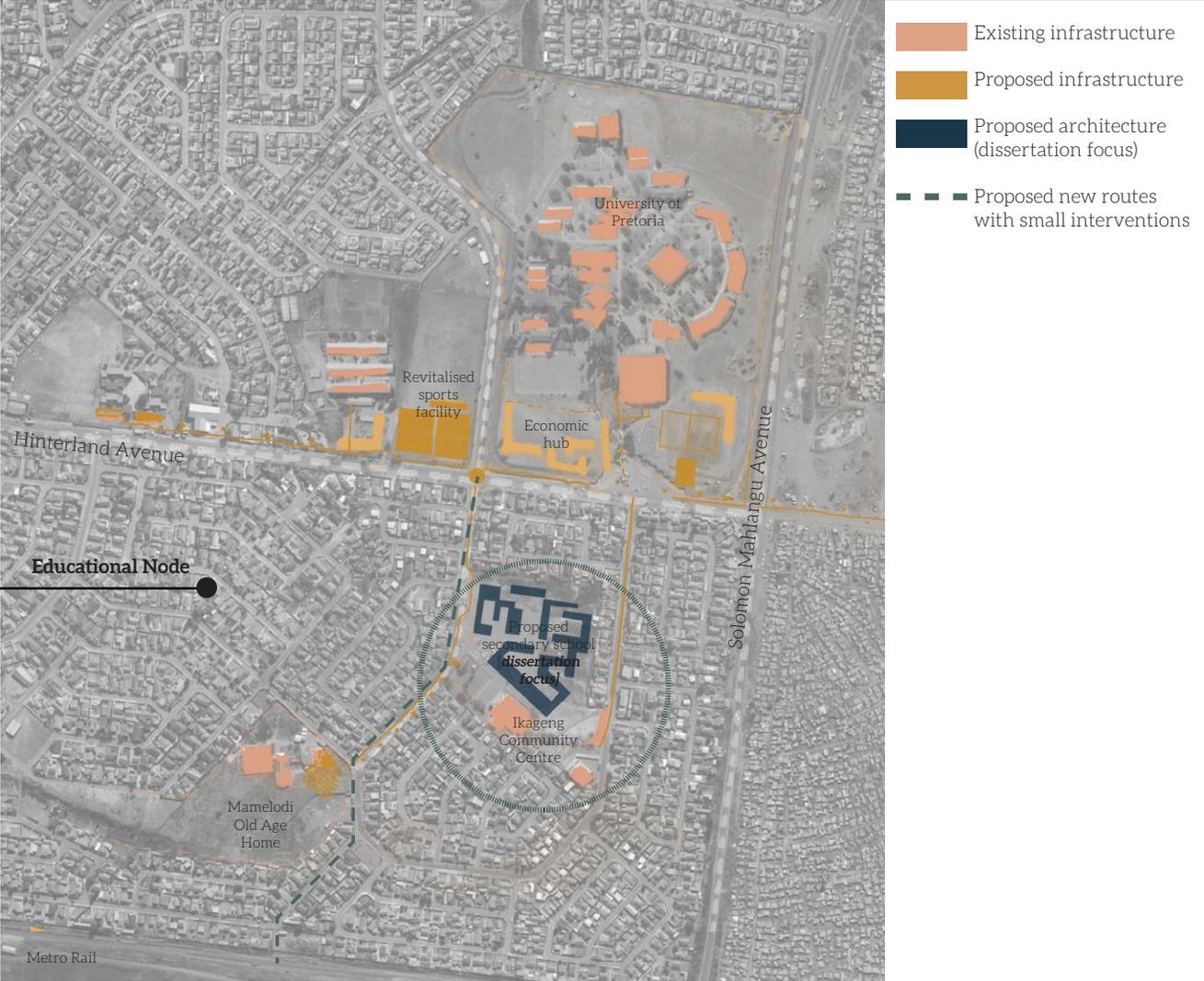
3.7.1 / BLOCK PLAN



Figure 3.62 (above): Block vision (Masters Research Group 2018)

Figure 3.63 (opposite): Precinct vision (Author 2018)

3.7.2 / EDUCATIONAL NODE MASTER PLAN





3.7.3 / ARCHITECTURAL ISSUE

The the sound of laughter and talking can be heard as the school children make their way on the dusty, broken pavements to school. Once they arrive at the school they are faced with grey, concrete fences that isolate the outdated buildings meant to promote education. Inside, narrow hallways channel students into packed classrooms with poor lighting and ventilation. Their hopes and dreams lie in introverted classrooms that are intimidating, mono-functional and rigid (Masters Research Group 2018, Workshops 2018, Mirchandani & Wright 2014). The schools are merely spaces to facilitate basic knowledge transfer between teacher and learner rather than striving to become learning environments that help foster resilient individuals who are empowered to change their futures (United Nations 2018).

3.7.4 / ARCHITECTURAL INTENTION

'Understanding that public buildings need to speak to people about the very nature of public buildings as well as looking for ways in which a building can merge education and cultural production, he (Noero), explores the spaces in between' (UIA Issue 8: 1985)

There is a growing awareness, both globally and locally, of the interwoven complexity of the social, historical and spatial spheres. A concept introduced by Lefebvre in the 1960s, which is only now being realised and understood (Soja 1996:73), trialectic thinking is not only changing the ways in which we think and make space, but also in how we study space (Soja 1996:3). This new thinking invites the individual to a place of openness - where multiple perspectives, which were previously thought to be incompatible, are considered. This thinking introduces the concept of the 'other'.

Soja describes the third space as a kind of meeting place of things; abstract and concrete, the real and the

imagined, the everyday life and the future (Soja 1996:56). Lisa Peattle (in Ewing 2017:11), refers to the informal, in between spaces of the city as third space. They are neither home nor work, but are inhabited spaces that are informal, spontaneous and where people experience everyday life. The city should allow for these spaces and as architects these spaces should become an important part of the design and not fall by the way side. Schools, being anchors within the community, have the opportunity to become these inhabited spaces within the city.

The intention is therefore to explore this meeting place of everyday life and concrete space through the design of a secondary school. The design of the school will be informed by the spatial outcome of the co-design and collaboration process (ten workshops) further explained in the next chapters.

Figure 3.64: Collage of arch issue (Author 2018, photos by Masters Research Group 2018)

3.8// RESILIENCE OF PLACE

Urban resilience

the capacity of a city to adapt to change, brought about by slow pressures or rapid pulse disturbances (du Plessis 2013:35 in Peres et al 2015:40).

Resilience can be seen in the way the fine grain of Mamelodi has changed and adapted over time. It is important, however, that the public sphere also be resilient as these are the anchors within Mamelodi. Concepts of urban resilience, which fall under the umbrella theme of sustainability, are based on an understanding that active components in a city system, human-beings, are managers of various living systems comprising of humans and nature together, referred to as socio-ecological systems (Peres & du Plessis 2012:2). Sustainable transformation of environmental challenges can only be truly possible if today's young people, especially those from disadvantaged backgrounds, are engaged in the process of change and work alongside scientists and social scientists to take actions now. It is pressing that they are more involved than they currently are in understanding the challenges and generating collective solutions to them (GCRF 2017). A continued observation from the workshops was that learners always drew large natural spaces. This was especially true when asked to draw social spaces. There is a inner need for natural

space that is currently not being met by schools in Mamelodi (Workshop observation).

Socio-ecological systems such as resilience and biophilic design encourage qualities and relationships that give rise to thriving and regenerative urban systems in which the relationships within and between social and ecological systems are healed and renewed (Peres et al 2016:692). The idea of architecture and learning, being lived, rather than being intellectually understood comes about. The outdoor spaces, which were highlighted in the workshops as important spaces, therefore become teaching spaces rather than just purely for aesthetics.

Biophilia means 'love for our living systems (Griffon 2004).' In a context where there a lack of outdoor spaces for children to learn, a lack of sense of ownership, the simultaneous exposure to a growing natural environment that is cultivated and nurturing could promote positive spaces for the community of Mamelodi. The site mediates between the public and private realm. There is an opportunity to merge the private and public spheres through the integration of a natural environment that is beneficial to the school and to the community.

The natural environment also becomes a metaphor for the school – a place to grow roots and help develop knowledge to sustain a future.

Biophilia calls for the establishment of more natural places and places of the imagination (Orr 2010:205, Griffon 2004:11). These attributes should add value to the everyday experience of ritual and activity therefore aiding in the creation of place. These include

- 1 / Natural sunlight and ventilation
- 2 / Direct, physical connection to nature from interior spaces
- 3 / The ability to have frequent, spontaneous and repeated contact with nature throughout the building
- 4 / Use of local, natural materials
- 5 / Connection between interior and exterior surfaces

The benefits of biophilic design is not only the creation of place but the inclusion of natural plants and materials aids in passive heating and cooling. Exposure to the natural environment aids the development of children by creating intuitive, caring responses to the natural environment. It improves the biodiversity and the health of users that come into contact with the place (Griffon 2004).

Figure 3.65 (opposite): Resilience of place, the Mamelodi Community Centre (Author 2018)



3.9 // PROBLEM SUMMARY

The current typologies of schools in Mamelodi East are mono-functional and introverted islands that do not promote social interaction or healthy spaces for the development of children into proactive urban citizens (Mirchandani + Wright 2014). The immediate spaces around civic buildings, especially schools, are dirty and uninviting (Honours Research Group 2017, Masters Research Group 2018).

This is partially due to outdated infrastructure that was designed under the Apartheid government for control and partially due to a lack of ownership being taken (Honours Research Group 2017, Masters Research Group 2018, Kotze 2016).

“Owned spaces refer to a process by which communities feel concerned about and responsible for their immediate and daily environment (Ewing 2015).”

3.10 // RESEARCH QUESTIONS

“Great learning happens in groups, collaboration is the stuff of growth” (Robinson 2010)

Civic architecture has the potential to facilitate and encourage placemaking through integrating and promoting social interaction of the left behind networks. Participatory design methods will aid the process of placemaking and ownership. The investigation is based on the following questions:

During the process of architectural design, how does co-design and collaboration become possible and what is the spatial outcome?

Sub-questions:

How does co-design take place in the architectural process?

What are the benefits and shortfalls of co-design in the architectural process?

3.11 // RESEARCH OBJECTIVES

“An architecture of more humility, restraint and care outlasts these overbearing statements of excess and of the ‘now’. It produces far better urban environments, so why is it so difficult to produce? Maybe we are too blinded by our own egos to search in the right places – in the world of the ordinary – in order to create value and meaning for all of us, not just the few. Why are we so afraid of that? (Kotze 2017:2)”

Architecture is public. It takes up space either by crushing out of existence what has gone before it or it attempts to blend and harmonise with what is existing (Scruton 2013:13). There are rituals and routines that are a part of everyday life yet are taken for granted as they appear ordinary. Architecture has the ability to highlight and celebrate these routines thereby turning from architecture as an object to architecture as a dynamic point of social interaction. The project intention is to create a common ground for people of all ages to come together and celebrate the ordinary through the creation of socially purposeful South African architecture.

The research method follows in the next chapter.

3.12 // DELIMITATIONS

The dissertation will focus on the Mamelodi East area.

It is not the aim of the dissertation to propose new methods of teaching within schools but rather investigate how space can contribute to different teaching methods.

The spatial organisation is determined by the artisan programme. It does not propose new ways of running these programmes.

3.13 // LIMITATIONS

Access to accurate building plans of the Ikageng Community Centre was not possible. Existing built fabric was analysed and measured, as well as compared to the hand drawn plan from the community centre, by the author during a series of site visits.

Current soil conditions and natural biodiversity was not investigated. Basic observations were done on site and assumptions were made.

3.14 // ASSUMPTIONS

It is proposed that the Department of Education, in association with the Department of Infrastructure Development's Independent Development Trust, as well as the Accelerated Schools Infrastructure Delivery Initiative (ASIDI) program, will be responsible for the implementation of the new school typology as a symbol of community upliftment.

It is assumed that material found on site can be re-used in the proposed building, however, cannot be used in any new structural objects.

Figure 3.66 (opposite page, from top) : Street in Mamelodi (Author 2018, Masters Research Group 2018)
Figure 3.67: Tswelopele Day Care E-Park (Author 2017)
Figure 3.68: Residents of Mamelodi waiting for a taxi (Author 2017, Masters Research Group 2018)
Figure 3.69: View towards the mountain (Author 2018, Masters Research Group 2018)



*it takes a community to
raise a [building]*

a way of creating//

chapter four

LEARNING BY DOING

- 4.1. Play games. Serious games.
 - 4.1.1. Limitations
- 4.2. Precedent
- 4.3. Workshops
 - 4.3.1. Online
 - 4.3.2. Workshop 01
 - 4.3.3. Workshop 02
 - 4.3.4. Workshop 03
 - 4.3.5. Workshop 04
 - 4.3.6. Workshop 05
 - 4.3.7. Workshop 06
 - 4.3.8. Workshop 07
 - 4.3.9. Workshop 08
 - 4.3.10. Workshop 09
 - 4.3.11. Workshop 10
- 4.4. Design toolkit

4.1 // PLAY GAMES. SERIOUS GAMES.

Van Rensburg and de Costa (2008:47) propose a new reconfiguration of the city that goes beyond architecture. Firstly, this could occur in the blurring of physical boundaries, and secondly a blurring of boundaries between design and social disciplines. An argument can be made to re-imagine urban spatial configurations through the lens of the everyday ritual and event. It is a dynamic approach where complexity lies in connecting social and economic networks with space. This relationship between designer, client and space is reinforced by Dana Cuff in her book, *Architecture: The Story of Practice* in which it is stated 'in the creation of any architectural work, there are no actors more important than the architect and the client' (in D'Anjou 2015:29).

Co-design is based on the belief that all people are creative in their own way and can contribute to design if provided with the appropriate setting and tools (Vaajakallio & Mattelmäki 2014:63). It acknowledges that "participation is not something you tag on if you have time or good will, but an integral part of making design and planning efficient and effective. It underpins today's concepts of partnerships and good governance. It cultivates ownerships and, with it, a sense of belonging and responsibility, both of

which are important to the health of place and community "(Hamdi 2010: xvi). Throughout the research there has been the question of what is the purpose of co-design and where does it happen in the process of architectural design? Co-design is often questioned by professionals as according to Muir (1995), 'collaboration has been seen by many architects as the greatest single threat to their long-established position as the natural 'leader' of the team. The view is often expressed that designers must provide leadership and that if they do not the quality of the building, in both functional and aesthetic terms, will suffer' (Muir and Rance 1995 in D'Anjou 2015:38).

This question of authorship in architecture essentially looks at the relationship between client and designer. D'Anjou (2015:30) states that relationships between client and designer in professional design practice, such as architecture, can be reduced to three categories. The first relationship views the designer as the professional who is in charge of providing the client with what they want without them being involved. The designer is the design expert who moves in the abstract space (Soja 1996:76). D'Anjou calls this model Design Paternalism (D'Anjou 2015:32). The second relationship views the

client as being completely in control in the decision-making process as he/she is the one that requested the design service. This is referred to as Client Autonomy (D'Anjou 2015:33). The designer is there to serve the client, operating in the concrete space. The third relationship falls into the realm of collaboration where both designer and client are equally involved in the design process.

According to D'Anjou (2015:41) clients are rarely considered in architectural education as part of the real design pedagogy, however, design education is a good place where authentic conversation in the client-designer relationship could be implemented to ensure another ethical layer that moves beyond the strict codes of professional practice. This dissertation therefore explores the process of co-design within a Professional Master of Architecture degree. This is tested through the design of a secondary school within the Mamelodi East area as it was identified through the mapping exercises that there is a great need for additional schools in the area. For this collaboration, children of a school going age were selected as co-design partners. The collaboration group consisted of 15-35 Grade 8 learners who are enrolled at four different secondary

schools in Mamelodi East. A series of ten workshops, consisting of two hours, were designed to simulate the work stages prescribed by South African Council for the Architectural Profession's (SACAP). The potential answer to where co-design occurs within the architectural process lies within the SACAP learning levels of awareness, knowledge, understanding and ability. These answers can also be related back to the co-design purposes of research, building design competency, empowering users and engaging multiple stakeholders outlined by Vaajakallio & Mattelmäki (2014:65). The following section explores the potential impact on the architectural design process through three workshops. A summary of the workshops, as well as the results is discussed below.

4.1.1 / LIMITATIONS

Due to logistical reasons, it was necessary to use a participation group that was already connected with the University. The University of Pretoria's Mamelodi campus hosts Grade 10, 11 and 12 students (150 students per grade) as part of a bridging course between school and University. It also hosts 50 Grade 8 students twice a week as part of homework assistance. Grade

8 learners were used as co-design group as it was decided they would be the most eager to participate, they could all be accommodated and the workshops would not be interrupting university applications or exams.

***Please see Appendix for ethics clearance documents.*

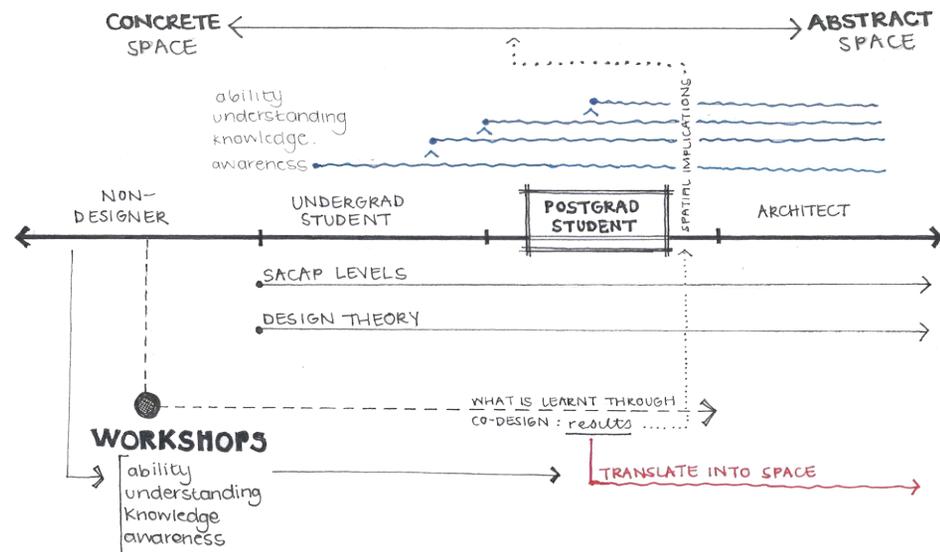


Figure 4.1 (title page): Who is the author of architecture? (Author 2018, adapted from an African proverb)

Figure 4.2 (above): Diagram showing the architectural process and where co-design could fit in (Author 2018).

4.2 // PARTICIPATORY PRECEDENT



4.2.1 / NELSON MANDELA CHILDREN'S HOSPITAL Sheppard Robson, John Cooper, Ruben Reddy, GAPP Parktown, Johannesburg 2017

"There can be no keener revelation of a society's soul than the way in which it treats its children" (Nelson Mandela)
The brief for this hospital was to provide a world-class paediatric facility with a unique design that would create a welcoming, playful and family-orientated facility. The concept proposed the creation of six wings connected by a central corridor. It is designed around a series of courtyards and garden spaces which allow for light and ventilation. A series of workshops were held with children, parents and staff from surrounding hospitals to inform the interior design. Drawings from the children were literally translated into furniture and artwork scattered around the hospital (Tour of hospital with GreenInc.).



4.2.2 / HANDMADE SCHOOL Anna Heringer & Eike Roswag Rudrapur, Dinajpur district, Bangladesh 2007

The main intention of this project was to communicate and develop knowledge and skills within the local community. Historic building techniques are used and improved to allow local craftsmen to learn new skills. 25 local tradesmen from the vicinity were trained during the building works creating new jobs and providing professional "help for self-help". (Heringer, A. S.a)



4.2.3 / WESBANK

CS Architects

Wesbank, Cape Town
2006-2008

*“By listening to people, the architect is provided with a wealth of information to feed into the design process. In the process of participation, role-players are empowered and they take ownership of their design decisions”
(C Smuts 2010)*

CS Studio Architects are focussed on listening to their clients or end users and involving them in an interactive and participatory process. This process, according to Smuts (2010), is a powerful tool that allows everyone to have their say often leading to better design solutions. The architect is provided with a wealth of information that can be fed into their design process. Participants are empowered and take ownership of their design decisions.

The traditional approach to participation implies the ‘involvement’ of all relevant parties. This usually happens in a top-down decision-making process where the emphasis is on identifying needs. The approach implemented by CS Studios is that of ‘empowerment’. This involves actions at grass root levels, creating self-awareness which leads to negotiated power sharing. It is means orientated rather than ends orientated (Smuts 2010:5). Smuts highlights several important aspects of participation:

- 1/ Changing people’s mindsets
- 2 / Encouraging individual participation and group work
- 3/ Developing the inner creative energy of everyone participating

- 4 / Installing a sense of self belief
- 5/ Understanding the context
- 6/ Understanding the political dynamics

Participation fails when it is only seen as a social process (Smuts 2010). It needs to be underscored by making. A good understanding of assembly and the active transfer of skills through making therefore becomes an important component of the process. Through research and experience, CS Studio Architects has proved that this leads to more sustainable environments. It allows energy inside of people to be unleashed (CS Studios 2014).

Figures 4.3, 4.4, 4.5 (Opposite, left): Nelson Mandela Children’s Hospital (Author 2018)
Figures (Opposite, right) 4.6, 4.7, 4.8: Handmade School (Heringer 2007)
Figures 4.9, 4.10, 4.11 (Below): Wesbank (CS Studios 2014)



4.3.1 // ONLINE QUESTIONNAIRE

Date of workshop: April 2018

Method of capture: Online

Design requires interaction, that is, a relationship that engages more than one person (D'Anjou 2015:32). In the real-world process of architectural design, architects have to engage with many different people ranging from the client to builders and engineers. Engaging with multiple perspectives also underpins the concepts of co-design (Vaajakallio & Mattelmäki 2014:65) where it is stated by Teder (2018:2) that placemaking in the public sphere implies connecting various people with their built environments. The study is focused on school learners within Mamelodi, however, an online survey aimed at teachers and student teachers was also undertaken in order to engage with the other client group, teachers, who are an essential part to schools. An online questionnaire, with fourteen questions, was distributed online via word of mouth. This questionnaire, in which thirty-one participants from Cape Town, Johannesburg, Pretoria and Arizona (USA) participated, aimed to bring the users back into the conversation by asking them their likes, dislikes and dreams regarding school design. This gives the users a voice, which according to Fereiss and Bouman (2011:16), is essential to good quality architecture.

The ideal number of children per class, as voted for by the teachers, is twenty learners with twenty-five learners the runner up. This is much lower than the 40 learners per class as stipulated by regulations (Department of Basic Education 2013) and as seen in Mamelodi (Workshops 2018).

Flexible space, which includes space for group work, was identified as both something that is lacking in current schools as well as something that teachers would add to their dream classroom. This is reinforced by the Organization for Economic Co-Operation and Development (2003) in which it is stated that school buildings that respond to changing needs of society are best identified by their 'space for teams'.

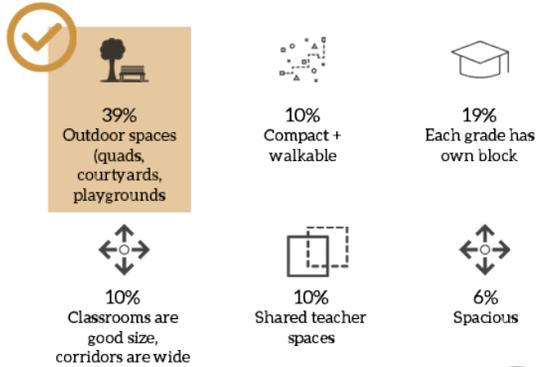
Storage and a resource section were also identified as important spaces within the classroom. Both neutral and natural colours, such as blues and cream, were the most popular colour choice as they are soothing colours and teachers have the opportunity to put posters on the wall that will stand out. According to the psychology of colours, blue is a calming colour and people tend to be more productive in a blue room as they are calm and focused on the task at hand (Psychology of Colour 2017, Colour Psychology 2018). Teachers thought that a playground or outside work space, multi-purpose

hall and creative centre were the most important spaces other than the classrooms as these spaces encourage interaction and allow for an outlet for the learners. These areas create a hands-on learning approach, emphasized in the Technical and Vocational Educational Training (TVET) system (Maclean & Wilson 2009: xxxi). These types of spaces are all lacking in schools in Mamelodi (Workshops 2018).

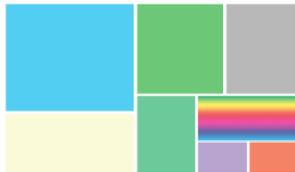
Lastly, teachers were asked about the likes and dislikes of their current schools. Positives of schools included outdoor spaces, compact and walkable, shared resources and each grade having its own block. Exposure to the natural environment, according to the biophilia research, aids the development of children by creating intuitive, caring responses to the natural environment (Griffon 2004).

Size, colour and style were thought to be the most identifiable elements of schools whereas the position had little to no effect. The colour and size of schools are further explored in workshop two in the precedent studies. It is interesting to note that the answers to each question were all similar even though the participants were from different places indicating that worldwide the same problems with space and education are occurring.

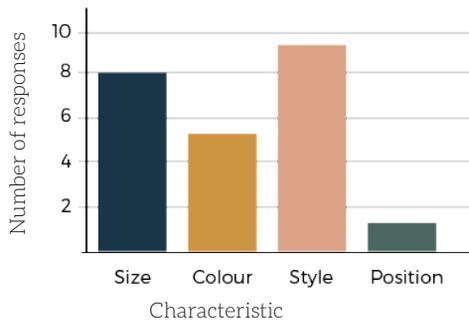
LIKES + DISLIKES OF CURRENT SCHOOL



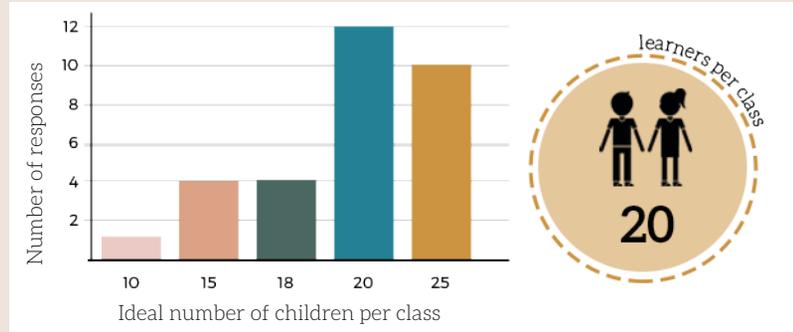
IDEAL COLOUR FOR CLASSROOM



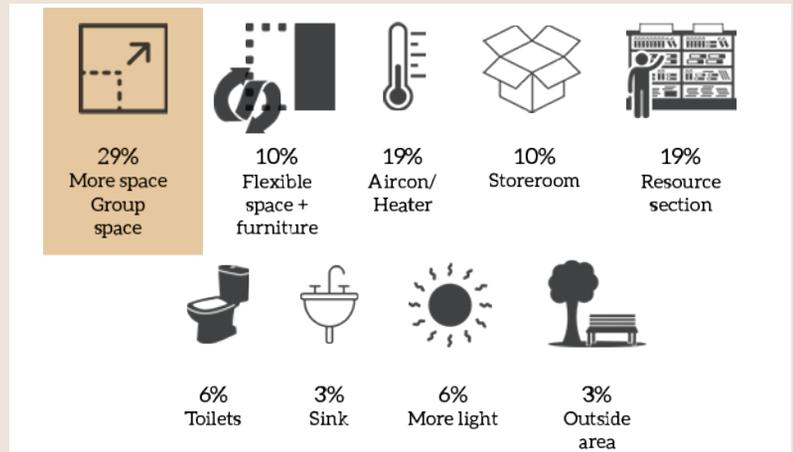
CHARACTERISTIC OF MOST IDENTIFIABLE ELEMENT IN SCHOOL



IDEAL NUMBER OF LEARNERS PER CLASS



WHAT WOULD YOU ADD TO YOUR EXISTING CLASSROOM?



SPACES MOST IMPORTANT TO A SCHOOL OTHER THAN CLASSROOM

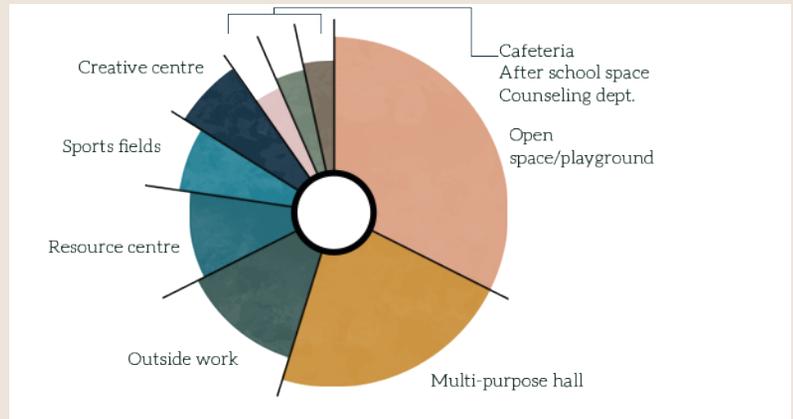


Figure 4.12 (above): Summary of online workshop results (Author 2018)

4.3.2 // WORKSHOP 01: BARRIERS



Date of workshop: 18 May 2018

Method of capture: photographs, drawings, written answers

The inception stage is the first work stage outlined by SACAP. In this stage information is collected about the client, brief and time frame (SACAP 2008). At a Masters level it is required that the candidate have the ability to do a competent building design based on parameters and constraints developed through scientific research, which is sensitive to issues of sustainability and cultural issues (SACAP 2010:5). The first workshop was therefore designed to research and understand the context of the township and the secondary schools that the learners attend.

The role of the architect according to Awan, Schneider & Till (2011:33) can be extended to take into the account the consequences and not just the objects of architecture. This workshop was designed to allow the architect to not only understand the consequences of the space in which the learners operate but allow the 'non-designers' to think critically about their environments therefore entering into

the design process. Eighteen learners attended this workshop. In this workshop, learners were first asked to draw their desired profession. As in getting to know a client's brief in the inception stage, this was a warm up task in which the author could engage with the clients (the learners) and understand their wants and needs. The next two activities involved mapping of the learner's routes to school and the schools they attend. This was to 'define a complex architectural problem' (SACAP 2010:5) through an understanding of barriers and opportunities that exist within these environments.

RESULTS

There were many different professions that learners wanted to be when they left school with the most popular choices being in the medical field followed by creative professionals and lastly business-related professions. These professions all require different skills which are acquired in different ways - some require studying, others require a hands-on approach and sometimes they require a combination of these. There should be spaces

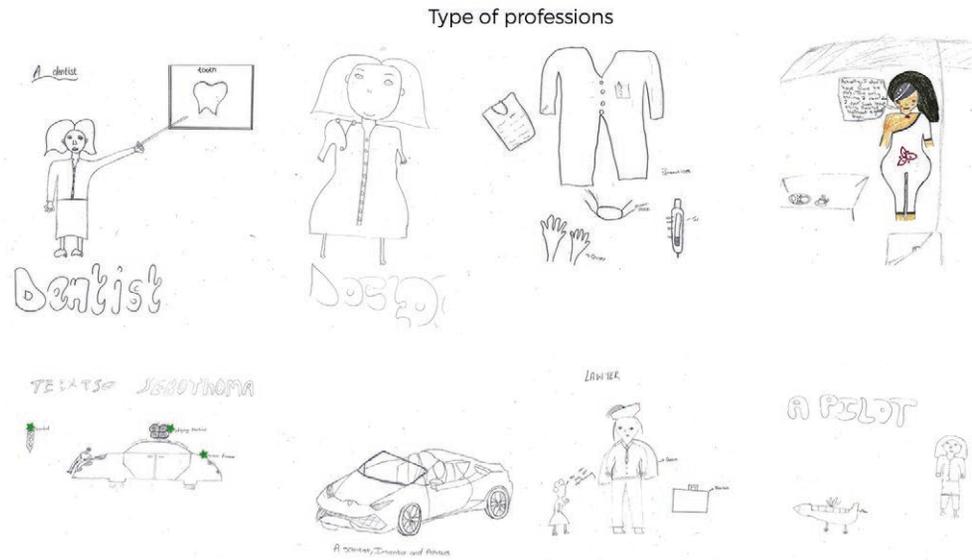
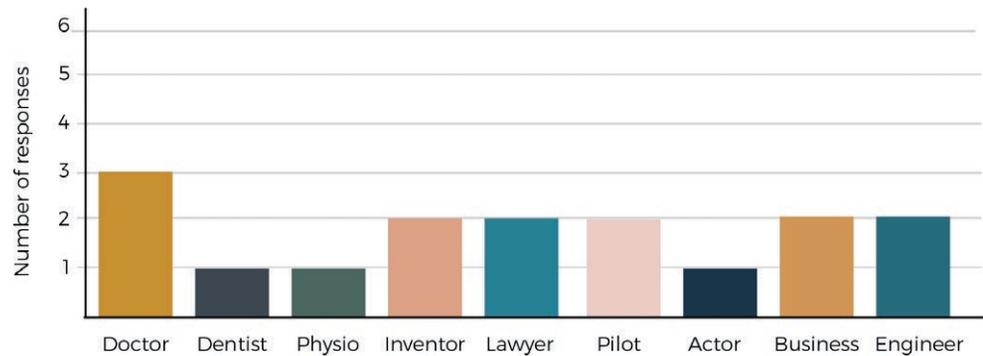
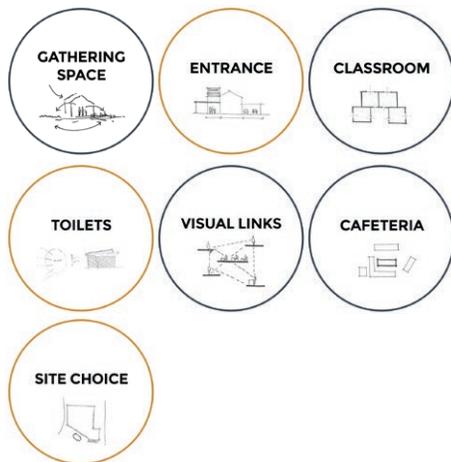
within schools that allow for children to learn differently to support a variety of aspirations.

It can be seen from the broader mapping exercise that many of the children walk far distances to school and often encounter dangerous situations. Safety was more of an issue for the girls than for the boys. Again, the issue of safety was raised with toilet blocks within schools. Toilet blocks were identified as the biggest spatial issue as the large blocks with dark spaces create environments where students smoke, drink and gamble.

Classroom spaces were identified as being problematic as they lack ventilation and light. Some schools in Mamelodi have container classrooms which were identified in the workshops as being empty as they are too hot in summer and too cold in winter. The upper storeys were favourites of the learners as there was a view over the whole school and children could relax and talk with their friends. This again relates back to a safety issue where sight lines become important to create a safe environment.

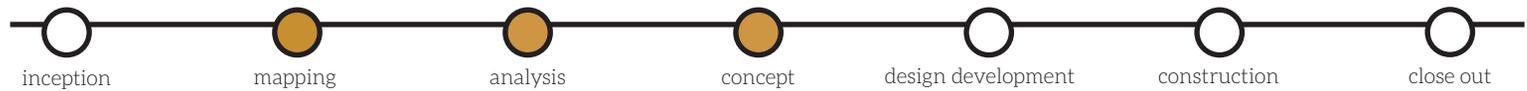
The food centre was identified as a favourite within the school. The learners stated, however, that there was no shade to wait in and no spaces to sit once they had received their food. This space is seen as an important social space which is reinforced by the outcomes of the online questionnaire. The lack of covered and gathering space is further seen in the assembly quad. The students gather in the assembly quad every Monday. This is not covered so if it is raining or cold they are unable to have this assembly and relay important information.

SPATIAL OUTCOMES:



Figures 4.13: Workshop one results (Author 2018)

4.3.3 // WORKSHOP 02: IDENTITY



Date of workshop: 25 May 2018

Method of capture: *photographs, drawings, written answers*

Precedent and site analysis are part of the inception and analysis stage. An understanding of precedent as part of a wider social and cultural system is needed at a Masters level (SACAP 2010:8). In the collaborative process, architects have to look beyond the design intentions and listen to the users themselves in order to exchange perspectives (Fereiss & Bouman 2011:16). Twenty-six learners attended the second workshop which was designed to evaluate how current schools in South Africa were perceived by users after their completion.

The ability to prepare an appropriate concept is also a requirement for a candidate professional architect (Masters level - SACAP 2010:8). The second activity involved the investigation of spatial elements within a school in order to evaluate types of elements learners identify with. This design game, where learners were asked to divide their pages in twelve and choose from a series of design elements such as type of roof, wall material, colour for school, number of learners and extra

activities needed, started to explore how design could be conceptualized by a non-designer. Vaajakallio & Mattelmäki (2014:65) include 'conceptualise design' as a design game outcome in the co-design process. The learners were given options for each heading and this allowed the author to see which elements of architecture learners were drawn to and if there were any trends.

Lastly, learners were asked to design their dream school in groups of 4-5. They were given two pieces of A3 paper, pencils and coloured stickers. This was turned into a competition which was intended as a way to teach interaction and establish a social connection (Vaajakallio & Mattelmäki 2014:65). At the end of the exercise, learners had to vote for which school they would like to attend. Figure 4.16 (following page) indicates the school chosen as it had the most colour, a double storey classroom block, a sports field and a separate entrance for cars and pedestrians. The aim of this task was to create scenarios and describe the intended use (Vaajakallio & Mattelmäki 2014:65) through which as understanding of the relationship between the natural environment, built environment and

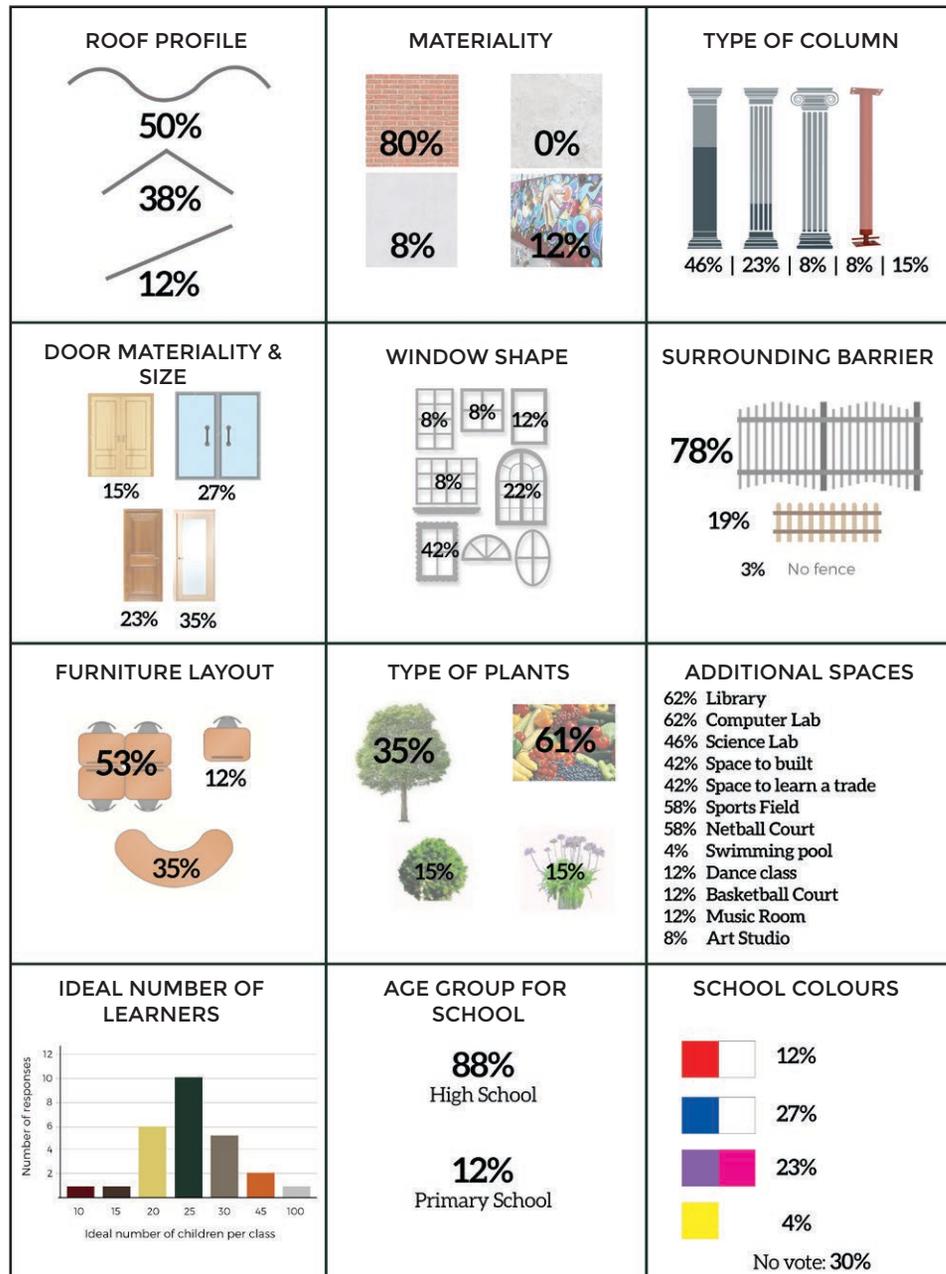
cultural environment was discovered (SACAP 2010:8). This moves users from subjects for analysis to active participants in the design process (Lee 2008:33).

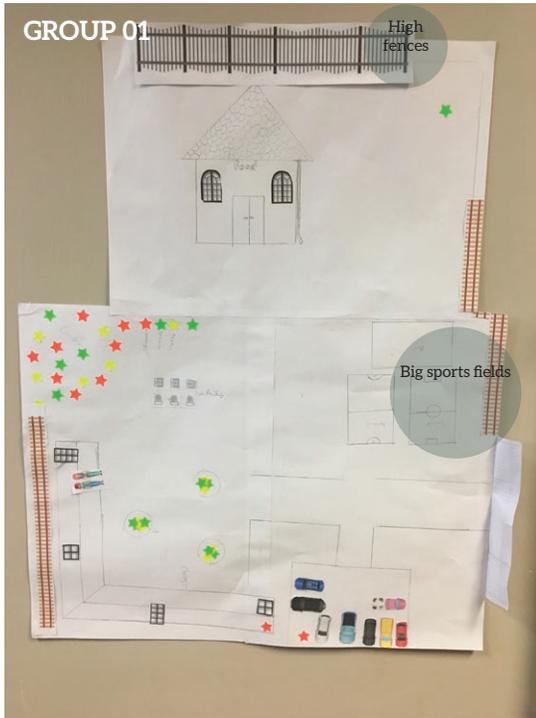
RESULTS

Six schools, which form part of the design precedents, were given to the learners. Learners were asked to express their likes and dislikes. These schools included Vele Secondary School (East Coast Architects), Usasazo Secondary School and Inkwenkwezi Secondary School (Wolff Architects), Meetse Bophelo School (Geldenhuys & Jooste Architects), Anna Heringer's Inside Out school and Thandokhulu High School (A + B Architects). Elements that learners liked within the schools included big classrooms, garden spaces, upstairs areas, bright colours and the creativity of the schools in terms of shape. Learners did not enjoy the buildings constructed from materials other than brick, the lack of sports fields, schools located in a township setting and the big windows in classrooms as they found these to be distracting. It was discovered that learners were drawn to the schools, such as Vele Secondary School, that had outdoor spaces and covered

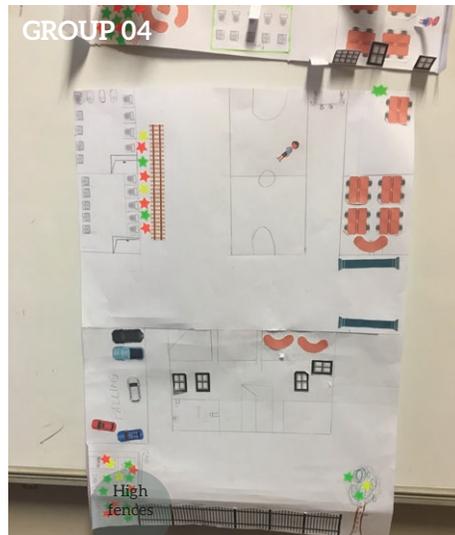
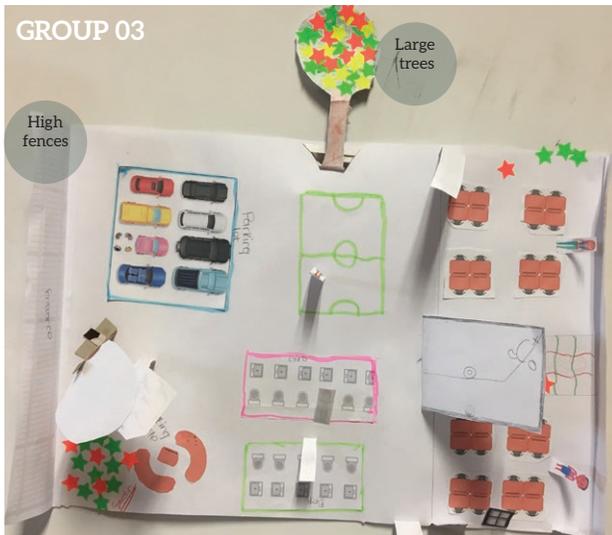
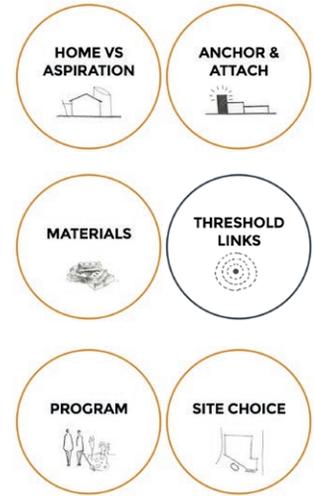
walkways. The majority of learners were impressed by the colourful, bold signage of Inkwenkwezi School but were not impressed with the sheet metal materiality of it as they associate sheet metal with being poor. This was also true for Usasazo Secondary School. Learners thought the school was a factory or prison as it is grey with no addition of a natural landscape.

The chosen elements, outlined in the table, show a choice of both familiar and aspirational elements. The choice of familiar is a need by children to have something to fall back on to (Cunningham 1995, Hertzberger 2008:35, Jans 2004). The aspirational elements reflect the learners want for a better environment. The concept of home vs aspiration is introduced in which a school is created that is part of the neighbourhood whilst still enabling it to become a symbol of community (Lackney 2003:8). Most students identified having a library and computer lab as a priority. Both Solomon Mahlangu Freedom School and Lehlabile Secondary School have libraries but none of the children visit them as they were identified as being inaccessible, unorganized and only for teachers. This reinforces the need for accessible education outlined by UNICEF (2018) and the United Nations (2018). Group work identified as important through the choice of 4 tables together.





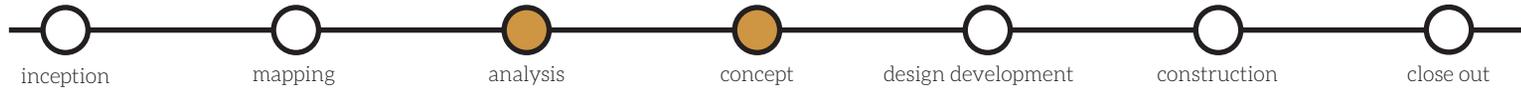
SPATIAL OUTCOMES:



Figures 4.15 (Opposite, left): Table showing results from workshop 02 choose your elements (Author 2018)

Figure 4.16 (above): Photos showing schools designed by learners (Author 2018)

4.3.4 // WORKSHOP 03: SPACE MAKING/REFLECTION



Date of workshop: 20 July 2018

Method of capture: *photographs, drawings, models*

The concept stage is the second work stage outlined by SACAP. Initial designs are done at this stage which involve organizational and planning relationships between spaces (SACAP 2008, Hofman Architects 2018). Co-design advocates for building on what is already in the context and taking it to scale (Hamdi 2004:xviii). The purpose of this workshop was therefore to explore how space is made by learners in Mamelodi and to investigate what relationships they perceive in space. Vaajakallio & Mattelmäki (2014:65) classify this type of workshops under ‘games to create scenarios and describe intended use’.

Sixteen learners attended this workshop. Learners were first asked to close their eyes and imagine their favourite space. They were then asked to draw or write about the space they had pictured. This type of game helps to facilitate the learners in envisioning scenarios which in turns helps to conceptualize design. This exercise enabled the author to understand the

types of spaces learners enjoy and therefore the quality of space that needs to translate into school design.

Next, learners were divided into four groups and allocated to a station. This was a visualization task to promote an explorative and create attitude (Vaajakallio & Mattelmäki 2014:65). At the first station learners were asked to fill in furniture on a basic RDP house plan using only paper and pencils. At the second station learners were asked to design a park using paper, straws and pencils. At the third station learners were asked to fill in the spaces of the plan of the author’s proposed school using coloured clay. Through the creation of everyday environments, the author could also understand social and spatial dynamics of the learner’s everyday experience, another requirement for a candidate architect.

RESULTS

As a reflection exercise, the author’s proposed school was used as a base for the exercise. It is a requirement for a candidate architect to be able to design a building that is cultural, contextually

and environmentally responsive therefore the author saw this task as a way to understand the context and create a base for discussion. Learners immediately filled in the cafeteria and sports spaces with objects indicating once again the importance of these spaces. If a school is a place to practice social behavior then sports and games are key in developing healthy, competitive attitudes (Hertzberger 2008:156). Learners also thought the classrooms were too small and moved them into the courtyard spaces to make them bigger. There was also a focus on display boards within the classroom. This relates back to the online workshop where teachers wanted neutral colours in the classroom in order to have more display space.

At the second station, the learners continued to draw familiar elements of home within their design work. This point reinforces the theory that children are still only allocated two spaces: home and school (Cunningham 1995, Jans 2004) and that there is a need for a familiar base element. When asked to imagine their favourite place, the majority of learners chose

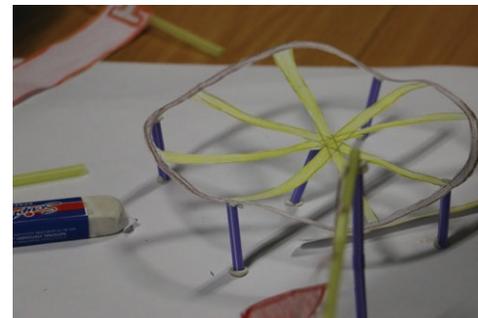
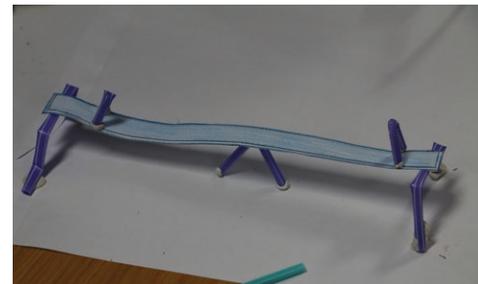
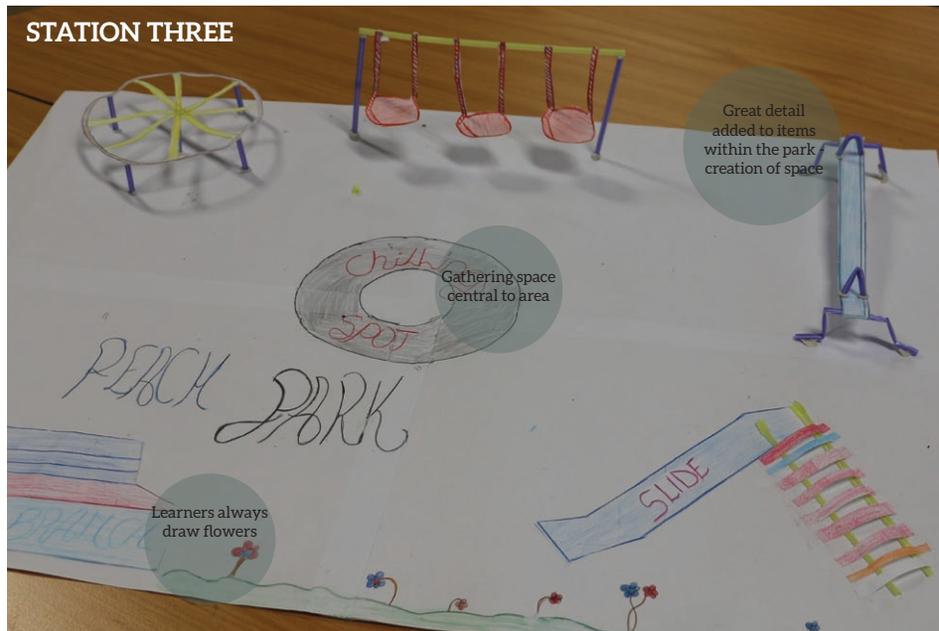
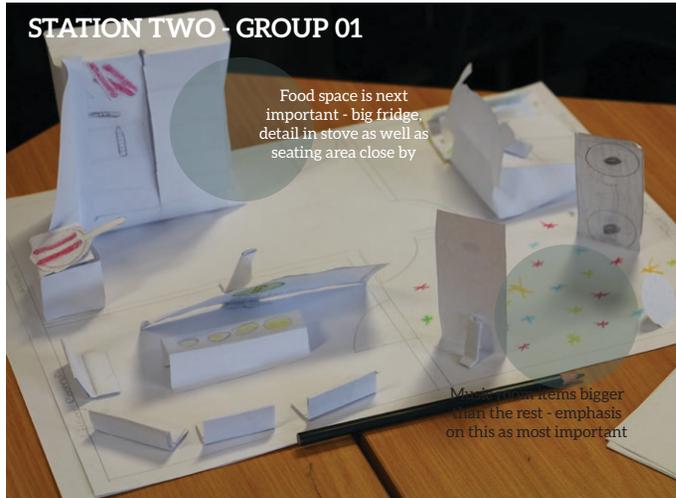
buildings such as the White House, the beach or castles. When asked why, learners said they had never been to these places before but they had seen them on tv or in magazines and hope to one day visit. Home elements become familiar points of reference as they have no knowledge of other inspiring public spaces. Placemaking, according to Hertzberger (2008:101), is facilitated by the familiar and at the same time changing environment or the aspirational. It is therefore a necessity in the proposed school to have both elements.

At the last station, where learners designed a park, there was an emphasis on spaces to relax with their friends in the shade. In the mapping of the schools the lack of shady seating space was identified. Education, besides being about reading and writing, is about exploring the world and building relationships (Hertzberger 2008:43) therefore these spaces become important aspects in the learner's development.



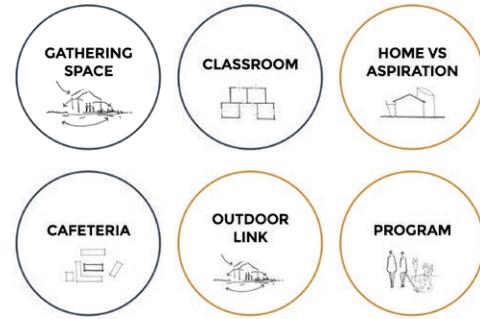
Figures 4.17 (Opposite): Fill in the space using the author's proposed school as the base (Author 2018)

4.3.4 // WORKSHOP 03: CONTINUED





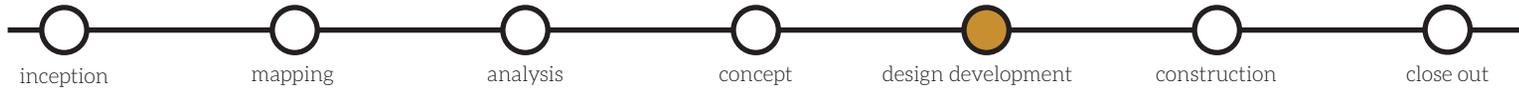
SPATIAL OUTCOMES:



Figures 4.18 (Opposite): Photos of the design game - RDP house and desing a park (Author 2018)

Figures 4.19: Learners explain their spaces to the author (Marsh 2018)

4.3.5 // WORKSHOP 04: CONCENTRATION



Date of workshop: 27 July 2018

Method of capture: photographs, drawings, models

In the design development phase, the plans are further developed based on the concept (SACAP 2008). Schools should be an ever-changing, stimulating environment that teaches learners to learn and explore (Hertzberger 2008). The environment has an influence on how children learn and occupy space. Workshop Four explored how space influences the behavior and concentration of learners. This 'game' helps define the role of the co-design team – they are learners within a school therefore their experience as learners within a space is important (Vaajakallio & Mattelmäki 2014:65). Twenty learners attended this workshop. First, the classroom was set up with traditional rows and learners were asked to design a house as an individual task. Next, the classroom was changed into table groupings and learners were asked to repeat the task in groups. Lastly, learners were asked to find a space outside and repeat the group task. A discussion was then held to understand which space the learners felt was the best learning

environment for them and which they would feel most creative or relaxed in. By observing how users occupy a space and the social dynamics within that space, the architect can 'prepare an appropriate concept' as well as develop each space 'to an ultimate and rational conclusion' therefore creating a school that encourages different learning in different environment (SACAP 2010:5).

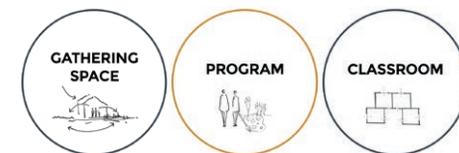
RESULTS

In the first exercise, the classroom space was set up as a traditional classroom in rows. The learners, however, still gathered around the singular rows in circular groups. Next, the classroom was set up using circular group tables. Learners stated afterwards that this circular set up was their favourite as they felt supported and secure. Learners were well behaved and quiet during this task even though they were in groups. Learners also stated that they liked the higher windows in the classroom as they could not see the activity happening outside and could concentrate on the task within the classroom. The last activity occurred outside. Learners chose where they could do the task. All the

learners chose the benches that were placed in a circular configuration or gathered around a tree. The outdoor space was their least favourite for a classroom due to the fact that they found it difficult to concentrate and would rather have a separation of their play space and teaching space. They would like their creative spaces to open towards the outside.

There is a move in education towards providing a diversity of spaces that allow for different forms of learning as well as a diversity of subjects taught (Heitor 2005:47, Hertzberger 2008, Lackney 2003). Classroom spaces therefore need to be adaptable in order for the teacher to set up the space that is most conducive to the learning of the students they have. For example, grade 8's may feel the need to sit in groups but Matric learners may find sitting by themselves to be more beneficial. The articulation of the classroom space is further discussed in the design development chapter.

SPATIAL OUTCOMES:



TASK ONE: TRADITIONAL CLASSROOM

Learners ignore line seating and sit in group at the back

Learners still gather in groups



TASK TWO: GROUP



TASK THREE: OUTSIDE SPACE

Learners gather in circle using one of their team as a table



Learners use benches that create a circle with tree as anchor



Learners use the trees as a base



Figure 4.20: Photos showing the learners in different spaces to test their concentration (Author 2018)

4.3.6 // WORKSHOP 05: THRESHOLDS



Date of workshop: 3 August 2018

Method of capture: photographs, drawings, models

The design development phase is used by the architect to develop the design and the components within the design (SACAP 2008, Hofman Architects 2018). The author used this workshop to investigate one component of space: thresholds. In the context of Mamelodi, as seen in Chapter Three, thresholds are important for defining space. Thresholds are also important for security which is a concern raised in many of the workshops.

At a master's level, the candidate needs to 'understand the basic spatial, functional and aesthetical aspects appropriate to design' (SACAP 2010:7). In order for the co-design team to be able to think about how a school is designed, it is necessary for them to understand how their space works currently and to understand what they do and do not like about it. This workshop was done to facilitate learners in envisioning space beyond what they know as important (Vaajakallio & Mattelmäki 2014:65).

First, learners were asked to think about the entrance to their classroom

and how the space in their classroom works. This was a brainstorming activity to understand the work context. Next, learners were given a series of shapes (Square, circle and triangle) and asked to design a space using that shape. Lastly, learners were asked to design the entrance to their dream school and use the elements they liked and disliked from the first exercise in this design.

RESULTS

The challenge in participatory design is to tease out the genuine needs of those and not just create a laundry list (Ho 2011:95). Twelve learners attended this workshop and unfortunately most of them were new to the sessions. Having not gone through the previous design exercises, learners wanted to revert back to 'mapping' of their schools rather than designing their dream schools. This resulted in a laundry list of items rather than spatial outcomes. It was found that when learners needed to brainstorm they just created laundry lists of items but when they were asked to draw or create something then more effort was made to imagine how the space could be.

In the last activity the entrance to

the school was always drawn as an overhead shelter with large walls/fences on both sides. Two of the groups also created entrance structures that were circular in nature. This is the beginning of a spatial wrapping or protection of space theme. Learners also separated pedestrian and vehicular movement onto different streets. Since the majority of the learners walk to school it is important that the pedestrian entrance is as pronounced and important as the vehicular entrance (Workshop One, Honours & Masters Research Groups).

Learners are more willing to share information when asked specific questions, listened to and then asked follow up questions on their answers. As was predicted in literature by Derr (2015:120), children can be empowered through experiencing that adults are interested in their opinions. An important observation from this workshop was that the learners who had attended the previous workshops were able to formulate space with the shapes whereas the new learners left this activity blank. Co-design can become beneficial as long as, just as in architectural education, the learners start at the beginning and work through the design process.

SPATIAL OUTCOMES:

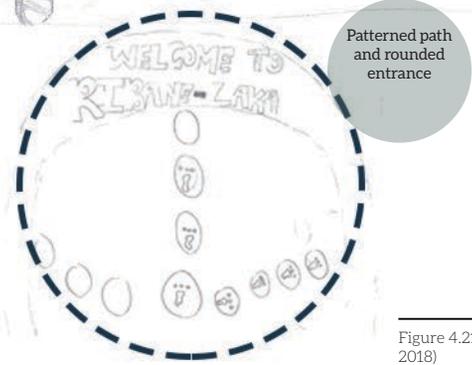
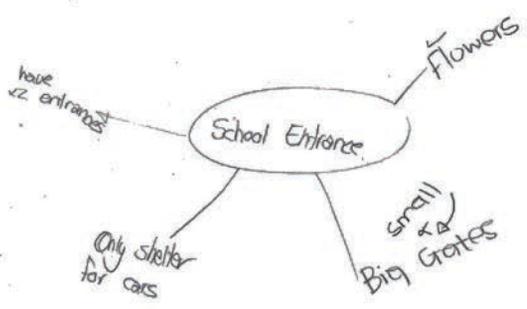
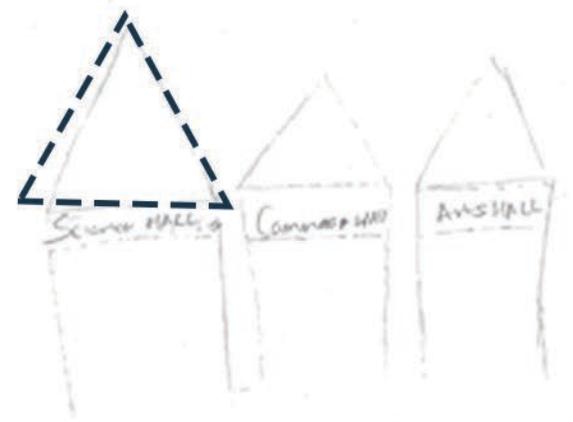
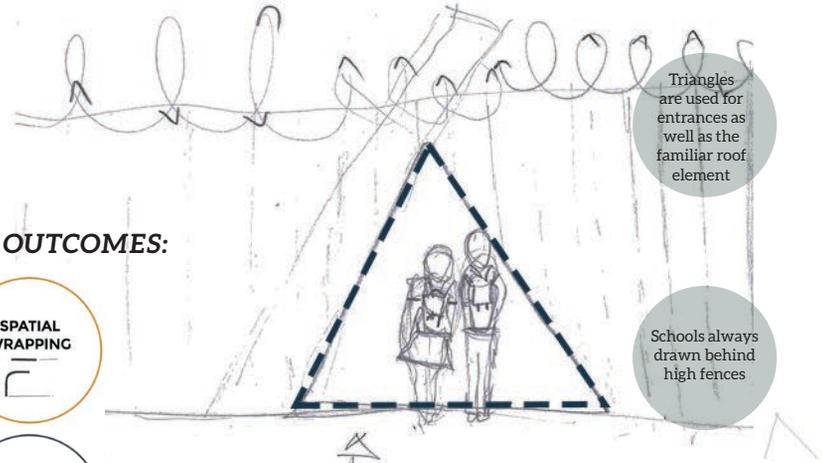
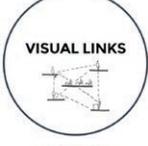
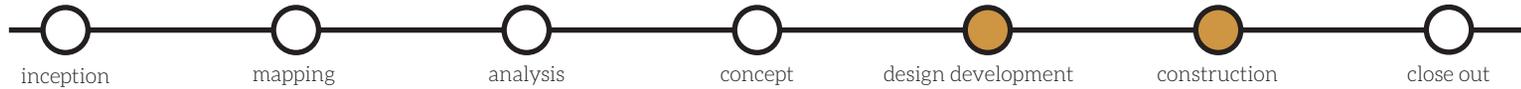


Figure 4.21: Results from the workshop on thresholds (Author 2018)

4.3.7 // WORKSHOP 06: PATTERN



Date of workshop: 17 August 2018

Method of capture: photographs, drawings, models

The design is iterated and detailed as the design process evolves (SACAP, Hofman Architects 2018). The ability to implement innovative construction methods as well as recognize the demands of context, local resources and technologies that harmonise with the environment is the outcome for a candidate architect reaching this stage in the process (SACAP 2008:6). Through mapping of the context, and the analysis of schools in the second workshop, it was revealed that brick is an important material as it provides a sense of safety to learners. This is also a local material and there is a large network of brick makers within Mamelodi East whose skills can be used in the making of the school. This introduces the opportunity for a second co-design group. Through the use of a local, known material, a common design language is formed (Vaajakallio & Mattelmäki 2014:65). Thirty-five learners attended this workshop which was focused on brick pattern making. This activity contributes to nurturing an understanding of what more a material can do (Wright 2017:27). Whilst a new co-design group could be introduced at this stage, exposing learners to construction could help develop new skills which in turn leads to resilient development opportunities (GCRF 2017:2).

For the first activity, learners were asked to design the wall behind the board in their dream classroom using the cut-out brick modules as a guide. They were told they could not use the stretcher bond as this is a familiar bond and the idea was to investigate alternatives to this common bond. This helps facilitate learners in envisioning new situations rather than creating known options (Vaajakallio & Mattelmäki 2014:65). Next, students were asked to design the floor to the entrance of their schools. They could choose the material and pattern. In the third exercise, students were asked to design a gathering space in their school. Lastly, students were asked how they would show where to walk from the classroom to their gathering space using only floor materials.

In every workshop, the task was explained to the class as a whole. In the majority of the workshops there were learners that still did not understand and the task needed to be re-explained. This was better done in smaller groups of learners where it helped to draw examples. As it is not always possible in a normal classroom situation to re-explain work, there needs to be space in the classroom for the teacher to draw/write and use examples for the whole class to see. This idea also reinforces the need for good acoustics in the space as a noisy environment, or one where sound does not travel to all the learners, prevents the reception of instruction particularly

when there is a language barrier (ASHA, Van Reenen 2017:2).

RESULTS

Wall in classroom: The most popular pattern was a type of herringbone / diagonal pattern. This was followed by a block pattern and then a stretcher bond with a header course in after every 3rd course.

Entrance: The most popular entrance type was block tiles. There were a few learners that had concrete floors with decorative tiles. Most learners had 2-3 types of pattern within their floor.

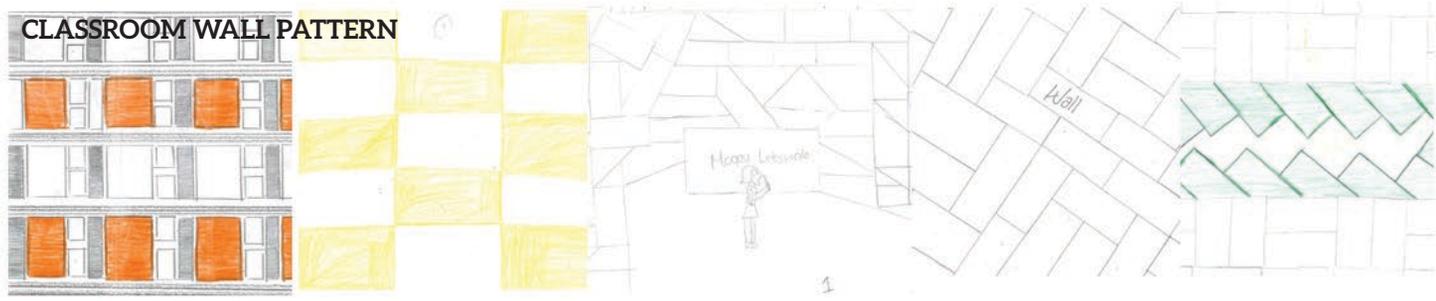
Gathering space: Learners always drew benches gathered around a central space. There were bricks under the benches and the rest was left natural. There were lots of trees in this space. Learners also drew patterns on the floor to play games on.

Walkway between space: Learners used concrete as the floor material with brick arrows as the inset to show direction between their classroom space and the gathering space.

Colour: Learners chose red and yellow for most of their patterns.

The brick patterns and the application thereof are further discussed in the technical chapter.

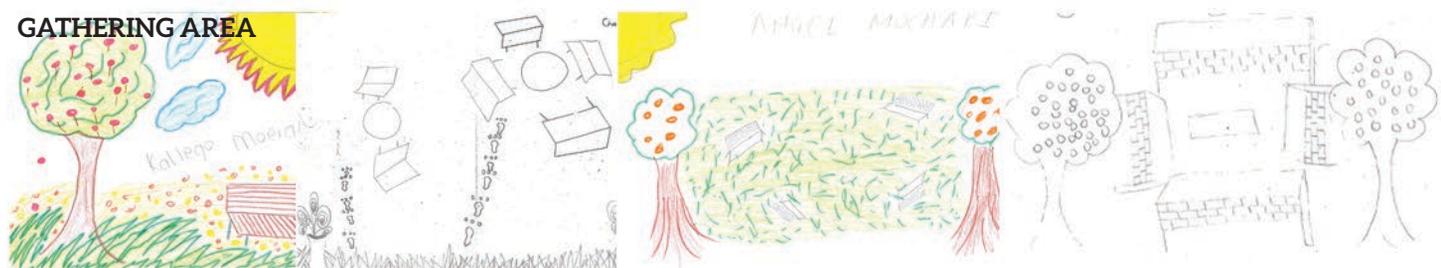
CLASSROOM WALL PATTERN



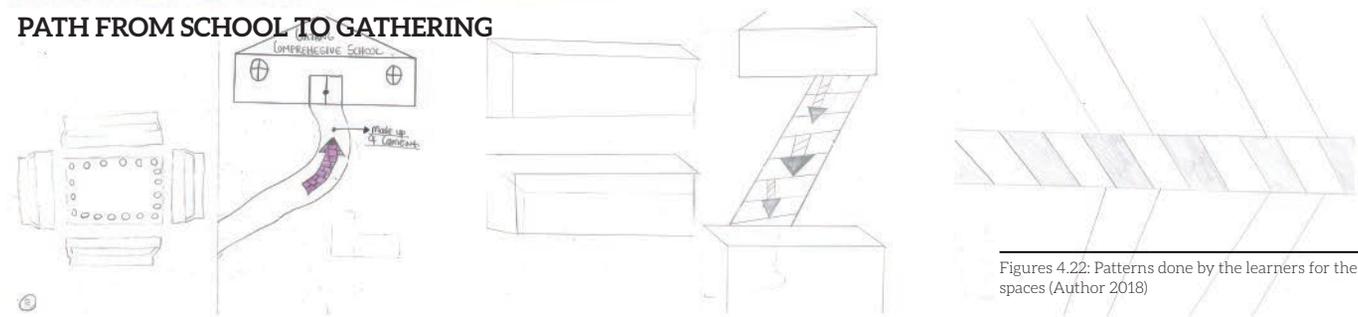
ENTRANCE TO SCHOOL'S PATTERN



GATHERING AREA

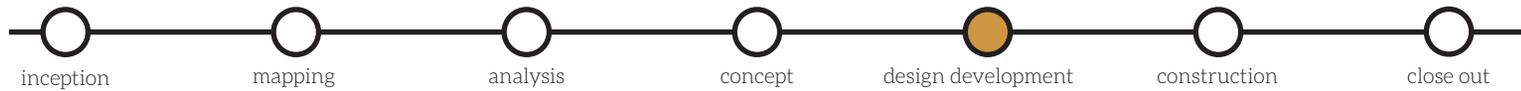


PATH FROM SCHOOL TO GATHERING



Figures 4.22: Patterns done by the learners for the different spaces (Author 2018)

4.3.8 // WORKSHOP 07: SPATIAL WRAPPING



Date of workshop: 24 August 2018

Method of capture: photographs, drawings, models

Workshop Seven continued to focus on the design development phase as this is a large percentage of the work stages (SACAP 2008). This workshop investigated how to design to an ultimate and rational conclusion (SACAP 2008:5) through evaluating the relationship between space, program and experience. Thirty-two learners attended this workshop which was focused on thresholds and space making. Learners were split into two groups and given two separate tasks. This was done to promote exploration and creation and compare how learners created space when they were given different materials. One was a paper-based task where learners were asked to design a series of thresholds to a school space. The other was a model building task where learners were given the six sides which make a box and asked to construct a space within it.

RESULTS

Both groups that did the threshold, paper-based activity had similar

layers of space. Both started off with a bright and colourful entrance that was well defined and large enough to accommodate many people. They were constructed with brick and careful attention was made to draw the bricks correctly. The next layer was space for exhibiting art and storage space for their possessions. Following this was the desk space and finally windows and doors that opened to the exterior. Learners always draw borders around objects, big walls as the first layer and closed doors. From this layering it can be seen there is a need to protect space. The author refers to this as spatial wrapping or protection.

In the model building activity all of the learners designed music spaces. After school activities were continuously focused on in the workshops. There are no spaces within Mamelodi that cater for these activities. These spaces are important for the development of children, for social reasons as well as to keep teenagers out of trouble (Heitor 2005, Hertzberger 2008). In a class with 45 learners, the surrounding environment and the after school activities are even more important as a learning tool and an outlet for

learners. Spatial learning is therefore a priority in the design.

The 'wrapping' of space is more evident in this second activity and this wrapping was shown in different forms. The first group created a curved roof to enclose space. This was done to protect it from the sun and the rain but also allow the sound from their stage to be reflected out. There were more private rooms to the side which were darker. The second group learners created an inside shell with an outer protective skin. The third group created a triangle box with a flip down door. Inside there was a smaller stage area. The last group also created a curved roof with a smaller stage inside. The rooms to the left and right of this stage were enclosed for more private spaces such as change rooms and practice rooms. In all these examples there is a wrapping of space for protection and to create thresholds between space. This spatial organisation developed into another theme used throughout the design: **anchor & attach**. The more private spaces act as anchors, similarly to the houses in Mamelodi, and the more social spaces attach to these, similarly

to the spaza shops in Mamelodi. This was an observation throughout the workshops in the classroom. Learners would always walk into the classroom and radiate towards the same table or someone in the room they knew. These spaces become an anchor, a place of familiarity, that provides a sense of comfort. Learners attach to these spaces by unpacking their stationery, playing music and moving around the chairs therefore making it their own.

LESSONS LEARNT

The learners that were given the model making task were far more experimental with space than those that did the paper-based activity. Those that did the paper-based activity tended to create what was known instead of envisioning a situation. This influenced the author's thought making process within the design of the secondary school. Moving away from just drawing on plan, the author started to experiment by building models. This is not a new concept to

the architectural process, however, experimenting with space through model building is not common for the author. It was found that the creation of space became far richer once it was explored in 3 dimensions.

SPATIAL OUTCOMES:



4.3.8 // WORKSHOP 07: CONTINUED

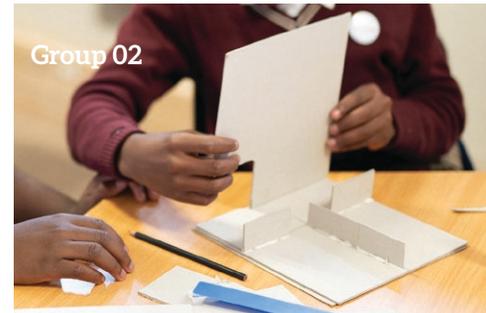
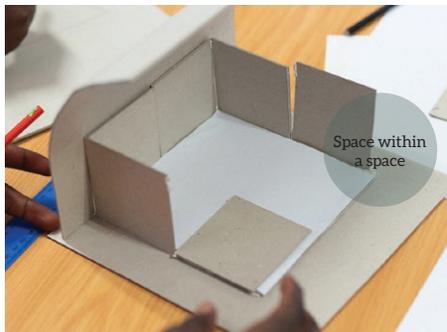
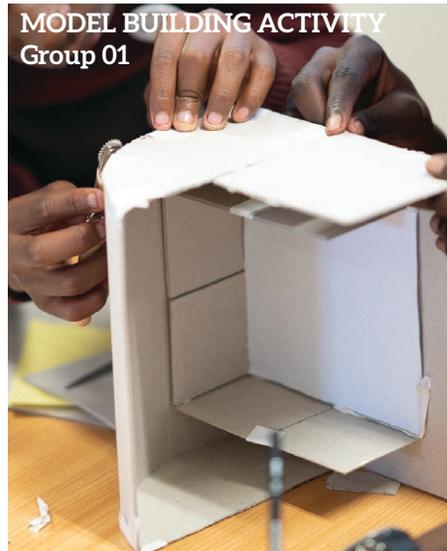
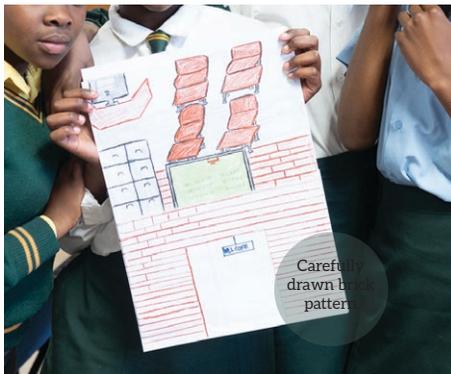


Figure 4.23: Spatial wrapping element in the build your space game

4.3.9 // WORKSHOP 08: COLOUR & WAY FINDING



Date of workshop: 31 August 2018

Method of capture: photographs, drawings, models

Providing specifications is part of the construction work stage. This includes materiality and colour. Since colour always played an important role in the previous workshops it was decided to focus on way finding and the psychology of colour and how this is translated into identity within schools. The decoration of sidewalks and use of colour in Mamelodi was also highlighted as important in the mapping therefore this workshop aimed to respond to the cultural and urban context in a responsible manner (SACAP 2010:5). Twenty-eight learners attended this workshop which was used at exploring how colour creates a common design language.

Learners were first asked to draw their favourite clothing outfits as this not only gives an indication of what activities they are interested in but also indicates what colours they like without it being dependent on the day. Next, learners were given a sheet with colours on the one side and spaces on the other and asked to match a

colour to a space. This was done to discover what colours are associated with spaces. Following this activity learners were asked to pick one colour and in the groups they were in, design a space that could be associated with this colour. Lastly, learners were given a maze and asked to design a series of objects to help users find their way through the maze.

RESULTS

Outfits:

45% of learners drew sports outfits with brands such as Adidas and Reebok. 22% of learners drew formal wear (e.g. suits) and 33% of learners drew fancy dress. Identity becomes a theme that emerges through this task. Similarly to how learners associate different colours with different spaces, a different identity could be given to each grade block in order to make way finding within the school easy.

Match colour and space:

- 1 / Classroom - white/red/purple
- 2 / Feeding scheme - orange
- 3 / Art class - red/blue/purple
- 4 / Admin block - white/brown
- 5 / Music room - blue/red

- 6 / Soccer field - green/yellow
- 7 / Park - green/yellow
- 8 / Entrance - black/brown
- 9 / House - grey
- 10 / Bedroom - purple/pink
- 11 / Library - yellow/orange
- 12 / Shop - yellow/black

Space:

The colours each group chose were:

- Red: Music studio, kitchen/dining room
- Blue: Music studio
- Grey: House, admin office, soccer field
- Yellow: Classroom
- Pink: Music room
- Purple: Bathroom space

Colour can play an important part in identifying different parts of the school. Learners associate more neutral colours with admin and authoritative spaces. Brighter colours are associated with social space. This too can be seen in the way the community of Mamelodi decorate their space. The walls and fences are always brightly coloured and the houses are more neutral.

Blue is a calming colour and people tend to be more productive in a blue room as they are calm and focused on

the task at hand (Psychology of Colour 2017, Colour Psychology 2018). In the online workshop it was identified as a colour best suited to a classroom space, however, learners thought blue was best suited to a music space. Music is seen as a calming aspect. It was observed during the workshops that many learners played music softly and would often hum whilst doing the task. Again, the need for different learning spaces as is highlighted.

Yellow, according colour psychology (Psychology of Colour 2017, Colour Psychology 2018), produces a warming effect. It is known to stimulate mental and muscle activity. It is a colour that draws attention and is associated with optimism. Yellow was associated with the park and a soccer field. Both of these spaces were favourite spaces of the learners and attention was drawn to them in the majority of workshops.

Red is the colour of energy and life (Psychology of Colour 2017, Colour Psychology 2018). Creative spaces, such as the music room and art studio were associated with red indicating that these spaces are what inspires the learners and gives them energy.

Brown is a colour that is associated with stability, reliability and friendship (Psychology of Colour 2017, Colour

Psychology 2018). Spaces that were associated with brown included the entrance and admin block. The admin block in Mamelodi schools is a space for teachers. In the workshops the admin block was always drawn near the entrance to the school indicating it as a form of **anchor** within the school.

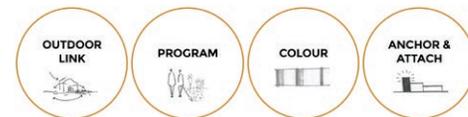
Orange is associated with happy, fun spaces with warmth and organic products psychology (Psychology of Colour 2017, Colour Psychology 2018). It is also tied to ambition. The cafeteria space, or feeding scheme, was identified in Workshop Two and the online workshop as an important social space. Orange is therefore a significant choice of colour as this further reinforces that this space is a happy, fun space where learners can socialize.

Purple was a popular choice for the learner's bedrooms, the classroom and the art studio. Purple is associated with the stability of blue and the energy of red. It is associated with wealth, wisdom and creativity therefore it is fitting that the types of spaces learners associated with this colour are not only places of stability but places where ownership can take place (Psychology of Colour 2017, Colour Psychology 2018).

White signifies safety, cleanliness and success (Psychology of Colour 2017, Colour Psychology 2018). Learners associated this colour with the classroom space and the admin block. Both these spaces are 'anchors' within schools reinforcing the need for them to be safe spaces.

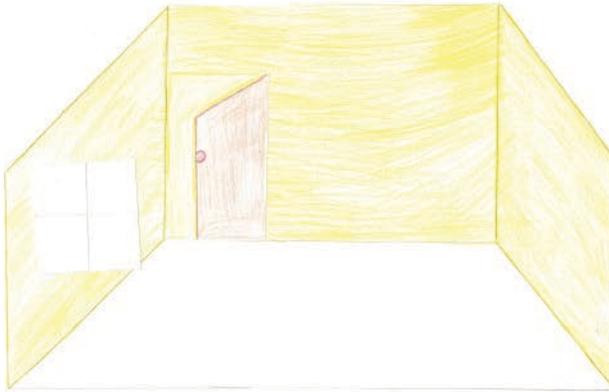
Maze: Throughout the workshops, and with specific reference to the maze exercise, learners drew directions through space as a series of objects that guided them through the space. It started off with a place of authority or a place of help. It progressed through to a more natural space which included trees and flowers. This is reinforced by the way learners designed their schools in which the admin block was closest to the entrance and the fields were the furthest away. The admin block becomes an essential anchor within the school as a place of safety.

SPATIAL OUTCOMES:

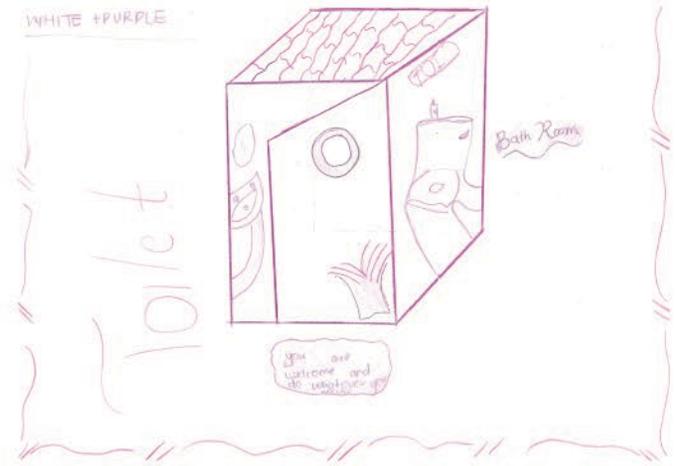


Figures 4.24 (Opposite, left): Drawings done by the learners to show the types of space they associate with different colours (Author 2018)

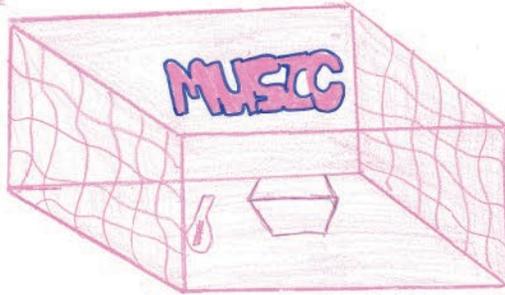
YELLOW



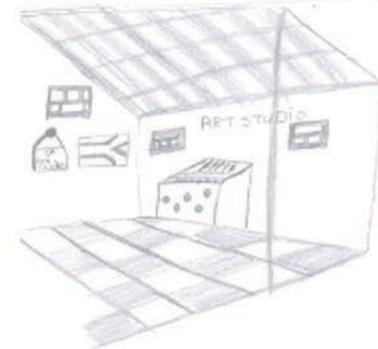
WHITE + PURPLE



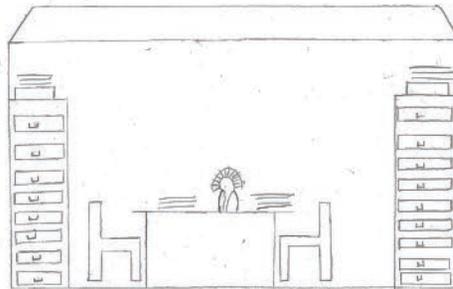
PINK



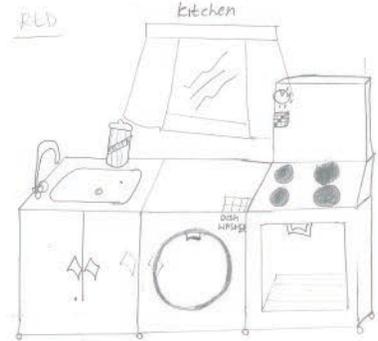
RED ART STUDIO



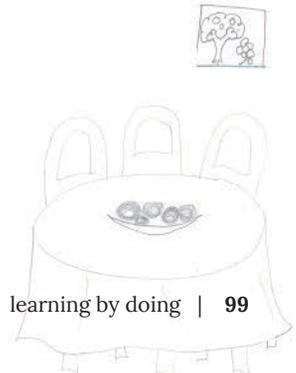
GREEN ADMIN OFFICE



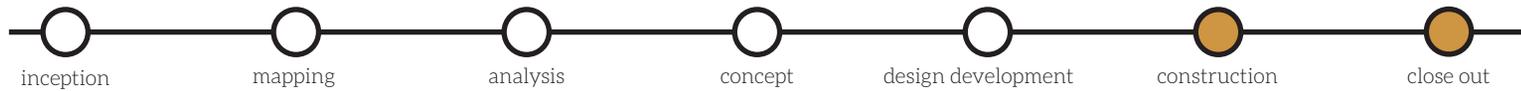
RED



DINING ROOM



4.3.10 // WORKSHOP 09: ARTWORK



Date of workshop: 7 September 2018

Method of capture: photographs, drawings, models

Artwork is usually considered in a post-occupancy stage. Artists, or in some case the users, create artwork and sculptures for the interior and exterior spaces. This form of participation is seen in the Nelson Mandela Children's Hospital where children in other hospitals created art which was used in the playground in the hospital. Drawings were also translated into furniture seen around the hospital. Signage is not completely circular to indicate how children would draw circles. Since this was the last workshop before close out it was decided to investigate this form of participation as it is a fun way for the learners to conceptualise how a school looks after completion. Seventeen learners attended this workshop which focused on creating artwork for their dreams. Learners were given coloured paper, glue, scissors, pens and pencils and asked to create anything they wanted. By having no restrictions, the author could analyse what type of art they chose, what they chose to make and what colours were

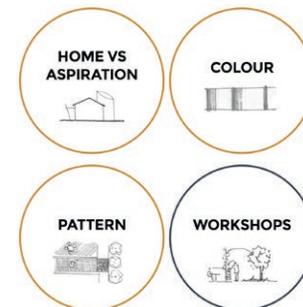
most popular. This was not in line with any SACAP learning outcomes but rather used as an exploration of a different type of participation where learners design for a completed school.

RESULTS

Yellow was the most popular choice of paper colour when handing out the coloured paper. Again, the psychology of yellow indicates that this colour produces a warming, inspirational effect which corresponds to the inspirational artworks that the learners produced (Psychology of Colour 2017, Colour Psychology 2018). The majority of learners had some form of natural object on their page (Trees or flowers). Once again music came through as a strong theme. Those that wrote poems wrote inspirational ones on courage and love. The majority of learners stated that they would like their artwork to be in the classroom so that they would see it every day.

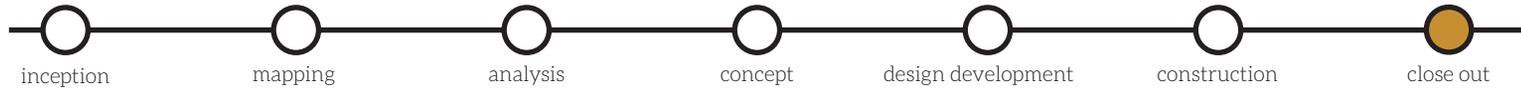
Children need an either a physical or creative outlet. This is especially true in a township setting where children need to be inspired by something to change their condition. Vocational or hands on educational programs also offer opportunities to explore career options and ease transition between secondary school and college (Lackney 2003:22). Learning spaces are important but the support spaces are just as important and should not be excluded from schools as is currently found in Mamelodi.

SPATIAL OUTCOMES



Figures 4.25 (Opposite, left): Artwork done by the learners (Author 2018)

4.3.11 // WORKSHOP 10: REFLECTION



Date of workshop: 14 September 2018

Method of capture: photographs, drawings, models

D'Anjou (2015:38) states that communication in design has two important aims: to inform the client and to provide the client with support. Twenty three learners attended this workshop which was used to inform the 'client' on the design of the urban campus as well as reflect on the series of workshops. As a last exercise, learners were asked to repeat the first activity from Workshop One in which they had to design their dream school in order to see what design competency had been built over the ten weeks. Whilst this was happening, smaller groups were asked to comment on the plan and a few views of the school as well as have an informal conversation about their likes and dislikes of the workshop series. This workshop was done to simulate the close out stage of the SACAP work stages.

RESULTS

Derr (2015:120) states that the co-design process should enable children to become reflective practitioners who understand how to establish

partnerships and communicate with people who hold diverse views. This relates back to the argument by D'Anjou (2015:38) in which it is stated that revised relationship between the client and the designer is proposed in which they are able to interact on the ground of reciprocal recognition and valuation of individual subjectivity (D'Anjou 2015:28). The final workshop allowed the learners to be reflective on the design and express their opinions. Learners loved the outdoor spaces, especially those that were shaded. There was a request for more outdoor seating spaces that were sheltered. The cafeteria, at the heart of the school, was one of their favourite places. A suggestion was made to put serving hatches to the outside so that learners could easily collect their food. Authenticity of design should not be envisioned as the absolute will of the client or the designer but a shared decision-making process between the two in which the aim is common design. The subjectivity of both the designer as well as the client is recognised and respected. Learners felt that there should rather be one big block of toilets, however, from research done the author believes that smaller blocks that are grade specific

will lead to less problems. It is here that the issue of toilets, highlighted by learners, is acknowledged but the knowledge of the designer is recognised.

Learners loved the images that had dramatic shadows. A suggestion was also made to have spaces that were not brick but rather plastered and painted to show different spaces.

School design:

Learners coloured spaces with more direction rather than sticking stars all over the page. This shows a maturity and thought process when choosing colour. There are more objects on elevation, rather than a combination of plan and elevation which again shows a growth in spatial awareness. The library has become a more pronounced space in the learner's schools and the classrooms have become smaller spaces. The toilets still remain a big part of the school design. The outdoor spaces remain the most important and biggest part of the learner's schools.

Lessons learnt:

The teachers were striking on the day of this workshop therefore the

learners did not have school. The learners had a lot of extra energy and were therefore very noisy and easily distracted. This further reinforces the need for support spaces that allow these learners to use their extra energy towards something beneficial.

Visual relationships, especially in secondary schools, is highly important (Hertzberger 2008:123). For teenagers is a way to see and be seen, an important part of their social lives. Brand identity was an important part when the learners drew their favourite outfits indicating this need to be seen and 'show off'. Increased opportunity to see and be seen is introduced as a principle by Lackney (2003:9) and Heitor (2005:10) introduce for the design of educational environments not only as an important social aspect but as a safety aspect.

Visual relationships also become important for safety, a theme highlighted in the workshops. According to Lackney (2003:10), there are three critical principles to safety. One of these is natural surveillance. Two of the learners were involved in a physical fight after this workshop. Visual access throughout the school is important in these situations. It allows teachers to break these up before they get harmful. Visual access by teachers also reduces fighting as the learners respond to authority.



Figures 4.26: Design your school round 2 (Author 2018)

4.4 // DESIGN TOOLKIT

A design toolkit was developed from the ten workshops which can be used to inform the design. The key below indicates which workshop influenced the design opportunity specifically.

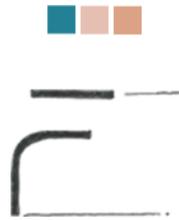
KEY

	Workshop 01		Workshop 06
	Workshop 02		Workshop 07
	Workshop 03		Workshop 08
	Workshop 04		Workshop 09
	Workshop 05		Workshop 10

01 SPACE

SPATIAL WRAPPING

THE EXTERIOR ROOF EXTENDS AND WELCOMES THE USER. THE INTERIOR SPACE WRAPS AND PROTECTS THE USER.



HOME VS. ASPIRATION

FAMILIAR ELEMENTS ARE USED IN UNFAMILIAR OR INSPIRING WAYS. FOR EXAMPLE, MANY DIFFERENT BRICK PATTERNS ARE USED.



LAYERED THRESHOLD

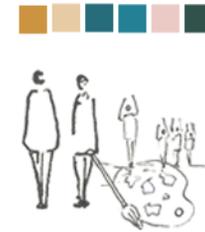
LAYERS OF SPACE ARE USED FOR SECURITY AS WELL AS TO CREATE HIERARCHY.



02 PROGRAM

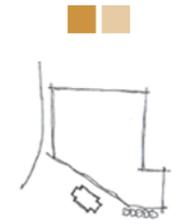
PROGRAM

THE PROGRAM DEVELOPED FROM A SECONDARY SCHOOL INTO AN URBAN CAMPUS DUE TO THE LEARNERS RESPONSES.



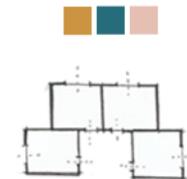
SITE CHOICE

THE SITE CHOICE WAS INFORMED BY THE LEARNERS REASONS OUTLINED IN WORKSHOP TWO.



CLASSROOMS

CLASSROOMS ARE FLEXIBLE SPACES WITH GOOD INTERIOR ENVIRONMENTS. THEY ARE ORGANISED IN GRADE BLOCKS TO PROVIDE ANCHORS FOR LEARNERS.



(SKETCH ADAPTED FROM HERTZBERGER 2008)

03 PROGRAM

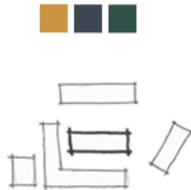
ENTRANCE

PEDESTRIAN AND VEHICULAR MOVEMENT IS SEPARATED. THE ENTRANCE IS VISIBLE AND EASY TO LOCATE.



CAFETERIA

FOOD IS AN IMPORTANT ELEMENT IN THE LIVES OF THE LEARNERS. THIS ALSO BECOMES AN IMPORTANT SOCIAL SPACE AND IS THEREFORE LOCATED IN THE HEART OF THE SCHOOL.



TOILETS

TOILET BLOCKS ARE SMALLER AND LOCATED IN EACH COURTYARD. THIS MEANS THEY BECOME MORE GRADE SPECIFIC.



04 LINKS

OUTDOOR LINKS

THERE IS A CONTINUOUS LINK THROUGHOUT THE SITE TO THE OUTDOORS. THE MAIN OUTDOOR LINK IS THROUGH THE COURTYARDS AND PRODUCTIVE LANDSCAPE.



SITE LINES

VIEWS THROUGHOUT THE SITE ALLOW FOR PASSIVE SURVEILLANCE. THIS ALSO ALLOWS FOR LEARNERS TO LEARN FROM SPACE (HERTZBERGER 2008)



(SKETCH ADAPTED FROM HERTZBERGER 2008)

ANCHOR & ATTACH

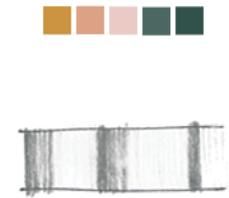
ANCHOR SPACES ARE FAMILIAR ELEMENTS. THEY ARE USED AS A WAY



05 CONSTRUCTION

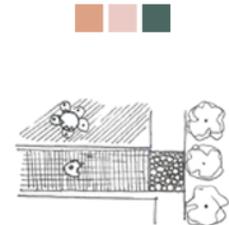
COLOUR

COLOUR IS USED TO DEFINE SPACES AS WELL AS IN THE ARTWORK AS AN INSPIRATIONAL ELEMENT.



PATTERN

PATTERN IS USED TO SHADE, DEMARCATATE SPACE AND ENCOURAGE MOVEMENT OR GATHERING.



MATERIAL

BRICKS ARE USED AS THE PREDOMINANT MATERIAL AS THEY PROVIDE A SENSE OF SAFETY, ARE LOCAL, MAINTENANCE FREE AND ROBUST.



4.5 // A SHIFT IN THINKING: LESSONS LEARNT

Architecture is not a solo act, even within the world of experts (Kennon 2006:51). This statement already begins to question authorship within this world. The question of authorship and identity has extended into many architectural circles and collaboration is being used to such an extent that it risks becoming meaningless if it is not dealt with in the correct way (Kennon 2006:51). Collaboration has become both an anti-heroic effort that acknowledges a collective's ability to conceive and produce meaningful architecture but at the same time may fall into the trap of being 'all things to all people' (Kennon 2006:51). It is therefore essential that the process becomes more than a laundry list of items to fix but a distilling process where valuable information is extracted from the workshops. Collaboration is seen as an opportunity to engage with the people whose lives the architecture impacts therefore there needs to be authentic dialogue for it to work (Vaajakallio & Mattelmäki 2014:75).

Collaboration requires both a selfless maturity and in contradiction to that, a child's sense of play (Kennon 2006:53). It requires a deep understanding of the process of making architecture in order to investigate where the different voices of client and designer

lie. With children in co-design, it is especially important to see the world through the eyes of a child as this not only allows the workshops to be tailored for a specific group and therefore getting the most out of them, but it brings the fun back into the process that is sometimes dominated by rules and regulations.

Several important lessons were learnt during the workshops. Firstly, model building works best for spatial experimentation. When learners were given the opportunity to build spaces, they were far more creative, and did not resort back to known elements, than when they were asked to just draw the spaces. This was a reminder that one needs to build space and not just draw on plan as is the comfort zone for the author.

Secondly, when working with children, it is important to make the workshops fun. This may seem like an obvious statement but in the process of making one can sometimes forget that care is what makes buildings come alive. Competitions are a good way to create a fun, participatory atmosphere, however, the guidelines and rules need to be set out properly from the beginning.

The importance of guidelines and rules is extended into the workshop

planning. The workshops also should not be pre-planned months in advance but evolve with the design process. In this way the workshops can be crafted to become integral parts of the design process rather than becoming tagged on items. This reinforces the idea that designers should not bring pre-conceived ideas to the workshops but allow authentic dialogue to guide the process (D'Anjou 2015:32). The workshops, however, do need to be thoroughly planned before they are executed with specific aims and goals outlined. If not, the workshop activities resort into a laundry list of items.

Architectural design is taught, aided by the SACAP levels, as a process moving from an awareness of issues to the ability to tackle them (SACAP 2010:4). In the same way architectural students are slowly matured into designers, the co-design team needs to be taught how to think about space in order for the workshops to be of relevance. This was specifically seen in the fifth workshop on thresholds where there were several new learners to the workshops and they immediately wanted to create a list of items.

Lastly, designers need to remember that the co-design team is not trained

in design and therefore does not necessarily think in the same way, however, there is beauty in this as it uncovers new perspectives. Besides the site and program ideas that emerged from the workshops, several major themes that underpin how the space is made were discovered. These themes considered how space makes the user feel. They evoke a sense of attachment to a place. Without the co-design workshops, these themes would not have been explored. The themes are summarised below and continue to be explored throughout the design iterations.

/ HOME VS ASPIRATION

Placemaking, according to Hertzberger (2008:101), is facilitated by the familiar and at the same time changing environment or the aspirational. In the school environment, this is introduced as the classroom being the home base. It is a familiar environment in which safety is found (Hertzberger 2008:35). The surrounding space should arouse curiosity through the creation of learning spaces that present the users with the stimulation required for learning (Hertzberger 2008:35 Lackney 2003:9). The need for an inspirational learning environment is emphasized in the Department of Basic Education (2011) guidelines in

which it is stated that the physical infrastructure and environment of every school should inspire learners to want to come to school and learn, and teachers to teach (Department of Basic Education 2011).

/ ANCHOR AND ATTACH

The theme of anchor and attach is evident in both the mapping of the context as well as evidence from the workshops. These places of anchor are grounded elements which provide a sense of stability and security. The attaching spaces provide a sense of emergence and sociability. These qualities are all important in creating dynamic learning environments (Hertzberger 2008:24).

/ SPATIAL WRAPPING

Another theme that was discovered was spatial wrapping. As discussed in Workshop Seven, learners protected their space by 'wrapping' it. Folding in architecture, introduced by Greg Lynn and Mario Carpo, can be seen as a process and not necessarily a product of visible folds within architecture (Lynn 2004:15). This reinforces the idea of space evoking a feeling in the user, for example, the sense of safety or inclusion.

Lynn (2004:15) states that folding becomes a method by which the

surface of a space is differentiated whilst remaining continuous. It involves the subtle layering of space where elements are smoothed across a shared surface. Folding is creating built forms, which are motionless, but introduce the perception of motion (Lynn 2004:15). It is a form of tension-release, contraction-dilation and enveloping-developing (Lynn 2004:35). There is a coherent continuity, not just in the exterior space, but into the interior surfaces allowing for smooth pedestrian flow that enhances co-operation, communication and creativity within (Rahim & Jamelle 2007:41). The idea of spatial wrapping of the interiors as an extension of the exteriors is further explored in the design iterations. This allows the building to be simultaneously designed from the inside out, as well as the outside in. Elegance in Lynn's work is contained in effortlessly tying together the organisational, spatial and aesthetic features through a continuity and fluidity of space. Each space is designed to create an individual sensibility, but the elegance resides in the seamless integration of these spaces through a single, winding form (Rahim & Jamelle 2007:40). It is hoped that through the investigation of spatial wrapping within the workshop that the parts are distinct but relate to the whole.



back to school

a way of investigating//

chapter five

PROGRAMME

- 5.1. Program development
- 5.2. Space and learning
 - 5.2.1. Schools in SA: Apartheid
 - 5.2.2. Schools in SA: Today
 - 5.2.3. Schools in Mamelodi
- 5.3. Artisan training
 - 5.3.1. Architecture for Education
- 5.4. Conclusion to Education
- 5.5. Program Requirements
- 5.6. The People
- 5.7. The Places

5.1 // PROGRAM DEVELOPMENT

Secondary school

In line with current practice, this term is used to refer to schools offering Grades 8-12 or more or less this range of grades. Importantly, the curriculum and other policies divide grades into four phases rather than into primary and secondary categories (Department of Basic Education 2011).

ASIDI

Accelerated Schools Infrastructure
Delivery Initiative

In 'Small is Beautiful', Schumacher (1973:140 in Carter 2008:7) states that "development does not start with goods [a category that includes buildings]; it starts with people and their education, organisation and discipline", Education has the power to change the world. If our children are "our greatest treasure" and the future of the country, (Nelson Mandela 1997) then we need to rethink how we look at, and design for, education. According to the National Development Program (DHET 2017:10), the education system will "*play a greater role in building an inclusive society, providing equal opportunities and helping all South Africans to realise their full potential,*

in particular those disadvantaged by apartheid policies, namely black people, women and people with disabilities."

Figure 5.1 (opposite top): Classroom, early modern
Figure 5.2 (opposite): Classroom in the industrial era
Figure 5.3 (opposite): The classroom is set up to simulate the industrial environment as pictured here
Figure 5.4. (opposite): Modern school with similar classroom set up
Figure 5.5 (opposite bottom): Open plan learning centre

All: <https://www.architectural-review.com/rethink/typology/typology-quarterly-schools/8625738.article>

5.2 // SPACE AND LEARNING

Schools have always been a reflection of a society's stage of development (Bautista & Borges 2013; Tigran et al 2014). The world is witnessing rapid and on-going transformations in many aspects of society. It is evident that learning spaces and environments have not experienced sufficient change to keep up with this ever-changing society (Bautista & Borges 2013; Tigran et al 2014). According to Ana Rodriguez for ArchDaily (2017), the educational model of the 21st century can be described as being similar to the *"spatial model of prisons, with no interest in stimulating a comprehensive, flexible and versatile education."* The built environment, in particular, seems to be lacking in development to encourage and enhance educational development. Hertzberger (2008:11), in reference to educational buildings, states that *"there are few building types that have so poorly evolved during the past 100 years"*. There is a missing link between the architectural and functional design and the pedagogical functions and approaches that need to be applied (Mostafa 2016). The built environment has a significant influence on educational development and therefore a revision of the way these learning centres are designed is called for.

Think of schools and the immediate vision is that of classrooms with rows of desks, a blackboard and a teacher up front doing their best to make the children facing them a little wiser. In most areas of the world there is no means to achieve more than the most basic conditions of four walls and a roof (Hertzberger 2008:3). The school should be an ever-changing, stimulating environment where there are choices to be made. It is a place where children have to contend with other children, learn to do things together, take one another into account and understand each other. There is a great deal more to schools than reading and writing and school space should encourage this (Hertzberger 2008:7). **Spatial learning**, according to Hertzberger (2008:5), describes how space can meet the principle of schools which is learning how to learn.

The system of schooling and school typologies can be dated back to the industrial and early modern era. In the industrial era, schools were developed as highly controlled environments to instill the discipline needed to thrive in a machine age, which depended on a reliable and productive workforce. In this classroom there were rows of benches, with the boys and girls being separated. The boys occupied the front



of the classroom whilst the girls were placed on the side lines, a reflection of the society of the day (Kuhn 2012).

The early modern learning spaces were not so different from their predecessors. Whilst the building itself became more modern in appearance, the classroom layout did not change. It was still a highly controlled space which symbolised another stage in the Industrial Revolution which was the rise in the service sector. Today, the majority of schools follow this standard school model of a teacher-centered classroom and a corridor model (Bautista & Borges 2013; Kuhn 2012; Rodriguez 2017). The controlling of space, especially in educational typologies, can largely be seen in the South African schooling system.

5.2.1. SCHOOLS IN SOUTH AFRICA: APARTHEID

In education, an uneven racial and spatial spread of schools developed. The Bantu Education Act of 1953 passed by the Government, extended Apartheid into the schooling system. In 1994, there were nineteen different racially-based education departments that *'dispensed an unequal system justified by cultural and ethnic difference'* (Christie

2012:8). It brought African education under control of the government by stipulating that funding would be received if the schools accepted the racially discriminatory curriculum. This education system was designed to separate black students and teach them to be the 'labour' of the country (Carrim 1998:179). Clear priority was given to white schools with twelve times more being spent on the education of a white child than a black child (Christie 2012:8).

It was in 1996 when the first evidence of the spatial inequalities between black and white schools surfaced (Christie 2012:8). Spatially the conditions of these 'Bantu' schools were vastly different from white schools. Schools were characterised by dilapidated buildings, overcrowded classrooms, inadequate instruction, poor teacher training and lack of textbooks and facilities. School fields and sports facilities were non-existent in these Bantu schools. These schools did not usually have libraries, laboratories, running water or functional toilets. The classrooms did not have the capacity for the number of students they had to accommodate. Apartheid saw not just the segregation of schools but also the segregation in the

training of teachers. Teachers were often under qualified as they had no training facilities (Carrim 1998:179, Christie 2012:9).

The legacy of Apartheid is still evident today and often reinforced by economic inequalities. Many black learners still attend these historically black, Apartheid schools (Honours Research Group 2017, Masters Research Group 2018). This means that their spatial activities have not changed (Christie 2012:8). Schools, and the schooling system, should therefore be making a continuous effort to heal the divisions of the past, foster a sense of South African nationhood and provide education opportunities that will break down these inequalities (Department of Basic Education 2011:17).

5.2.2. SCHOOLS IN SOUTH AFRICA: TODAY

Whilst the materiality and construction of schools may differ in and around South Africa, the basic classroom model has largely remained the same. There is a focus in South African schools to eradicate the backlog in schools without water, sanitation and electricity and to replace schools constructed from

inappropriate materials to contribute towards levels of optimum learning and teaching. Accelerated Schools Infrastructure Delivery Initiative (ASIDI) aims to provide infrastructure that exceeds the minimum norms and standards (Department of Basic Education 2018).

When working in township settings architects often resort to shipping containers or prefabricated construction. The goal is to create safe, decent schools as a fraction of the price of brick and mortar. Shipping containers need to be customised and properly maintained otherwise holes and rust begin to appear after five years (Big Box Containers 2018). This fit out of containers is often not done in schools resulting in poor indoor environments and rendering the classrooms useless. An example of this is evident in Lehlabile Secondary School where several container classrooms are standing empty as the heat in the containers makes teaching impossible (Workshop Two 2018).

5.2.3. SCHOOLS IN MAMELODI

The history of schooling in Mamelodi dates back to Mamelodi's origins. Before the 1953 Bantu Education Act, training of black teachers was

a provincial responsibility. This, however, was usually performed by private institutions or churches. One such institution was the Pretoria Bantu Normal College which was situated in Vlakfontein, now the current Mamelodi West. The first buildings erected for this institution were the Mamelodi rondavels which were constructed in 1947. Several single-storey block classrooms were added in the 1950s and now form part of the Mogale School (Bakker *et al* 2002:4). The Vlakfontein Industrial School, established in 1948, trained over 1100 artisans and workers, was located on the site adjacent to the Pretoria Bantu Normal College. The rondavels were also associated with the Kollege ya Bana ba Afrika which shared resources with the Pretoria Bantu Normal College. Black teachers, such as Archbishop Desmond Tutu, were trained at this college. Both these institutions were closed in 1959. It has been stated by Archbishop Tutu (in Bakker *et al* 2002:8), that the institutions were monuments to the idea of separate development. The rondavel complex was a place where students could be moulded into the government's vision of building whole but separate cultures and retaining the non-modernising, 'traditional'

culture for black people (Bakker *et al* 2002:8). In 1950, three years after the completion of the rondavels, it was found that they were illegal and unsuitable for teaching. Larger, more modern facilities were built in 1955, which are now part of Mamelodi High School. This was the first high school in Mamelodi, founded in 1956, and is located in Tsomo Street (van der Waal 2000:1). Administration buildings were built in 1957 on the adjoining piece of land and these now form part of Phateng Secondary School (Bakker *et al* 2002:20).

5.2.4. GAP 01

Today, the implications of this skewed education system are evident in the dropout rates within Mamelodi. According to the 2011 Census, only 50% of learners within the area complete their Matric. This is higher than both the 44.6% National rate and 40.5% Gauteng dropout rate (Wazimap 2018). These figures give evidence to the gaps in our educational system as explored in figure.

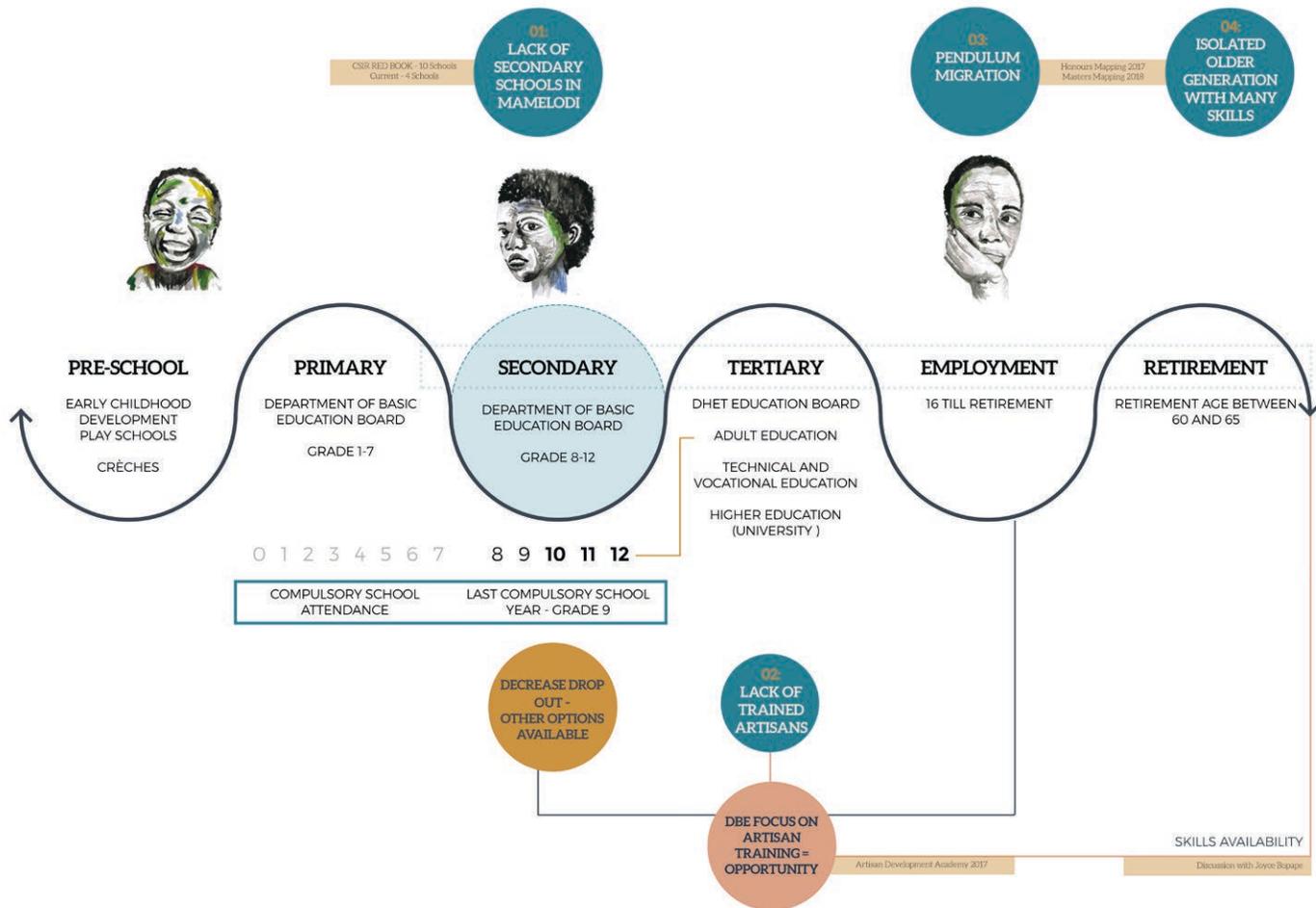


Figure 5.6: Diagram indicating the South African education system with the gaps identified (Author 2018)

5.3 // TRAINING OF ARTISANS

Artisan

The Skills Development Act RSA 1998 defines an artisan as 'a person who has been certified as being competent to perform a listed trade'.

Another gap identified in the education system was that between secondary schools and higher learning or the work environment. Declaring 2013 the 'Year of the Artisan', Minister of Education Dr Blade Nzimande placed focus on the critical need for qualified and competent artisans as part of South Africa's strategy towards job creation and dealing with skills shortages (Artisan Development Academy 2017). There are currently 125 listed trades in South Africa which include the sectors of construction, hospitality, agriculture and draughting (DHET 2018:38).

According to the Department of Higher Education and Training (DHET 2018:88) artisan development has become a priority as there is a continuous need for suitably qualified artisans to sustain industries and support economic growth. Traditionally in areas such as artisan trades, apprenticeships have been the pathway to qualifications. The apprenticeship system, however, has deteriorated since the mid 1980s resulting in a skills shortage (DHET 2017:57). The National Development

Plan and White Paper indicate that by 2030 there should be 30 000 qualified artisans trained per year. The number of artisans trained per year currently stands at 16 000 leaving much room for improvement (DHET 2018:88). The DHET aims to re-establish a strong apprenticeship training system and simplify the pathways leading to artisan training. It further recognises the importance of forming relationships between different role players (DHET 2017:9). South Africa's emerging economy reinforces the argument for a strong artisan or vocational system. Effective vocational programmes provide practical training linked to the prospect of jobs which in turn smooths the transition from school to work (Maclean & Wilson 2009:cxx).

5.3.1. ARCHITECTURE FOR EDUCATION

Today in Korea, nearly 40% of secondary students are enrolled in TVET education (Maclean & Wilson 2009:xxx). This trend towards a hands-on education is seen throughout the world. An example of such is Taliesin West, Frank Lloyd Wright's school for architecture, which was built in 1937. Wright sought to create a place where students, or 'apprentices' could learn

by doing. He created an environment with the concept of co-existence of man made structure and natural elements. The student community is responsible for the care of vegetable gardens and animals as well as the daily activities that occur. The campus encourages the students to use the entire environment - learning about the desert ecology, the landscape and the integrated relationships of architecture, structure and the environment (Taliesin S.a). There are draughting studios, which provide workshops, classrooms, study rooms, library and exhibition spaces as well as two theatres which provide space for concerts, performances and rehearsals. Workspaces and equipment are available for woodwork, metal work, painting, printing, photography, sculpture, pottery and model making (Taliesin S.a).

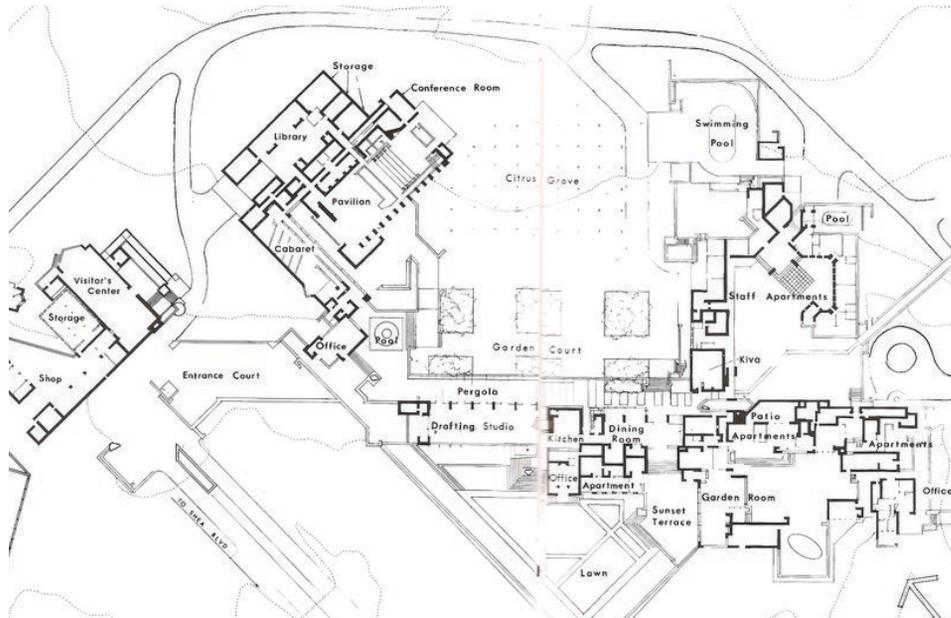


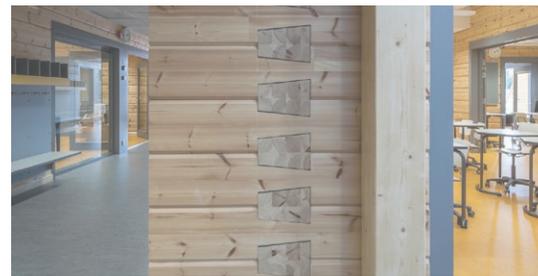
Figure 5.7 (Above): Taliesin West (Taliesin S.a)
 Figure 5.8 (below): Taliesin West plan (Taliesin S.a)
<https://frankloydwright.org/Taliesin-west/>

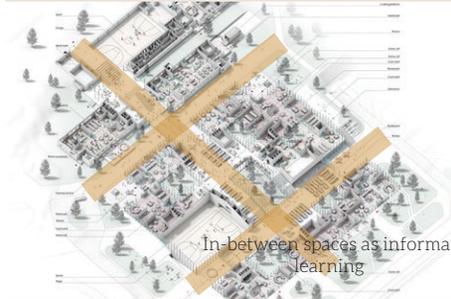
Figure 5.9 (opposite above): Pudasjärvi Log Campus wings
 Figure 5.10 (opposite middle): Joinery
 Figure 5.11 (opposite middle): Canteen joinery and columns
 Figure 5.12 (opposite left): Plan
 Figure 5.13 (opposite right): Informal meeting spaces in between classrooms
 Figure 5.14 (opposite right): Classroom
 All: <https://navi.finnisharchitecture.fi/en/pudasjarvi-log-campus/>.

A more recent example of a hands on education is seen in the Pudasjärvi Log Campus in Finland. In 2012 Pudasjärvi, a town of approximately 8700 residents, decided to bring its schools and community college to one location. The new school campus consists of a pre-school, primary school, secondary school and community college which focuses on carpentry and metal work. The campus also houses a sports and events centre as well as a music and arts centre.

The campus is divided into two wings which house four sections. The primary and secondary school are located in the two single storey sections. They are reminiscent of small log cottages which characterise the context. The spaces between these 'cottages' serve as open teaching and learning spaces. The special classrooms, administration and student welfare facilities are located in the two storey sections. The two wings are linked by a central hall which serves as a canteen.

Timber is the predominant material which is not only a local material making it eco-friendly, but also has excellent acoustics and good interior learning environments can be created by the harmonious appearance of the interiors surfaces and pleasant scent of wood (Kummala 2016).





The Hiekanpää Life Span Village is a winning master plan proposal for a campus that will consist of a new secondary school, a vocational college as well as a restaurant building. The campus will be developed into a holistic learning area with enhanced resources and a new service network for the community.

The design of the campus aims to efficiently maximise resources. Multi-functionality and accessibility are emphasized. Unlike traditional programmes that are housed in specific buildings, the learning spaces are dispersed throughout the campus for all to use.

The Pieksämäki secondary school is located at the heart of the Hiekanpää campus. The school building is designed as a community resource that will support life long learning for the entire community. The new building acts as a catalyst for the area's development. The building makes use of shared resources within the campus area.

The typology is based on an open learning environment. A timber shell structure is used to provide maximum flexibility. It introduces the need to rethink existing learning methods and spaces. The ground floor consists of workshop spaces for visual arts and crafts. Additional learning spaces are housed on the upper floors. Varying

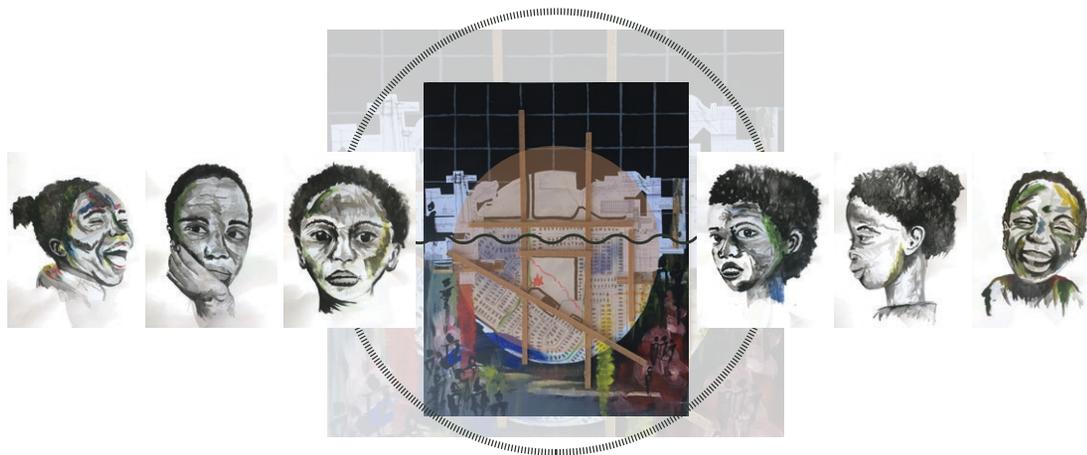
degrees of enclosure occur to support different learning conditions (Lunden Architecture Company 2014).

Lunden Architecture Company further developed this idea of a urban campus in the competition proposal 'Sibbesby' for Sipoonlahti school. The campus is designed to be a village; a diverse learning environment for the entire community. Young children occupy the space during the day and this transitions into various learning activities for adults in the evening. The campus serves as meeting place, workshop area and communal activities center. It encourages diversity in learning as well as supports the needs of users of different age.

Eight learning cells are centered around a public area. These learning cells are intended to be 'home' bases for the learners. The plan creates visual and functional links between the spaces without complex corridors, thereby creating different learning situations. All home cells are connected to sheltered and quiet green courtyards, which can be used as extensions of the learning spaces. (Lunden Architecture Company 2016).

Figure 5.15, 5.16: Pieksämäki secondary school indicating the campus typology of the school (Lunden Architecture Company 2014)

Figure 5.17, 5.18: Sipoonlahti school showing different spatial layouts with an urban campus typology (Lunden Architecture Company 2016)



5.4 // CONCLUSION TO EDUCATION:

In 2003, the Organisation for Economic Co-Operation and Development (OECD) published a study on 'Key Qualifications for a Successful Life and a Well-Functioning Society'. This study identified three qualifications which were essential to learn, namely, 'act autonomously', 'interact in heterogeneous groups' and 'use tools interactively'. Helping students to acquire these qualifications goes beyond the traditional models of teaching. School buildings that respond to these changing needs are best identified by their 'space for teams'. These buildings offer adaptive infrastructure with well-designed

micro-climates that are flexible and connected.

As education changes, so must the design of schools. Schools are moving from the old industrial factory model, which relies on uniformity, memorisation and lecture learning, into the digital information age which supports the idea of interactive learning (Taylor 2009:8). Schools must become more community orientated through shared facilities, multiple use and community participation in the planning process (Taylor 2009:8).

Together with an understanding of the needs and desires of the Mamelodi community, explained in Chapter 4 : Workshops, as well as an

understanding of the literature and the narrative of a **'learning by doing and interacting'**, a secondary school with artisan training is proposed. The narrative is built on the vision of transforming public spaces into places that contribute to the creation of shared knowledge, resources and social development. It is envisioned that the secondary school will act as a community interaction point, where all ages can gather, thereby becoming a place to share collective thoughts, memories and pass on existential knowledge to younger generations.

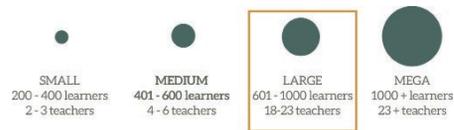
Figure 5.19: Artwork illustrating how children 'lose their colour' as they move through the current school system in Mamelodi but through architectural intervention their hopes and dreams can be renewed and strengthened (Author 2018).

5.5 // PROGRAMME REQUIREMENTS

“Education breaks the generational cycle of poverty and disease and is the key to a nation’s development and prosperity” (UNICEF 2008).

There are currently four secondary schools within the study area. The CSIR Human Settlement, Planning and Design (2000) recommends that for the population size there should be ten secondary schools. The proposed programme focuses on an additional large secondary school within Mamelodi which will accommodate 750 learners.

This secondary school has additional programs such as artisan and teacher’s training, which were developed through the participation process, that assist with bridging the gap between schools, Universities and Vocational Colleges. This secondary school therefore becomes an urban campus where different people and different programs come together.



The campus consists of different places of making. The five places of making are as follows:

Place 01: Secondary School

Learn + inspire

Place 02: Library/Support space

Anchor

Place 03: Cultural Hub

Exhibit + inspire

Place 04: Community Centre (Existing)

connect + expose

Place 05: Spaza shops (Economic)

learn, work, express

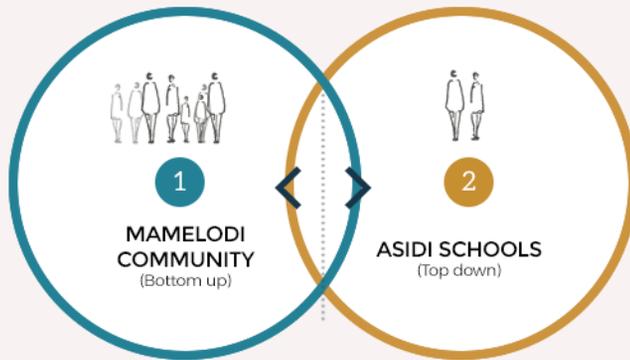
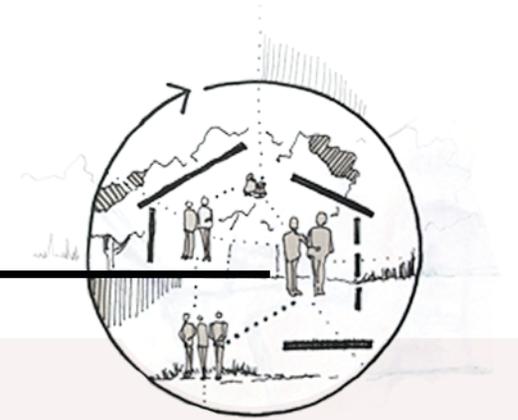
Ian Smilie, one of Canada’s leading writers on the development industry, points out that developments fail as we are not quick to learn from our mistakes (Carter 2008:1). It was not until the 1990s that there was a shift away from complete government funding towards more partnership-based and NGO funding. There are two characteristics, according to Carter (2008:2) that are significant about this shift. Firstly, there is the realisation that working with smaller organisations is more efficient and effective. Secondly, communities and the organisations must participate in the process in order for the project to have the ability to improve people’s lives.

Figure 5.20 (above): School sizes as per Department of Education (Author 2018)

Figure 5.21 (opposite): Urban campus stakeholders (Author 2018, layout inspired by Bruinette 2016)

5.5.1 // STAKEHOLDERS

GOAL: Involving the community in all aspects.



PRIMARY STAKEHOLDERS

- 4 PUBLIC WORKS & CITY COUNCIL
(SITE OWNERS)
- 5 PARENTS
LEARNERS
UNEMPLOYED
ELDERLY
LARGER MAMELODI COMMUNITY
(USERS)
- 6 ARTISTS & ARTISANS
ENTRPRENEURS
LOCAL CRAFTSMEN
PRIVATE INVESTORS
(INVESTORS)

SECONDARY STAKEHOLDERS



Narration 01
The Parent



Narration 02
The Teenager

5.6 // THE PEOPLE

Through the process of observations, site visits and the participatory process, the following characters have become apparent (Honours Research Group 2017, Masters Research Group 2018, Workshops 2018). These characters depicted are used as potential clients for the proposed architectural intervention, however, are not a depiction of all the people living in Mamelodi and do not suggest that all residents living in Mamelodi can be grouped into categories.

They get up whilst the city is still dark to make the long journey into the city for work. They work hard throughout the day, only returning home when the city is once again filled with darkness. There is never a chance to work on their own dreams as they are the breadwinners of the family and have hungry mouths to feed.

There are very few facilities in Mamelodi that offer night classes. It is proposed that the school acts as a space where parents returning home from their long day at work have the opportunity to attend class and further their skills.

The older school children in Mamelodi frequently misbehave (Workshop One 2018). They spend time smoking and drinking in the school bathrooms and many are involved in drugs. There are very few recreational centres or sports facilities in Mamelodi where they could do other activities (Masters Research Group 2018).

Expanding the range of activities through the built environment has the opportunity to help these teenagers work towards their goals. This could be achieved through offering a variety of activities with varying levels of observation and interaction.

Figures 5.22 - 5.26: Characters of Mamelodi (Author 2018)
(Inspired by Kotze 2016)



Narration 03
The Younger school kids

During the day, the streets of Mamelodi are filled with school children. They are curious about life and eager to learn. They navigate through the dangers of walking to school but once there are faced with small classrooms packed with learners. Yet they return each day, eager to learn and make a change in the world.

As discovered in the workshops, there is a need for activities that go beyond 'book learning'. The urban campus offers these children sports and recreational facilities which in turn helps them develop as children.



Narration 04
The Elderly Dependant

The burden of care of young children who have ill or deceased mothers falls on the elderly, especially the grandmothers. 38,2% of young children are living in households where a grandparent is the head of the household (UNICEF 2018).

There is an old age home down the road from the site. It is proposed that these older generation people could help teach the younger generation. The urban campus also acts as a social spot for the elderly.



Narration 05
The Unemployed

In 2011, the City of Tshwane had a youth (18-35 years) unemployment rate of 32.6% (CDE 2014:14). According to the Centre of Development & Enterprise (CDE)(2014), a city's vitality must be seen as key to the performance of the country. One of the most important aspects of a city's vitality is its workforce. Cities therefore need to be '*demanding better education systems and lobbying for more education and training opportunities through markets, entrepreneurs and companies*' (CDE 2014)

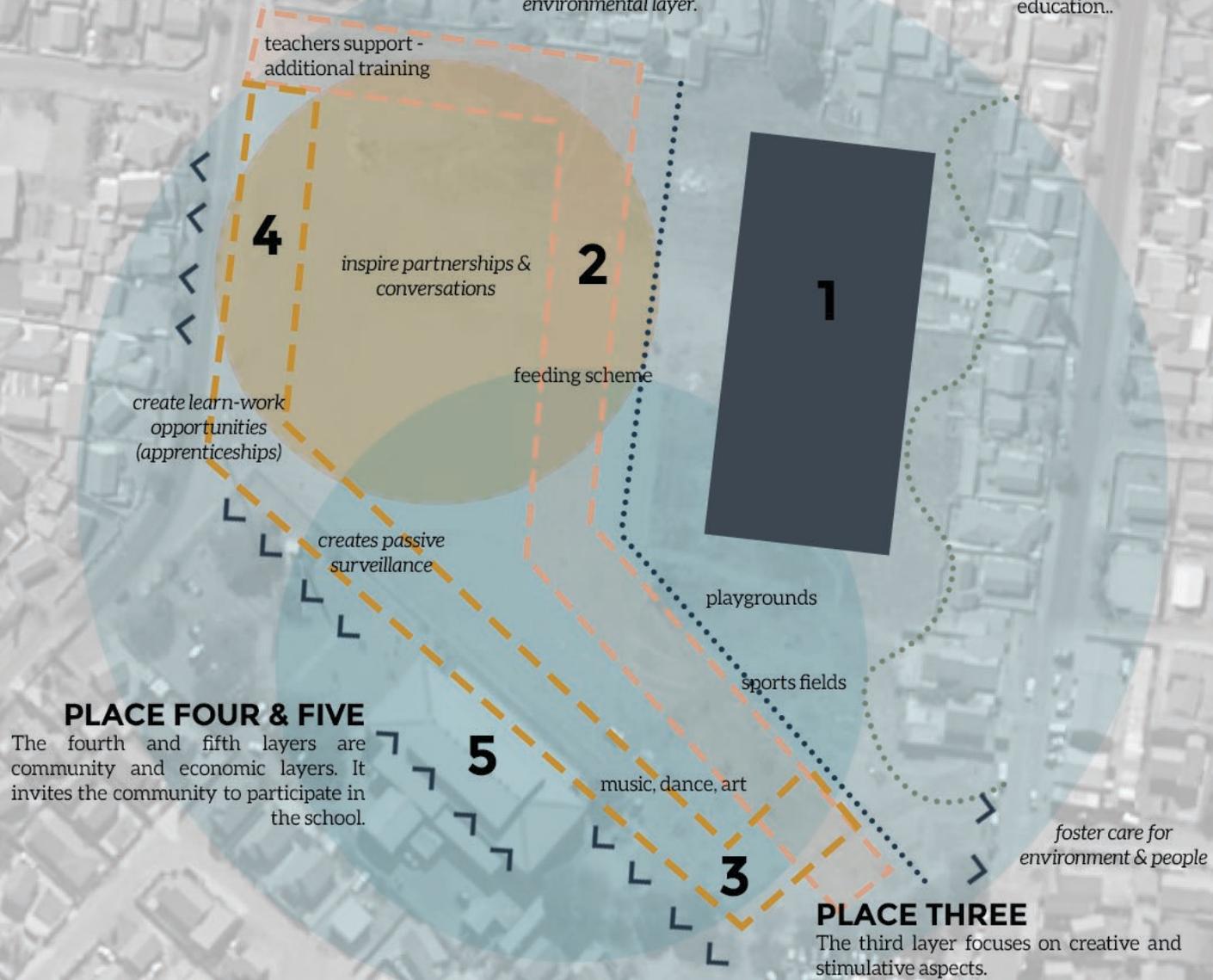
The urban campus will offer afternoon and night classes for the community of Mamelodi. This gives the unemployed the opportunity to learn new skills making them more employable. The internet cafe will also give people the opportunity to work on their CV's as well as learn basic skills (e.g. Word, Excel etc).

PLACE TWO

The support space for the secondary school & workshops forms the second layer. This is a *social and environmental layer*.

PLACE ONE

The most secure layer is the secondary school - the inner most layer of the urban campus. It is focused on traditional school education..



PLACE ONE //

SECONDARY SCHOOL - CORE

- Users**
-  Parents
 -  Learners/Staff
 -  Elderly
 -  Unemployed
 -  University of Pretoria/TVET
 -  Artists/Business people
 -  Surrounding community

FUNCTION



REQUIREMENTS

<i>(as per Department of Education 2013:16 Annexure A)</i>			<i>(as per Workshops 2018)</i>		min/optimal m ²
1. Classrooms - min 25 classrooms		07h30 - 15h00	1 x teacher 30 x students (per class)	 daylight  ventilation  accessible  robust  constant temp  safe, lockable	48 - 60
2. Laboratories - 2 x physical sciences - 2 x life sciences		07h30 - 15h00	1 x teacher 30 x students (per class)	 daylight  ventilation  surveillance  robust  constant temp	60 - 80
3. Storage		24/7	In classrooms Additional	 robust	12 - 15
4. Ablutions <i>(as per Department of Education 2013:19 Annexure D & SANS 10400 Part P Table 7, A3 Place of Instruction)</i>		School & after school hours	Removal of grey + black water Water provision (Hot + cold)	 ventilation  surveillance  separation  wash	Female: 8 basins, 16 WC Male: 5 basins, 6 WC, 12 Urinals Staff: 5 WC, 3 Basins (Female) 2 WC, 3 Urinals, 3 Basins (Male) Disabled: 2 WC, 2 Basin
5. Playground		Break time, after school	Gathering Benches Trees	 surveillance  permeable	
6. Library	      	06h00 - 21h30	3 x staff Discussion Rooms Reading section Computer lab Circulation desk Staff area	 ventilation  surveillance  permeable  daylight	60 - 80 Computer lab: 100m ² (50 students) programme 125

PLACE ONE //

SECONDARY SCHOOL - ADMIN

- Users**
-  Parents
 -  Learners/Staff
 -  Elderly
 -  Unemployed
 -  University of Pretoria/TVET
 -  Artists/Business people
 -  Surrounding community

FUNCTION



REQUIREMENTS

<i>(as per Department of Education 2013:18 Annexure C)</i>			<i>(as per Workshops 2018)</i>		min/optimal m ²
1. Principal's office		06h30 ->	1 x teacher 1 x assistant	 daylight  ventilation  accessible  surveillance over school  constant temp	15 - 20
2. Storage			In classrooms Additional	 robust	12 - 15
3. Printing room				 ventilation  constant temp	10 - 15
4. Staff Room		07h30 -> After hours training	40 Staff	 daylight  ventilation  surveillance over school  constant temp	48 - 60
5. Sick Room		06h30 ->		 daylight  ventilation  constant temp	10 - 15
6. Cleaning store room				 wash  lockable  accessible	10 - 15



Figure 5.29 (opposite): Place 1 requirements (Author 2018)
Figure 5.30 (above): Place 1 locality (Author 2018)

PLACE TWO

SECONDARY SCHOOL - SUPPORT

- Users**
- Parents
 - Learners
 - Elderly
 - Unemployed
 - University of Pretoria/TVET
 - Artists/Business people
 - Surrounding community

FUNCTION   **REQUIREMENTS**

<i>(as per Department of Education 2013:17 Annexure B)</i>		<i>(as per Workshops 2018)</i>		min/optimal m ²	
1. Food gardens	 		Greenhouse Open planting Shaded planting Tool store	daylight greenhouse solar panels maintainable different growth methods	15 - 20
2. Fields	 	07h30 - 15h00	Existing netball courts Link to existing fields	shared equipment permeable	12 - 15
3. Hall	 		Existing hall used	daylight ventilation accessible robust constant temp	120 - 180 +/-0.2 m ² per seat
4. Kitchen		07h30 - 15h00		wash ventilation shopfront constant temp	15 - 20
5. Teacher's training rooms	 	07h30 - 21h30	Discussion rooms Lecture hall	daylight ventilation accessible constant temp	
6. Server / plant rooms			Server room Solar plant room	ventilation accessible robust constant temp	15 - 20
7. Ablutions for netball courts/gym <i>(as per SANS 10400 Part P Table 6, A5 Outdoor sport)</i>			Removal of grey + black water Water provision (Hot + cold)	ventilation surveillance separation wash	Female: 3 basins, 5 WC Male: 3 basins, 2 WC, 3 Urinals Disabled: 1 WC, 1 Basin

PLACE THREE

TRAINING - ART & ARTISAN HUB

- Users**
- Parents
 - Learners/Staff
 - Elderly
 - Unemployed
 - University of Pretoria/TVET
 - Artists/Business people
 - Surrounding community

FUNCTION	 	REQUIREMENTS	min/optimal m ²	
<i>(as per Department of Education 2013)</i>		<i>(as per Workshops 2018)</i>		
1. Workshop area <i>Basic skills, Draughting, Electrical, Plumbing, Agriculture</i>		07h30 - 21h30 Acoustics - absorption of noise	daylight ventilation accessible robust constant temp safe, lockable	60 - 80
2. Ablutions <i>(as per SANS 10400 Part P Table 7, A3 Place of Instruction)</i>		07h30 - 21h30 Removal of grey + black water Water provision (Hot + cold)	ventilation surveillance separation wash	Female: 8 basins, 16 WC Male: 5 basins, 6 WC, 12 Urinals Staff: 5 WC, 3 Basins (Female) 2 WC, 3 Urinals, 3 Basins (Male) Disabled: 2 WC, 2 Basin
3. Material's Library		07h30 - 21h30	ventilation surveillance permeable daylight	40
4. Discussion/meeting rooms		06h00 - 21h30	daylight ventilation accessible robust constant temp safe, lockable	15 - 20
5. Studios <i>Art, drama/dance, music</i>		07h30 - 21h30 Washing up Worksapce Storage Practice rooms	daylight ventilation accessible robust constant temp safe, lockable	60 - 80

PLACE FOUR & FIVE

COMMUNITY CENTRE & SPAZA SHOPS

- Users**
-  Parents
 -  Learners/Staff
 -  Elderly
 -  Unemployed
 -  University of Pretoria/TVET
 -  Artists/Business people
 -  Surrounding community

FUNCTION   **REQUIREMENTS**

<i>(as per Department of Education 2013)</i>		<i>(as per Workshops 2018)</i>		min/optimal m ²
1. Community Centre <i>Existing hall</i> <i>Existing WC</i> <i>Change rooms</i> <i>Gym</i>	      	07h30 - 15h00	Acoustics - absorption of noise  daylight  ventilation  accessible  robust  constant temp  safe, lockable	Female: 5 basins, 5 WC Male: 5 basins, 5 WC
2. Rentable space <i>Spaza shops</i> <i>Artist studios</i> <i>Shops</i>	 	24/7	 daylight  ventilation  accessible  robust  constant temp  safe, lockable	
3. Ablutions <i>(as per SANS 10400 Part P Table 7, Part B, F2 Small shop)</i>			 ventilation  surveillance  separation  wash	Staff: Female: 1 basins, 2 WC Male: 1 basins, 1 WC, 1 urinal Visitors: 1 basins, 1 WC



Figure 5.35 (opposite): Place 4&5 requirements (Author 2018)
Figure 5.36 (above): Place 4&5 locality (Author 2018)



the story of site

a way of creating //

chapter six

CONTEXTUAL DEVELOPMENT

- 6.1. Site Choice
- 6.2. Site narrative
- 6.3. Site analysis
- 6.4. Existing fabric
- 6.5. Precedent

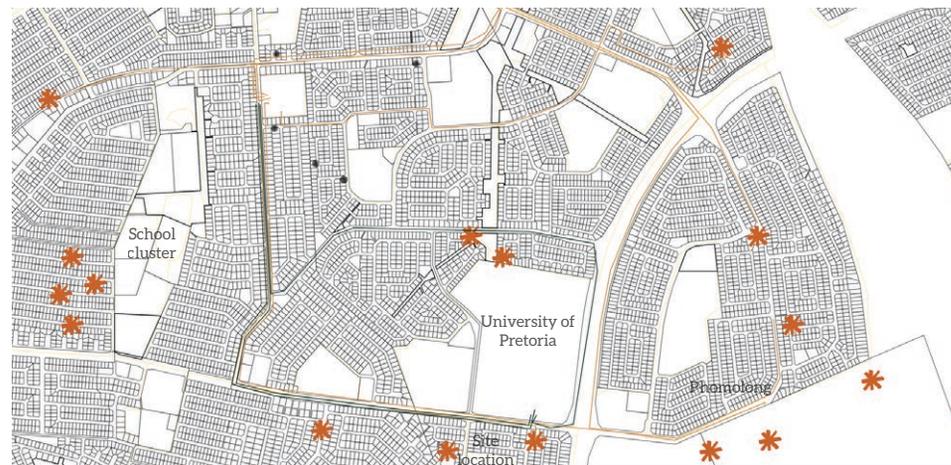
6.1 // SITE CHOICE

In the traditional design process, a site and brief are given to the architect who then designs. Inception of this project was undertaken from a novel perspective. Instead of having a preconceived idea about site and program, the author allowed the workshops to inform this decision. The site for a school in Mamelodi could be located in many places within Mamelodi East. A set of criteria was established as a baseline, further reinforced by the mapping and urban vision, which was used to identify possible sites. These criteria included having existing infrastructure that was isolated, existing every day activities and movement, a large parcel of land and close to a school cluster. In Workshop One learners mapped where they lived and where they went to school. In Workshop Two learners were asked to place their dream schools on a map of the township and give a reason why they placed it there. The actual spaces learners placed their schools was not considered as the majority of learners just placed it where there was a large empty space, however, the reasons they gave were applied to the site choice for the design project. These reasons included: in an area where there were no schools, close to amenities such as sports grounds or shops, the environment of the area

(close to a park, open area, big area) and close to the university or other public building.

Looking at where the majority of learners walked from, as well as the reasons from Workshop Two, the Ikageng Community Centre site (Number 2) was selected. This site also met the baseline criteria as well as those from the urban vision as it is located in the educational node. The proposed study area is located close to the University of Pretoria, Mamelodi Old Age home and the Ikageng Community Centre.

Figure 6.1 (Opposite): Locality map showing the site options with the final site choice (Author 2018)
Figure 6.2 (above): Learners choosing a site for their dream school (Marsh 2018)
Figure 6.3 (below): Map indicating where learners walk from (Marsh 2018)





1

SCHOOL CLUSTER

1

2

3

4

5

HINTERLAND AVENUE

UNIVERSITY OF PRETORIA

2

IKAGENG COMMUNITY CENTRE

4

MAMELODI OLD AGE HOME

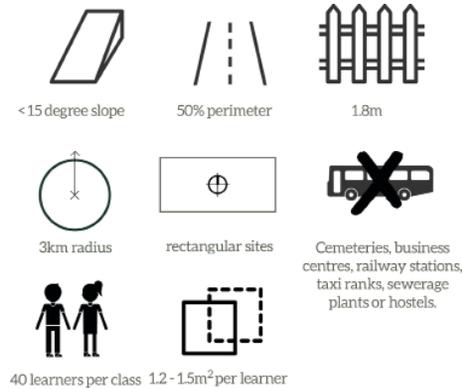
3

PHOMOLONG

TRAIN TRACKS & BUFFER ZONE

5

The Department of Basic Education (2013) sets guidelines for the development of schools in South Africa. These guidelines were also taken into consideration with the site choice. The guidelines, and the design response, are outlined below:



6.1.1 / SLOPE:

Less than a 15 degree slope of the land. Site has no steep slopes, however, ground manipulation is important within the design to create place.

6.1.2 / PERIMETER:

50 % of the perimeter should be road. The eastern and western edge are bordered by roads. An additional pedestrian path is created through the site to increase accessibility as learners placed emphasis on a pedestrian entrance in the workshops.

Schools should be fenced with a 1.8m high fence. Security was highlighted in the workshops as an important aspect within a school. Instead of a

fence, which creates dead edges, the edge is activated through a layered threshold. This increases security, which is important for learners as emphasized by 100% of learners choosing fences to surround their schools in the workshops.

6.1.3 / LOCATION:

Schools need to be within 3km of the community that they serve. The school is located in an area that can serve Phomolong as well as Mamelodi East.

Schools should not be located next to cemeteries, business centres, railway stations, sewerage plants or hostels. The author agrees that the site should not be located next to cemeteries, railway stations, sewerage plants or hostels for safety and noise reasons. The program, however, does propose businesses within the site as it is an important link between secondary school and tertiary/work environment. The author proposes a new bus stop on the site as aside from walking, taxis and buses are the most commonly used transport in Mamelodi (Honours & Masters Research Groups)

6.1.4 ORIENTATION:

Rectangular sites (E-W orientation) are preferred. This is due to climate considerations. Although the site does not conform to this guideline, the buildings are orientated to the north on the site.



Mamelodi Old Age Home



Figure 6.4: Guidelines for schools by DBE (Author 2018)
Figure 6.5: Aerial view of site (University of Pretoria Geography Department 2017)

6.2 // SITE NARRATIVE

6.2.1 / STRENGTHS

There are many activities happening around the site. These include small spaza shops, car washes and informal soccer games. The existing bus route passes by the site, and the proposed urban vision (Masters Research Group 2018) would see that this route is emphasized. The site is in close proximity to Mamelodi Old Age home and the University of Pretoria therefore it has the ability to bring many age groups together. There is a diversity of people on site ranging from school children passing through the site, to teenagers playing soccer and older people working in the surrounding spaza shops. The Magalies Mountain range can be viewed from the site. There are also many beautiful trees (Masters Research Group 2018).

6.2.2 / WEAKNESSES

Mamelodi East experiences waves of activity therefore the flow of activity is not always constant (Masters Research Group 2018). The residential area, Community Centre and Church surrounding the site turns their backs on the site creating dead edges. There is no demarcation of space leaving the site full of illegal dumping and unsafe spaces (Masters Research Group 2018).

6.2.3 / THREATS:

The illegal dumping on the site could lead to the increase of pests and diseases in the area. The surrounding context creates many dead spaces where drug deals could occur (Honours Research Group 2017, Masters Research Group 2018).

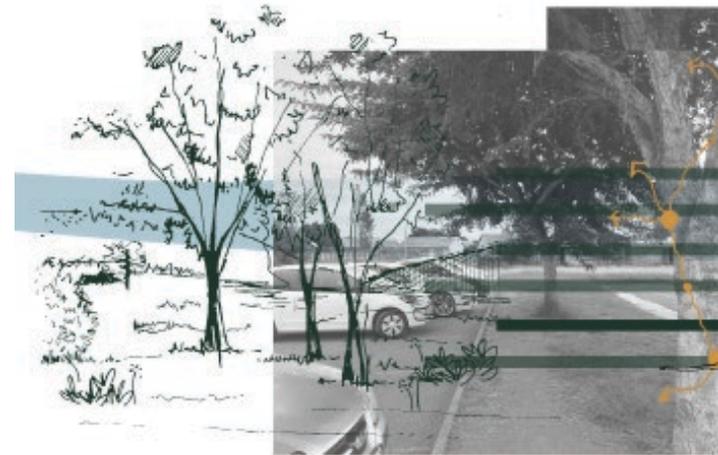
6.2.4 / OPPORTUNITIES:

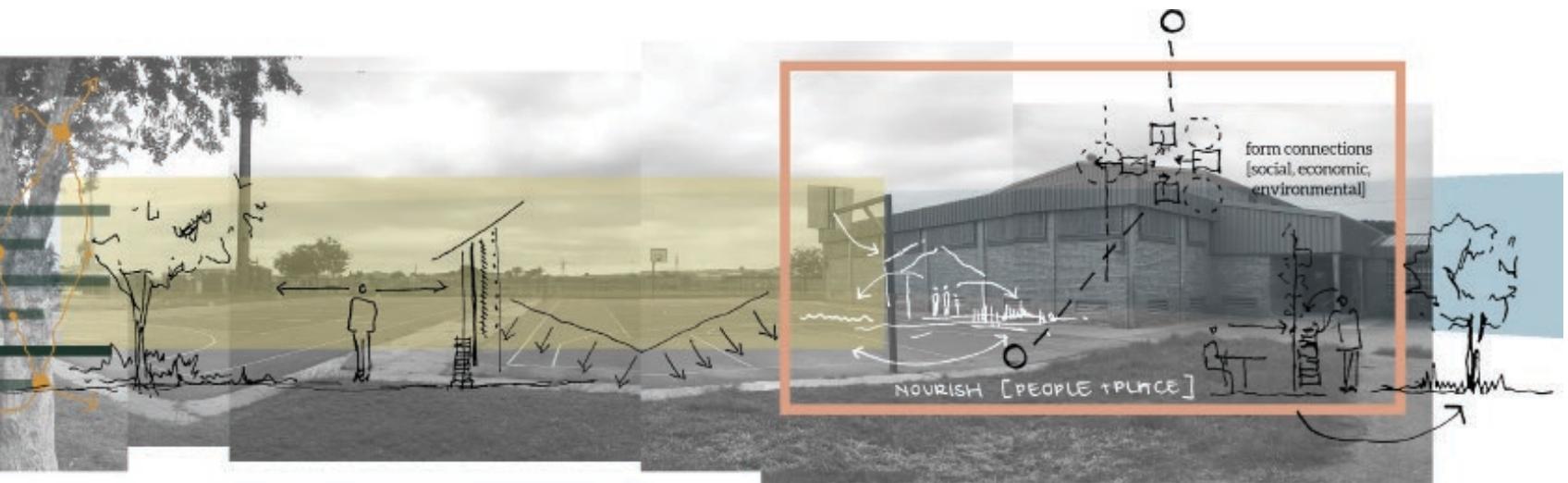
The functions, and positive aspects of the site, can still be kept however, there is the opportunity to transform the site and bring out the dormant potential in it. The skill of the people, flat open space, different cultures and the existing community centre are immediately available. All these opportunities can be utilised in the new school integrating the existing and the new (Kotze 2016, Honours Research Group 2017, Masters Research Group 2018).

The second opportunity involves the perception towards public and 'green' spaces (Kotze 2016, Honours Research Group 2017, Masters Research Group 2018). By creating a porous building that allows life to flow through the structures and integrate with the courtyards, interaction is encouraged between users and the surroundings and between users themselves

(Honours Research Group 2017, Masters Research Group 2018). This challenges the stigma surrounding public buildings and evokes stewardship of the site. The extension of buildings beyond their physical domain enhances their capacity to adapt, evolve and nurture life within the city. Resilience thinking offers thinking towards a positive future (Kotze 2016, Resilience theory - see page 66).

Figure 6.8 (opposite): Site vision (Author 2018)





6.3 // SITE ANALYSIS

* see complete mapping in appendix

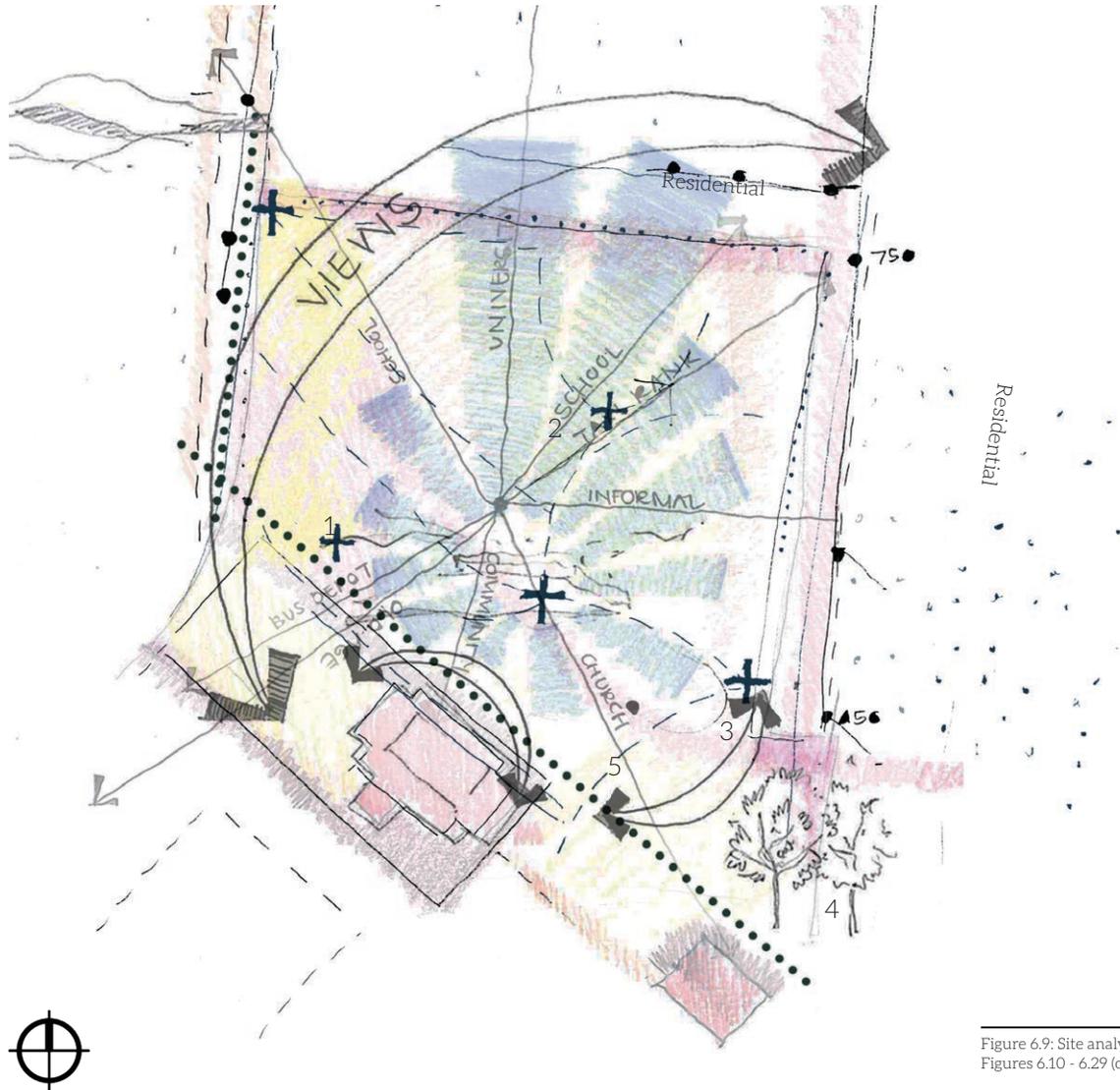


Figure 6.9: Site analysis (Author 2018)
Figures 6.10 - 6.29 (opposite): Photos of site (Author 2018)



1 / Immediate surroundings of Ikageng Community Centre



2 / Open space of site



3 / Borders of Ikageng Community Centre



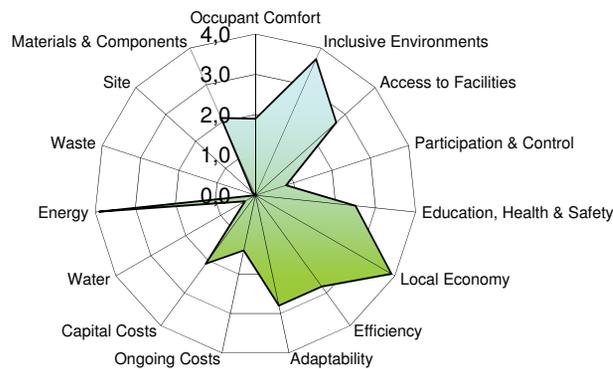
4 / South-west corner (Church)



6.4 // EXISTING BUILT FABRIC

5/ Ikageng Community Centre

The Ikageng Community Centre is located on the southern side of the site. It currently has a gym, offices, a large hall and two smaller halls as well as storage and ablution facilities. Functions such as weddings and dances are held there as well as courses such as plumbing therefore it scores high in the local economy and education categories in the SBAT rating. The conditions on the opposite page indicate why it is currently isolated and under performing in the remaining categories of the SBAT analysis.



Social	2.3
Economic	2.6
Environmental	1.3
OVERALL	2.1

Figure 6.30 (above): Plan of Ikageng Community Centre (Author 2018)
 Figures 6.31 - 6.36 (opposite): Photos and analysis of Ikageng Community Centre (Author 2018)
 Figure 6.37 (left): SBAT Analysis (Author 2018)

SPACE

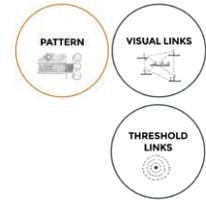
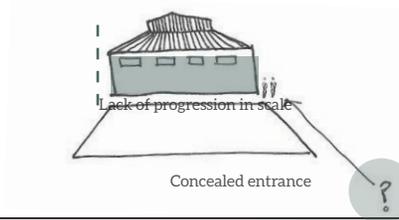
ANALYSIS

ELEMENTS FROM WORKSHOP THAT CAN BE APPLIED



1 // Entrance to site

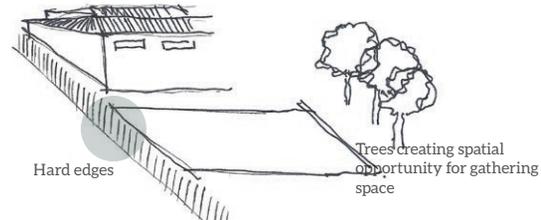
Entrance from street is concealed - lack of identifiable elements
 No threshold space - confronted with a blank facade as first impression
 Not child orientated - large scale and imposing



2 // Netball courts

Lack of seating
 Fenced off from public
 No changing facilities

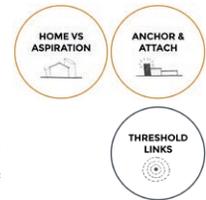
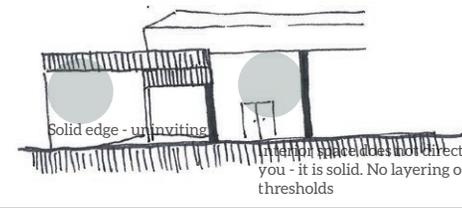
Beautiful big trees surrounding the courts



3 // Entrance to community

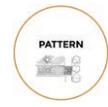
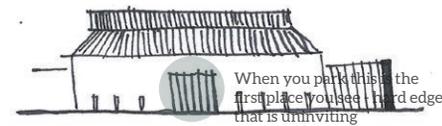
Air grills, burglar bars, rubbish bins & solid door do not create an entrance that invites the user in

Wheel chair accessible
 Covered entrance - protection from elements



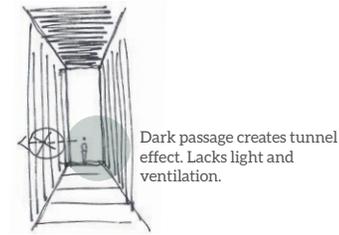
4 // Secondary entrance

Secondary entrance is permanently locked
 Entrance is not covered from the elements
 No screening of pipe work
 Lack of water harvesting - no gutters, no grey water treatment
 Wheel chair accessible but this is far from the entrance



5 // Interior

Lack of openable windows - poor ventilation
 Long, narrow, dark corridors
 All hard surfaces - creates echo, poor acoustic for learning environments & events
 Lack of differentiation of space - all spaces have the same floor and wall surface
 Large number of empty rooms



6.5 // PRECEDENT

6.5.1 / INKWENKWEZI SECONDARY SCHOOL

Wolff Architects

Dunoon, Cape Town

2006

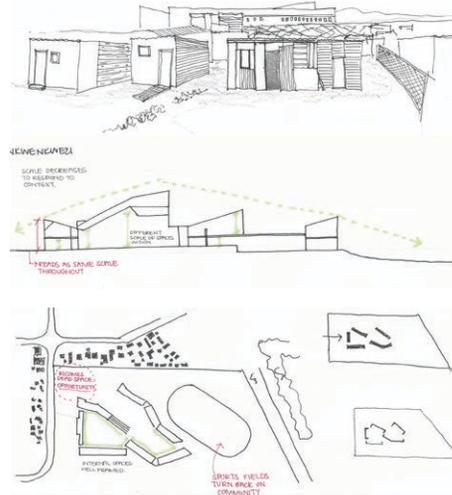
The sloping site was exploited to develop a civic architecture that distinguishes itself from the residential fabric by its scale and form. The hall rises to a tall corner, exaggerated by vertical fluting and a characteristic window. In the workshop session, learners liked that the hall made an impact due to its size as well as the bold colours. There is a good use of natural light in the hall that invites the space to be used for more than one function.

The school protects itself from theft and vandalism by creating an outer 'wall' with play spaces and access beyond the entrance gates. Learners enjoyed the irregular shape as they associate this with a fancy, private school with better education. Following from this, learners stated that they would move this school to another location as they would rather walk further to a more 'affluent' neighbourhood than have shacks surrounding the school. The outer 'wall' encloses an undulating courtyard with an open end. This courtyard was disliked by the learners as there was insufficient greenery and

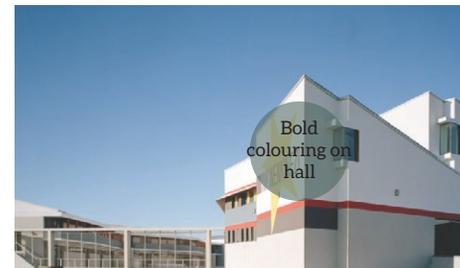
shade to sit under. Courtyard space does not invite the user to participate in the space.

The junior classrooms are lowered by a meter to make it read against the block behind it. This layered approach is intended to form a recognisable image for the school. The wall architecture is a device to bind the repetitive classroom modules together. The decorative device draws inspiration from the way people paint buildings as well as draws on African weave work. Learners loved the bright colours of the school and thought it was a creative way to do the exterior of a school

(<http://www.wolffarchitects.co.za/projects/all/inkwenkwezi/>).



Figures 6.38 - 6.41 (right): Inkwenkwezi School (<http://www.wolffarchitects.co.za/projects/all/inkwenkwezi/>)
Figure 6.42 - 6.44 (left): Precedent analysis (Author 2018)



6.5.2 / USASAZO SECONDARY SCHOOL

Wolff Architects

Victoria Merge, Cape Town
2014

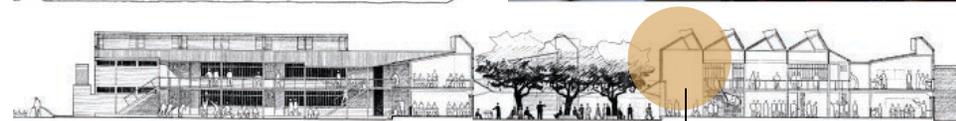
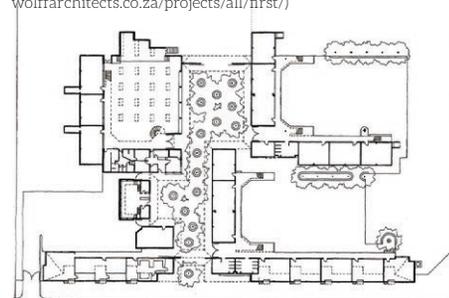
The concept proposed the creation of six wings connected by a central corridor. It is designed around a series of courtyards and garden spaces which allow for light and ventilation. Whilst learners enjoyed the trees and seating spaces in the central corridor, they disliked the courtyard spaces as they lack shade, greenery and colour. Learners found the school neat and clean and enjoyed the colours of the doors and big numbers on the classrooms. The school is double storey which the learners were drawn to as this gives them views over the whole school.

The pronounced wings on the end are identifying elements that are intended to engage with the city. Hatches are used for hairdressing, car repairs etc but can they facilitate these functions? The façade is meant to create an interactive street front but there is very little shading and very little interaction is created when hatches are closed. Use of colour to show each classroom is successful. Layout along a central corridor space with outdoor seating makes the

building legible.

This school was least liked by the learners as they thought it looked like a prison/factory/industry. This is due to the grey colour, the lack of gardens, too much corrugated iron, and the zig zag roof shape as seen in the images below. (<http://www.wolffarchitects.co.za/projects/all/first/>)

Figures 6.45 - 6.49: Usasazo School (<http://www.wolffarchitects.co.za/projects/all/first/>)



6.5.3 / VELE SECONDARY SCHOOL

East Coast Architects

Mavhuwa, Kwa Zulu Natal
2005

Vele Secondary School started in 1960 . By 2009, 460 learners were accommodated in eight dilapidated classrooms. There were only twelve pit latrines and no other support spaces (library, labs, computers). In order to understand the challenges faced by these learners, the architects did an introductory mapping exercise. This was done to introduce everyone, share some of their knowledge but also to gain some knowledge on the physical and social landscape.

This was followed by a photography exercise with disposable cameras. Photos were used for exhibition purposes but also to gain insight into building materials, construction methods and spatial arrangements of homesteads.

Workshop sessions, visioning sessions and development reviews then followed in order to acquire buy in and ultimate ownership. As a final buy in, the school is rooted in the community through the use of local labour as the architects did a skills and material audit before the building began.

From the workshops, this school was the learners favourite school because of the outdoor environment. Learners loved the amount of shade and space to sit outdoors. They enjoyed the food gardens and that the food was both used in the school and sold to the surrounding community. They did not like it when too many trees were together as they perceived this to be a space of attack. This reinforces that sight lines are important in a school.

Seventeen new classrooms were designed for maximum solar gain and cross ventilation. External shading devices and light shelves prevent direct sunlight but reflect light deep into the space. Learners desks face the board on the southern wall which allows the warm, northern winter sun to heat their backs (East Coast Architects 2015). From the workshop, learners enjoyed the bigger classrooms but disliked that there was no ceilings as they thought it would be too cold in winter.

The hall and resource centre are located on the edge of the school which allows the community to use them. The sharing of resources becomes an important part the community taking ownership (East Coast Architects 2015).



Figure 6.50 (above): Vele School before intervention

Figure 6.51: New classroom block

Figure 6.52: Shared community hall

Figure 6.53: Shared resource centre

Figures 6.54 - 6.56: Vele school environment

(<http://www.eastcoastarchitects.co.za/eca-vele-secondary-school.html>)



6.5.4 / MEETSE-A-BOPHELO

Humphris Jooste Architects

Alaska, Gauteng

2011

The brief was to create an environment that facilitates teaching and learning. This explores prefabricated construction as an alternative method to building future schools. The school is designed for 1200 students and includes 30 classrooms, an admin block, media centre, caretaker's house and sports fields. There is a nutrition centre and tuck shop in the heart of the school.

The school is about 3600m² of triangular plan forms which converge towards a central nutrition centre. The triangular form enables a north orientation for many of the classrooms. From the workshop, it was found that whilst learners enjoyed the shape of the school, they found it difficult to orientate themselves and said they would probably get lost.

Meetse-a-Bophelo is situated close to the informal settlement of Alaska. The context is characterised by low density, low cost housing. This school responds to this by being one storey as well as using a familiar roof typology. The edge conditions, however, have not been addressed therefore the

school needs to be completely fenced and is once again isolated from the community. The school also has no shared resources therefore can only be used by the school learners.

In order to create buy in from the community, 30 local ladies were trained to look after the urban agriculture. Once again, a positive aspect that came from the workshops was that the outdoor spaces are shaded. Learners loved the idea of the feeding scheme. Throughout the workshops food was highlighted as an important aspect not just in terms of nutrition but also as a social aspect. The cafeteria, highlighted again in the online workshop as the most important space other than the classroom, becomes a highly important space within the school.

Eighty percent of the workforce was recruited from the surrounding community in the construction of the school (Meetse-a-Bophelo Primary School Mamelodi 2009). Learners did not like that the whole school was constructed from sheet metal.

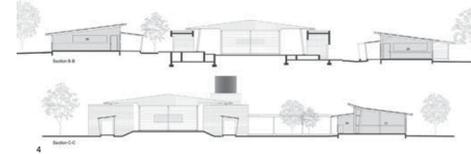
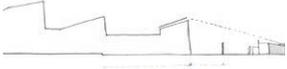
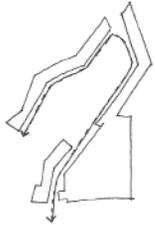
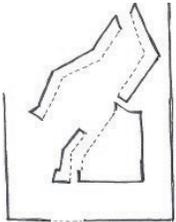
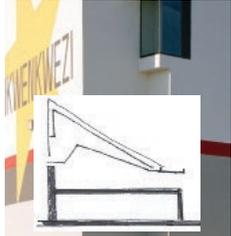
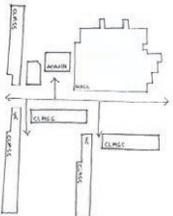
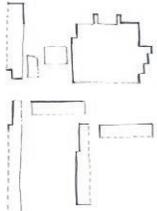
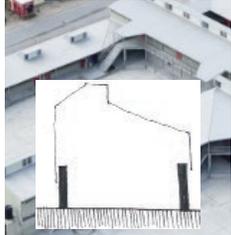
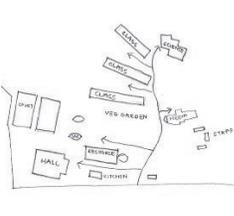
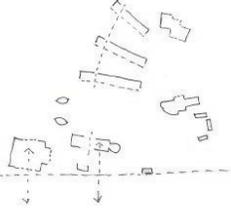
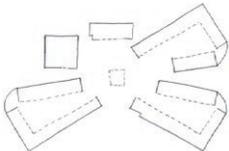
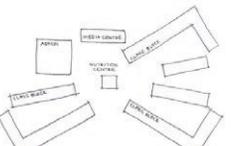


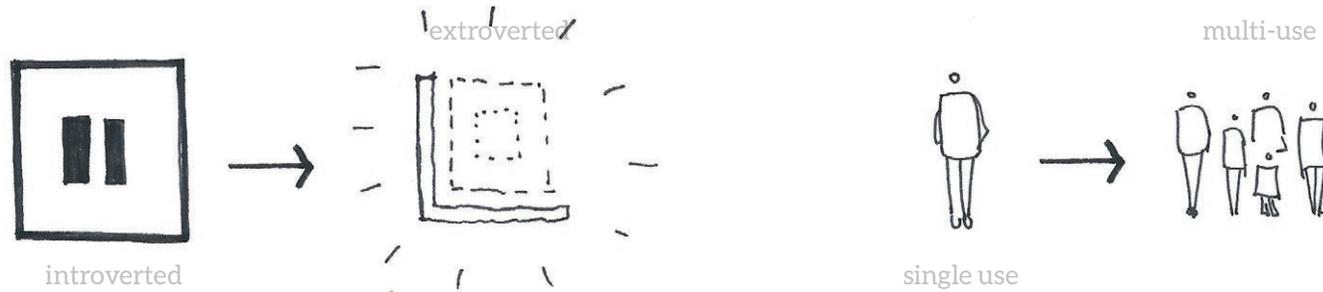
Figure 6.57 (opposite, aerial): Meetse-a-Bophelo (Author 2017)
Figures 6.58 - 6.61 : Meetse-a-Bophelo
(<https://arcelormittalsa.com/Portals/0/Meetse-A-Bophelo-Primary-School-Mamelodi.pdf>)





PROJECT	CONTEXTUAL INTEGRATION	SPATIAL ORGANISATION	PERMEABILITY	MATERIALITY/ TECTONICS	SUSTAINABILITY
Inkwenkwezi Secondary School	Materiality Colour Decreasing scale 				Use of local graphics Use of local skills Use of local labour
Usasazo Secondary School	Materiality Street edge Scale 				Use of local skills Use of local labour
Vele Secondary School	Use of gardens & courtyards Main axis leading into community Hall & sports open to 				Community participation Rainwater harvesting Solar panels Vegetable gardens Serves the community Use of local skills Use of local labour
Meetse-a-Bophelo	Scale Materiality 				Community participation Vegetable gardens Use of local skills Use of local labour

6.5.6 / REFLECTION



The post occupancy and feedback stage of the architectural design process is included in the RIBA and AIA work stages; however, it is missing in the SACAP stages. The co-design process is included in this stage to engage with the user on their thoughts on the physical manifestations of architecture. The scale above indicates where the precedents sit on the co-design scale according to the author.

- 1 / Inkwenkwezi Secondary School
- 2 / Usasazo Secondary School
- 3 / Vele Secondary School
- 4 / Meeste-a-Bophelo School

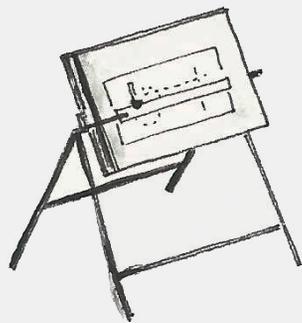
Stock design government schools are typically located in the centre of the site and enveloped by fences and parking lots. The Usasazo school

takes a different approach whereby the school is placed on the boundary line with roll up hatches so students can trade directly with the public. Usasazo School is featured in many architecture journals for leading school architecture. The precedents, however, were not only looked at from a design point of view but also from a post occupancy study as part of the participation process. It was found that the classrooms with hatches directly on to the street had to be blocked up as children were blowing smoke and banging on the hatches, therefore disrupting the classes inside. This was translated into the design by having the more public programs situated on the street, creating a street presence, and the classrooms protected through the layering of space.

As was said by East Coast Architects (2015) after the design of the Vele Secondary School, *"schools play a critical role in the life of communities, especially those under-served by other public or private institutions. Schools in these areas have the potential to serve, not only as educational institutions, but also centres of the community that radiate opportunities for learning and growth"*. The improved schools in these township areas have significantly increased the pass rate of students. For example, the pass rate at Vele Secondary school increased from 39% in 2009 to 93% in 2014 after the school was constructed (East Coast Architects 2015).

Figure 6.62 (opposite): Comparison of precedents table
Figure 6.63 (opposite, below): Scale of participation (Author 2018)

Figure 6.64: Programme as driver - a multi-functional, extroverted approach (Author 2018)



there are many ways to
achieve something

a way of creating //

chapter seven

DESIGN DEVELOPMENT

- 7.1. Design vision & intent
- 7.2. Design informants
- 7.3. Application
- 7.4. The Classroom
- 7.5. Spatial explorations
- 7.6. Final Design iteration
- 7.7. Design conclusion

7.1 // DESIGN VISION & INTENT

According to Heitor (2005:44) schools should be designed to make use of space as an educational tool by operating as a social, cultural and informational interface. Hertzberger (2008:44) introduces a similar concept in which it is stated that education, besides being about reading, writing and mathematics, is about exploring the world. The architecture holds significance by providing spaces of rich conditions that allow for this. The concept of '**Space as the fourth teacher**' is therefore adopted as the design concept.

Traditionally the first teacher is that of the actual teacher who stands in front of the class and imparts knowledge. The current shift in education moves from this teacher-centered instruction towards what the author interprets the second teacher to be: that of self-teaching. The third teacher is peer-to-peer teaching (Heitor *et al* 2005:44). The dissertation introduces learning landscapes as the fourth teacher in which the space becomes didactic in nature.

Schools have a critical role in the formation of good quality urban environments, especially those under-served by other public or private institutions (East Coast Architects

2015; Heitor 2005:44; Wolff S.a). According to Hertzberger (2008:123), every educational building calls for a spatial order that works as a structure of streets and squares forming a small city. The spatial layout of the design therefore draws from the street character of Mamelodi, the idea of home, whilst still creating a strong image that can be associated with the school. This image relates back to the aspirational component which should be in the design as identified in the workshops.

The spatial layout consists of a number of 'places' that make up a whole. These places draw certain principles which were developed through the workshops and from observations of context. It here that the context and the workshops start to intertwine. These conditions include:

- 1 / Building as a series of thresholds**
- 2 / Building as place of gathering**
- 3 / Building as street**
- 4 / Building as a neighbourhood**
- 5 / Building as a place of exchange**

Figure 7.1 (opposite above): Design intention collage (Author 2018, Stock images - www.pexels.com, Child painting by Nelson Makamo, Participatory tree - Department of Architecture Honours Mamelodi Studio 2017 with Joyce Bopape)

Figure 7.2 (following page): Design response - an intertwining of informants (Author 2018)

Figure 7.3 (following page): Design intentions, developed from workshops (Author 2018)

"SPACE WAS SUCH A CRUCIAL FACTOR IN THE SHAPING OF THE COLONIAL AND APARTHEID STATE THAT THOSE URBAN AND ARCHITECTURAL SKILLS SHOULD BE IN THE FOREFRONT OF DISMANTLING AND RESHAPING IT"

Julian Cooke (May/June 2007)

"UNDERSTANDING THAT PUBLIC BUILDINGS NEED TO SPEAK TO PEOPLE ABOUT THE VERY NATURE OF PUBLIC BUILDINGS"

USA Issue 8, 1968

CONTEXT

space making

7.2 //

DESIGN INFORMANTS

THEORY
[CO-DESIGN & SCHOOL]

+

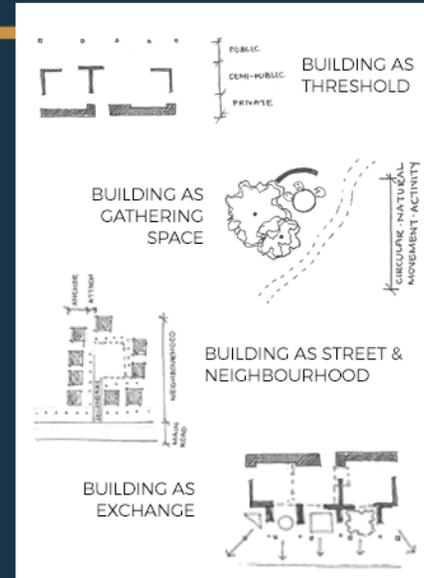
DOING
[PARTICIPATION &
OBSERVATION]

WORKSHOPS

*design toolkit
chapter 04*

OBSERVATION

place making



01 EXTERNAL SPACE

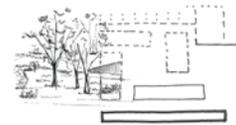
GATHERING SPACE

THE USE OF EXISTING BUILDING AS ONE OF THE ANCHOR POINTS TO THE DESIGN, TRANSFORMING IT FROM PURELY GOVERNMENT OWNED TO A COMMUNITY BUILDING.



COURTYARDS

COURTYARDS ENCOURAGE INTERACTION BETWEEN INTERIOR AND EXTERIOR SPACES. THESE GATHERING SPACES ACT AS THRESHOLDS.



02 LINKS

VISUAL LINKS

SPACES ALLOW FOR VIEWS THROUGHOUT THE PRECINCT FOR PASSIVE SURVEILLANCE. IT ALLOWS THE SCHOOL TO FEEL LIKE A PRECINCT RATHER THAN ISOLATED BUILDINGS (HERTZBERGER 2008).



SKETCH ADAPTED FROM HERTZBERGER 2008

CONCRETE LINK

LINKING OF THE OLD (COMMUNITY CENTRE) AND NEW (CAMPUS) TO ALLOW THE NEW BUILDING TO INTEGRATE INTO ITS SURROUNDINGS.



THRESHOLD LINKS

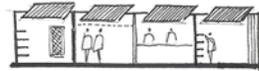
LAYERS OF SPACE FOR PROTECTION OF SCHOOL. ENCOURAGING MIXED USE AND TO ALLOW FOR THE BUILDING TO HAVE A PRESENCE YET STILL BE SENSITIVE TO THE SURROUNDINGS (WORKSHOPS 2018).



03 PROGRAM

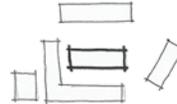
SPAZA SHOPS

SPAZA SHOPS, A FAMILIAR ELEMENT, ARE THE FIRST LAYER IN DESIGN, ALLOWING AN ACTIVE STREET EDGE. THIS MINIMISES DEAD EDGES AND INTEGRATES THE BUILDING INTO THE COMMUNITY (HONOURS MAPPING 2017, MASTER MAPPING 2018)



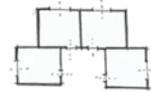
CAFETERIA

FOOD ACTS AS THE LINK BETWEEN THE MORE PUBLIC AREAS OF THE PRECINCT AND THE PRIVATE AREAS. IT ENCOURAGES INTERACTIONS WITHIN THE SCHOOL AND INCREASES THE RESILIENCE OF PLACE (WORKSHOPS 2018).



CLASSROOM

CLASSROOMS ARE FLEXIBLE SPACES WITH GOOD INTERIOR ENVIRONMENTS. THE CLASSROOM AIDS THE CONCEPT OF SPACE AS THE 4TH TEACHER (HERTZBERGER 2008).



WORKSHOPS

SPACES TO AID SPAZA SHOPS. COMMUNITY MEMBERS CAN LEARN NEW SKILLS. THIS ALSO BRIDGES THE GAP BETWEEN HIGH SCHOOL, TVET COLLEGES AND UNIVERSITY (ARTISAN THEORY) AS WELL AS EXTENDS THE HOURS OF THE SCHOOL.



03 PUBLIC/PRIVATE

ANCHOR POINTS

LIBRARY AS ANCHOR POINT TO LINK PUBLIC AND PRIVATE SPACE. IT BECOMES A PLACE FOR TRAINING AND ANCHORS THE SITE ON THE NORTH WESTERN EDGE (WORKSHOPS 2018).



CONNECTING POINTS

THE EXISTING COURTS ARE USED AS PUBLIC SPACE. THE GYM IS LINKED TO THIS SPACE CREATING A SPORTS PRECINCT. THIS ENCOURAGES THE CONNECTION BETWEEN MANY SCHOOLS



PROGRAM POINTS

CONNECTION BETWEEN AGE AND SKILL GROUPS (GAP THEORY, BOPAPE 2017). THIS CORRIDOR ENCOURAGES EXCHANGES. IT IS A PLACE FOR MENTORSHIP AND GROWTH.



7.3 // APPLICATION OF DESIGN INFORMANTS

The users play an important part in creating value in space. The proposed design is therefore developed as a response to the various informants, as discussed in earlier chapters, namely:

- The ten workshops with secondary school learners
- The daily ritual of the working class coming and going from the bus stop.
- The lack of public institutions that invite the community in.
- The building of space in the local context.
- A place for the community to share their thoughts and memories and for the passing on of knowledge.
- The creation of public building as a place for knowledge and for the community to call their own.

Research has shown that cities do not provide sufficient places that appropriately meet the developmental needs of children, nor do they facilitate and encourage independent use of the city by children. Children are usually more competent than acknowledged by adults and designers (Hussain 2010:99). Instead of the new campus adhering to the spatial patterns of current introverted schools, it reflects Mamelodi, building on the layers of space, to allow for children to begin to interact with their 'city' in a safe environment. The strength of design

in township contexts lies in its ability to reveal the ordinary, celebrate the spirit of life and empower users (CS Studios).

The layout of the school is interlaced with the residential character of Mamelodi becoming a neighbourhood-scaled learning environment. The new hierarchy responds to the notion of streets, lanes and neighbourhoods. The campus is therefore arranged as a small city a series of public and private urban courtyards and communal routes structuring the campus. The school is seen as a single spatial entity with key places of learning and social exchange. The emphasis is placed on social spaces as well as on open and legibly organised structure that allows quality learning and thinking possibilities to be readily available. The ordering system consists of a series of anchor points, acting as home bases, and attaching points which act as inspirational places. The frequently used desire lines on site were used in the creation of the main movement paths. These become datum lines which link a series of smaller lanes (connecting spaces) which in turn connects the courtyards. This helps create individual spaces but integrates the building as a whole.

Figure 7.4 (opposite): A collage of the informants indicating how they informed the architectural response (Author 2018)

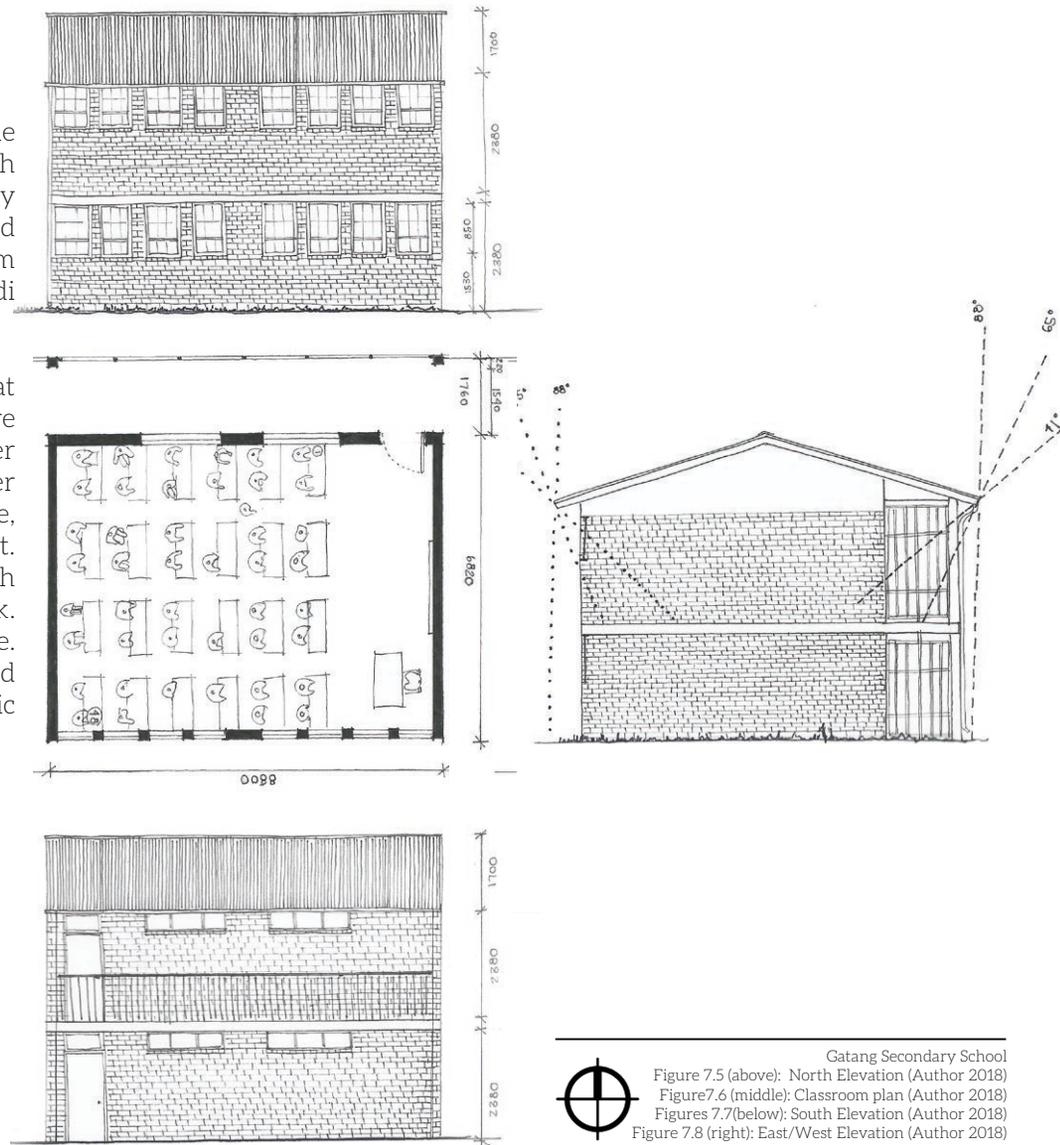


7.4// THE CLASSROOM

7.4.1 / CLASSROOMS IN MAMELODI

In order to design something new, one must first look at the problems with what is existing. Gatang Secondary School, as in the figures, was used as an example of a typical classroom building and layout in Mamelodi (Author 2018).

Research and mapping reveals that the school buildings in Mamelodi are orientated incorrectly. The larger windows on the south, and smaller higher windows on the northern side, leave classrooms cold and under-lit. There are up to 45 learners in each class leaving no space for group work. There is no link to outdoor space. Classroom spaces are unarticulated and strung together off of a basic corridor (Workshop Two 2018).



Gatang Secondary School
Figure 7.5 (above): North Elevation (Author 2018)
Figure 7.6 (middle): Classroom plan (Author 2018)
Figure 7.7 (below): South Elevation (Author 2018)
Figure 7.8 (right): East/West Elevation (Author 2018)

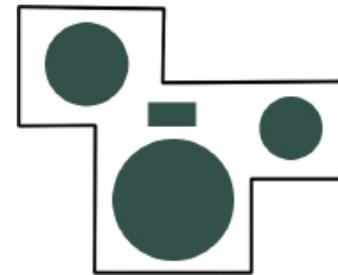
7.4.2 / THE ARTICULATED CLASSROOM

“An unarticulated rectangular classroom lends itself best to instruction, the unidirectional transfer of knowledge that forms that basis of teaching fronted lessons. The primitive paradigm gives teachers the ideal overview of their pupils. An articulated space by contrast is less easily survey-able and provides more places for different groups or individuals to engage in different activities simultaneously in a room without being unduly distracted by each other. So the number of options are greater here, there being several centres of attention rather than just one.” (Hertzberger 2008:24)

In the National Training Laboratories pyramid (Tigran et al 2014:42) it can be seen that the most effective learning methods are discussion groups, practice by doing, teaching other and immediate use. These methods all advocate the role children have in their own development. Learning is most effective when children are able to participate, interact and learn from their environments. Learning can happen through different methods which should be reflected in a dynamic spatial environment. The dissertation explores how the spatial environment can aid learning.



Basic classroom layout
[one centre as seen in classrooms in Mamelodi]



Articulated classroom layout
[multiple centres]

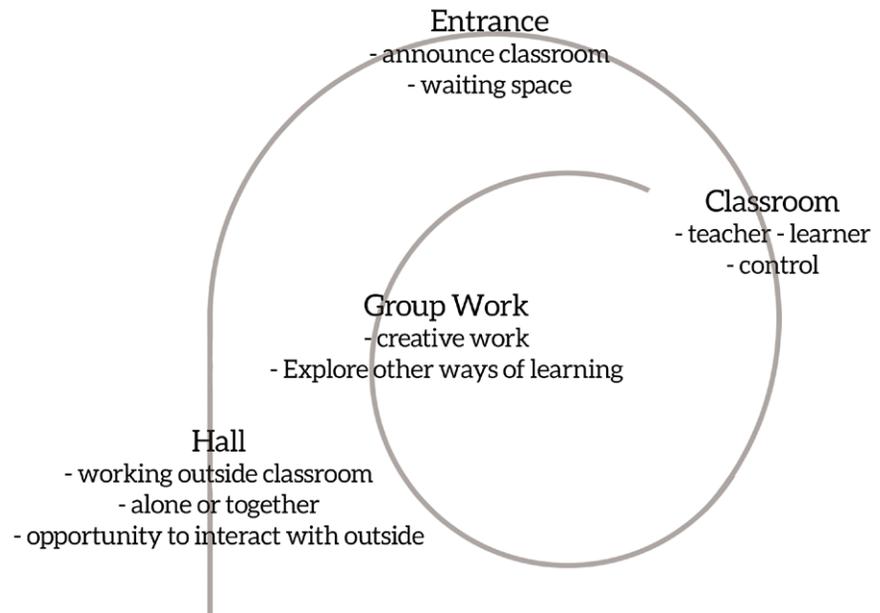
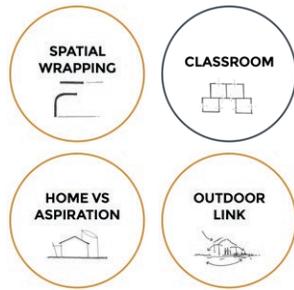


Figure 7.9 (above): Basic versus articulated classroom (Author 2018, adapted from Hertzberger 2008)

Figure 7.10 (below): Layers of threshold learning spaces as illustrated by Hertzberger (Author 2018, adapted from Hertzberger 2008)

7.4.3 / ITERATIONS: PLACE ONE

SECONDARY SCHOOL - CLASSROOMS

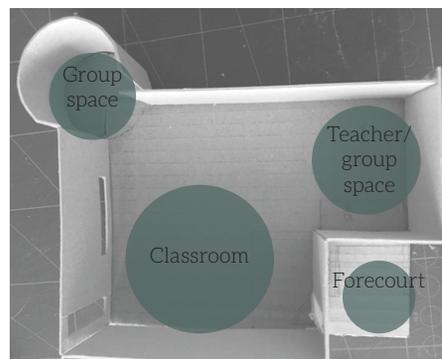
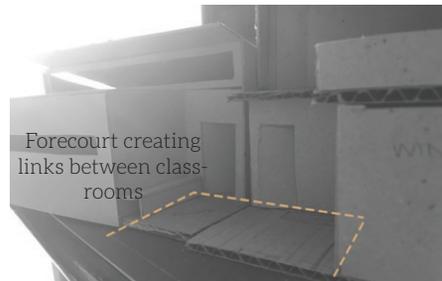


Classrooms have traditionally been the principal building blocks of schools (Hertzberger 2008:23). Throughout the workshops it was observed that learners chose to draw on elevation. Traditionally, space is viewed on plan or by bird's eye view. On making this observation, the design process was altered to design the building from the inside out. In other words, the classroom was the first module designed, then the space surrounding the classrooms and finally how the classrooms interlock to fit the site.

This views the project as a holistic outcome in which the design begins to integrate user, environment and space specific to the context, viewing the process and product as a continuous, holistic loop instead of separate entities.

Figure 7.11 : Initial models exploring classroom configurations (Author 2018)

Figures 7.12 (opposite): Initial sketches of classroom clusters (Author 2018)



An observation from Workshop Two, where learners designed their dream schools, was that the classrooms were always grouped into grade blocks. This was also an observation in the workshops - at times there were several older learners that joined the workshop, however, the learners always separated themselves into their specific grades and schools.

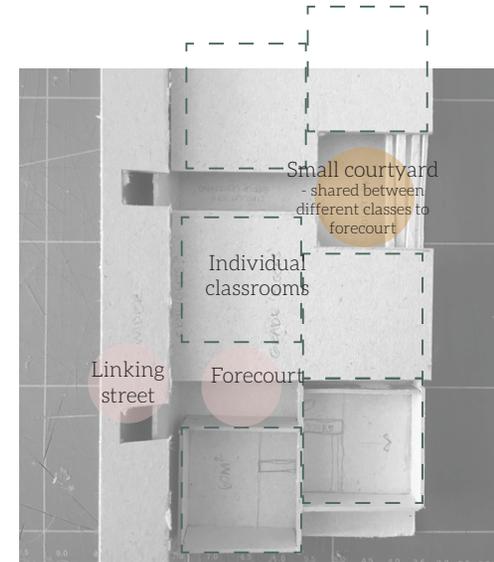
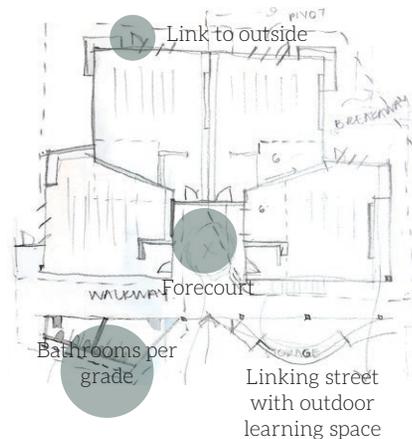
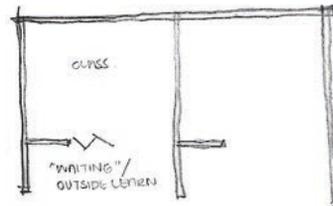
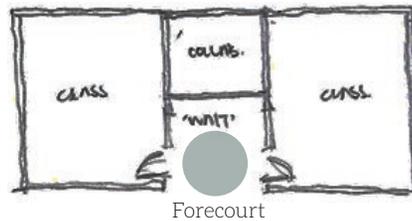
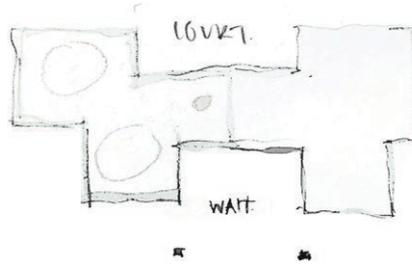
Hans Scharoun's Volschule, a mixed primary school, focused on the classroom cluster arrangements of each age group. The way in which the classroom clusters are arranged emphasises an educational process in which individuals are gradually integrated into a community by making him/her spatially responsible without repressing individuality (Scharoun 1978). Examination of the layouts of 21 schools by Heitor (2005:48) also revealed the grouping of classrooms together.

The design iterations of the classrooms therefore focus on creating classroom clusters which surround grade specific

courtyards. Grade specific courtyards further reinforce Jane Jacobs (1961) theory of children needing a outdoor home base. The classroom itself becomes an anchor which can then be personalised by the teacher and students.

The concept of home, aspiration, anchoring and attaching is further articulated within the classroom. In the workshop, some learners were hesitant to enter the classroom and sit down when there were older learners from a different school already seated. When these younger learners did enter the classroom, they grouped together near the back of the class. With time, the younger learners warmed up to the older learners and began to talk with them. As predicted in literature, the co-design process crafted linkages between partners (Hamdi 2004: xviii). Translated spatially, elements that are enclosed or circular create a sense of safety whereas open spaces encourage interaction.

The toilets were revealed as problematic during the mapping workshop. The design therefore considers the toilets as smaller entities that are grade specific. It explores toilets as designed elements rather than left over space.



7.5 // SPATIAL EXPLORATIONS

7.5.1 / EXPLORATION ONE

The creation of series of public and private courtyards guided the initial concept.

Successful elements:

- Scale of space responds to existing fabric whilst still holding its own identity
- Orientation of spaces creates better classroom environments, outlined in Workshop 1 as important.
- Layering of courtyards creating safety thresholds

Critique:

- Circulation isn't clear - no hierarchy of street and neighbourhoods
- Connection between new and existing is arbitrary - no integration into context, it still remains isolated.
- Classroom spaces are disconnected - they do not form anchors
- No hierarchy of spaces - legibility within the school is unclear (Lack of anchoring)

Reflection:

Teamwork is complex, especially in participatory design. Analysis has shown that the problem stems from the natural attitudes associated with the designer's roles and experiences. This creates a dominance in the group that leaves the other participants self-restricted and passive (Ho et al 2011:97). In order for the co-design process to work, the designers cannot bring any preconceived ideas to the workshop as these ideas then tend to be projected onto the co-design team which will change the outcome. This calls for designers to do their work conscientiously as authentic individuals and not as rigid role players. This is only achieved through authentic communication or conversation between designer and client (the learners)

(D'Anjou 2015:32). The focus on the 'other' makes designers adopt an objective attitude, while self-experience as an access to user experience is ignored (Ho et al 2011:101).

As a response to this statement, exploration one was based on the initial experience the author had in Mamelodi as well as the 'build your space' game undertaken as part of the Honours and Masters mapping. This was a form of participatory design but because the workshops had not yet commenced, it is not a reflection of the workshops themselves. A reflection of exploration one, after Workshops One and Two, show that safety within schools is more of an issue than perceived by the author.

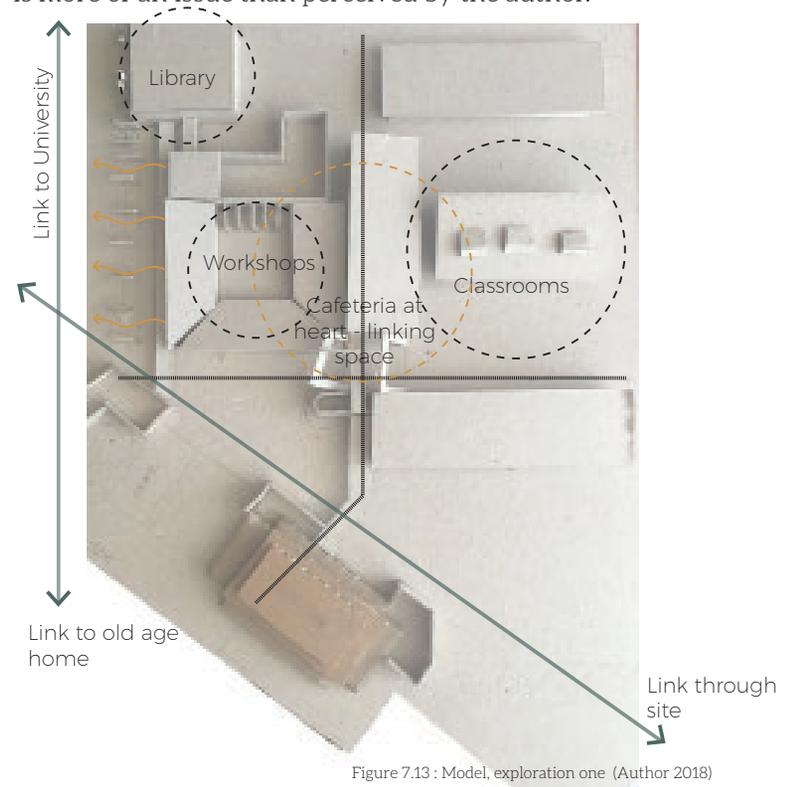


Figure 7.13 : Model, exploration one (Author 2018)

7.5.2 / EXPLORATION TWO

Relationship to existing buildings and lines picked up from site guided the second iteration.

Successful elements:

- Stronger link to existing fabric
- Spatial linking to movement through the site (beginning to form streets on outer edges)

Critique:

- Looks like a prison – no spatial differentiation.
- Space and buildings aren't well defined - there are no streets or neighbourhoods
- No hierarchy of spaces - no places of anchor or attaching
- Architectural language is still unclear - there are no identifiable elements nor elements of aspiration.

Reflection:

Exploration two was a response to the issue of safety within schools as highlighted in the first two workshops. The design response investigated what more could a barrier be other than a fence. The first two workshops showed that whilst safety is an issue, the learners do not want to go to a school that looks like a prison, but one that inspires them and creates a nurturing environment. Therefore, the design changed to explore more of what a barrier could be, and what layering could do in the design, in order to create smaller safe environments. This was unsuccessful as it did create a very hard barrier which lacked identity. A workshop could be held to explore how artwork could aid with this identity as seen in Inkwenkwezi School.

An observation from the first two workshops is that the more the designer engages with the learners, the more they participate and open up. The designer therefore needs to actively engage with the team as people recognise that you are taking an interest in their lives and are more willing to be part of the process.

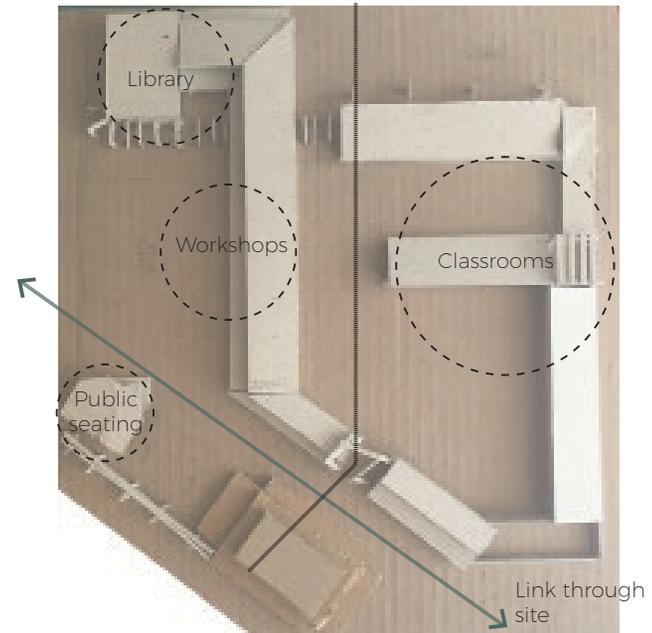


Figure 7.14: Model, exploration two (Author 2018)

7.5.3 / EXPLORATION THREE

Design iteration three focuses on the spatial integration with the natural landscape and social activities so that the building becomes an integrated part of the community.

Successful elements:

- Entrance elements are clearer
- Landscape integrates existing and built
- Movement lines are defined
- Bathrooms as focal, learning areas
- Cafeteria as heart of the school

Critique:

- South East corner creates awkward space - no integration of the sport which is an important aspect.
- Scaling does not create hierarchy therefore does not create spaces of anchoring.
- Classroom blocks respond to each other, however, are still not forming neighbourhoods and there is a lack of cohesion with the courtyard spaces.

Reflection:

Based on the results of the workshops that indicate that outdoor space is an important element to learners, but defined outdoor space is lacking in current schools, Exploration Three once again focused on the creation of courtyards. The courtyards can be further explored to aid the idea of learning landscapes. The first four workshops, as well as the online workshop, revealed the opportunity to enrich the program through the exploration of the creative hub. This additional program directly affected the layout through the creation of the link to the existing community centre.

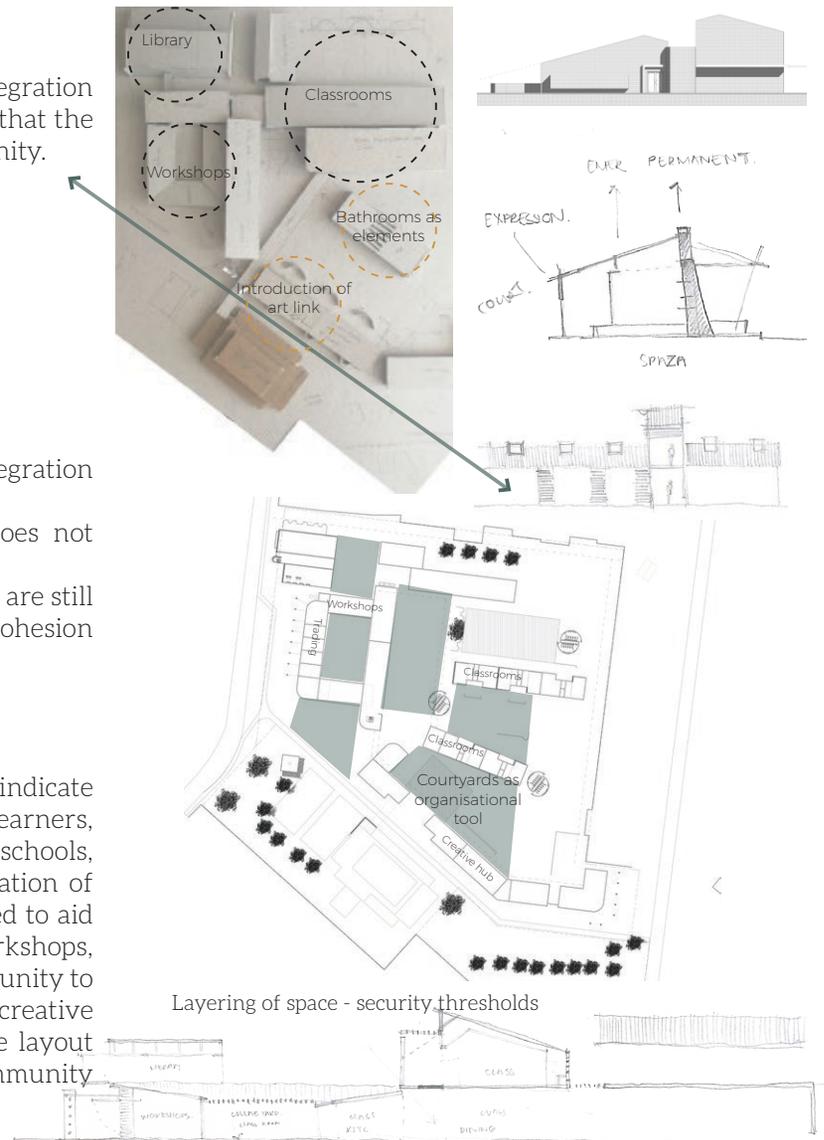


Figure 7.15: Model & Sketches, exploration three (Author 2018)

7.5.4 / EXPLORATION FOUR

Combining the successful elements of the first three iterations, a response is generated applying all 3 design drivers in balance.

Successful elements:

- Better spatial layout in terms of ordering of programs & creating security layers
- Courtyards which are framed by building – still need to be better defined and integrated into learning streets.

Critique:

- Roof scape is still arbitrary and does not define space, create anchoring points or inspirational points.
- No hierarchy of spaces - no identifiable elements that create anchor space.
- Architectural language is still unclear - lack of materiality showing through. It is still very pedestrian - no aspirational elements

Reflection:

Toilets were highlighted in the first two workshops as unsafe. Learners also continued to draw the toilet blocks as large spaces. Exploration Four therefore considered the toilets as designed elements rather than attaching elements. Toilets were explored as curved spaces in order to create fewer dark hiding spaces.

Exploration Four also considered how classroom elements could push out of the envelope to integrate better with the courtyard spaces.

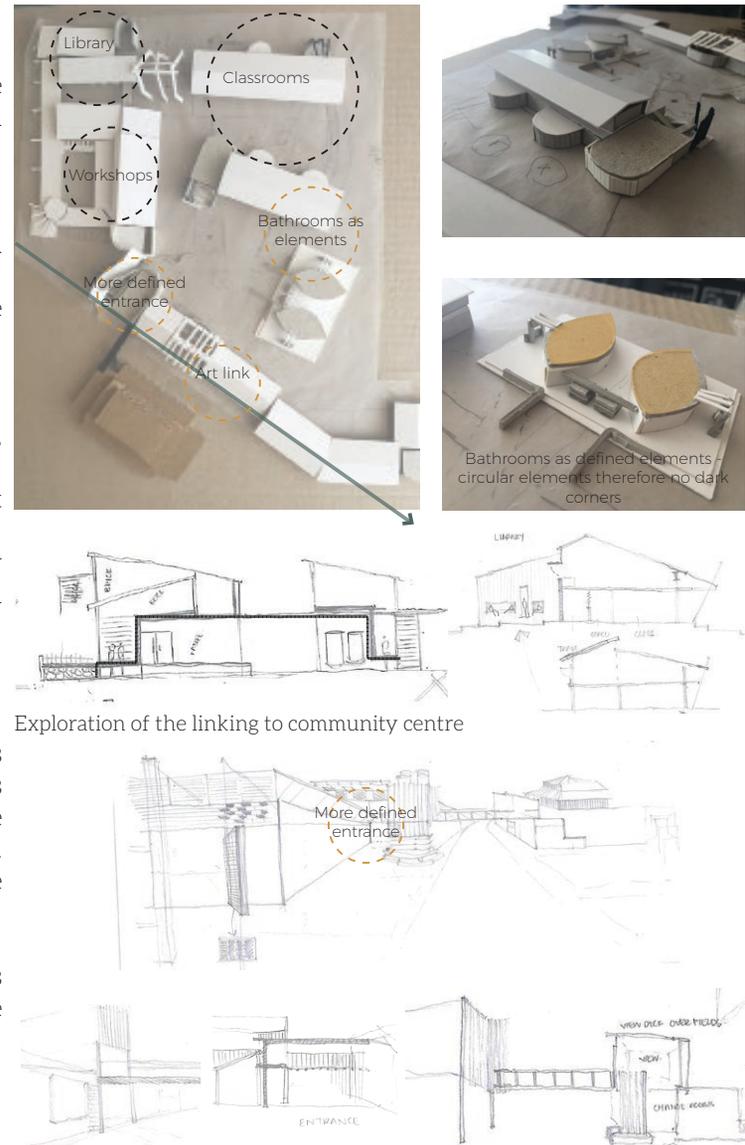


Figure 7.16 : Model and sketches, exploration four (Author 2018)

7.5.5 / EXPLORATION FIVE (JUNE CRIT)

Successful elements:

- Layering of space from public to private
- Development of program from secondary school to an urban campus.
- Toilets as smaller elements
- Layering of programme
- Entrance is beginning to be more defined

Critique:

- Lacks spatial hierarchy - again no anchoring
- Cultural courtyard looks like a street rather than a space
- One sided independent blocks results in dead edges
- Too conventional - 'streets' look like corridors, classrooms have not been articulated enough

Reflection:

Contrary to the previous exploration, Workshop Four, which focused on concentration, revealed that learners thought that the classroom should be less focused on the outside as this distracts them from their tasks. Outdoor spaces are important but should be more integrated with the social spaces. Specific views, rather than opening the whole class to the outside, should be considered. The exploration focused on creating classroom clusters, as it was revealed in the workshops that learners always sat together in grades as well as drew their classrooms in grades when designing the school. The one-sided blocks, however, left many dead edges. Further exploration into the creation of an 'urban edge' and a 'courtyard edge' for the classrooms, which relates back to the spatial layering in Mamelodi, is needed.

The workshops and context informants were not explored enough in the design yet. There was a greater need to focus on creating smaller neighbourhoods within the design and articulating each place within the campus with greater detail in order to create a hierarchy. Similarly to the workshop which compared paper based and model making activities, the design needed to be explored 3 dimensionally in order to create space and move away from merely planning.

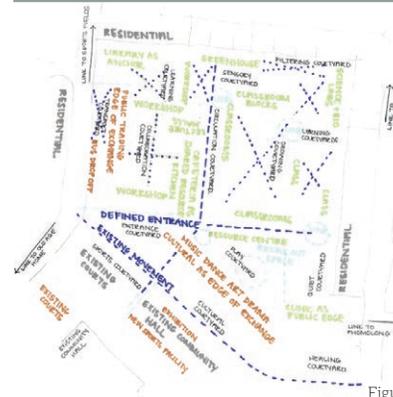
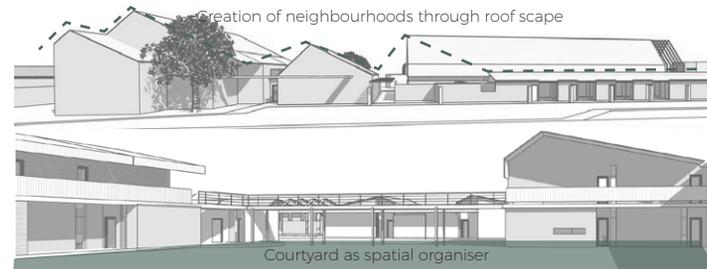
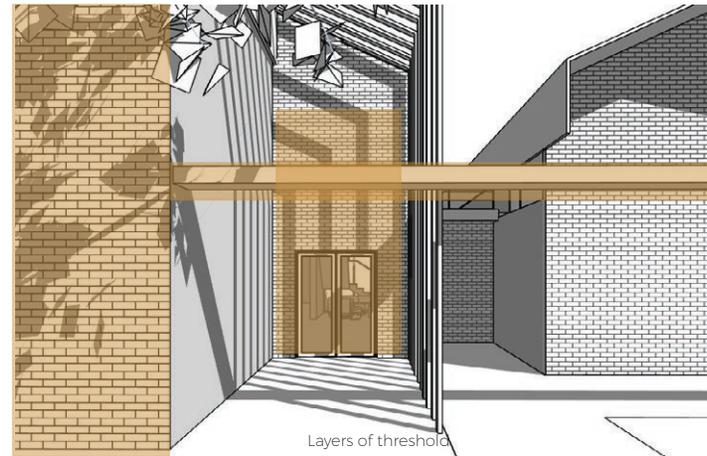
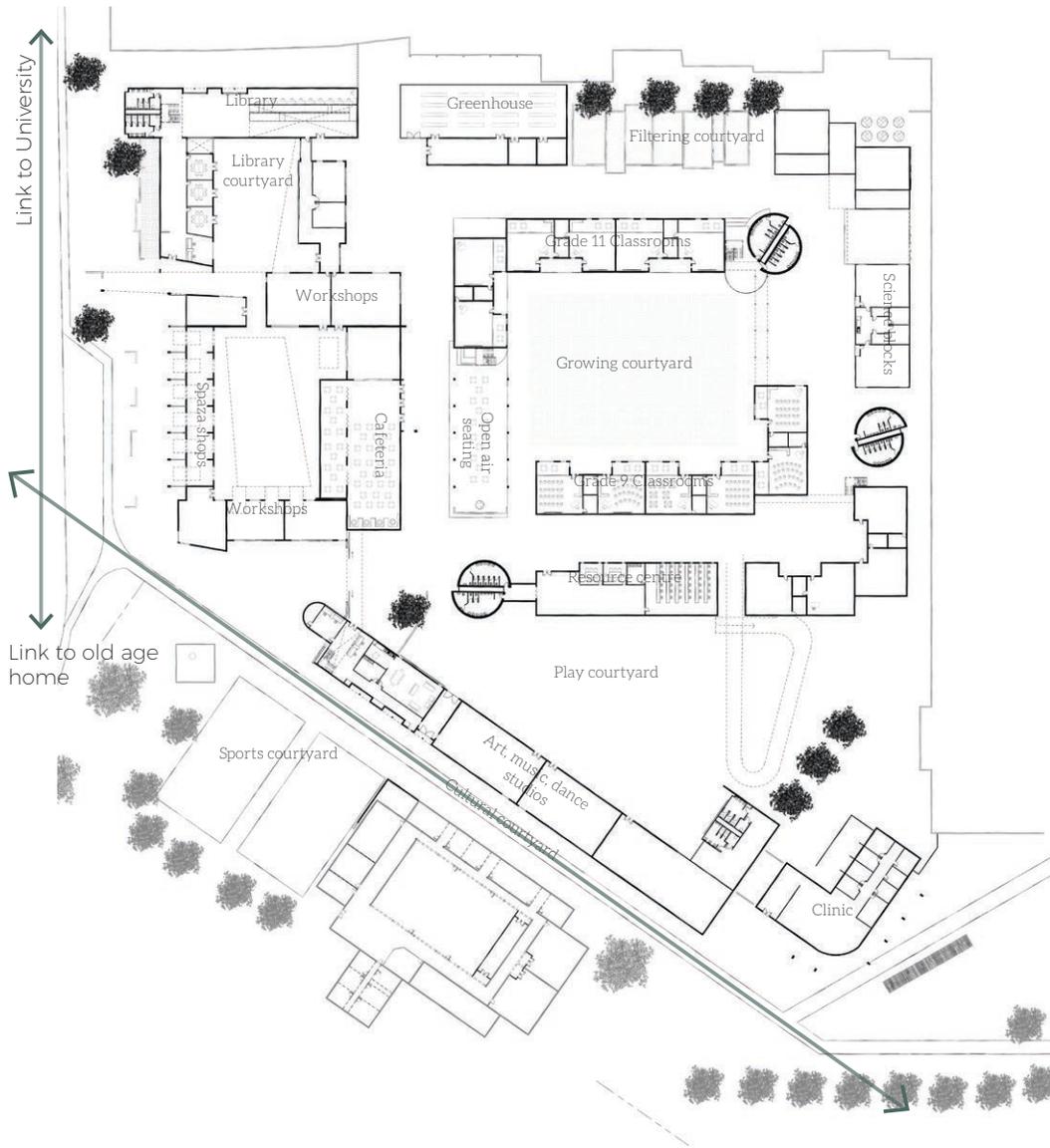
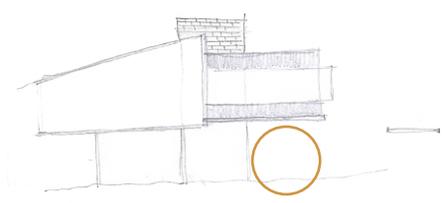
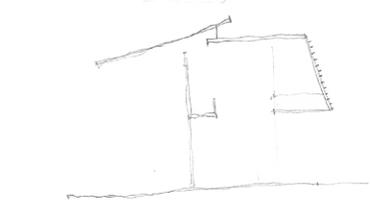
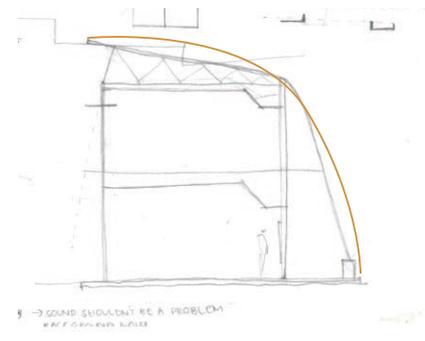
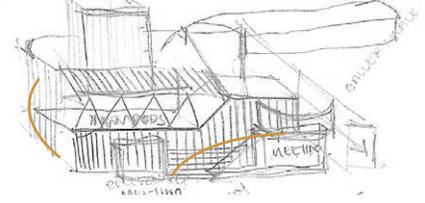


Figure 7.16 (above): June exam crit (Author 2018)

Figures 7.17 (opposite): Exploration five plans and models (Author 2018)



Spatial wrapping - roof and ceiling provide different spatial experience



7.5.6 / EXPLORATION SIX

Exploration focused on the creation of streets and neighbourhoods as well as creating places of anchor and attachment. Spatial wrapping becomes important in the way the spaces lead the user from one space to another and how it protects or extends a space. The classroom neighbourhoods were explored in several different configurations.

Successful elements:

- Connection of cultural block to sports courtyard
- Better creation of courtyard space in front of community centre.
- Layering of space to provide security

Critique:

- In the first iterations of the classroom blocks, the classrooms still seem disjointed and isolated.
- Lack of development 3 dimensionally

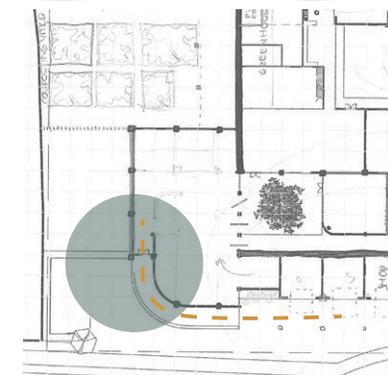
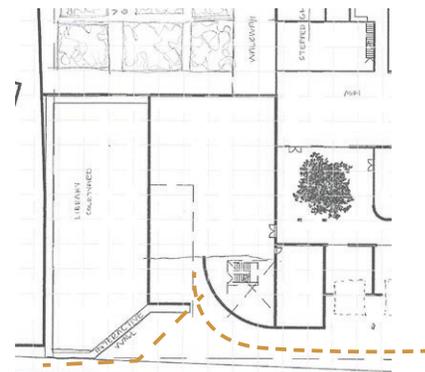
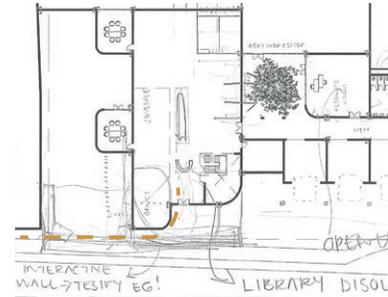
Reflection:

This exploration focused on spatial wrapping, specifically on the plan layout.

Different lenses were applied to each iteration, such as layering of thresholds, movement through the site and the use of courtyards. The different iterations led to the design being overly complicated, too simple, or too separated. It lacked the anchor spaces necessary. The ground floor level was heavily explored because of the overlaying of different functions and places of interactions. It was through the technical investigation that the design started to grow three dimensionally.

Figure 7.18 (above): Exploration of the library wrapping (Author 2018)
Figures 7.19 (opposite): Exploration six plans and models (Author 2018)

Exploration of spatial wrapping in the library - how spaces can flow into each other creating continuous movement



7.5.7 / EXPLORATION SEVEN (TECH CRIT - SEPTEMBER)

Further refinement is needed for the individual programs to become PLACE.

Successful elements:

- Connection of cultural block to sports courtyard
- Better creation of courtyard space in front of community centre.
- Layering of space to provide security

Critique:

- Construction methods were complicated (use of columns & ring beams).
- Ventilation strategy was incorrect
- Spatial wrapping needs to be explored more - the roof can extend and create exterior space whilst the ceiling can do something different and 'protect' the interior space.
- More exploration is needed on section

Integration of the workshop results and the design exploration still lacked in the technical development. As seen in the spatial wrapping workshop, where model building (3D) was more successful than the 2D exploration, more exploration was needed on section in order to create place and not merely plan. The pattern making and way finding workshops were therefore specifically designed to see how colour and pattern could aid with the technical development as these aspects of buildings were noted as important in the precedent analysis done in Workshop Two. These workshops helped remind the author that there is beauty in simplicity and that the structure does not have to be complicated. The next iterations therefore focused on simplifying spaces but designing them well so that learning landscapes are created.

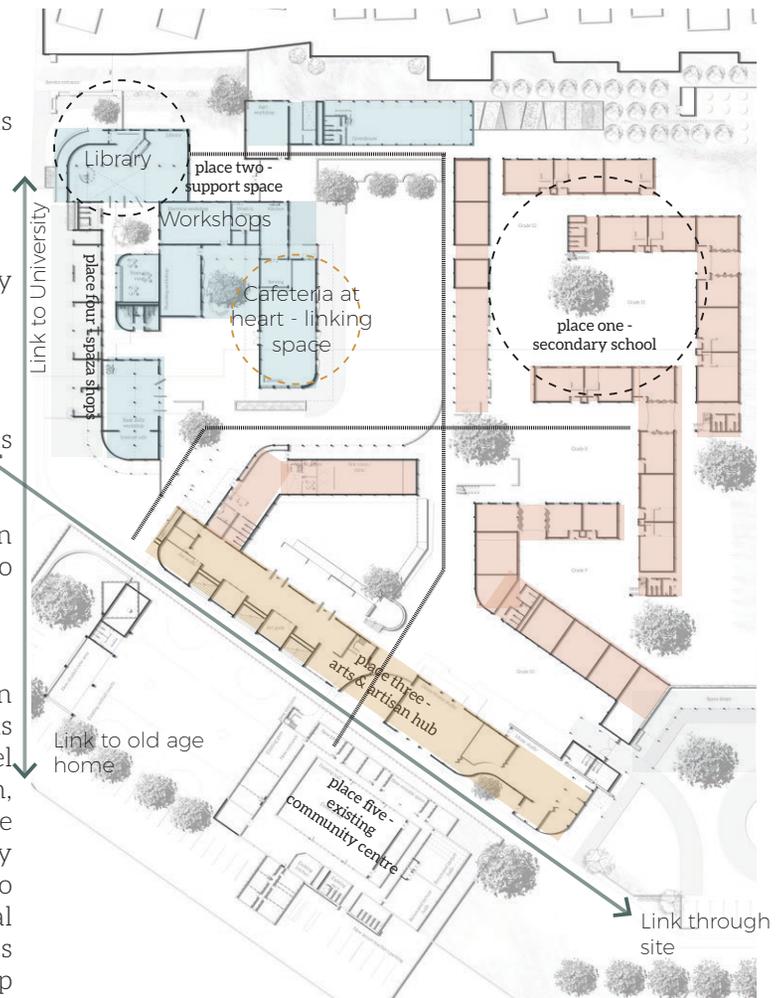


Figure 7.20 (above) : Plan, technical crit (Author 2018)
Figures 7.21 (opposite): Models and sketches of exploration seven (Author 2018)

7.5.8 / ROOF EXPLORATION MODELS



Fig. 7.22: Joining of two roofs (Author 2018)

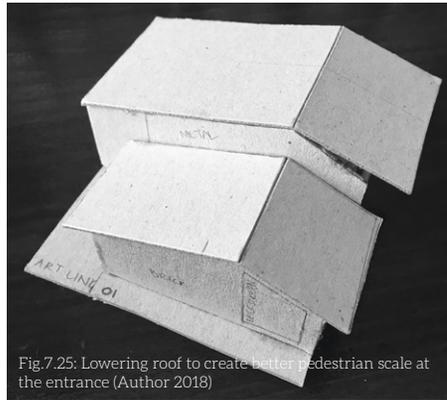


Fig. 7.25: Lowering roof to create better pedestrian scale at the entrance (Author 2018)

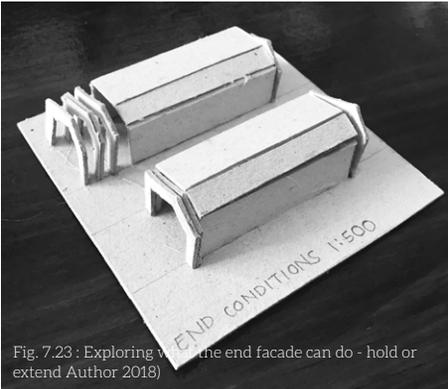


Fig. 7.23: Exploring the end facade can do - hold or extend (Author 2018)



Fig. 7.26: Exploration of the cafeteria roof - wrap around other space (Author 2018)

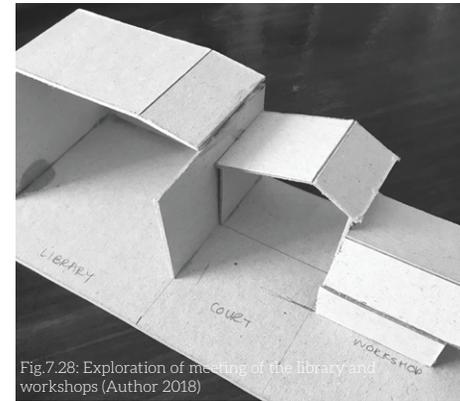


Fig. 7.28: Exploration of meeting of the library and workshops (Author 2018)



Fig. 7.24: Exploration the house type - what needs to be added or changed (Author 2018)



Fig. 7.27: Exploration of the cafeteria roof - workshop space extends - creates a threshold for cafeteria (Author 2018)



Fig. 7.29: Further exploration of meeting of the library and workshops (Author 2018)

The design was therefore explored with smaller roof models. The roof plays an important part in spatial wrapping yet had not been explored far enough to really contribute to the making of space. Evidence of the roof playing an important part in the making of space is seen in the workshop where learners kept the walls very basic, but manipulated the roof to suit their needs. Further investigation into what a ceiling can do, and what a roof can do, is needed.

A workshop on colour was done but the integration of this colour is lacking in the design. This could inform the technical investigation where the colour of brick, a known element, is changed in order to elevate this material.

This exploration was the one used in Workshop Ten where learners evaluated the space. Again, there was a focus on the courtyard spaces. The technical investigation also needs to focus on how these spaces are designed to become an integral part of the school.



Fig. 7.30: Entrance view - lower space wraps, higher space creates a presence (Author 2018)



Fig. 7.31: Facade evolution - creation of mini 'houses' to mimic the context (Author 2018)



Fig. 7.32: Aerial view looking towards the north (Author 2018)

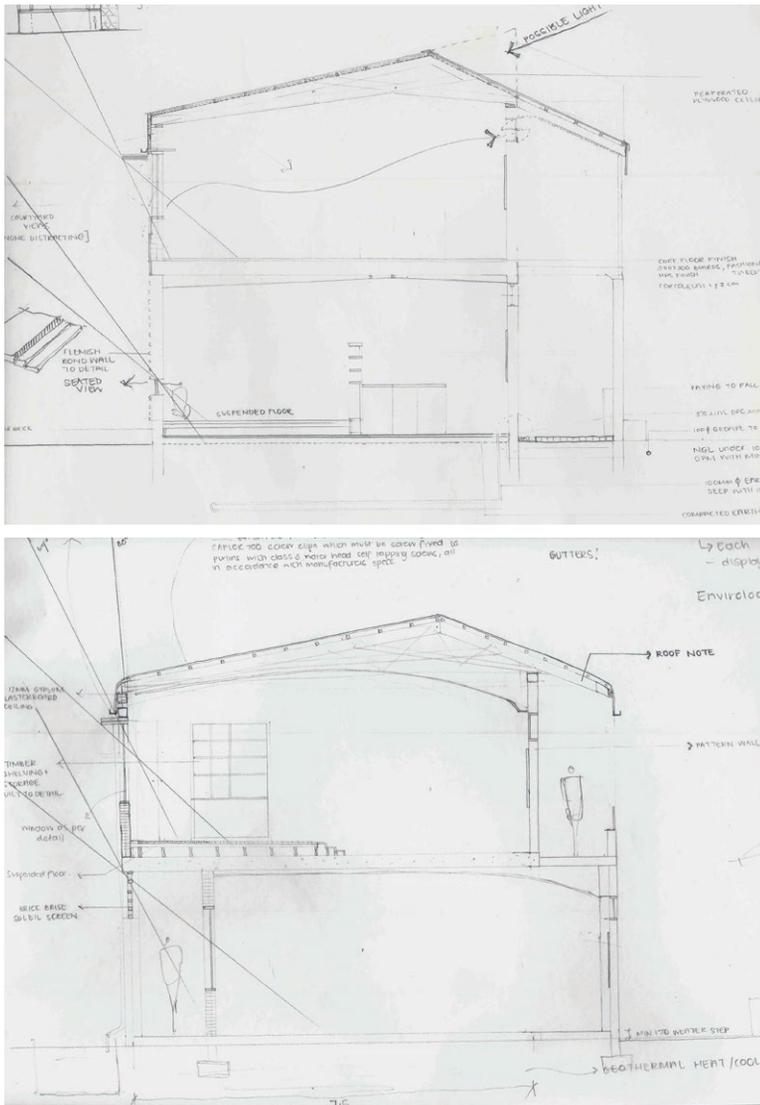


Figure 7.34 (above) : Section development sketch (Author 2018)

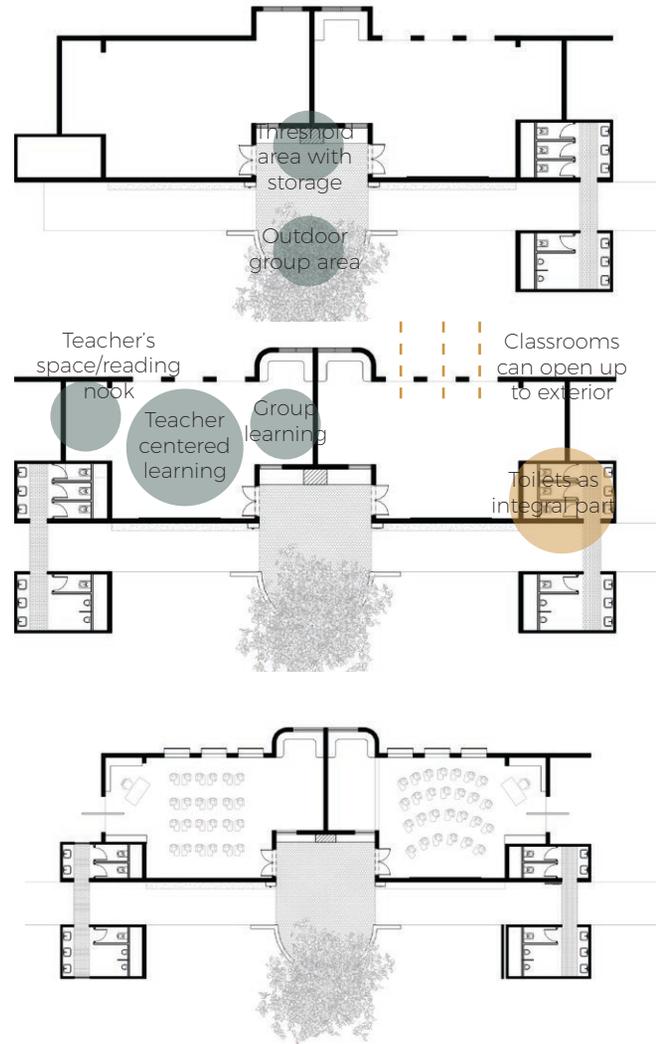


Figure 7.35 (above) : Classroom development sketches (Author 2018)

7.6.2 / FINAL DESIGN ITERATION: PLACE TWO

SUPPORT SPACE



The school site is considered as a whole, and not just a school building, therefore outdoor and support spaces are not considered as secondary spaces but rather integrated parts of the learning process (Heitor 2005:45). This is in contrast to the Department of Basic Education's guidelines which places more importance on classroom spaces and opposite to what is currently found in Mamelodi schools as seen in the mapping workshop where there are very little support spaces. 'Children in cities need a variety of places in which to play and to learn. They need, among other things, opportunities for all kinds of sport and exercise and physical skills - more opportunities, more easily obtained, than they now enjoy in most cases (Jacobs 1961).' Music, dance, art and food were continuously highlighted in the workshops as important spaces for social and group activities. There is a move towards providing a variety of spaces within learning environments. Highly accessible communal spaces are a way to foster social interaction (Heitor 2005:47).

LIBRARY

Lackney (2003:4) introduces 33 design principles for schools in which it is outlined that a resource centre or library should be an integrated place that is physically and visibly accessible. Building from the theme of anchor and attach, the library becomes an anchor to the design on the north-western corner as it is both for the school and for the community. The online questionnaire results indicated that size played an important part in the recognizability of a school. The design therefore considers the library as a larger space. It also becomes to the public, as well as the school, thereby extending its time of use. This, according to Lackney's (2003:7) design principles, is an important aspect of educational centres.

CAFETERIA

The older the learners are, the greater the need for opportunities to sit together, hang around, eat and talk (Hertzberger 2008:136). The importance of the cafeteria was first revealed in the online workshops where teachers saw this an opportunity for the learners to socialize and release their energy. The cafeteria was emphasized again

throughout the workshops as one of the most important spaces both for food and for social purposes. It therefore becomes the heart of the school. The wrapping of space, through the extension of roof, is used to create a link with the outdoors therefore extending the space of the cafeteria.

GREENHOUSE

The natural landscape was revealed as an important aspect to the learners through the use of big trees, large sports fields and lots of flowers in their designs. The design attempts to re-establish the connection of the community with the natural environment. This is proposed firstly through exposure to how fresh produce is grown and cultivated. This was attempted through various platforms of observance and engagement. The landscape acts as a mediator between existing and new and allows for outdoor spaces of learning. The senses become enticed through the learner's ability to smell, feel, see and finally taste what is being cultivated around them.

7.6.3 / FINAL DESIGN ITERATION: PLACE THREE

TRAINING - ART & ARTISAN HUB



In order to expand the concept of an urban campus, the communal elements of educational space are combined with urban design strategies to strengthen the public-school identity as a form of public space. This is referred to as an 'extended school' or a 'community school' (Lackney 20039). These schools are grouped with community facilities. This public facility integration creates across discipline interaction between adult and child whilst also allowing flexibility. The concept indicates the end of a self-sufficient school building, introducing an extroverted building that extends into the city. The users find themselves in different learning environments that are far richer in experience than traditional school buildings. The learning process then becomes more inclusive, a natural part of community life, a 'city of learning'. The southern edge is held by the art, dance and music spaces, which were identified through the workshops as the most important spaces for the

learners. These become the public interface of the school which links to the existing community hall. The workshops are located on the western edge. They are used as a secondary threshold that mediates between the public and the learners. These spaces become operational out of school hours thus extending the life of the school.

Seating is created in the façade of the school that links with the existing courts. Individual art 'boxes' are placed in between this seating. This create a pattern of 'seen and be seen' which is not only important for the learner's development but increases passive surveillance along this façade (Lackney 2003:9).

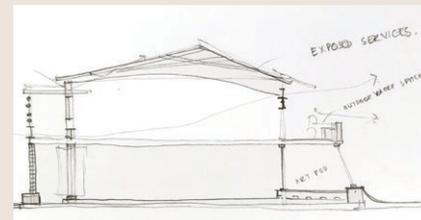
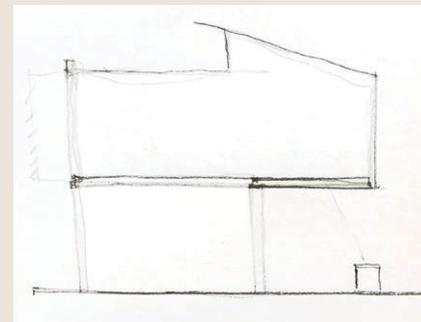


Figure 7.39: Development sketches (Author 2018)

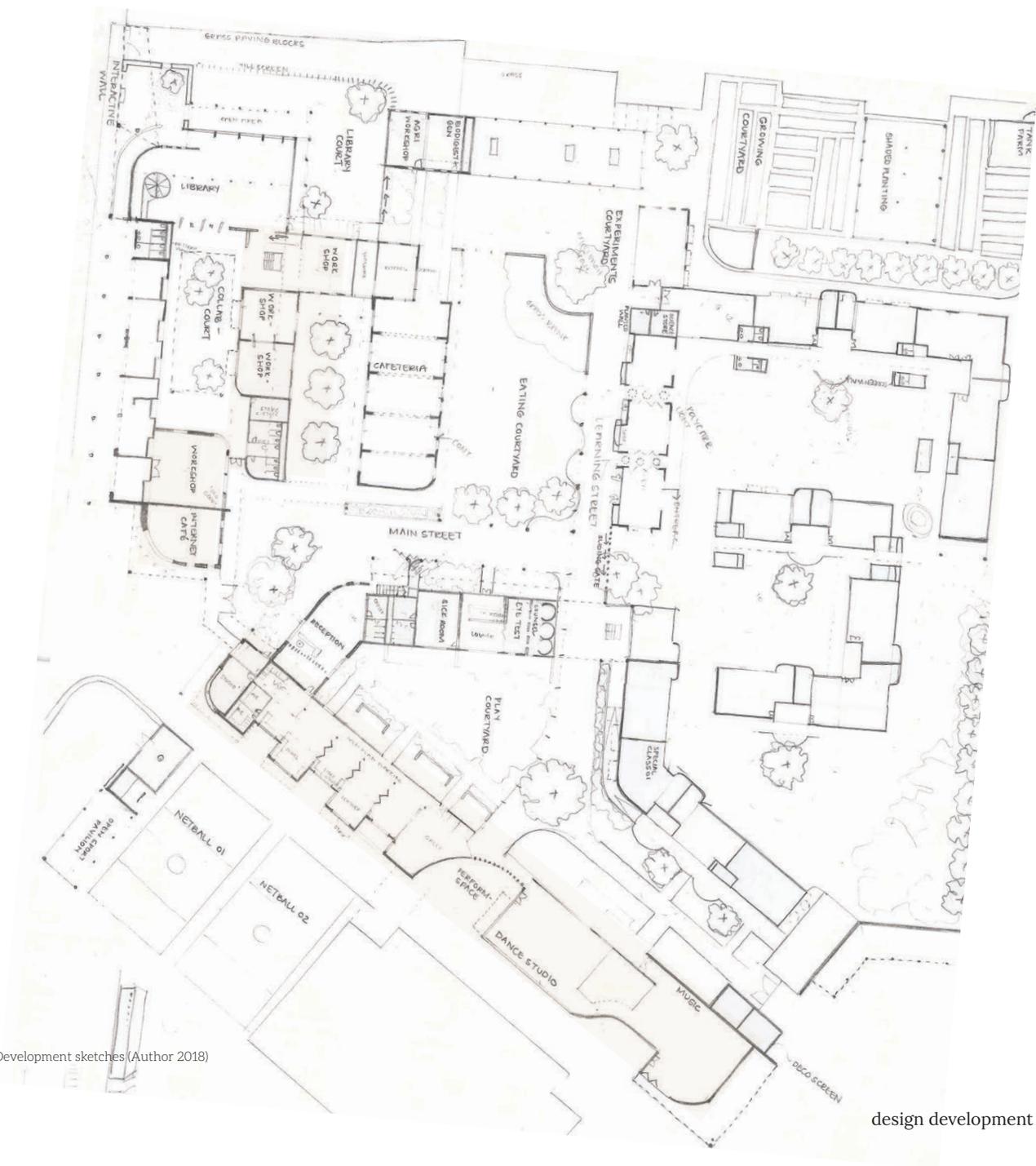


Figure 7.38 : Development sketches (Author 2018)

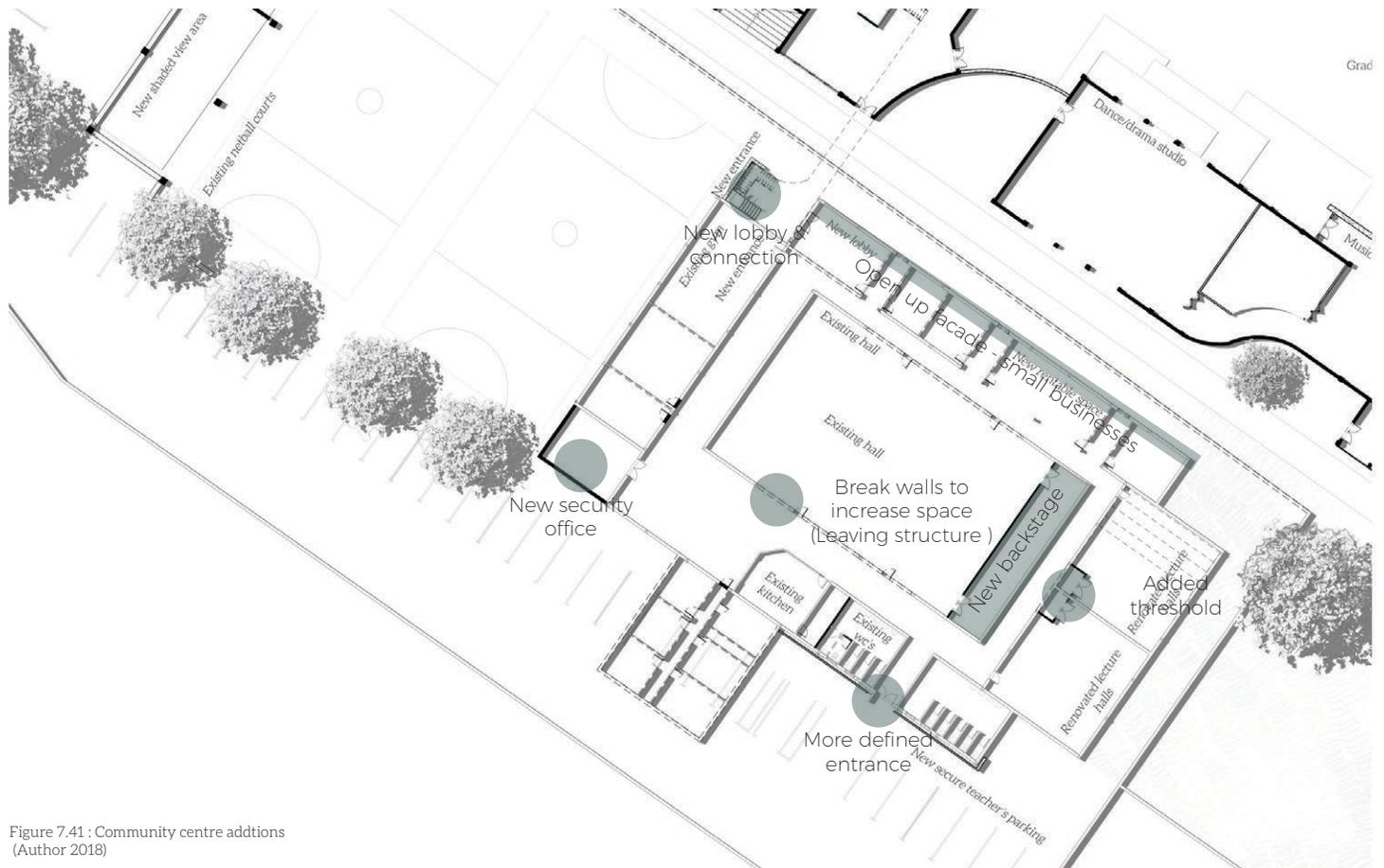
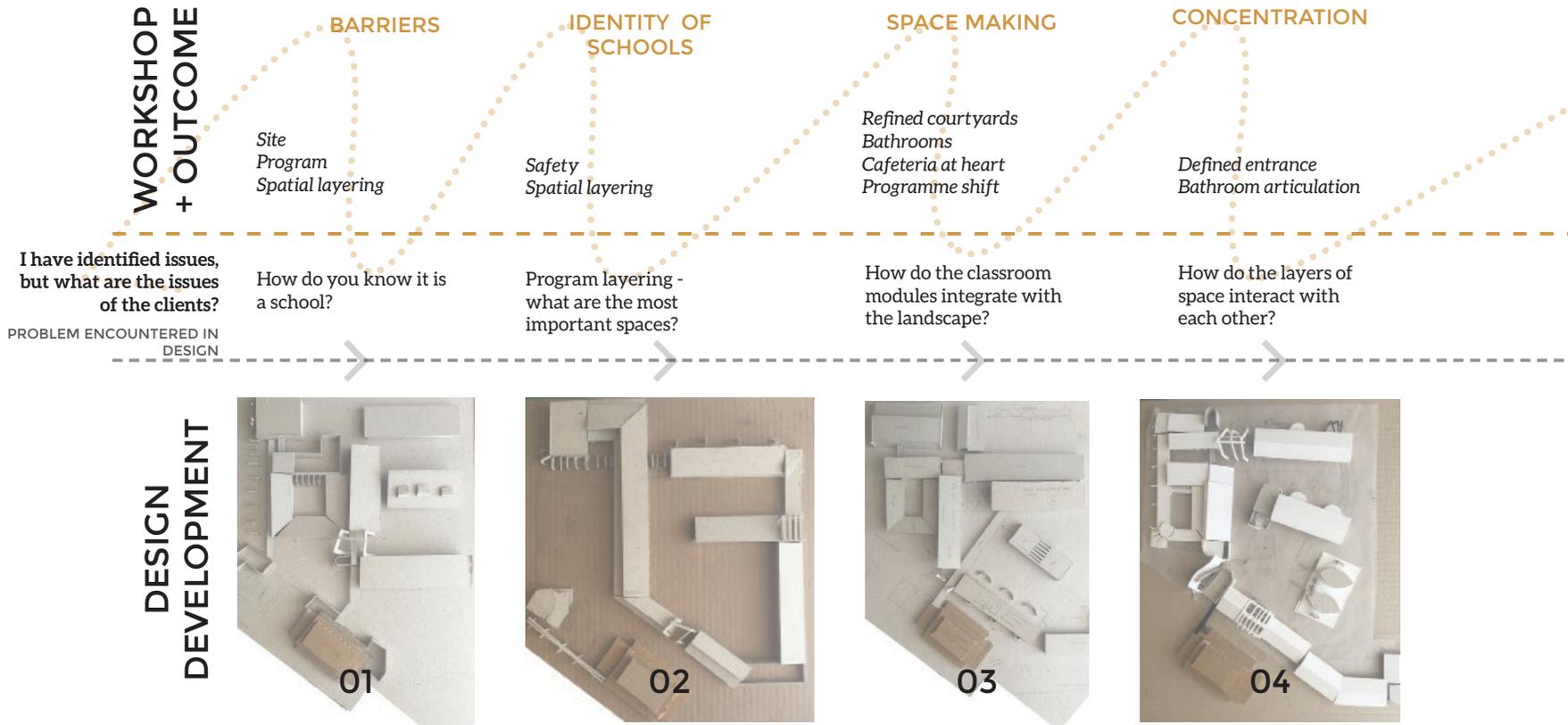


Figure 7.41 : Community centre additions
(Author 2018)

7.7 // DESIGN SYNTHESIS & CONCLUSION



Through the process of design, the workshops were most helpful when designed according to specific problems. For example, the author was exploring the integration of the exterior and interior in the classroom modules therefore a workshop on concentration was done. The importance of threshold was

highlighted therefore a workshop on the creation of thresholds were done. It is a continuous back and forth process where it is important that the workshops develop alongside the design. Reflection after the workshops also becomes an important process otherwise the design and workshops do run parallel to each other and don't

end up intersecting. This is evident after the pattern and way finding workshops where these aspects were not properly reflected on until much later and therefore did not inform the design for the technical crit.

The final design iteration is a combination of the workshops,



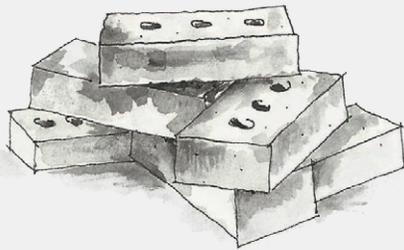
programme informants and context mapping. This iteration promotes the idea of an urban campus – a series of streets, lanes and courtyards which promote different learning landscapes. These become spatial ordering devices and allow the campus to be integrated into the context whilst still having its own identity. The concepts of home

versus aspiration, anchoring and attaching and spatial wrapping are evident, however, they can be further explored in the technification.

The above diagram indicates the problems encountered throughout the design development and how specific workshops, with specific aims,

were used as a way to solve these problems. This co-design process was a learning process therefore further research could be done into how each workshop could be executed better to further inform the space.

Figure 7.42: Collage of design development, problems and workshop influences (Author 2018)



the making of architecture

a way of building //

chapter eight

THE ARTISAN OF ARCHITECTURE

- 8.1. Techné concept & Intentions
- 8.2. Responding to the ordinary
- 8.3. Techné precedent
- 8.4. Translation into design
- 8.5. Structural systems
- 8.6. Materiality
- 8.7. Environmental systems
- 8.8. Climate considerations
- 8.9. Lighting
- 8.10. Energy
- 8.11. Acoustics
- 8.12. Water
- 8.13. Safety
- 8.14. SBAT Analysis

8.1 // TECHNICAL CONCEPT & INTENTIONS

Carin Smuts (2014), in CS Studios design philosophy, states that participation is usually only seen as a social process and this is where it fails. Participation needs to be underscored by making. A good understanding of the local vernacular, the local materials as well as the local skills are what underpins this making. Through their research and experience it is proved to lead to more sustainable environments (CS Studios 2014). Throughout the workshops the learners were never limited by material or size of the task. They combined materials, shared and went beyond the brief they were given. Building from this experience, and extending the design concept of 'Space as the fourth teacher', the concept of 'Revealing the ordinary, building as didactic in its making' is explored as a means to the making of this urban campus. In his book *Architecture without Architects*, Rudolfsky (1964:15) refers to this concept through the quote, "*there is much to learn from architecture before it becomes an expert art. The untutored builders in space and time*

- the protagonists of this show - demonstrate an admirable talent for fitting their buildings into the natural surroundings. Instead of trying to conquer nature, they welcome the vagaries of climate and the challenge of topography". The method and approach adopted in the making of this campus therefore echoes the surrounding context.

Learning from the workshops, in other words the 'ordinary', the scheme needs to reflect how both the grounding of home and the upliftment of aspiration can be achieved through place-making thereby giving the community a place of their own. Transformation of these home and aspirational elements is explored through structure, materiality and connections. Passive design principles such as natural ventilation, daylighting, acoustics and water harvesting are promoted. This allows the structure to become an extension of the landscape and of nature, an aspect highlighted in the workshops.

8.1.1 / INTENTIONS

The aim of this concept is to protect, integrate and teach. The selection and assembly of materials, structure and details is deliberately clear, didactic and relating to either home (anchor) or aspiration (attach). The intention of the exploration of making is to serve as a pedagogic and development process, enhancing the idea that this educational campus must start to serve before it is an actual building by allowing different user groups to have a voice in the process (Hussain 2010:100). The materials, assembly and details of the building begin to inform the space within and are therefore apparent to the users who are passing by, or visiting the campus. The users begin to engage with the building on another level therefore fulfilling its didactic purpose from inception to building and beyond.

Figure 8.1 (opposite): Concept collage of the technical intentions
(Author 2018)

REVEALING THE
"ORDINARY"

extension of city

learning landscapes

boundary through threshold

tectonic

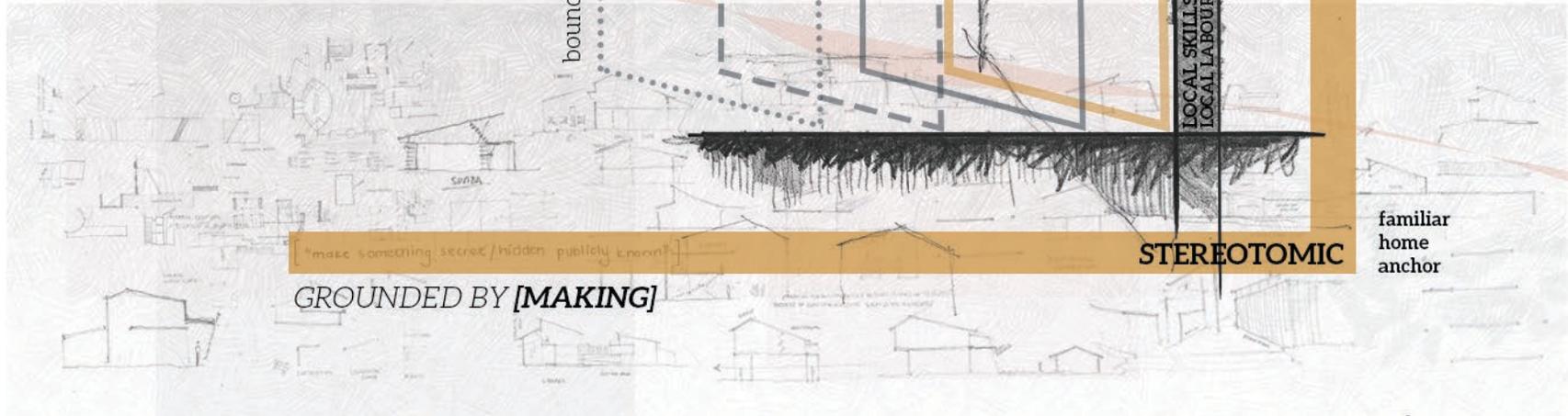
attach
inspire
wrap
extend

LOCAL SKILLS
LOCAL LABOUR
LOCAL LABOUR
LOCAL SKILLS

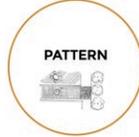
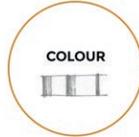
familiar
home
anchor

"make something secret/hidden publicly known"
GROUNDED BY [MAKING]

STEREOTOMIC



8.2 // RESPONDING TO THE 'ORDINARY'

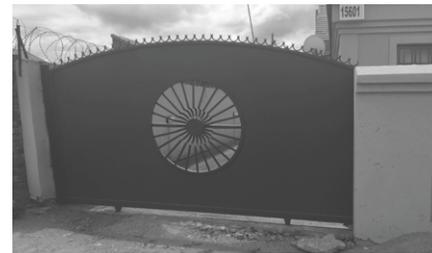
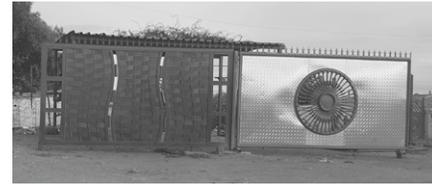


Home environments are created through the use of elements that are recognisable to the users (Workshops 2018, Master Research Group 2018). This was evident in the workshops where learners drew the familiar roof shape and used local material in their designs. The use of familiar materials provides a sense of comfort. Furthermore, the material choices also aim to include further possible co-design groups by supporting the local economy and local craftsmen.

8.2.1 / STEEL & CRAFTSMEN

It was observed during site visits (Honours Research Group 2017, Masters Research Group 2018) that steel structures are prevalent in many areas of Mamelodi East and are constructed by the local craftsmen. As was seen by the 'build your space' game and the mapping, these are spaces of emergence and often used for small businesses. They are associated with social spaces as residents often gather around these structures (Department of Architecture Honour's Studio 2017 and the Master's Studio 2018).

The use of steel in decorative screening is incorporated to support this local network.



Figures 8.2 -8.6 (above): Decorative gates and portal frames in Mamelodi East (Department of Architecture Honours and Masters Mamelodi Studios 2017, 2018)

8.2.2 / AN EXPRESSION OF MAMELODI: THE BRICK

The use of masonry is seen throughout Mamelodi where residents have begun to experiment with pattern however this creative use of brick does not translate into the public buildings within Mamelodi (Randall 2016:160, Honours Research Group 2017, Masters Research Group 2018).

An observation that continued throughout the workshops was that learners always designed their buildings with bricks with careful consideration to how the bricks were placed. The most time in the exercises was spent drawing individual bricks. This relates back to two of the themes previously discussed: safety and home versus aspiration. Firstly, learners associate bricks with a sense of stability and therefore safety. It is a known element which brings about a sense of comfort. The ability to implement innovative application of construction methods and materials is part of the construction technology outcome for the SACAP work stage. Through taking this known element of brick and investigating ways to use the brick beyond the standard production, the architect has not only met the SACAP requirement but also provided

the user with a sense of home. The technical concept therefore developed as a result of an understanding of the local context. There is a unique and simple manner in which the residents of Mamelodi build in order to achieve what is needed for survival.

Brick and blocks are the primary construction method for permanent structures within Mamelodi East. From the context mapping, it was discovered that these permanent structures are the anchors for other activities. The small scale businesses, classified as spaces of emergence, operate from backyards or on the side of the street, and attach to the permanent structures (Honours Research Group 2017, Masters Research Group 2018).

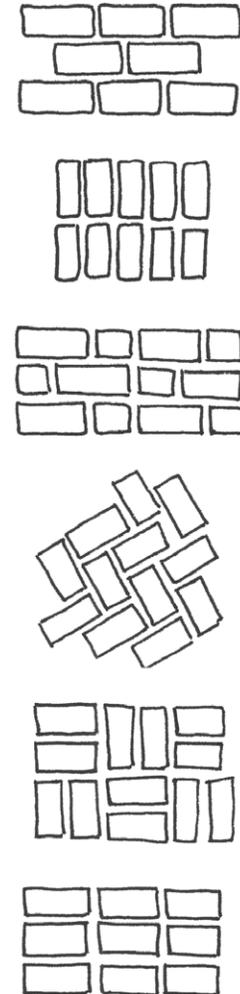


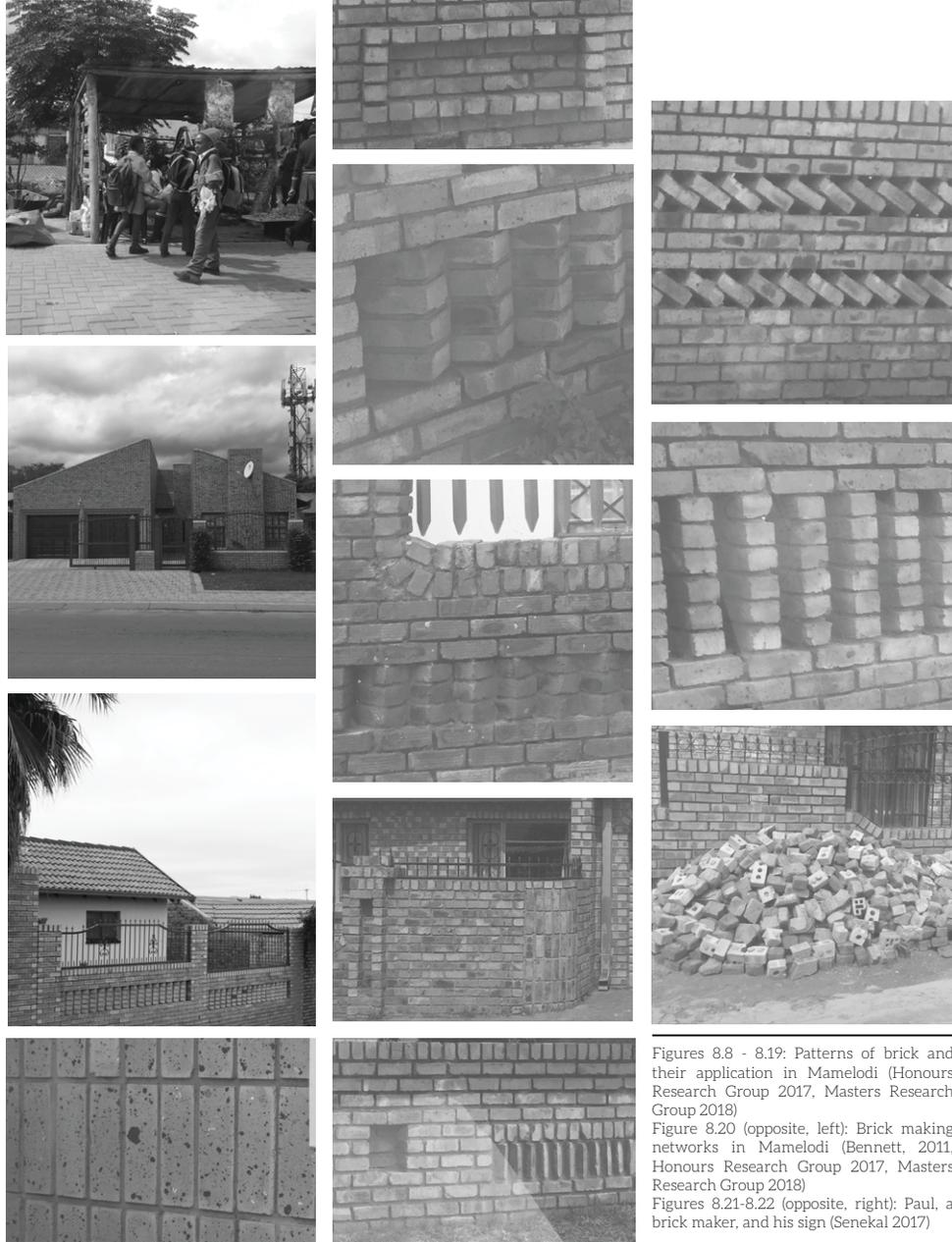
Figure 8.7: Brick bonds typically taught in architecture (Author 2018, Corobrik 2018, Think Brick 2018, Site experience, Wegelin)

8.2.3 / PATTERN IN MAMELODI

The Department of Architecture Honours Studio 2017 undertook field research which revealed a large network of brick and block makers in Mamelodi East. Many of these brick makers are also skilled brick layers as well as doing other construction work such as tiling, paving, bricklaying and plastering (Honours Mapping 2017). This is an ever growing industry as seen the changes from 2011 to 2017 (Figure 8.20, Honours Research Studio, Bennett 2011). Bricks are weather resistant, long-lasting and readily available making them a useful material in Mamelodi (Corobrik S.a:6, Honours Research Group 2017, Masters Research Group 2018).

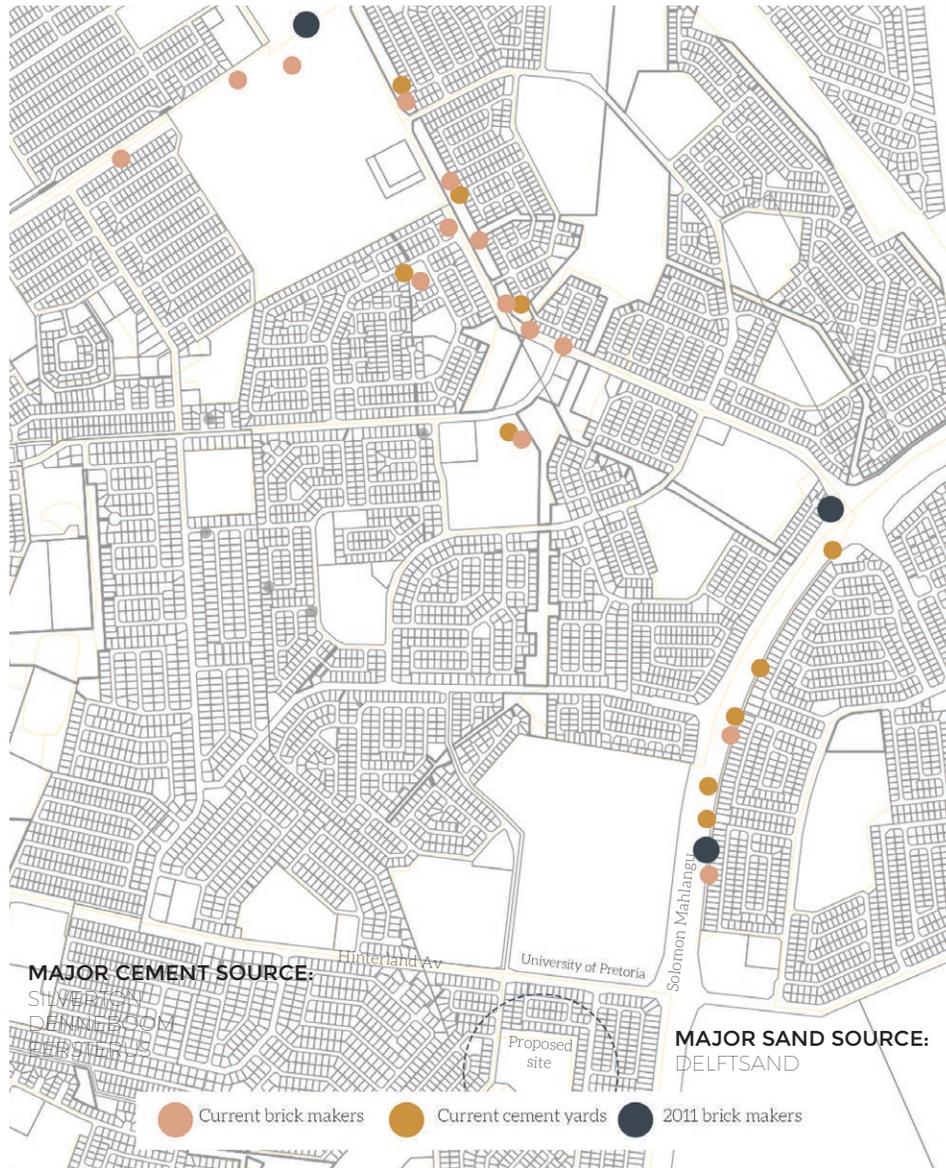
Bricks are used in Mamelodi for decorative purposes as well as to demarcate space (Honours Mapping 2017, Masters Mapping 2018). Photographic evidence, as seen in figures, reveals the many patterns seen in the urban fabric.

As was discovered in the workshops, pattern and colour can be used to give identity to spaces. Clay bricks are therefore used to explore the notion of identity as well as create anchors within the design. The selection of brick aids in employment during construction. This adds another co-design group to the process thereby empowering the community by giving them a voice (Hussain 2010:100).



Figures 8.8 - 8.19: Patterns of brick and their application in Mamelodi (Honours Research Group 2017, Masters Research Group 2018)
Figure 8.20 (opposite, left): Brick making networks in Mamelodi (Bennett, 2011, Honours Research Group 2017, Masters Research Group 2018)
Figures 8.21-8.22 (opposite, right): Paul, a brick maker, and his sign (Senekal 2017)

MAJOR AGGREGATE SOURCE:
MAMELODI QUARRIES



8.3 // TECHNICAL PRECEDENT

8.3.1 / TELETON CHILDREN'S CENTRE

Solano Benítez

Lambare, Paraguay

2010



This Children's Centre made use of prefabricated vaults of rubble, ceramic tiles and other construction waste from the demolition of some walls. Building services are used to give the building structural and constructive value (Benitez 2010). In the workshop on thresholds, where learners were asked to draw a space in a triangle, the learners used it as an entrance. The triangulation of brick at the entrance to the school demarcates this space. The use of brick triangles relates back to the material bringing a sense of safety to learners.

Figures 8.26: Teleton Children's Centre (<https://www.archdaily.com/773980/telethon-childrens-rehabilitation-center-gabinete-de-arquitectura>)

8.3.2 / BRICK PATTERN HOUSE

Alireza Mashhadmirza

Tehran, Iran

2011



The project is located in a poor area of Tehran but Mashhadmirza was determined to show that architecture can happen in an economically poor area. Complicated details were designed in simple ways. Inspired by traditional architecture, the architect created a 'tri-dimensional' wall. This was used to moderate glare and sunlight as a low budget solution to a building that needed good acoustics, earthquake resistance, fire safety and energy efficiency. A system of precast sized, drilled bricks were used to 'weave' the brick skin with steel rods. This was done with limited knowledge of construction methods, as well as limited access to construction equipment (Mashhadmirza 2012). This example shows how a local material can be translated from ordinary to extra-ordinary through the use of local inspiration.

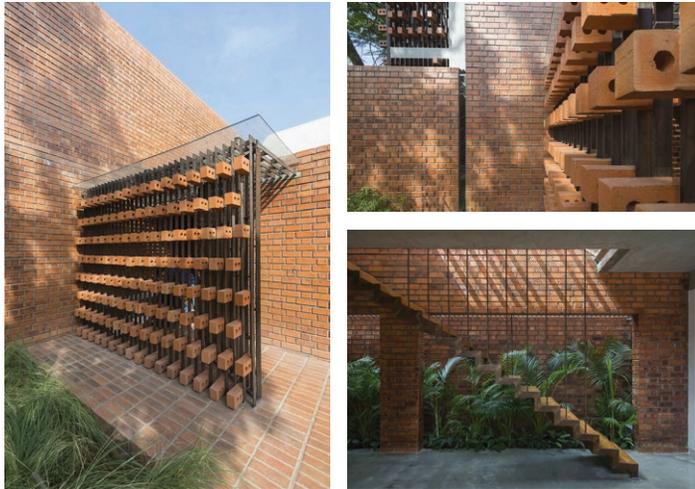
Figures 8.24: Brick pattern house (<https://www.archdaily.com/298353/brick-pattern-house-alireza-mashhadmirza>)

8.3.3 / BRICK HOUSE

Architecture Paradigm

Mysuru, India

2016



This residential building is organised in an L shaped plan to organise the diverse programs, functions and desires of the family. It is an amalgamation of individual vs collective, public vs private, formal vs informal, largeness vs intimate and openness vs security. Open space become counterpoints to the urban subdivided neighbourhood in which the stand sits. Subtle changes in scale bring a sense of connection and intimacy. The concrete structure, a material of modernity, forms the framework whilst the traditional brick brings a sense of warmth. Natural light is harnessed in the spaces to create space (Architecture Paradigm 2017). Courtyard spaces are essential in the schools design as home bases for the learners (Jacobs 1961). The framing of courtyard spaces using change in scale and visibility is used as inspiration.

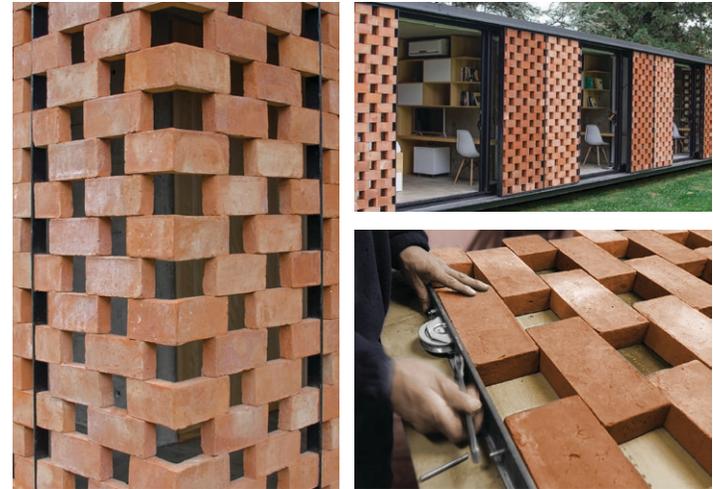
Figures 8.23: Brick house (https://www.archdaily.com/874305/brick-house-architecture-paradigm?ad_medium=gallery)

8.3.4 / EXPERIMENTAL BRICK PAVILION

Estudio Botteri-Connell

City Bell, Buenos Aires Province, Argentina

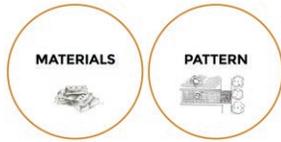
2016



Brick brise-soleil panels are created through dry construction using pins and a steel frame to create a self-supporting façade (Botteri-Connell Studio 2016). The lightweight experience of the brick is further emphasized by the panels being mobile which maximizes light and privacy control (Botteri-Connell Studio 2016). These panels provide a sense of stability, or anchoring, due to the materiality which relates back to the anchoring of space found in the workshops, however, they also allow for adaptability which according to the OECD (2003) is essential in creating well-designed micro-climates.

Figures 8.25: Experimental Brick Pavilion (<https://www.archdaily.com/785011/experimental-brick-pavilion-estudio-botteri-connell>)

8.4 // TRANSLATING RESEARCH INTO DESIGN



A workshop on pattern making with the learners saw several themes of patterns for specific spaces emerge. These patterns, developed by the learners, were translated into specific brick bonds in order to be constructed. The use of brick in the context of Mamelodi as well as the precedents was also considered therefore giving the author the 'ability to recognise demands of the context, local materials and appropriate technologies (SACAP 2010:8).

1 / SOLIDER BOND

The most popular pattern from the workshops, used in the entrance, was a block type pattern. This is translated into a solider bond. As it was predominately used on the floors in the workshops, the main circulation routes within the design are constructed using this bond.

2 / STACK BOND

The main use of this bond from the workshops was between interior and exterior spaces. This bond shows how exterior spaces can 'wrap' into interior space (Workshops 2018).

3 / RUNNING BOND

This commonly used bond (Site

experience, Corobrik S.a, Randall 2017:163) is predominately used in structural components. Different colours of brick, relating back to the colour workshop, are used to emphasize different spaces.

4 / FLEMISH BOND

This bond lends itself to curved walls (Think Brick Australia 2018, Precedent study, Randall 2018:160). Darker bricks can be used to emphasize the materiality thus creating a feature wall. The inspiration for this was drawn from the patterns learners developed for behind the classroom's board. These patterns made use of alternating patterns, different colours and different sizes of brick.

5 / FLEMISH BOND (SCREEN)

This is used in screens for protection from solar gain (Mashhadmirza - Brick Pattern House 2011). It allows for a sense of privacy whilst still allowing visual connections between interior and exterior (Randall 2018:163).

6 / BASKETWEAVE

This bond can be used in paving to indicate places of gathering (Workshops 2018, Randall 2018:163). This pattern was translated from the way learners arranged the benches in their gathering spaces. Different colours within the basketweave pattern indicate space for games, a suggestion from the learners.

7 / HERRINGBONE

A paving bond that indicates a change in movement, for example, at an intersection of paths where movement spreads in many directions. This was translated from the arrows made of bricks that the learners drew to indicate the path direction from their classrooms to the gathering space.

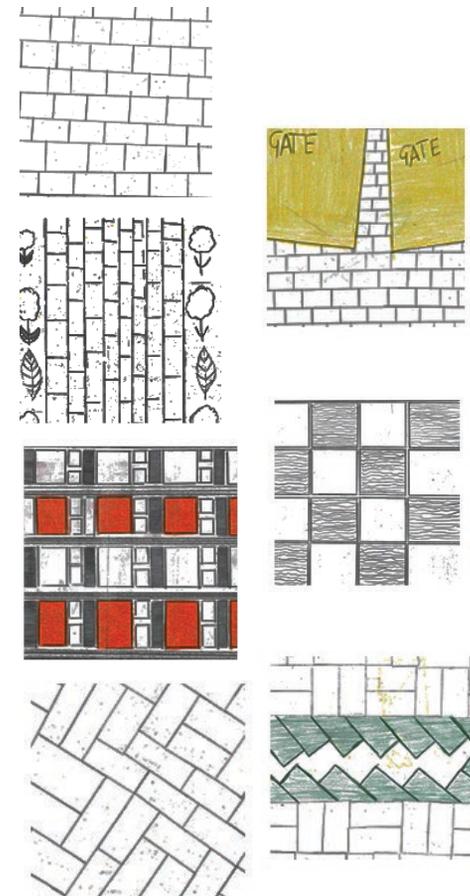
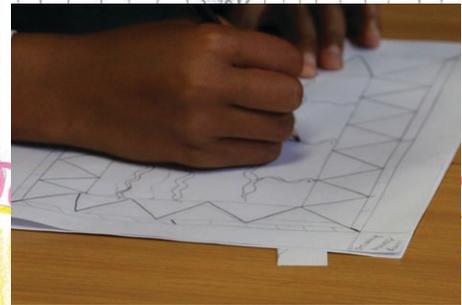




Figure 8.28 - 8.32: Drawings by learners from workshop 6 (Workshop Six 2018)
 Figure 8.33 (above): Photos of learners from workshop 6 drawing patterns (Porter 2018)
 (Research: Author 2018, from Workshops 2018, Abe [S.a]. Think Brick Australia 2018, Running Bond vs Stack Bond: Pros and Cons. [S.a], Corobrik [S.a], Randall 2017:159 -->)
 Figure 8.34: Diagram showing main axis and bond applications (Author 2018)
 Inspired by research by Randall 2017:163

- Stack
- Basketweave
- Triangle
- Flemish
- Herringbone



8.5 // STRUCTURAL SYSTEMS & MATERIALITY



The outcome for the construction technology at a Masters level in SACAP's work stages is the 'ability to implement innovative application of construction methods that are durable and cost effective' (SACAP 2010:5). In a township setting people build with what they have. It is therefore very effective if architects can learn from their surroundings and be taught by local craftsmen who have the ability to see potential in the materials. The ability to make 'something out of nothing' was also observed in the workshops. Learners used pencils as rulers, stuck pages together when they felt like they had too little space and built objects out of the paper instead of just using pencils to draw 2D objects. By delving in to the world of the ordinary, a beauty in the details is discovered. The view on technology therefore changed from 'what do materials look like' to 'what do materials do'. This extends the learning outcome of 'ability to evaluate materials in an ethically and responsible manner' and the 'ability to recognise the demands of context' (SACAP 2010:8) to include social and economic aspects.

Tectonic expression is centered around the user experience. The structural intention was to create a safe, nurturing environment where spaces are layered to create a flow through the site. The structure should meet the ground and anchor the proposed design, aiding the sense of safety and creating a feeling of home. A lightweight materiality is proposed for the first floor to allow the structure to become an aspirational element. This is a symbol of how the building is entrenched in the community but continues to inspire the community to flourish (Workshops 2018).

8.2.1 / PRIMARY STRUCTURE

Since the dissertation is based on how buildings can be crafted by the local community, local materials are chosen in order to encourage local craftsmen to help construct the building as well as ensure that the building becomes part of the community. Brick work was chosen as the primary structure as it can be locally sourced, and it is long-lasting and weather resistant (Corobrik S.a, (Honours Research Group 2017, Masters Research Group 2018), therefore making it suitable for the necessary robustness required for a public building. A lightweight structure is proposed for the first floor. This becomes the aspirational

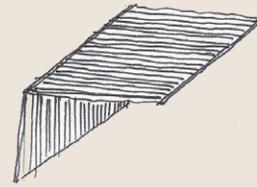
elements which attaches to the home anchor (Workshops 2018). The tectonic exploration is centered around what this element can become. A reinforced concrete base anchors the building, rooting it in the community as well as anchoring it in the poor soil conditions (discussions with engineer, Masters Research Group 2018).

8.2.2 / SECONDARY STRUCTURE

As the brick work became the home element in the design, a more lightweight structure was explored in contrast to this supporting element. A lightweight structure of interlocking roof sheeting becomes the aspirational element in the design. The roof profile draws on the familiar profile of home but adjusts according to how certain spaces need to be wrapped or extended. It also serves a functional purpose by ample allowing natural light and ventilation through the building nurturing learning environments. The structure is partly exposed on the interiors not only to continue to teach the users about the making of the building but the structure is also used to define certain spaces. The interior therefore becomes an extension of the exterior.

8.2.3 / TERTIARY STRUCTURE

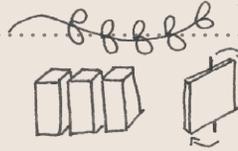
Hertzberger (2008:44) states that architecture holds significance by providing spaces of rich conditions in which children can not only learn about reading and writing, but also learn to explore the world. The tertiary structure further explores the concept of home versus aspiration. Elements, such as pathways, screens, adjustable walls and gardens are created as aspirational elements which encourage the learners of the campus to explore their world. These elements are also important in place-making (Resilience theory) and add to the spaces by creating better lighting, acoustic and ventilation conditions. The concept of home is explored through how each element can be adjusted by the user bringing a more personal aspect to a public building.



CONNECTIONS

'EXPOSE & TEACH'

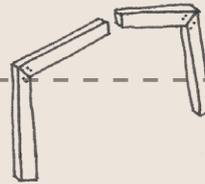
Fixing of different materials
Building as didactic



INFILL

'INSPIRE'

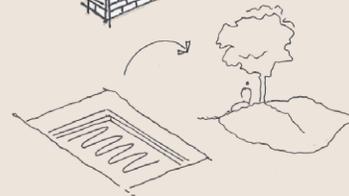
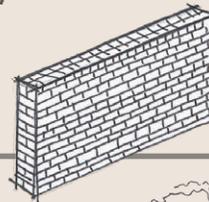
Non-structural components
Showcase versatility of brick



SUPERSTRUCTURE

'ANCHOR + SUPPORT'

Structural components
Load bearing brick walls
Tectonic quality of materials
Weathering & maintenance capacity



SUBSTRUCTURE

'GROUND + PROTECT'

Excavate & reuse soil
New foundations
Heat exchange system



EXISTING CONDITIONS

'REVEAL'

Retain all structural elements
Re-purpose demolished brick
Extend roof

Figure 8.35: Diagram of structure (Author 2018)

8.6 // MATERIAL PALETTE

The selected materials supported the tectonic intention by drawing inspiration from the local context as well as the materials used by the learners in the workshops. Brick is used as the predominant material as it is not only an extension of the local context, but it provides a sense of security to learners (Workshops 2018).



existing schools — existing site

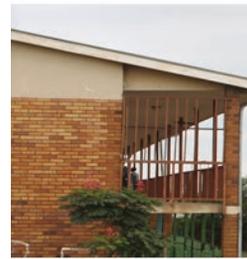
OVERHEAD

1. Safintra 0.5mm SAFLOK Colourplus AZ100 interlocking roof sheeting, Colour: Chalk
2. Treated timber structure
3. Treated timber pergola structure
4. Deciduous tree
5. Expanded insulation cork board



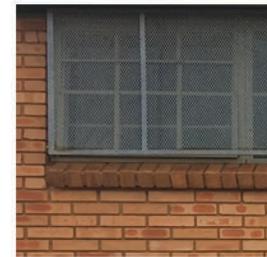
STRUCTURAL

1. Load bearing brick walls, Brick force every 5th course
Corobrik Roan Travertine
Corobrik Titanium Satin



INFILL

1. 230mm brick walls
Corobrik Roan Travertine
Corobrik Roan Satin
Corobrik Titanium Satin
2. Concrete blocks & bricks, made on site
3. Brick screens, planted walls
4. Safintra 0.5mm SAFLOK Colourplus AZ100 interlocking roof sheeting, Colour: Chalk



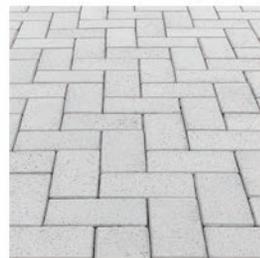
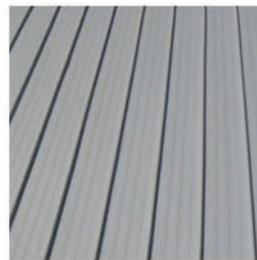
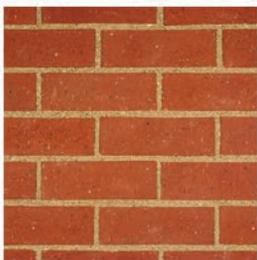
GROUND

1. Interior: 50mm screed polished corcolem floor
2. Exterior: Paving
Corobrik Cederberg Paver
Corobrik Burgandy Paver
3. Gravel
4. Planting



Figure 8.36: Materiality moving from the existing to the new (Author 2018, Images: Author 2018, Corobrik [S.a], www.pexels.com, Precedent studies)

new



8.6.1 / LANDSCAPE AS MATERIAL



Inspired design can transform and enrich our worlds. Taylor (2009:1) describes this as not only constructing beautiful buildings but also setting these buildings in thoughtfully transformed playgrounds called 'learning landscapes'. The outdoor environment was emphasized throughout the workshops as an important element. Trees and flowers were always big on the page, the majority of learners drew flowers in their artworks and parks were identified as favourite after school places. Mapping by the Department of Architecture Honours Studio 2017 and the Masters Studio 2018 indicates that open spaces usually lack ownership. The creation of grade specific courtyards not only creates a home base for learners but exposes them to the natural environment in the hope of cultivating and nurturing a care for the surroundings.

Food gardens are created surrounding the school. In the spatial layering of homes in Mamelodi, the kitchen mediates between the street and the more private bedrooms. The garden and food areas are therefore translated from this layering and

act as a mediator between public and private. The courtyard and landscape space also contributes to a variety of learning spaces by creating stimulating and nurturing environments. (Hertzberger 2008) The planting palette, as listed below, is proposed as it is low maintenance, uses small amounts of water, provides different colours throughout the year indicating the seasons and contributes to place making.

TREES

1. *Erythrina lysistemon* [Coral tree]

Uses: aesthetics, shelter for birds + animals
Flowers: August - September

2. *Celtis africana* [White stinkwood]

Uses: Drought tolerant- used for shading
Flowers: August - October

3. *Searsia leptodictya* [Mountain karee]

Uses: Drought tolerant, used for shading, attracts birds
Flowers: December - April
Fruit: March - June

4. *Harpephyllum caffrum* [Wild plum]

Uses: evergreen, attracts birds + butterflies, shading tree
Flowers: November - February

5. *Bolusanthus speciosus* [Tree Wisteria]

Uses: aesthetics, attracts for birds + animals, wood can be made into furniture
Flowers: August - January

SHRUBS

1. *Felicia amelloides* [Blue Felicia bush]

Uses: aesthetics, long flowering, little care needed
Flowers: throughout the year

2. *Dietes bicolor* [Yellow Wild Iris]

Uses: Fast growing, evergreen
Flowers: October - January

3. *Agapanthus praecox* [Agapanthus]

Uses: Fast growing, evergreen, medicinal plant
Flowers: December - January

4. *Chlorophytum comosum* [Hen & chickens]

Uses: drought tolerant, medicinal, soil erosion
Flowers: Summer months

4. *Grewia bicolor* [white raisin]

Uses: drought tolerant, medicinal, soil erosion
Flowers: October - March

HERBS (SENSORY GARDEN)

1. *Lavandula angustifolia* [Lavender]
2. *Rosmarinus officinalis* [Rosemary]
3. *Salvia officinalis* [Sage]
4. *Artemisia afra* [African wormwood]

CREEPERS

1. *Jasminum multipartitum* [Starry wild jasmine]
2. *Clematis brachiata* [Traveller's joy]

Figure 8.37 (opposite): Planting palette and colours (Author 2018, images from <http://pza.sanbi.org/>)





8.7 // ENVIRONMENTAL SYSTEMS & STRATEGIES

Climate change has been described by the UN Habitat (2016) as one of the greatest challenges of our times. It is noted that whilst climate change is a profound global issue, tackling this issue starts locally (UN Habitat 2016:16). With the built environment using about one third of the final energy in most countries (UN Habitat 2016:16), it is crucial that buildings are part of the solution rather than causing the problem. Environmental management and planning are essential to building resilient and sustainable environments.

This building explores a possible educational prototype for the future. It is therefore highly important that the building integrates into the context and the environment in order to teach the users about sustainability and encourage resilient development.

Auret (2015) stated that it is care that draws life into space and allows it to become place and have continuity therefore it is important that, through these systems, the user begins to care about place.

There is a link between space and learning (Hertzberger 2008). If schools are a reflection of a society (Bautista & Borges 2013) then this new urban campus needs to reflect a sustainable and resilient environment. The focus of the dissertation is therefore on efficient lighting and energy, good acoustics, local material and water strategies such as rainwater harvesting all of which contribute to a teaching environment where learners can mature into strong, resilient individuals (van Tonder *et al* 2015:1).

Figure 8.38 (opposite): Environmental systems & strategies concept (Author 2018, Resilience theory 67)

CREATING A LOVE & CARE FOR THE ENVIRONMENT



8.8 // CLIMATE CONSIDERATIONS

The consideration of climate conditions specific to a place is important in the built environment (Holm 1996). Mamelodi falls within SANS 204-2 climatic zone: Temperate Interior or the Northern Transvaal climatic zone as stated in Manual for Energy Conscious Design (Holm 1996). This means that the area experiences distinct rainy and dry seasons with a large daily temperature variation and strong solar radiation. Humidity levels are moderate. The summer rainfall season ranges from November to January with an average of 56,17mm.

Summer winds are predominately east-north-east to east-south-east with an average wind speed of 5-12 kilometers per hour. Winter winds are predominately south westerly followed by winds originating in the north east (Holm 1996:69).

The design aligns with the seven principles outlined by Schmidt et al (2013:104) for an appropriate design response in a temperate interior region:

- 1 / Passive solar principles
- 2 / Maximise north facing walls and openings in habitable spaces with

- passive solar access
- 3 / Minimise glazing on eastern and western facades
- 4 / Use adjustable shading elements
- 5 / Use cross ventilation and passive cooling for summer
- 6 / Use convective ventilation and heat circulation
- 7 / Use reflective insulation to keep out summer heat (Schmidt et al 2013:104).

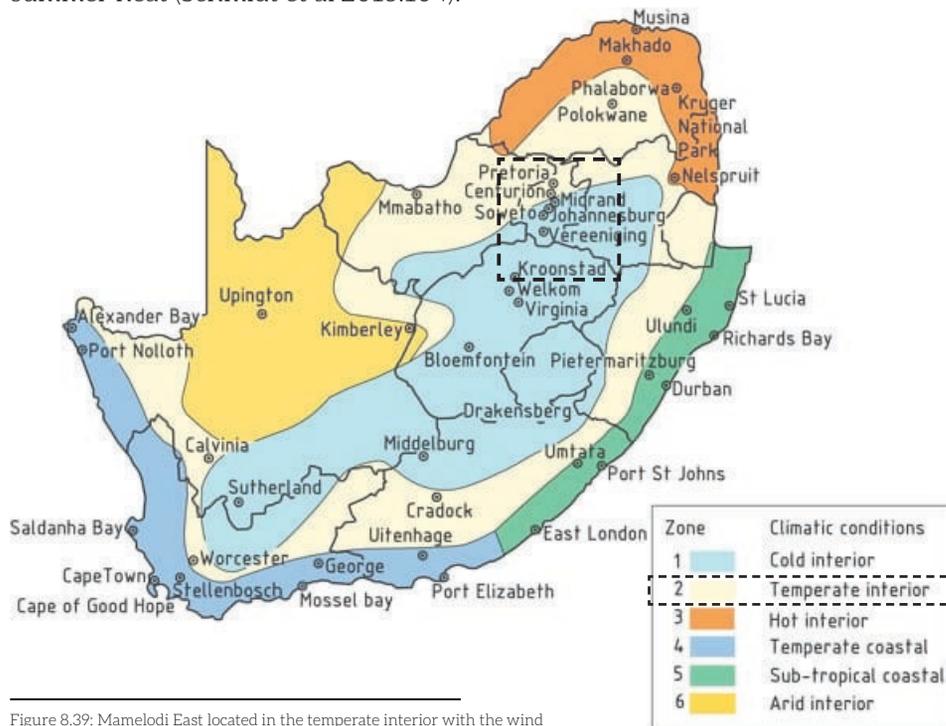
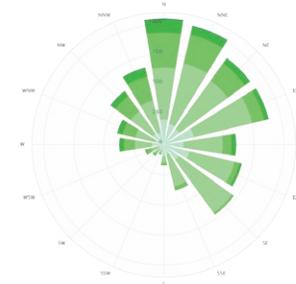


Figure 8.39: Mamelodi East located in the temperate interior with the wind rose for zone two (<https://www.homeinsulations.co.za/sans-10400-xa/>)

8.8.1 / REQUIREMENTS



FUNCTION <i>* see programmatic requirements on page</i>	m ²	WATER DEMAND <i>Litres/day</i>	RAIN WATER HARVEST CONTRIBUTION	ENERGY DEMAND <i>Watts/day</i>	SOLAR ENERGY HARVESTING	PASSIVE SYSTEM
Library - 5 full time staff members	599	15l/per person	Roof catchment: 599 Surface catchment: 226	Lighting = 840 Equipment = 40000		50 computer powered by solar Natural ventilation
Classrooms - 750 daily students - 50 teachers	3425	15l/per person (CSIR 2000b:21)	Roof catchment: 3425 Surface catchment: 2500	Lighting = 2800 Equipment = 480	PV Panels PV Panel Size: 958x680x34mm Energy (Wh/da) 270Wh Cost R4650/panel Batteries: 24 x 1600 Total panels installed: 60 Total energy generated: 16200Wh/day	Solar powered lighting Earth tubes Natural ventilation
Spaza shops - 10 full time staff members	430	15l/per person	Roof catchment: 430 Surface catchment: 1250	Lighting = 280 Equipment = 1000		Natural ventilation Solar powered lighting
Community Centre - 50 daily users - 100-150 for events	1064	65 l/per person (CSIR 2000b:21)	Roof catchment: 1064 Surface catchment: Combined with spaza	Lighting = 840 Equipment = 1000		Solar powered lighting Natural ventilation
Workshops - 50 daily users	700	5l/per person (CSIR 2000b:21)	Roof catchment:700 Surface catchment: 250	Lighting = 1120 Equipment = 20000		Solar powered lighting Earth tubes Natural ventilation
Cafeteria - School learners	600	15l/per person (CSIR 2000b:21)	Roof catchment: 600 Surface catchment: 350	Lighting = 2800 Equipment = 60000		Solar powered lighting Natural ventilation Gas for cooking from biodigester
Creative hub - 20 daily users + learners	1576	15l/per person (CSIR 2000b:21)	Roof catchment: 1576 Surface catchment: Combined with spaza	Lighting = 840 Equipment = 480		Solar powered lighting Natural ventilation
Greenhouse	580	6850m ³ /month	Roof catchment: 580 Surface catchment: 350	Lighting = 200 Equipment = 1500		Biodigester Cooling towers

ANNUAL AVERAGE YIELD: 8661.22 m³

ANNUAL DEMAND: 7527.5 m³

AVERAGE VOLUME IN TANK: 385 m³

BIGGEST VOLUME NEEDED TO HOLD:

600 m³ (60 000 litres)

TANK FARM:

6 x 10 000 litre Jojo tanks needed

2200 diameter, 3150 height

Colour: Winter grass

Sources:

<http://ecotechenergy.co.za/calculator/EnergyCalculator/xlsx>

Bruinette 2016

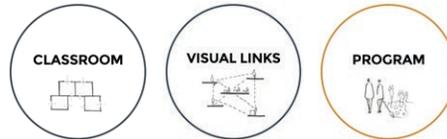
CSIR Red Book

Pieterse, F. 2015. AAL320 Water Budget Lecture. Pretoria:

University of Pretoria.

**See appendix for full calculations

8.9 // LIGHTING



Lighting in a learning environment is of utmost importance as it is critical to the performance of students (Samani 2015:129, Lyons 2001). Since learners and teachers spend a large portion of the day in the classroom, illumination within this space is important for determining the learners productivity and well-being (Samani 2015:129). Insufficient lighting can lead to problems such as eye straining, decreased attention span and hyperactivity (John & Timothy 2015 in Samani 2015:130, Lackney 2003:25). Poor lighting was identified as one of the problems in the current classrooms and further emphasized in the Sefeira modeling.

As a result of this, the building is orientated to ensure optimal northern exposure. North-facing walls and openings are maximised to ensure natural light as well as a connection to the courtyard space and the Magalies Mountain range. Shading elements are implemented on northern and southern openings to exclude direct

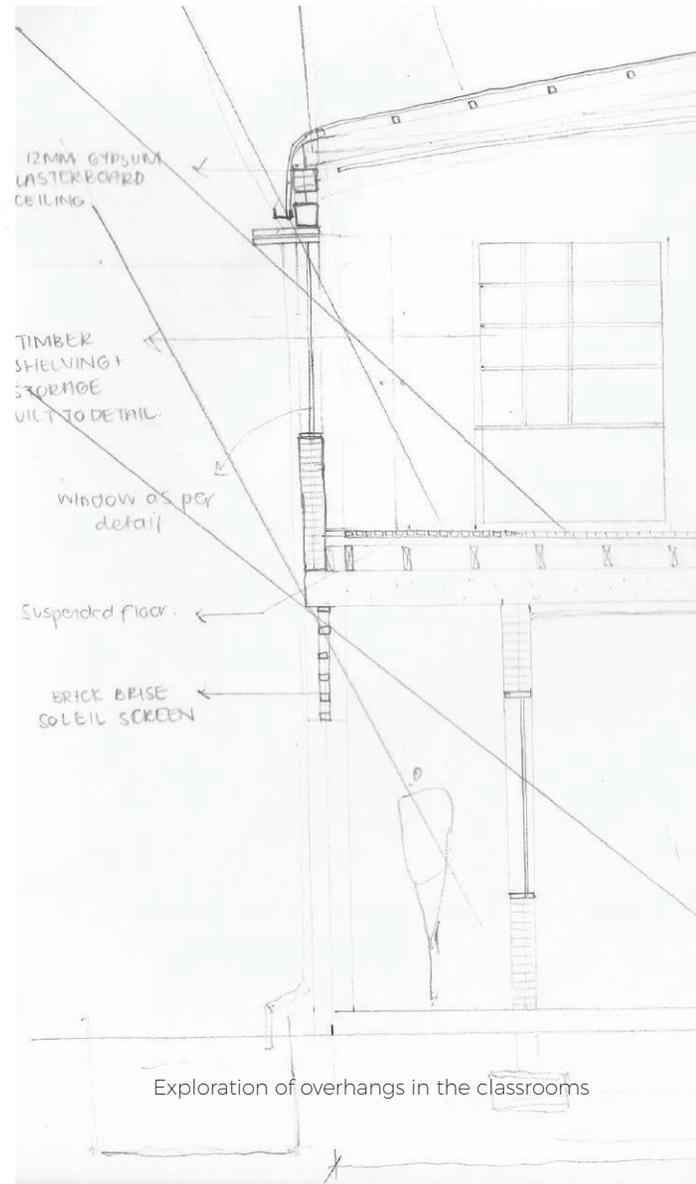
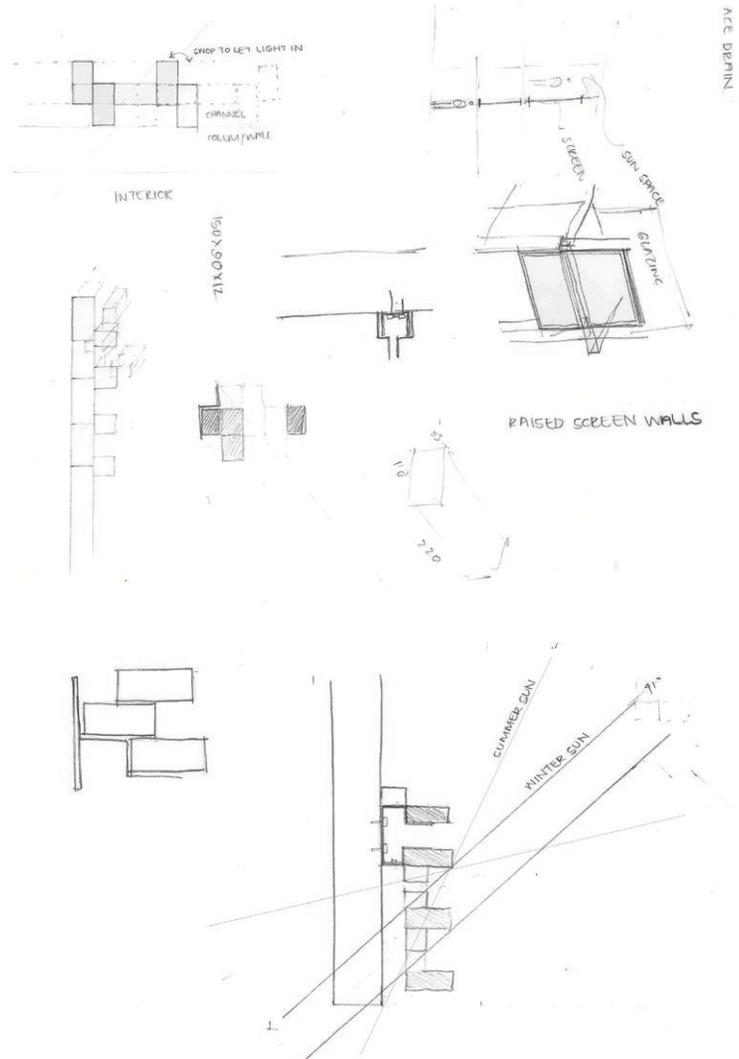
summer sun and include winter sun. Eastern and western facades are screened to assist with heating and cooling. These screening elements also assist with way finding.

A well lit classroom, according to Pulay (2010) and Benya (2010) (in Samani 2015:132) includes glare control, balanced brightness, higher reflectance ratings and an accent on the focal wall. As natural light is essential in a learning environment, the building is elongated along the east-west axis to maximise the amount of daylight. Daylight is also brought in from two different directions to minimise glare in the classroom (East Coast Architects 2015).



Figure 8.40: The many aspects of light (Author 2018)
Figure 8.41 (opposite): Development sketches to allow for natural light (Author 2018)

Brick brise soleil exploration - letting winter sun in but preventing direct summer sun



8.9.1 / SEFERIA TESTING

Spatial daylight autonomy [sDA]:

This indicates the percentage of area that receives a usable amount of daylight to conform to the required lux levels [400 lux for learning areas, 300 lux for office areas] (Schroen 2015).

Annual Sun Exposure [ASE]:

This factor helps to identify whether a space is subject to over or under-lighting. (Schroen 2015)

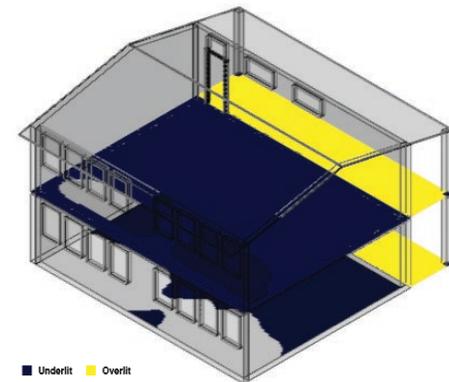
Seferia™ software is used to determine the differences in iterations, aiming to improve the amount and quality of natural daylight whilst eliminating glare. The amount of natural daylight entering the space is evaluated based on the Spatial Daylight Autonomy (sDA) figure. Glare percentage is tested through direct sunlight simulation and annual sun exposure (ASE) (Seferia 2018).

The Leadership in Energy and Environmental Design (LEED) and the Green Building Council of South Africa optimal values were used as benchmarks in the assessment (LEED 2017).

sDA > 75%
ASE < 10%

BASELINE MODEL

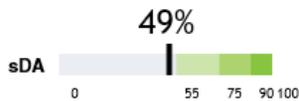
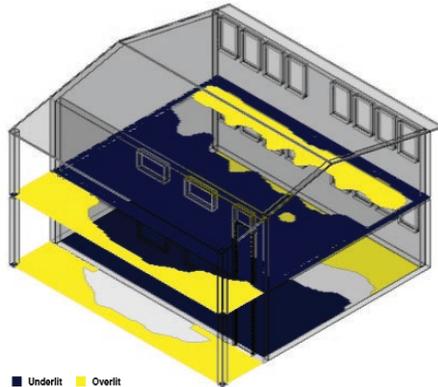
An existing standard classroom, modeled from a classroom at Gatang Secondary School) was used as the baseline. The results below indicate that the classroom is highly under-lit.



Figures 8.42-8.8.46: Iterations of Seferia lighting analysis (Author 2018 from Seferia 2018)

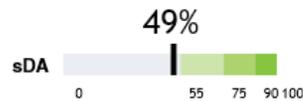
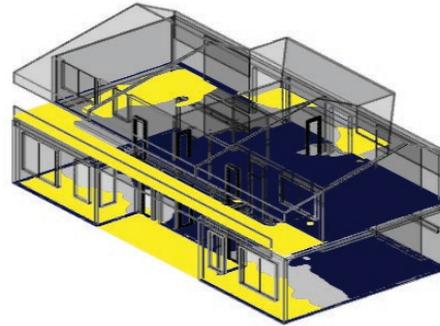
ITERATION ONE

The windows in the schools in Mamelodi are incorrectly orientated for both lighting and ventilation. The first iteration therefore orientates the building correctly - with larger northern windows and smaller southern windows. Whilst the usable daylight increased, the glare also increased due to the lack of shading.



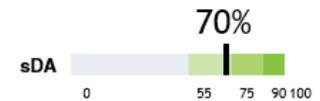
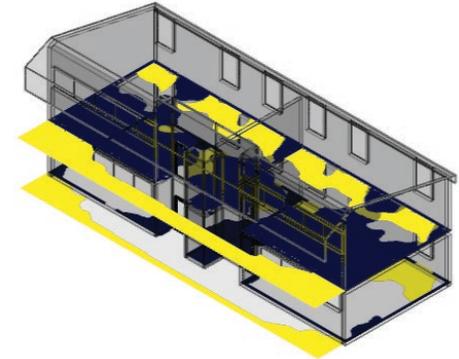
ITERATION TWO

Iteration two consider other ways to bring in natural light through the extension of the classroom beyond the 'house' envelope. Shading devices to minimise glare were also considered. Glare was minimised slightly, however, the sDA did not improve indicating that better placed glazing is needed.



ITERATION THREE

Iteration three developed on the previous model by increasing the amount of glazing. The sDA increased significantly, although is still under the required 75%. The glare is also too high, however, shading was not analysed in this model.



8.10 // ENERGY



Cities account for between 60 and 80 percent of energy consumption and generate about 70 percent of all human-induced greenhouse gas emissions through the consumption of fossil fuels for energy supply and transportation (UN Habitat 2016:16). The buildings we create affect this energy consumption. Various different heating, cooling and ventilation strategies were explored. To ensure a resilient approach, and one that works with nature, the system needs to have a low environmental impact and a feasible life-cycle (Resilience theory).

Earth tubes are used as both a heating and cooling system. In summer, the system extracts and filters air from the exterior, drives it through underground tubes that allows the air to assume the cool constant temperature of the soil, after which it is supplied to lecture halls and classrooms in regular air interval changes. In winter, the soil is warmer than the outside air therefore warmer air is supplied to the interior spaces (ASHRAE 2011).

8.10.1 / HEATING

Thermal comfort has been shown to

influence task performance, attention spans and physical health (Lackney 2003:26). With teachers and learners spending the majority of the day at school, it is of utmost importance that the school is a healthy environment.

Larger windows on the northern side, which are shaded, allow for winter morning sun penetration which heats the backs of the learners. Heat is supplied to interior spaces in the early mornings in cold seasons, through dedicated radiators within the interior walls (East Coast Architects Precedent). Workshops are heated in the winter afternoons by circulating liquid heated in solar collectors throughout the morning. The space is heated via radiation. (ASHRAE 2011). The heat exchanger is located on the roof of the workshops.

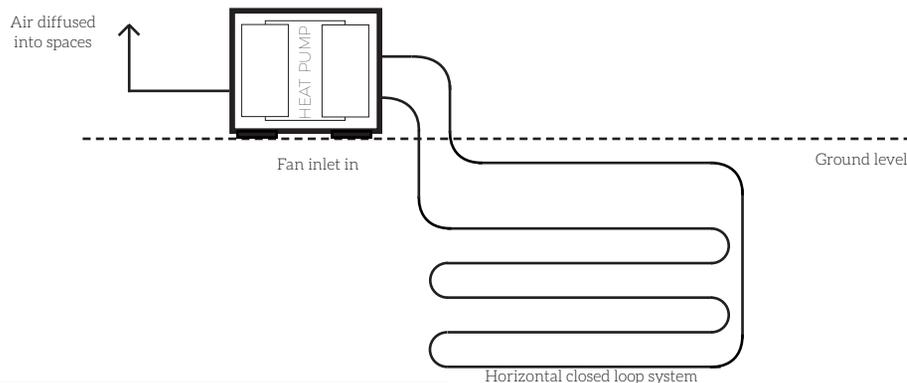


Figure 8.47 (above): Geothermal system (Author, adapted from <https://www.raleighheatingandair.com/geothermal>)

8.10.2 / COOLING & VENTILATION

For a fully naturally ventilated building, free area openings are required to be 5% of the floor area, equally distributed to enhance cross flow as per SANS 10400-O:2011. Larger windows on the northern facade and higher windows positioned on the southern side of the classroom make use of the natural occurrence of hot air rising to draw air through the space and out the higher windows.

Hot air is extracted through passive-assisted stack effect created at the highest point of interior spaces. The building is orientation around courtyards which cools the air before it moves into the classroom blocks.

8.10.3 / BIODIGESTER

The creation of the food process is a closed loop system and this should be evident to learners in order to fulfill its didactic purpose. A biodigester is implemented in order to show how food waste can become useful for the school. Biodigesters decompose organic material through the use of bacteria in an anaerobic environment. They allow for a self-sustaining alternative energy generating process which allows the campus to be less dependent on grid electricity (Biogas S.a). A biobag digester kit is implemented in the school. These are a simpler, more practical and

cost-effective type of digester. It is easy to install and requires only semi-skilled labour therefore can be implemented and operated by the community themselves. The kit from BiogasSA includes a 1000g/m2 reinforced, bacteria and UV resistant PVC cylindrical balloon digester, 30m of gas piping and fittings, a desulphurizer, pressure release valve and a small in-line gas pressure pump (Biogas S.a). The creation of energy, as well as up-skilling the local community, adds a level of sustainability and empowerment to the campus.



Figure 8.48 (above): Diagram of air movement through classroom blocks (Author 2018)

CALCULATIONS

Kg of waste produced x 0.05 = total gas produced
 (0.16 x 800 people) x 0.05 = 6.4

Total gas x 19 = MJ
 6.4 x 19 = 121.6MJ
 [1 m³ = 19 Mega Joules (MJ)]

Convert to KWh by dividing by 3.6
 121.6/3.6 = 33.7KWh

33.7KWh generated per day

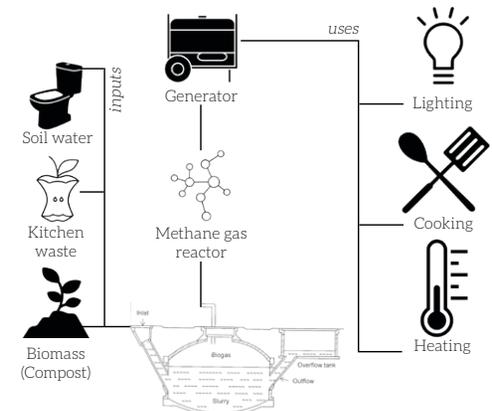


Figure 8.49 (above): Biogas system (Author, adapted from BiogasSA)

8.10.4 / SOLAR ENERGY

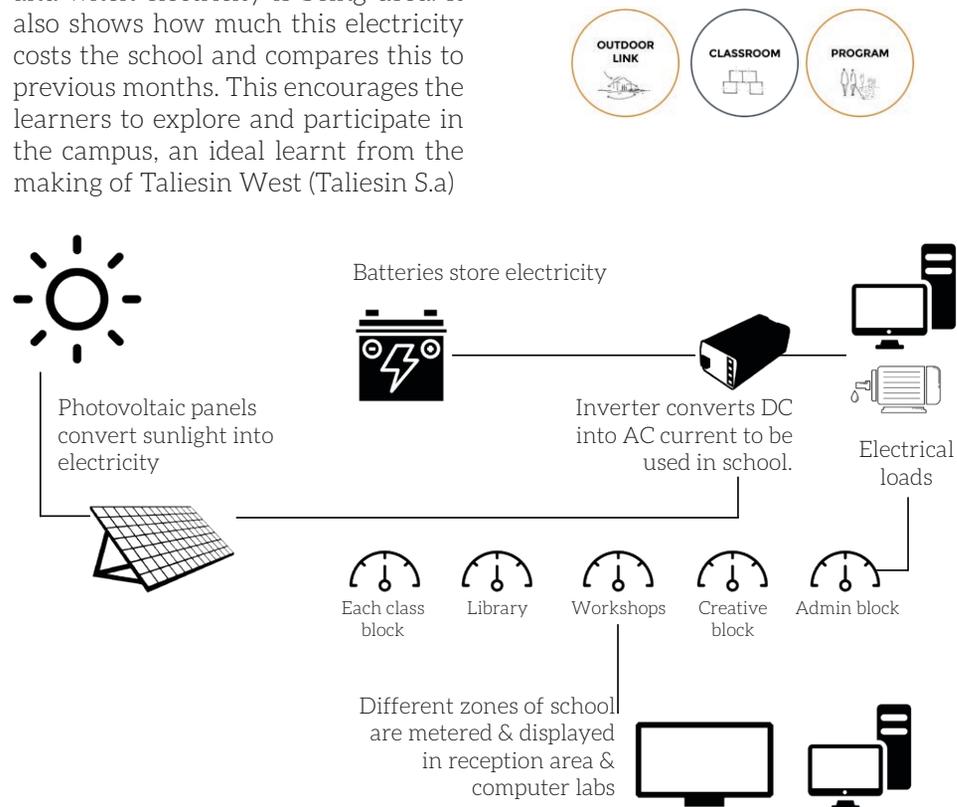
If consumption of fossil fuels for energy consumption (UN Habitat 2016:16) is to decrease, then passive energy collection is needed. Most areas in South Africa average 2500 hours of sunshine per year therefore solar energy is a readily available, renewable resource (Department of Energy 2018). A grid interactive system is used where photovoltaic cells on the northern facing roofs convert the sun's radiant energy into electricity which is then stored in batteries. The roofs of the urban campus are ideal for solar panel installation as they are exposed to maximum sunlight without being visually obtrusive. A battery room, located in the electrical workshop, allows for central distribution, adequate storage, ventilation and access as well as being a learning device within the workshop. An inverter converts the DC current into AC current which can then be used in the school. This teaches the learners about harnessing the sun's energy to create a resilient environment (Sinetech 2018)

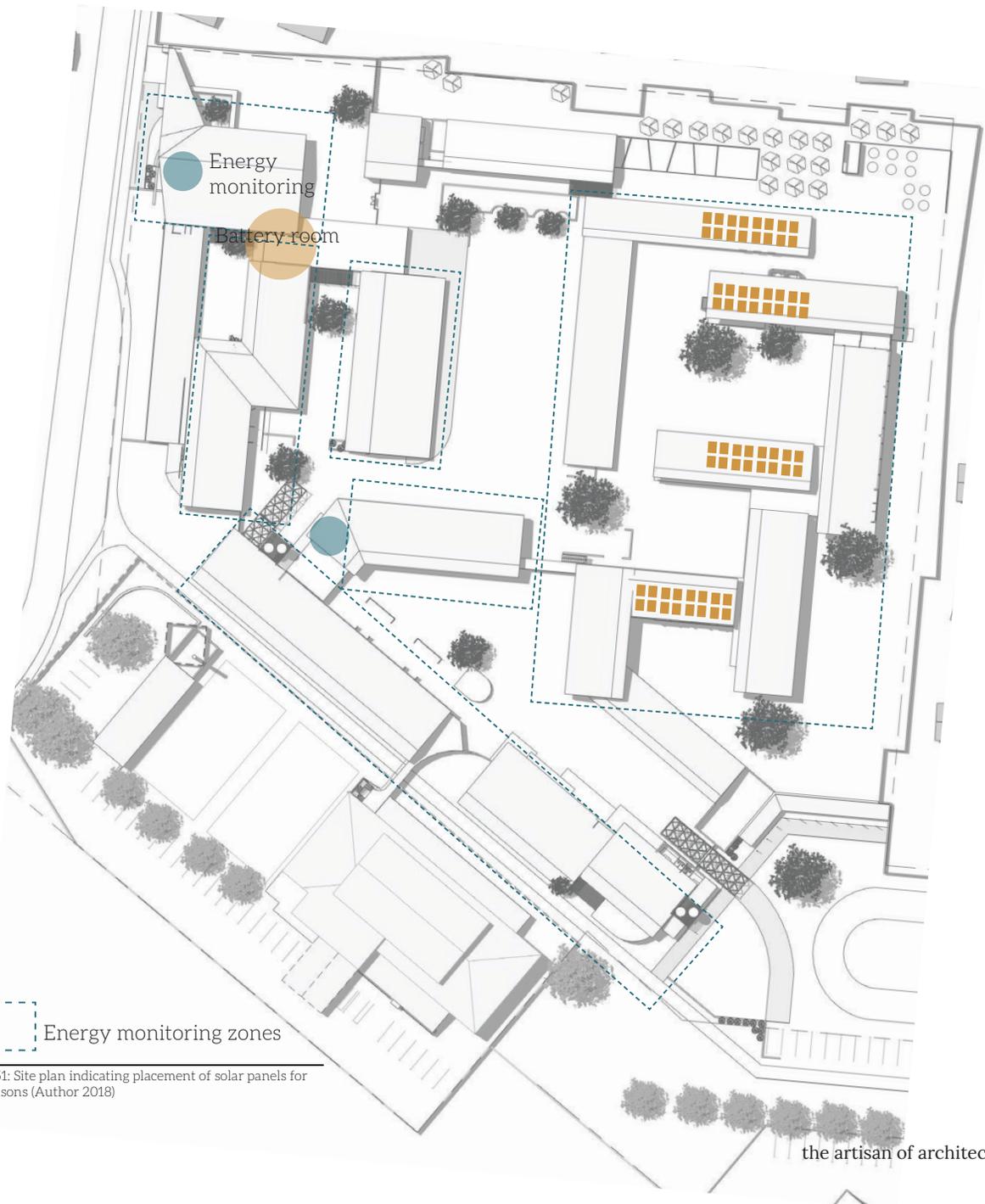
Figure 8.50: Solar energy system (Author 2018, adapted from East Coast Architects 2015 & Sinetech 2018)

8.10.5 / ENERGY MONITORING

The concept, 'Space as the fourth teacher' is further translated into teaching the users how the building works. A system for energy monitoring will be installed to create awareness about energy consumption and to help the school reduce electrical energy costs. The system works by informing where and when electricity is being used. It also shows how much this electricity costs the school and compares this to previous months. This encourages the learners to explore and participate in the campus, an ideal learnt from the making of Taliesin West (Taliesin S.a)

Public display screens in the reception and library show this information. A local website could also be developed which would provide information for the management team as well as learners to use in projects. This system was successfully implemented in the Vele Secondary School (East Coast Architects 2015).

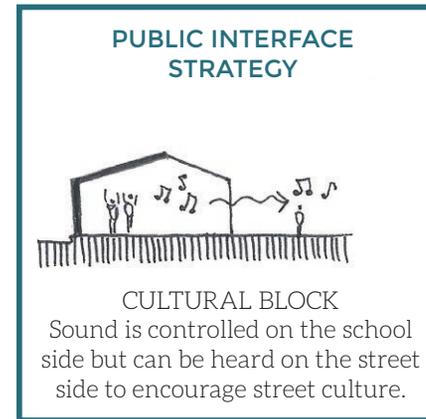
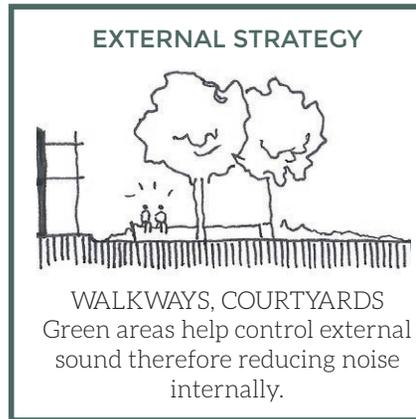




Energy monitoring zones

Figure 8.51: Site plan indicating placement of solar panels for safety reasons (Author 2018)

8.11 // ACOUSTICS



Noise control within the classroom environment is a relevant aspect of school design in South Africa (Van Reenen 2017:2). Learners in Mamelodi, according to the workshop on thresholds, are arranged in the classroom according to their marks with the learners with the highest marks seated at the front of the classroom and those with the lowest marks seated at the back. With up to 40 learners in a classroom in Mamelodi, it is essential that the learning environment is conducive to effective learning as the learners at the back of the classroom need access to the same fair, equal and

barrier free education as set out by the Department of Education (2013).

75% of the school day involves listening activities therefore it is logical that a noisy environment will have a big impact on the learner's reception of instruction, particularly those with sensory, language or learning disabilities (ASHA, Van Reenen 2017:2). It was observed in the workshops that when the class started to get loud that some learners would battle to concentrate and would continuously ask the others to keep quiet. This is a distraction from work and decreases teaching time (Lackney 2003:27).

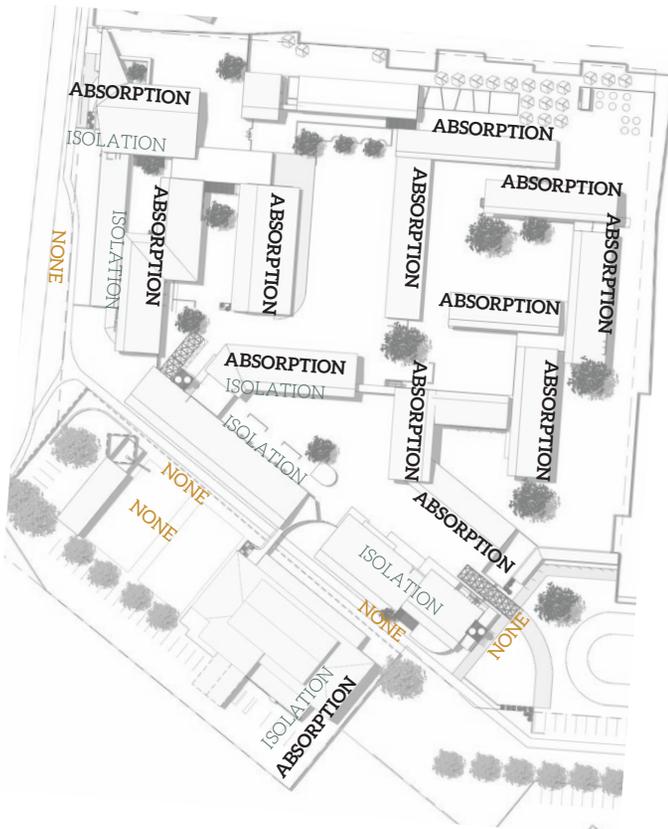
Learners also expressed that the most important rule in their school classrooms was when the teacher said,

“First rule” they would all need to keep quiet. This indicates that acoustics within current schools are a problem.

International guidelines indicate that the ideal ambient noise level is 30-35dBA with the ideal reverberation time of 0.4-0.6seconds. South African regulations say very little about reverberation time but indicate that the ambient noise level should be between 30-50dBA (Department of Basic Education, Van Reenen 2017:2). SANS 10103: 2008 indicates the ambient noise levels in a classroom should be a maximum of 40dBA.

Figure 8.52 (above): Acoustic approach (Author 2018, adapted from discussion & lecture by van Reenen 2018)
Figure 8.53: Relation to workshops (Author 2018)
Figure 8.54(opposite): Acoustic approach to different spaces within the campus (Author 2018, adapted from discussion & lecture by van Reenen 2018)
Figure 8.55 (opposite, right): Classroom acoustics (Author 2018)

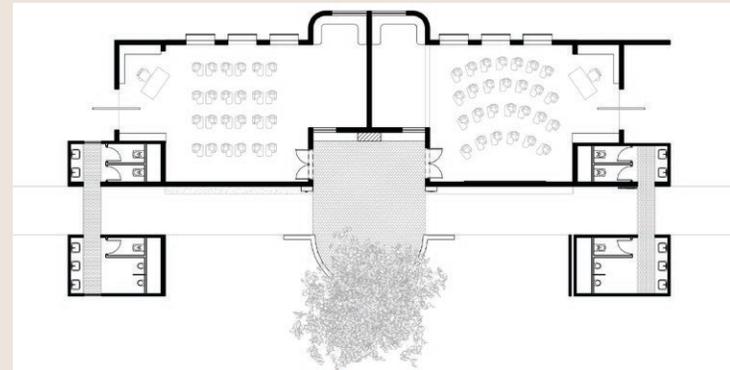
Isolation of sound refers to keeping sound out of a space. Absorption of sound refers to the need to control sound within a space. Reverberation is the rate of decay of the sound once the source has stopped (Van Reenen 2018). Material choice, placement of program and orientation was therefore an important part in the consideration of these aspects within the classroom.



CLASSROOMS ABSORPTION & REVERBERATION

Control sound within

It is important for the learning environment to control sound within the classroom (Van Reenen 2017:2). It is less important to isolate sound as the courtyards should only be noisy at break when the classrooms are not being used



Reverberation time in classroom with no acoustic materials (e.g. plywood): 0.71 seconds

This is 0.11 seconds higher than the guidelines. The addition of plywood furniture and panels in the group discussion areas decreases this time.

Source:

<https://www.omnicalculator.com/physics/reverberation-time>



1. CEILING FINISH
Insulation corkboard
R= 0.48 seconds
Thickness=40mm



3. FLOOR FINISH
Corcolem
R=0.26 seconds
Thickness=50mm



2. WALL FINISH
R=0.5 seconds
Thickness=220mm



4. FURNITURE
Plywood

8.12 // WATER



"Nature, water, food and people are inseparably entwined in our vulnerable landscapes" (WWF 2016:2).

The current droughts are a taste of the future (WWF 2016:2). With thirty-seven percent of urban piped water leaking from the systems, it is clear that there needs to be a rethink of how water works in the built environment (WWF 2016:48). Resilient cities of the future need to reduce water pollution and re-integrate the water cycle back into town planning (WWF 2016:48).

Since landscape is an essential element in the design, the sustainability of this becomes crucial. 'Greening' of the built environment through softer, living surfaces such as gardens is important to recharge the ground water system and reduce pollution, however, these green spaces need to be sustainable otherwise they become dirty, hard surfaces once again (WWF 2016:48). The collection of water therefore is important for the sustainability of the courtyard spaces and gardens within the urban campus as these spaces require irrigation.

The focus is on reducing water

usage, loss and waste. The water management plan includes the effective harvesting of rain water, runoff filtering and treatment of greywater. Black water and water that cannot be reused will be directed into the municipal sewer system. A tank farm at the lowest point of the site and header tank raised at the top end of the site are used for the storage of the water. There are two systems of water evident in the urban campus:

Firstly, potable water is supplied via filtered and purified water system that is collected from the roofs. This can be supplemented by the municipal water system. Water collected from the roofs is filtered through a bio-filter which consists of a layered system of sand, plant, gravel and stone. After the filtering process, water is pumped through a UV filter to kill any pathogens present. The water can be used for cooking and for water in the hand wash basins thereafter.

Secondly, surface run off and grey water from the kitchen and bathrooms is transferred to the grey water treatment system. First, a covered channel prevents larger debris from entering the system. The channel is directed to an underground grease trap. The filtered water stored in the tank farm at the bottom of the

site. Solar powered pump systems then pump the stored water into header tanks where it is distributed to bathrooms for flushing of toilets or for irrigation purposes.

Landscape design is proposed to reduce runoff. A drip irrigation system is proposed for the vegetable gardens as it allows a limited volume of water to be distributed without being wasteful. The combination of water access and food production in an educational environment provides future generations with a culture of environmental sustainability (WWF 2016:69). The design also proposes low consumption fittings and appliances to reduce the volume of water needed.

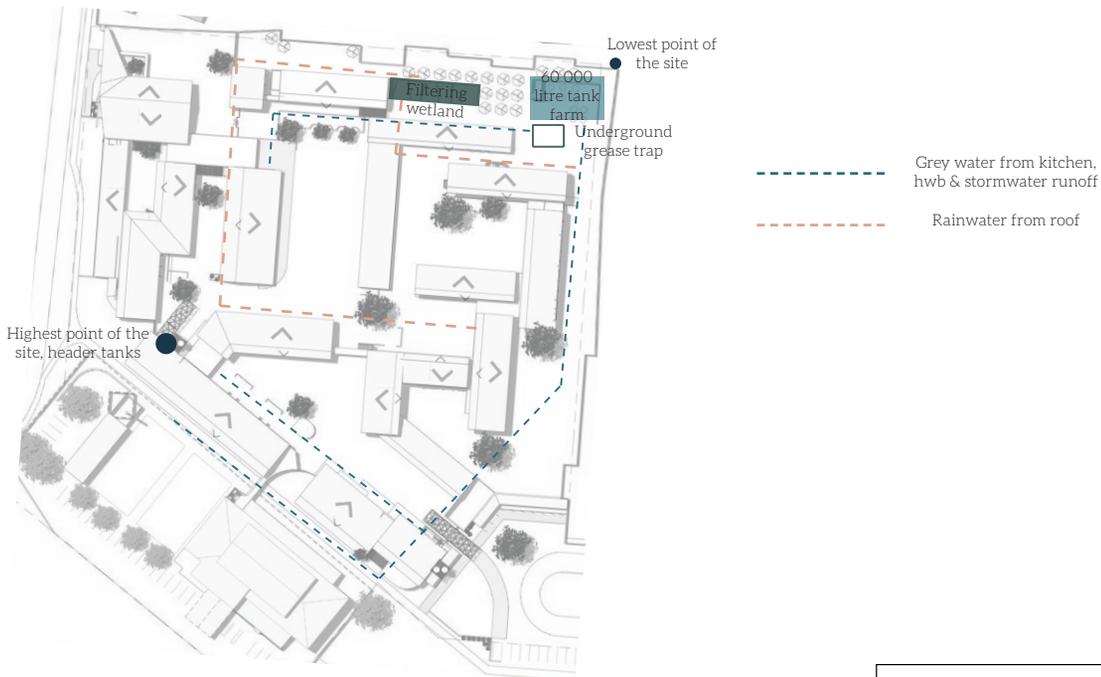
ANNUAL AVERAGE YIELD: 8661.22 m³
ANNUAL DEMAND: 7527.5 m³
AVERAGE VOLUME IN TANK: 385 m³
BIGGEST VOLUME NEEDED TO HOLD:
600 m³ (60 000 litres)
TANK FARM: 6 x 10 000 litre Jojo tanks
needed

See Appendix for full calculations

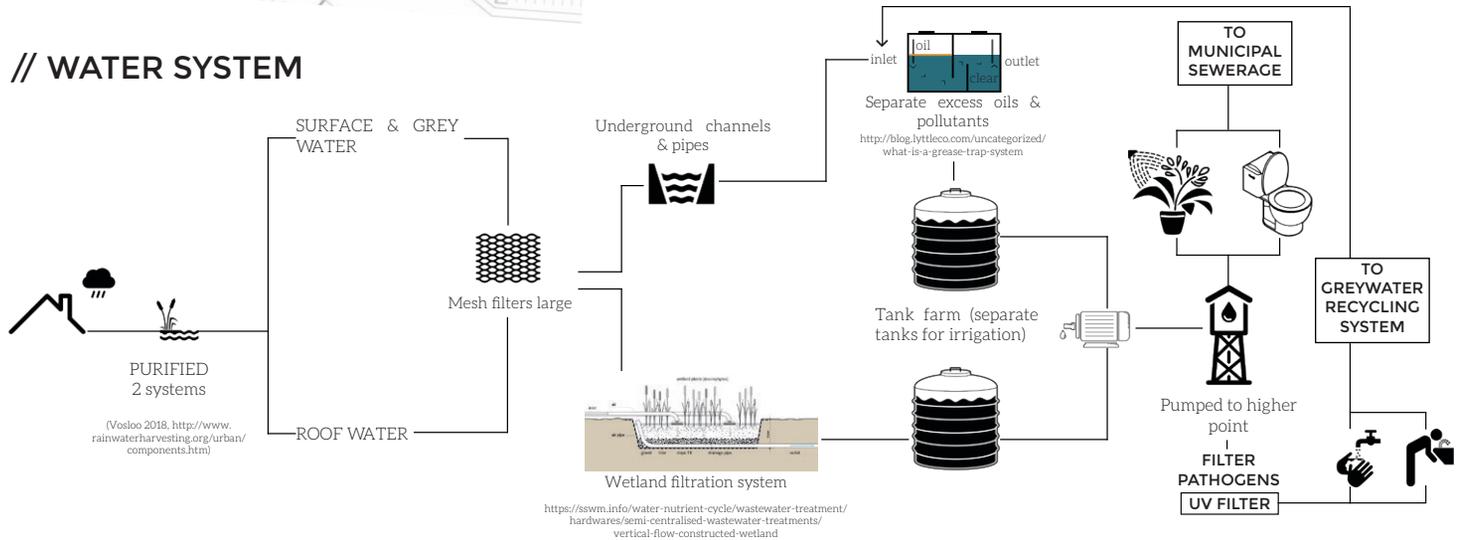
Figures 8.56: Diagrams showing water systems to be implemented in the school (Author 2018, adapted from <http://www.rainwaterharvesting.org/urban/components.htm> & <https://www.jojotanks.co.za/water-storage-solutions/water-storage-solutions-rainwater-harvesting-above-ground/>), <https://sswm.info/water-nutrient-cycle/wastewater-treatment/hardwares/semi-centralised-wastewater-treatments/vertical-flow-constructed-wetland>, <http://blog.lyttleco.com/uncategorized/what-is-a-grease-trap-system> Icons: www.thenounproject.com)

Figures 8.57: Site plan showing water flow (Author 2018)

// WATER COLLECTION



// WATER SYSTEM

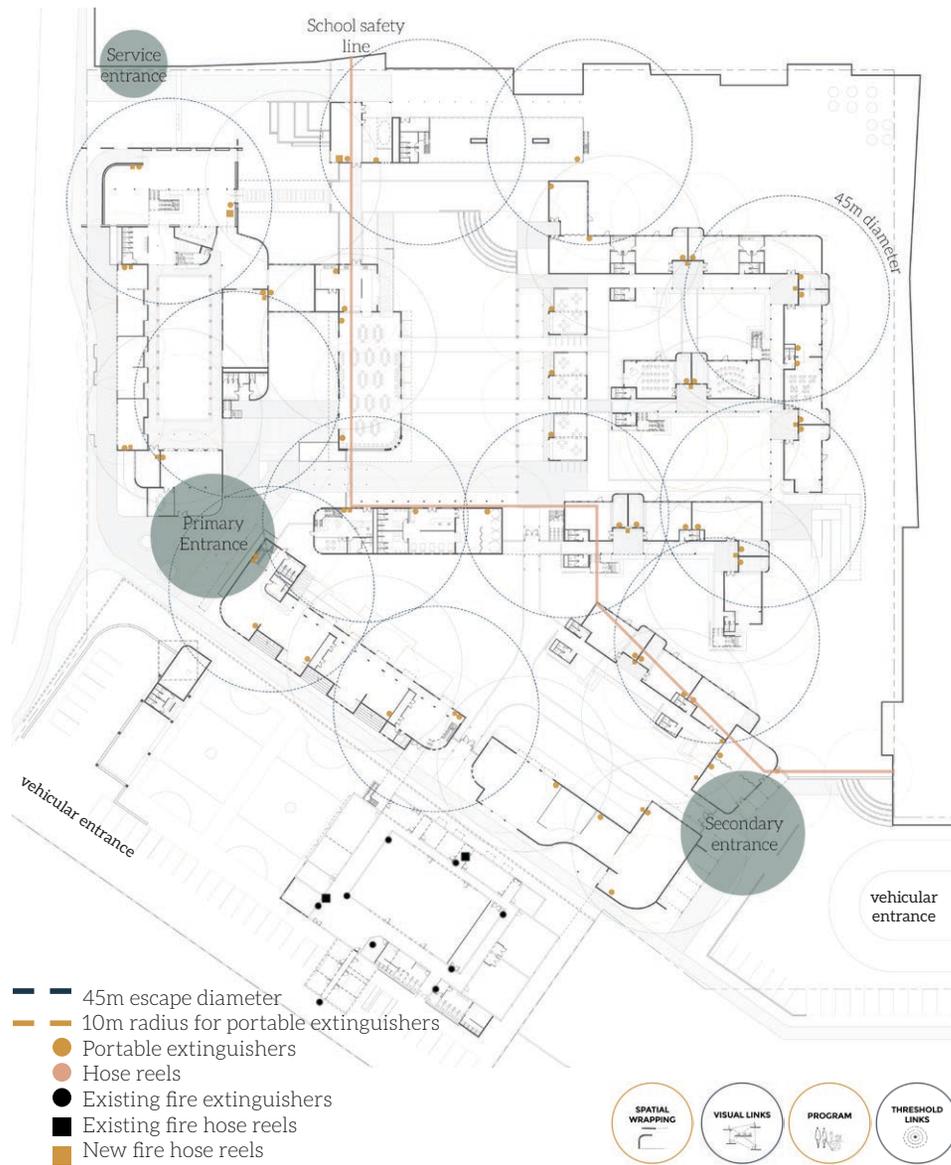


8.13 // SAFETY

Safety is of utmost importance in a school. A theme that emerged from the workshops was safety. This was seen through different aspects. Firstly, as discussed in the classroom section, it was revealed in the way learners use the classroom. Secondly, it was revealed in the mapping of schools. Learners expressed a concern when entering the schools as the entrances are often small and concealed. The younger learners are scared off by older learners who hang around in these areas. Lastly, in the precedent analysis learners did not like schools if they lacked fences as there was no way to enclose the school. A layered approach, with several thresholds, is adopted to address security concerns.

Safety does not only encompass physical barriers but also concerns such as fire. The design considers fire escapes and hose reels that are a part of the design rather than being added after completion. Being an integral part of the school teaches the learners about fire safety in their environments. According to SANS 10400 the requirements are:

- Fire hydrants:
- Portable extinguishers (10m radius)
- Hose reels (20m radius)
- Primary escape route (not more than 45m)
- Secondary escape routes



8.14 //SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT)

A sustainable performance rating is done after the architectural intervention to analyse the impact of the building on the surrounding environment and community as well as compare to the existing community centre on site. The Sustainable Building Assessment Tool (SBAT) provides an overview in the three categories of sustainability: social, economic and environmental.

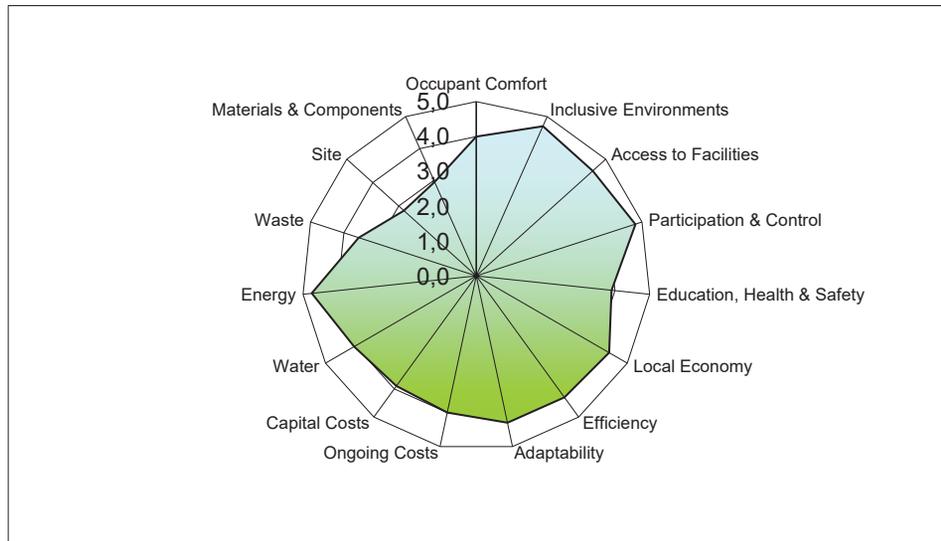
The SBAT rating increased from 2.1 out of 5 for the existing community centre to 4.1 out of 5 for the new intervention. The building scored high in the social sector due to the overlapping of social networks within the building. The spaza shops, small businesses as well as the taxi stop add to the building's economic sustainability by strengthening these networks.

The building scored low in terms of waste and site. These aspects provide room for improvement and further iterations which could investigate the use of recycled materials and previously developed sites.

SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) VI

PROJECT

Project title: Ikageng Community Centre
 Location: 144 Molokoloko Cir, Mamelodi, Pretoria, O
 Building type (specify): Community Centre
 Internal area (m2):
 Number of users: 800
 Building life cycle stage: Operation

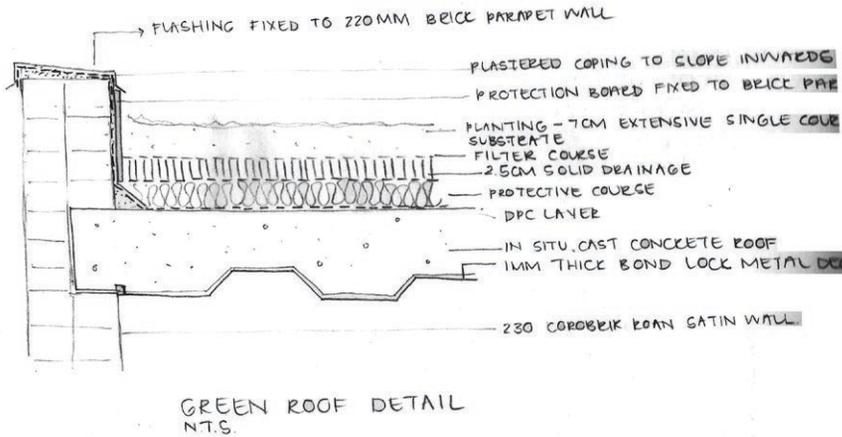


Social	4.4
Economic	4.2
Environmental	3.6
OVERALL	4.1

Figure 8.58 (above) : SBAT analysis (Author 2018)
 Figure 8.59 (opposite): Plan with safety information (Author 2018)

8.15 // DETAIL EXPLORATION

Green roof detail - used as a connecting element



Greenhouse - exploration of how it 'dissolves' into the landscape

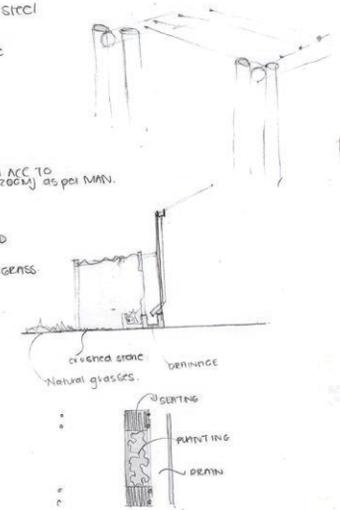
Jasminum multipartitum } acceper
 Clematis brachiata }
 trained to grow up trellis structure

SUPPORT

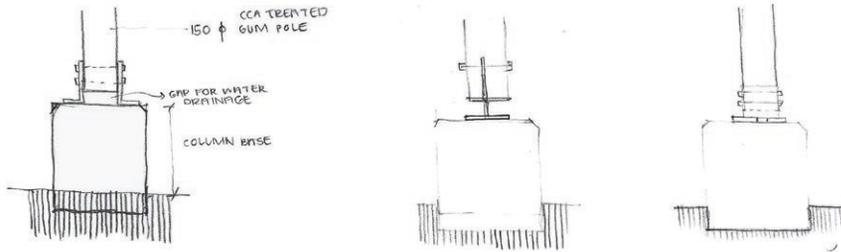
4mm diameter galvanised steel cable @ 150mm intervals, threaded along gum pole beam, through eye bolt + crimped ends.

GRASS PLANTING BLOCKS

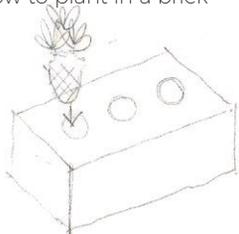
600x400x100mm BOSUN CONCRETE GRASS BLOCK, LAIN IN ACC TO SANS 1200K) as per MAN. PAVERS, LAID TO MIN LONG FALL OF 1%, TRANSVERSE FALL 2% ON 25MM COMPACTED SAND WITH FINE JOINTING SAND SWIPT INTO JOINTS GRASS BLOCKS TO BE PLANTED WITH LM GRASS STRETCHER BOND.



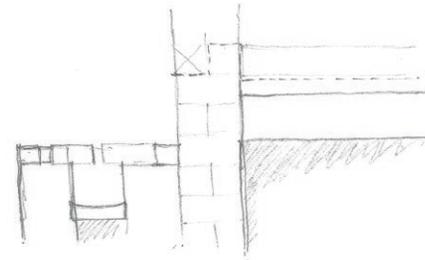
Timber column footing exploration



How to plant in a brick



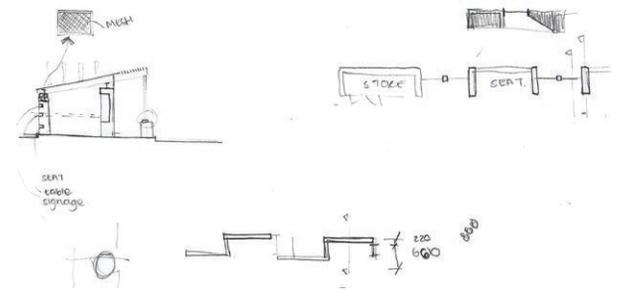
Drainage channel exploration - use of brick



Exploration of the screen to hide toilet fittings



Thickened walls - how a wall can become seating and storage



Attach - the intention for this structure is to be light weight. Exploration into the use of CNC timber

△-STABILITY
WELCOME

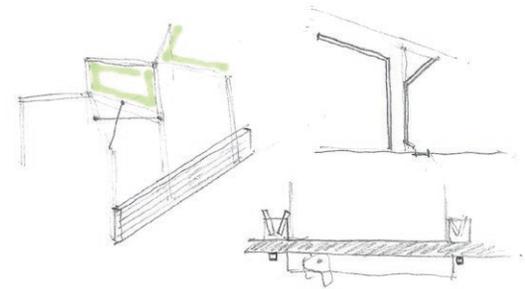
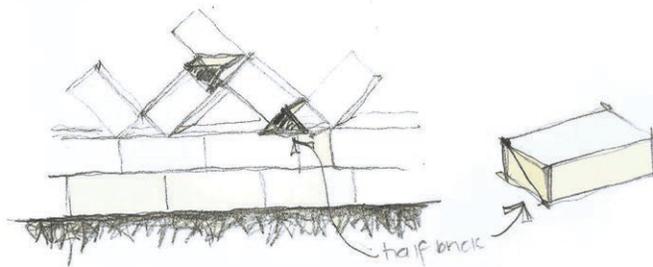
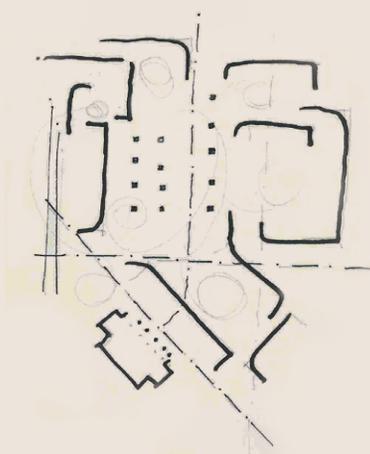


Figure 8.60: Detail exploration sketches (Author 2018; adapted from SANS 10400 Building Regulations South Africa, Architective, Constuction Primer)



urban campus

a way of visualising //

chapter nine

THE ART OF ARCHITECTURE

- 9.1. Site Plan
- 9.2. Site layout
- 9.3. Floor plans
 - 9.3.1. Ground floor
 - 9.3.2. First floor
- 9.4. Section A-A
- 9.5. Classroom perspectives
- 9.6. Details
- 9.7. Sections
- 9.8. Perspectives

9.1 // SITE PLAN



9.2 // SITE LAYOUT

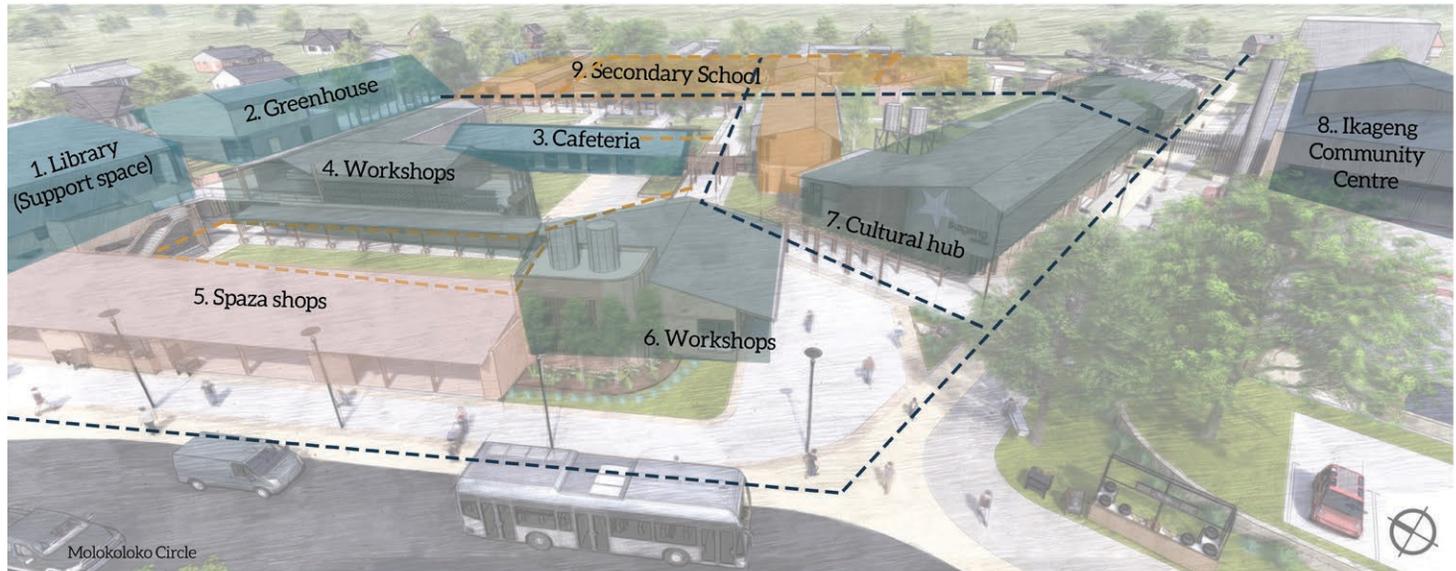
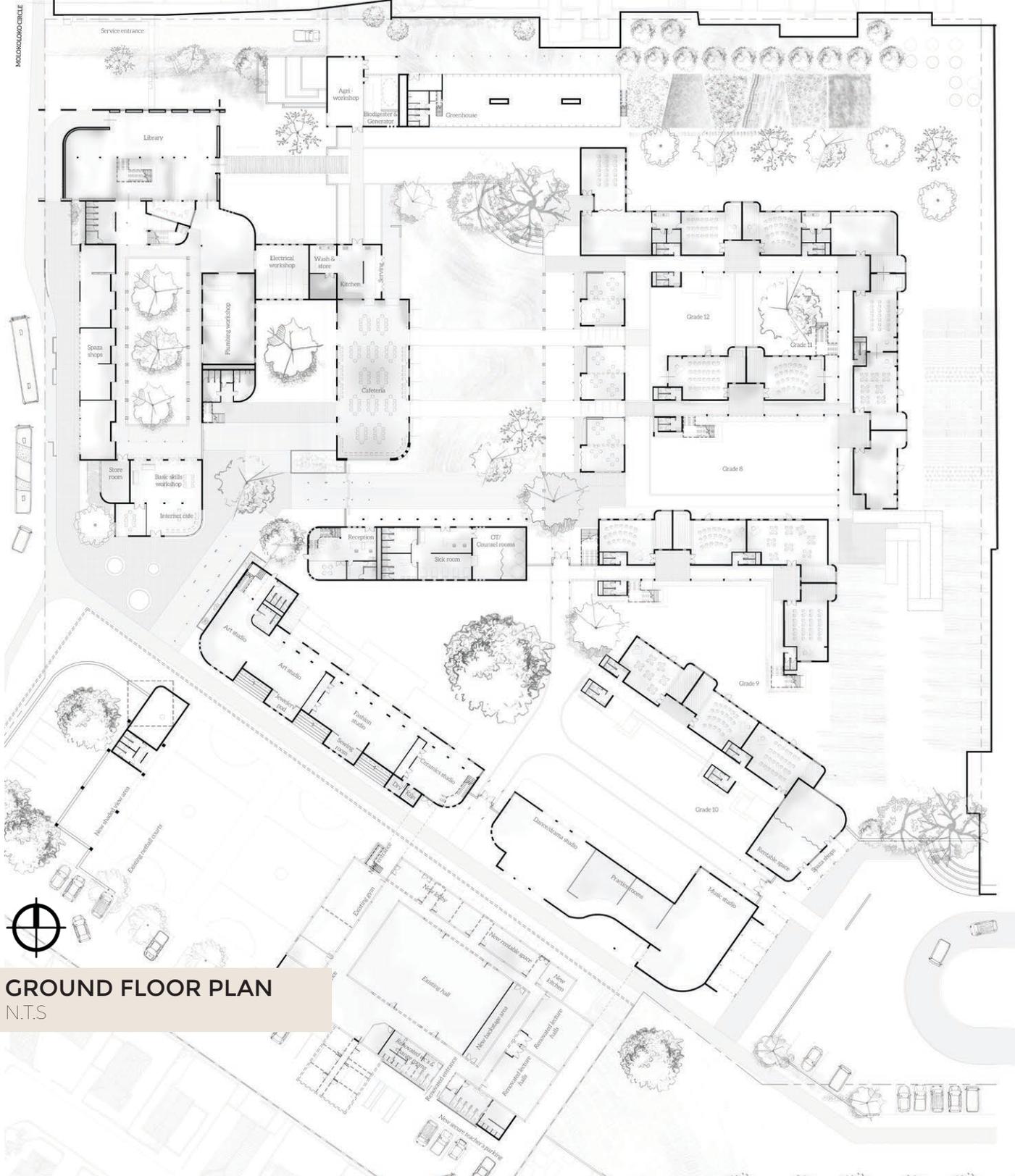


Figure 9.1 (opposite): Site plan (Author 2018)
Figure 9.2: Program layout (Author 2018)



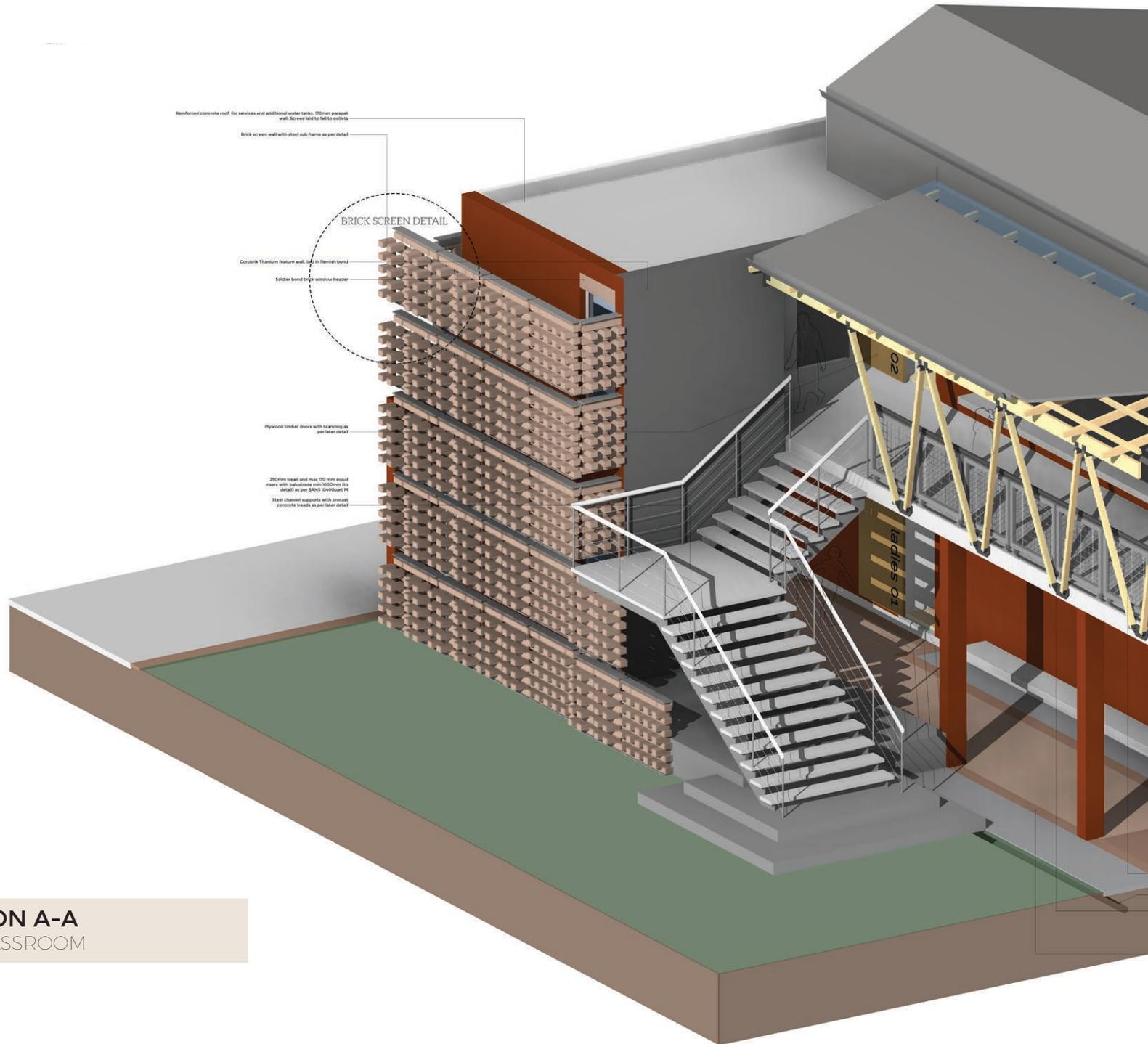
GROUND FLOOR PLAN
N.T.S



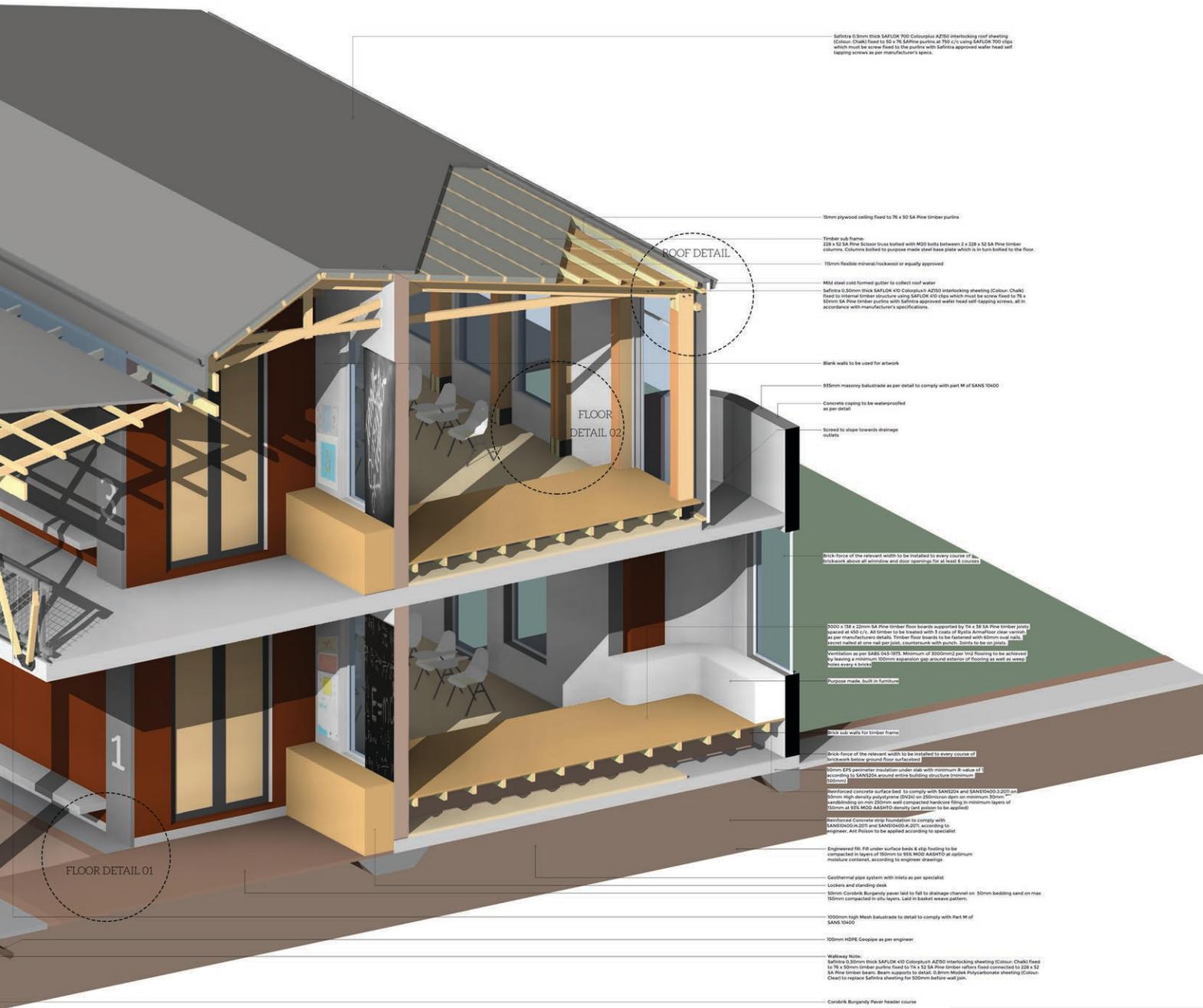
Figure 9.3 (opposite): Ground floor plan (Author 2018)
Figure 9.4: First floor plan (Author 2018)

FIRST FLOOR PLAN

N.T.S



SECTION A-A
THE CLASSROOM



Safinra 0.5mm thick SAFLOK 700 Coloursun AZ150 interlocking roof sheeting (Colour: Chalk) fixed to 76 x 76 SA Pine purlins at 750 c/c using SAFLOK 700 clips which must be screw fixed to the purlins with Safinra approved wafer head self tapping screws as per manufacturer's specs.

15mm plywood ceiling fixed to 76 x 50 SA Pine timber purlins

ROOF DETAIL

Timber sub frame:
228 x 112 SA Pine Schlor truss bolted with M20 bolts between 2 x 228 x 52 SA Pine timber columns. Columns bolted to purpose made steel base plate which is in turn bolted to the floor.
15mm flexible mineral/rockwool or equally approved

Mild steel cold formed gutter to collect roof water
Safinra 0.5mm thick SAFLOK 410 Coloursun AZ150 interlocking sheeting (Colour: Chalk) fixed to internal timber structure using SAFLOK 410 clips which must be screw fixed to 76 x 50mm SA Pine timber purlins with Safinra approved wafer head self tapping screws, all in accordance with manufacturer's specifications.

FLOOR DETAIL 02

Blank walls to be used for artwork

95mm masonry balustrade as per detail to comply with part M of SANS 10400

Concrete coping to be waterproofed as per detail

Screed to slope towards drainage outlets

Brick force of the relevant width to be installed to every course of brickwork above all openings and door openings for all levels & courses

1000 x 128 x 22mm SA Pine timber floor boards supported by 76 x 52 SA Pine timber joists spaced at 450 c/c. All timber to be treated with 3 coats of Pylinx Amalfior clear varnish as per manufacturer's details. Timber floor boards to be fastened with 60mm nail caps. Screed nailed at one nail per joint, countersunk with punch. Joints to be on joists.
Ventilation as per SANS 043-1973. Minimum of 3000mm² per 1m² flooring to be achieved by having a minimum 100mm expansion gap around exterior of flooring as well as every hole every 4 bricks.

Purpose made, built in furniture

Brick sub walls for timber frame

Brick force of the relevant width to be installed to every course of brickwork below ground floor surface

100mm EPS perimeter insulation under slab with minimum R-value of 4 according to SANS1204 around entire building structure (minimum 100mm)

Reinforced concrete surface bed to comply with SANS1204 and SANS10400.1201 on 30mm high density polyethylene (DPEL) on 250mm gap on maximum 30mm sandblasting on min 250mm well compacted hardcore filling in minimum layers of 100mm at 5% M20 AGASTATS density and position to be as per drawing.

Reinforced concrete strip foundation to comply with SANS10400.201 and SANS10400.201, according to engineer. All Poles to be spaced according to specialist.

Engineered fill: fill under surface beds & slip footing to be compacted in layers of 100mm to 200 MDD A40170 at optimum moisture content, according to engineer drawings.

Geothermal pipe system with inlets as per specialist
Lockers and standing desk
30mm Corbik Burgandy paper fixed to fall to drainage channel on 50mm bedding sand in max 150mm compacted in situ layers. Laid in basket weave pattern.

1000mm high Mesh balustrade to detail to comply with Part M of SANS 10400

100mm HDPE Copings as per engineer

Walkway Note:
Safinra 0.5mm thick SAFLOK 410 Coloursun AZ150 interlocking sheeting (Colour: Chalk) fixed to 76 x 50mm timber purlins fixed to 76 x 52 SA Pine timber rafters fixed connected to 228 x 52 SA Pine timber beam. Beam supports to detail. 50mm Modak Polycarbonate sheeting (Colour: Chalk) to replace Safinra sheeting for 300mm before wall join.

Corbik Burgandy Paper Header course

FLOOR DETAIL 01

Figure 9.5: Section A | A (Author 2018)

PERSPECTIVES
THE CLASSROOM

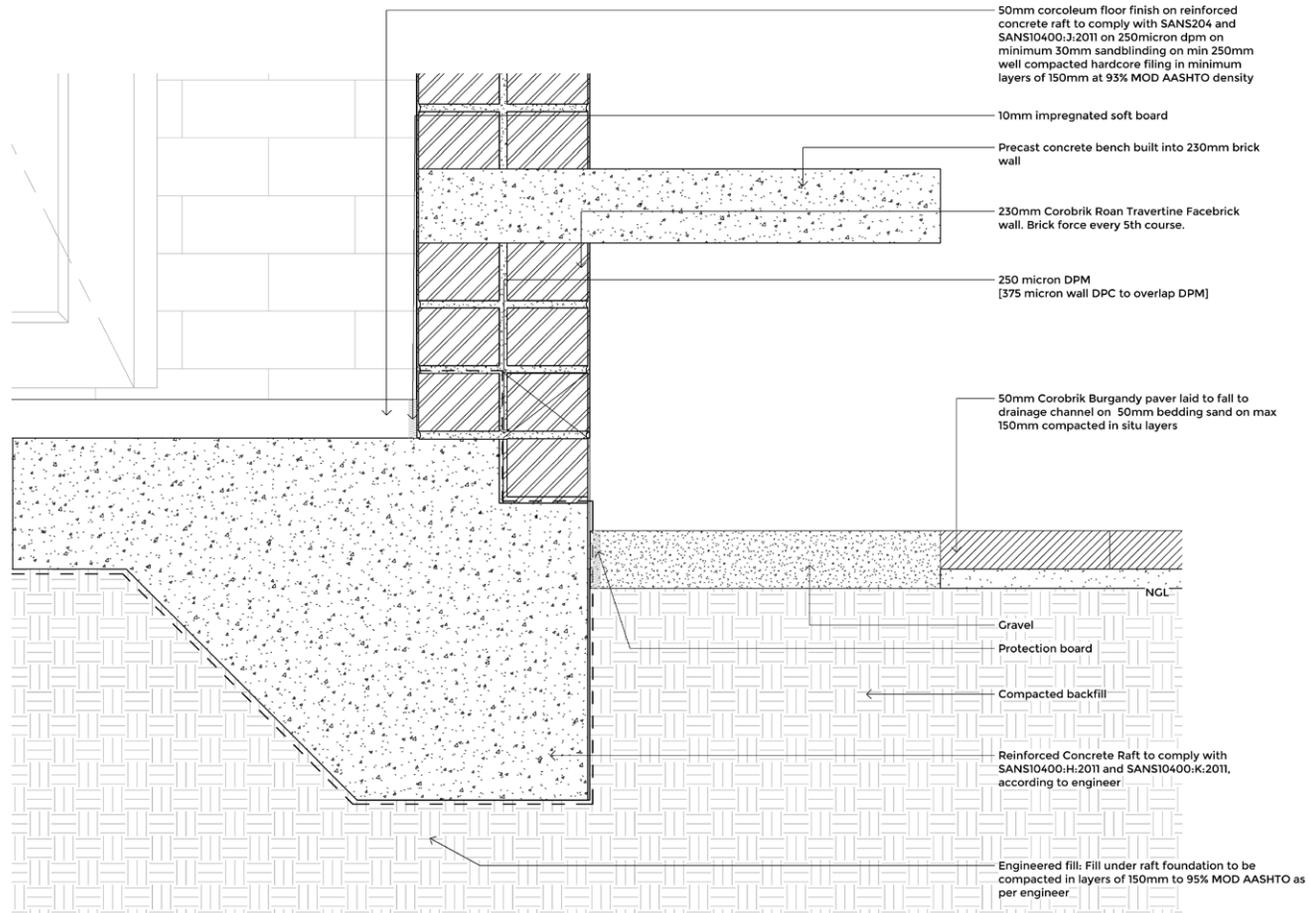




Figure 9.6-9.7 (opposite): Internal classroom perspective
(Author 2018)

Figure 9.8-9.9: External classroom perspective (Author 2018)

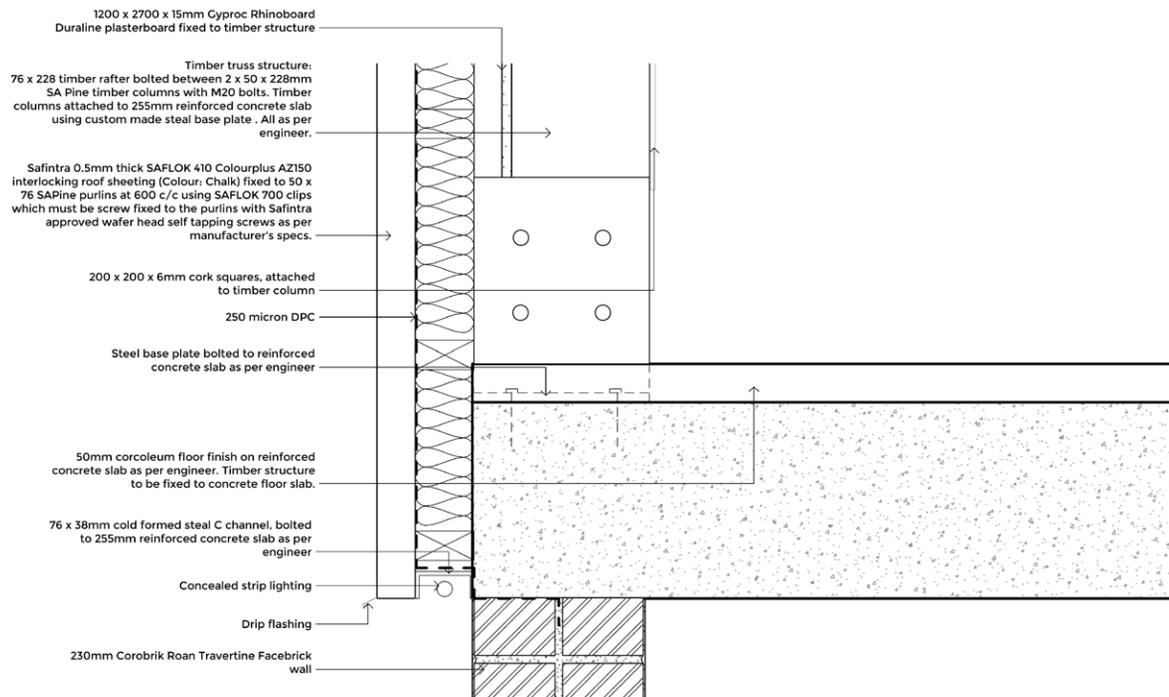
9.6 // DETAILS



FLOOR DETAIL

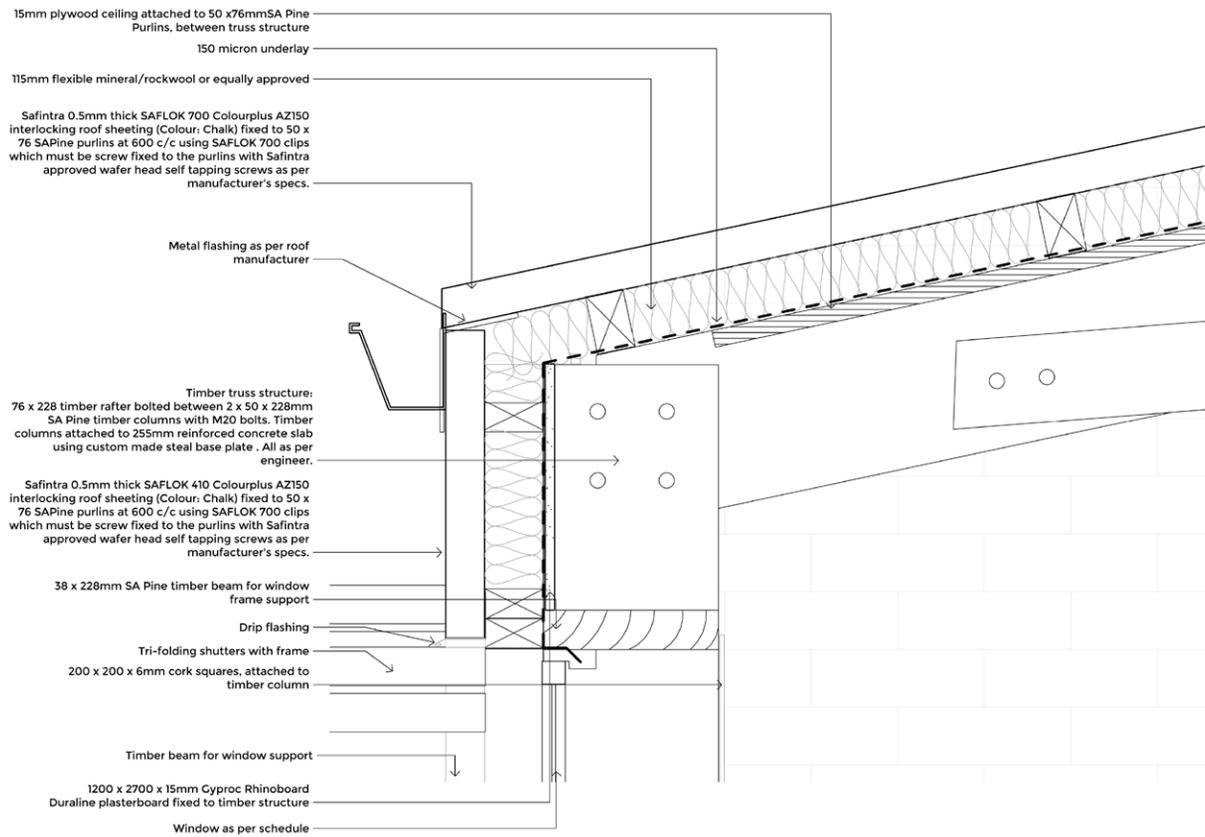
N.T.S

Figure 9.10: Floor detail (Author 2018)
Figure 9.11 (opposite): Floor detail 02 (Author 2018)



FLOOR DETAIL 02

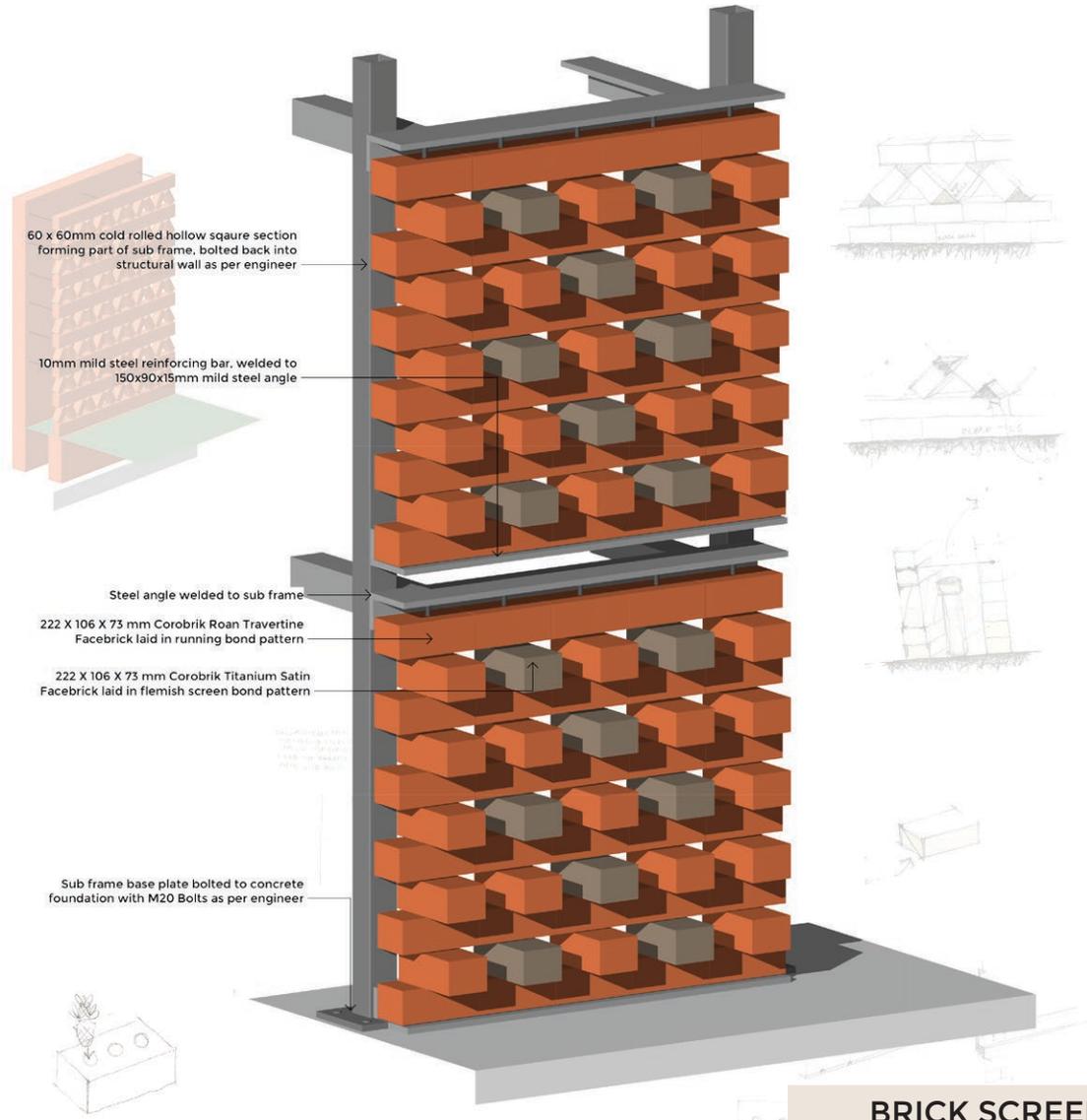
N.T.S



ROOF DETAIL

N.T.S

Figure 9.12: Roof detail (Author 2018)
Figure 9.13 (opposite): Brick screen detail (Author 2018)



60 x 60mm cold rolled hollow square section forming part of sub frame, bolted back into structural wall as per engineer

10mm mild steel reinforcing bar, welded to 150x90x15mm mild steel angle

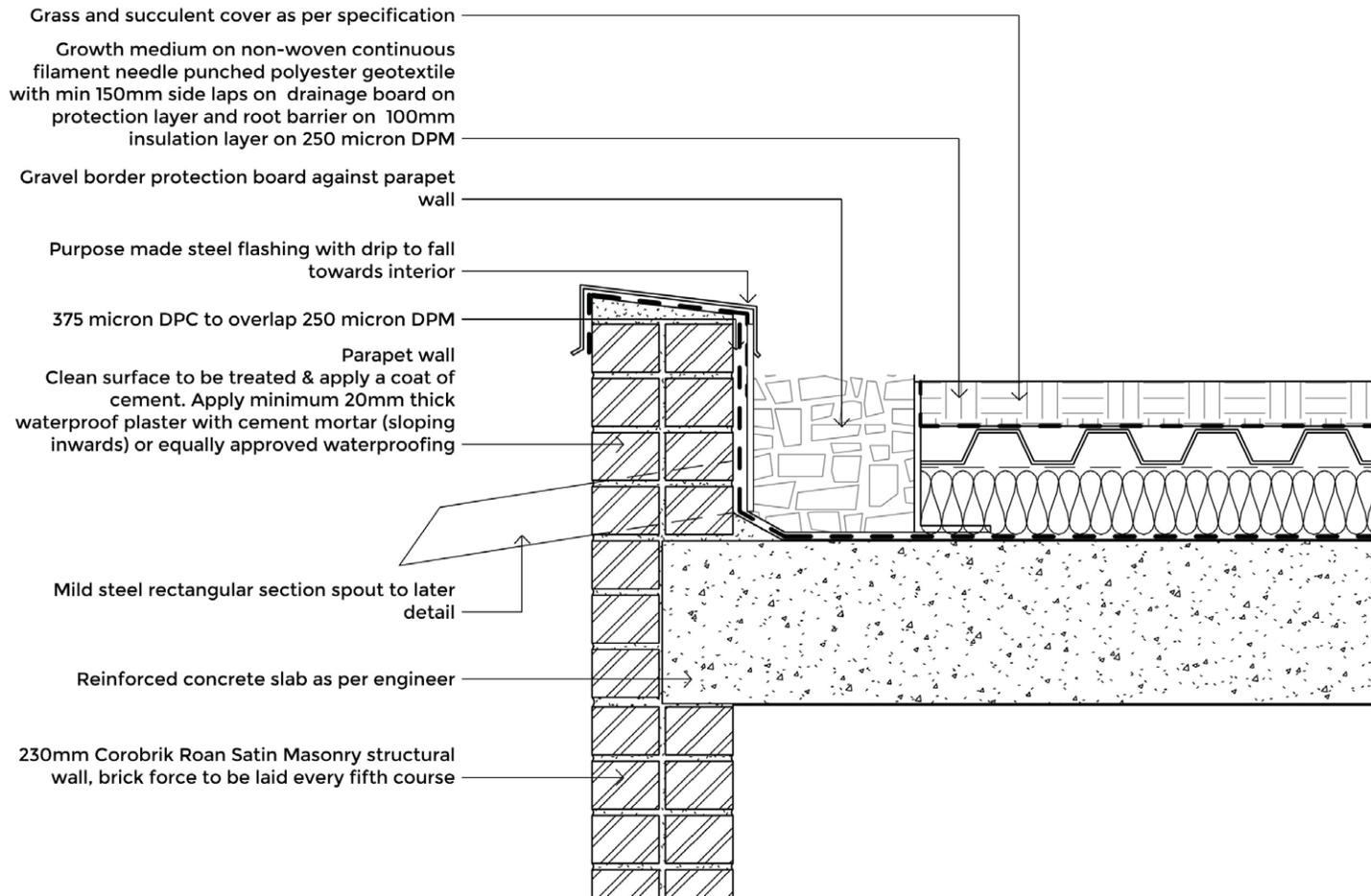
Steel angle welded to sub frame

222 X 106 X 73 mm Corobrik Roan Travertine Facebrick laid in running bond pattern

222 X 106 X 73 mm Corobrik Titanium Satin Facebrick laid in flemish screen bond pattern

Sub frame base plate bolted to concrete foundation with M20 Bolts as per engineer

BRICK SCREEN DETAIL
N.T.S

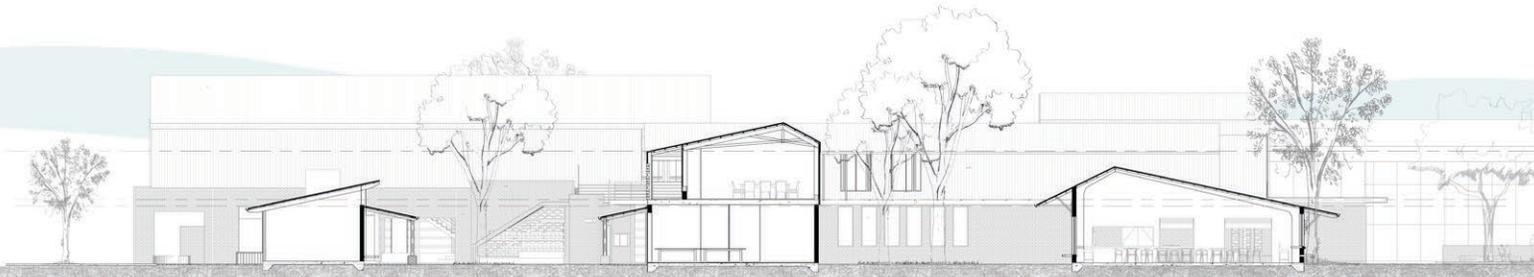
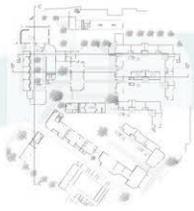


ROOF DETAIL

N.T.S

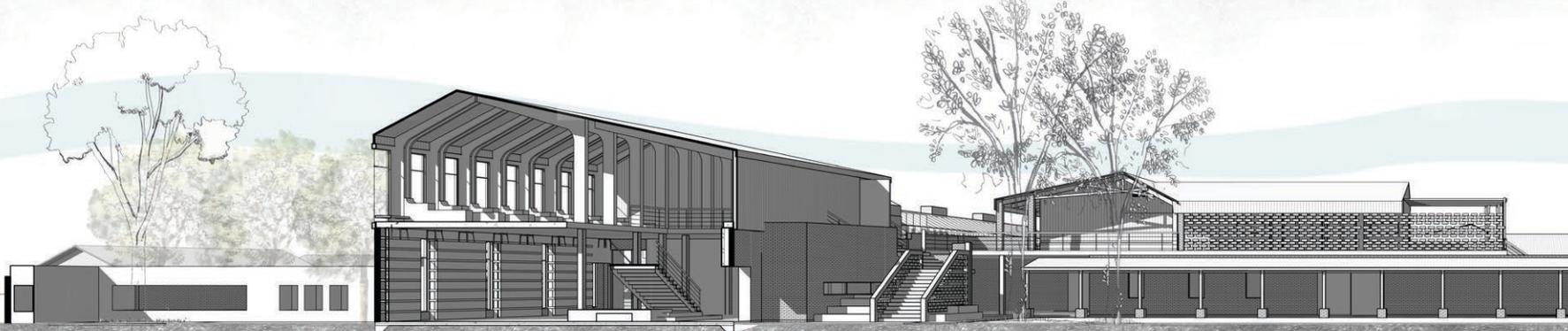
Figure 9.14: Brick screen detail (Author 2018, adapted from SANS 10400 Building Regulations South Africa, Architective) Figure 9.15 - 9.16: Perspectives (Author 2018)





section b | b

SCALE 1:100



section c | c

- northern elevation -

SCALE NTS



section d | d

- western elevation -

SCALE NTS

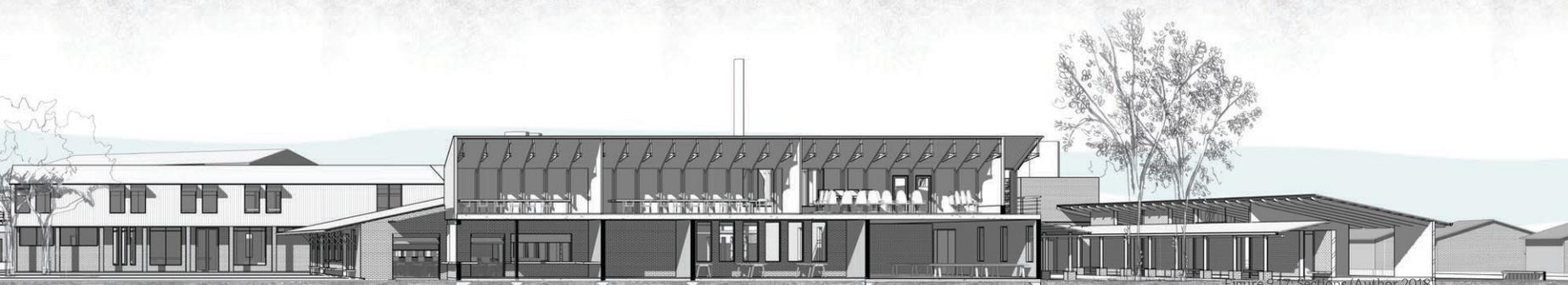
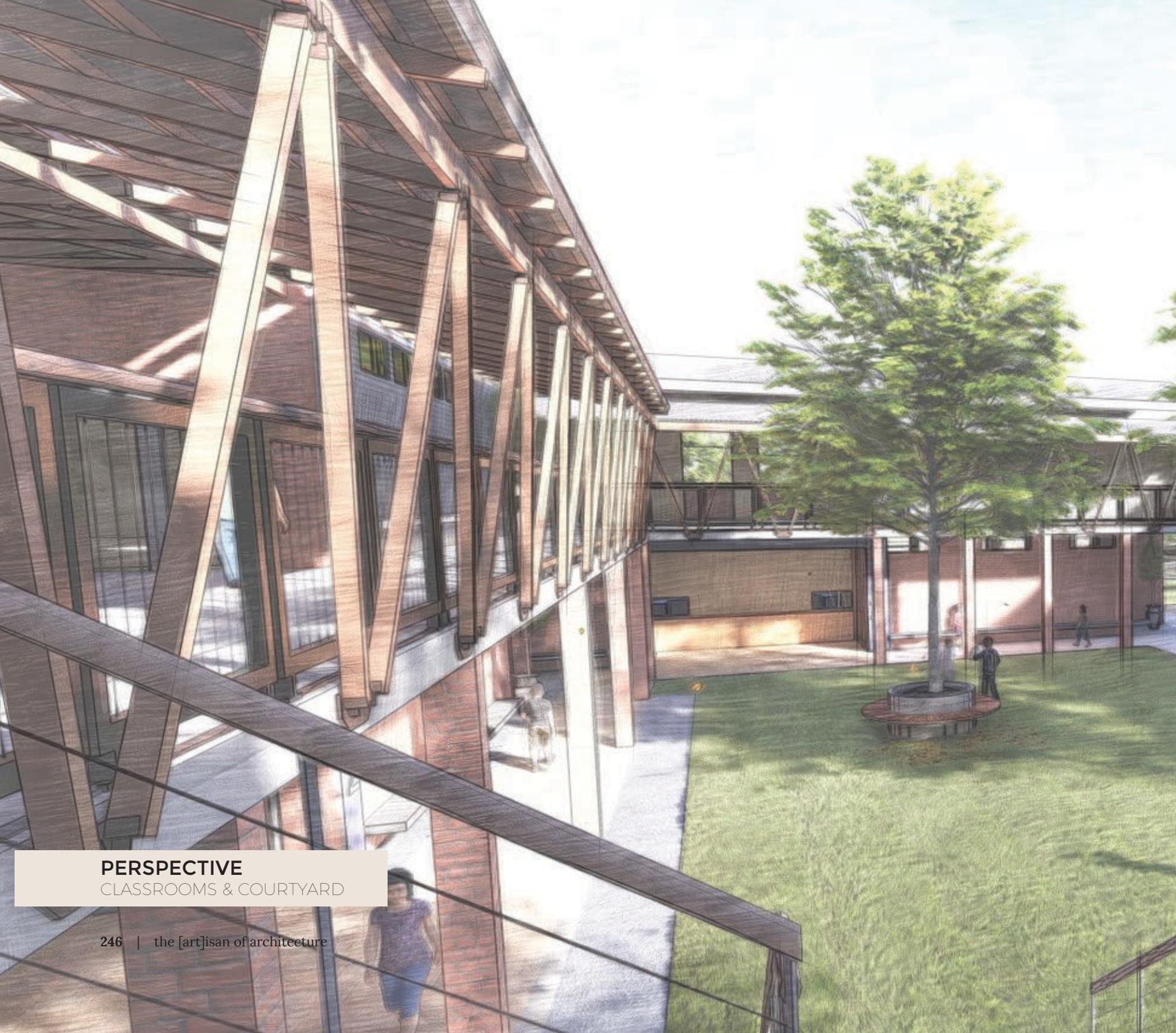


Figure 9.17: Sections (Author 2018)





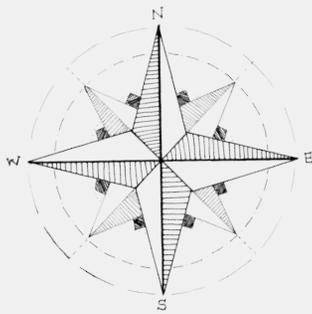
Figure 9.18 - 9.22: Perspectives (Author 2018)



PERSPECTIVE
CLASSROOMS & COURTYARD



Figure 9.23: Courtyard perspective (Author 2018)



the final bell

a way of reflecting //

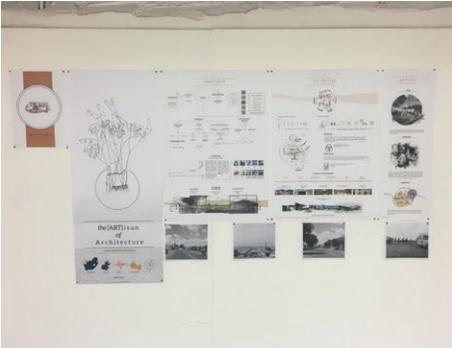
chapter ten

CONCLUSION

10.1. Lessons learnt

10.2 Conclusion

10.1 // FINAL EXAM



Figures 10.1: Final exam images (Author 2018)

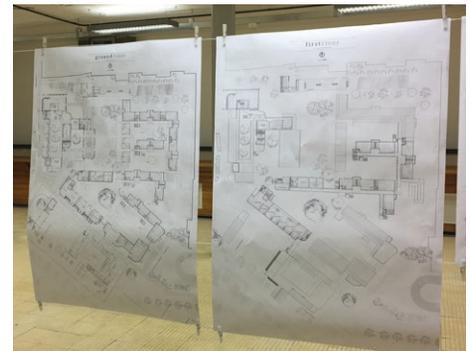
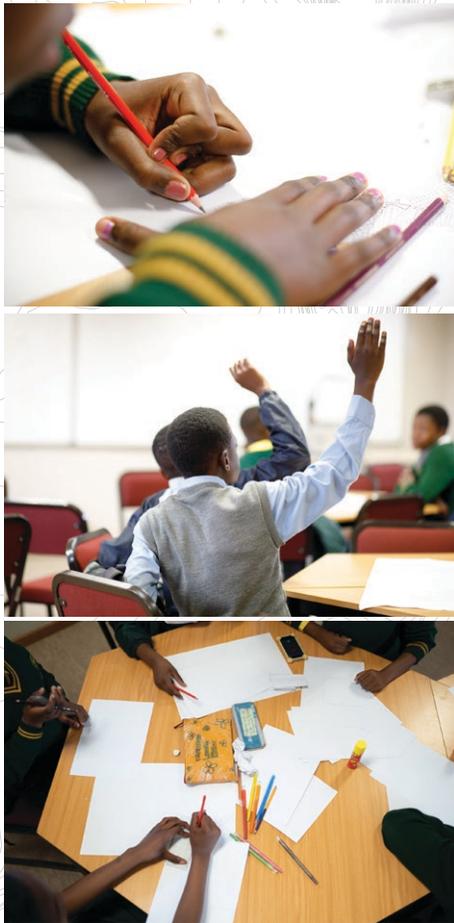


Figure 10.1 - 10.10: Final pin up (Author 2018, Porter 2018)

10.2 // LESSONS LEARNT / FURTHER RESEARCH

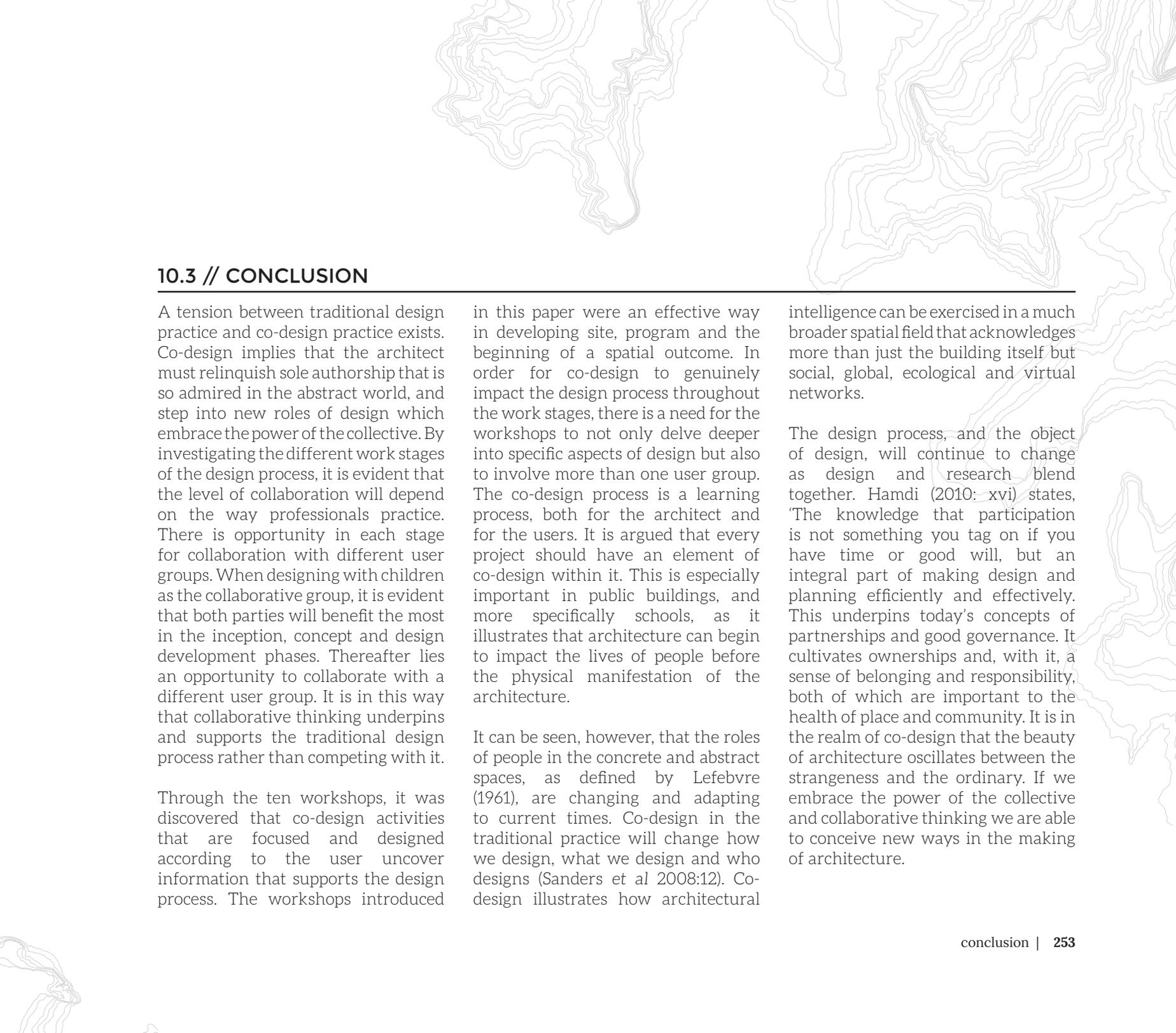


"I want to give all children an education that optimizes their talents, exposes them to what is real and true, gives them a sense of ethics and aesthetics, lifts their spirits, and prepares them to preserve our democratic society. I want them to become active global citizens and representatives of a culture that supports a more loving ambiance than we have today. I want children to love learning, love themselves, and love each other" (Taylor 2009:1). An intelligently designed, attractive, ecologically responsive learning environment is not a waste of taxpayer money or an unrealistic dream, but rather a vital, concrete endorsement of our better nature and our professed concern for children and the future of the world (Taylor 2009:4).

This dissertation explores the role of children in the design process. Further research could be undertaken to investigate the role of different user groups within the design process. Additional research into the types of games played in the workshops

and how these have an influence on specific spaces within a design could be done. In this way types of design toolkits, specific to different users, could be developed. This would allow collaborative practice to become a sum greater than its parts resulting in true insight and innovation (Kennon 2006:51).

Figure 10.11: Learner's hands (Marsh 2018)
Figure 10.11: Ask questions (Marsh 2018)
Figure 10.12: Collaboration (Marsh 2018)

A background image of a topographic map showing contour lines of a landscape, with the map extending across the top and right sides of the page.

10.3 // CONCLUSION

A tension between traditional design practice and co-design practice exists. Co-design implies that the architect must relinquish sole authorship that is so admired in the abstract world, and step into new roles of design which embrace the power of the collective. By investigating the different work stages of the design process, it is evident that the level of collaboration will depend on the way professionals practice. There is opportunity in each stage for collaboration with different user groups. When designing with children as the collaborative group, it is evident that both parties will benefit the most in the inception, concept and design development phases. Thereafter lies an opportunity to collaborate with a different user group. It is in this way that collaborative thinking underpins and supports the traditional design process rather than competing with it.

Through the ten workshops, it was discovered that co-design activities that are focused and designed according to the user uncover information that supports the design process. The workshops introduced

in this paper were an effective way in developing site, program and the beginning of a spatial outcome. In order for co-design to genuinely impact the design process throughout the work stages, there is a need for the workshops to not only delve deeper into specific aspects of design but also to involve more than one user group. The co-design process is a learning process, both for the architect and for the users. It is argued that every project should have an element of co-design within it. This is especially important in public buildings, and more specifically schools, as it illustrates that architecture can begin to impact the lives of people before the physical manifestation of the architecture.

It can be seen, however, that the roles of people in the concrete and abstract spaces, as defined by Lefebvre (1961), are changing and adapting to current times. Co-design in the traditional practice will change how we design, what we design and who designs (Sanders et al 2008:12). Co-design illustrates how architectural

intelligence can be exercised in a much broader spatial field that acknowledges more than just the building itself but social, global, ecological and virtual networks.

The design process, and the object of design, will continue to change as design and research blend together. Hamdi (2010: xvii) states, 'The knowledge that participation is not something you tag on if you have time or good will, but an integral part of making design and planning efficiently and effectively. This underpins today's concepts of partnerships and good governance. It cultivates ownerships and, with it, a sense of belonging and responsibility, both of which are important to the health of place and community. It is in the realm of co-design that the beauty of architecture oscillates between the strangeness and the ordinary. If we embrace the power of the collective and collaborative thinking we are able to conceive new ways in the making of architecture.'



supporting documents

APPENDICES

Ethics clearance

Site mapping

Mapping

Precinct Analysis

Other frameworks

Additional workshop
information

Article

// ETHICS CLEARANCE

Since it is a qualitative study, and the researcher had to interact with the participants, appropriate steps were taken to adhere to the ethical guidelines in order to uphold participants' privacy, dignity, rights and anonymity. Silverman (2000:1) reminds researchers that they should remember that they are entering the private spaces of participants and they have the obligation to respect the rights, needs, values and desires of the participants (Thomas 2010:325). The research proposal was cleared by the University of Pretoria's Engineering, Built Environment and Information Technology's ethics committee (Reference: EBIT/39/2018). The ethical issues have been addressed by obtaining informed consent, guaranteeing participants that there are no risks involved, maintaining privacy and confidentiality by securing information and avoiding showing faces and by lastly by making the workshops voluntary.



Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en
Inligtingtegnologie / Lefapha la Boetšenera,
Tikologo ya Kago le Theknološi ya Tshedimošo

Reference number: EBIT/39/2018

2 August 2018

Ms CJ Porter
Department of Architecture
University of Pretoria
Pretoria
0028

Dear Ms Porter

FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY

Your recent application to the EBIT Research Ethics Committee refers.

Approval is granted for the application with reference number that appears above.

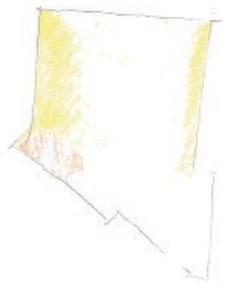
1. This means that the research project entitled "The [Art]isan of architecture" has been approved as submitted. It is important to note what approval implies. This is expanded on in the points that follow.
2. This approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Code of Ethics for Scholarly Activities of the University of Pretoria, or the Policy and Procedures for Responsible Research of the University of Pretoria. These documents are available on the website of the EBIT Research Ethics Committee.
3. If action is taken beyond the approved application, approval is withdrawn automatically.
4. According to the regulations, any relevant problem arising from the study or research methodology as well as any amendments or changes, must be brought to the attention of the EBIT Research Ethics Office.
5. The Committee must be notified on completion of the project.

The Committee wishes you every success with the research project.

Prof JJ Hanekom

Chair: Faculty Committee for Research Ethics and Integrity
FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

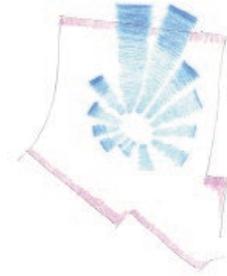
// SITE MAPPING



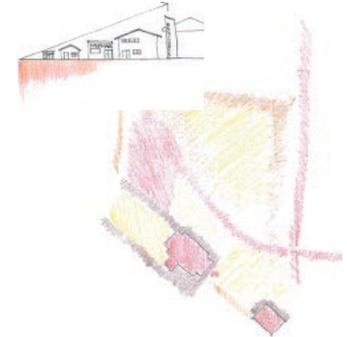
Energy nodes



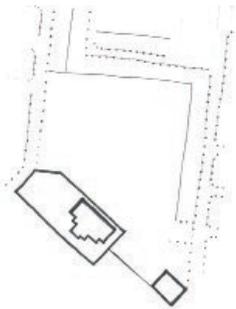
Topography



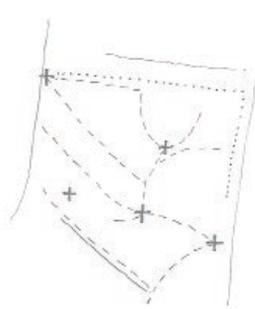
Wind mapping



Activity mapping



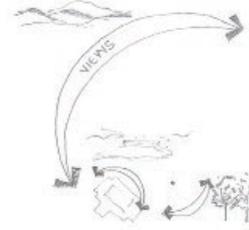
Hard/soft edges



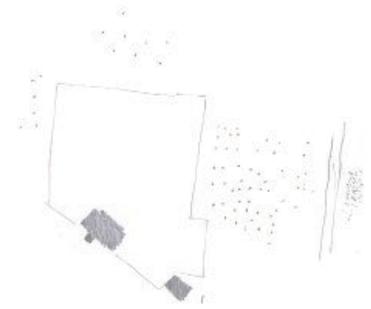
Desire lines



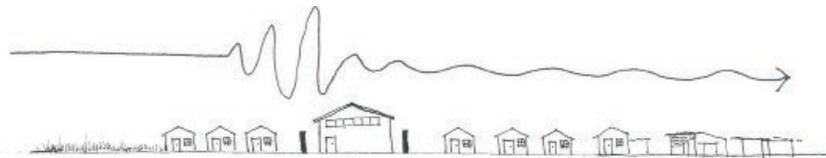
Sewerage points



Attractions



Grain



Site over time

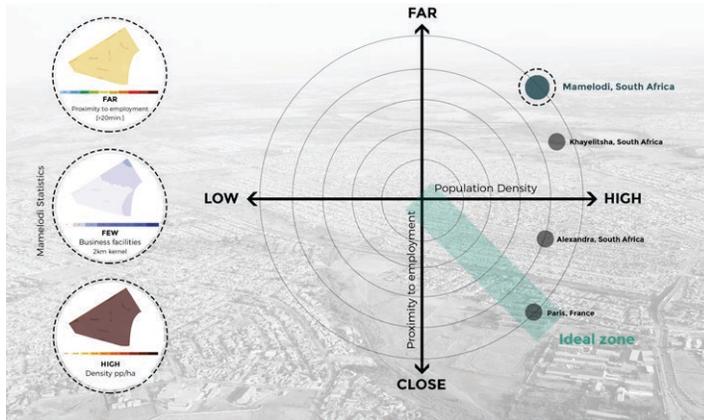


Amenities

Figure (title page): Books (Author 2018)
 Figures: Site mapping (Author 2018)

// MAPPING

URBAN ANALYSIS



HYDROLOGY & SENSITIVITY



Figures: Site mapping (Department of Architecture Masters Studio 2018)

// GAPP MAMELODI/NELMAPIUS FRAMEWORK

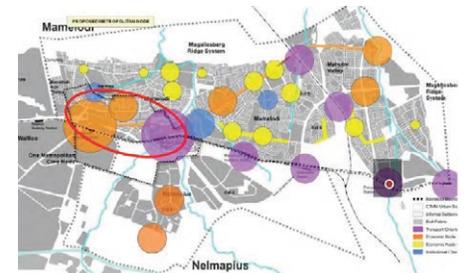
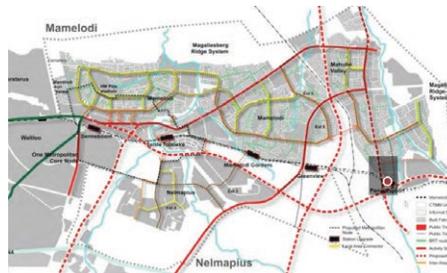
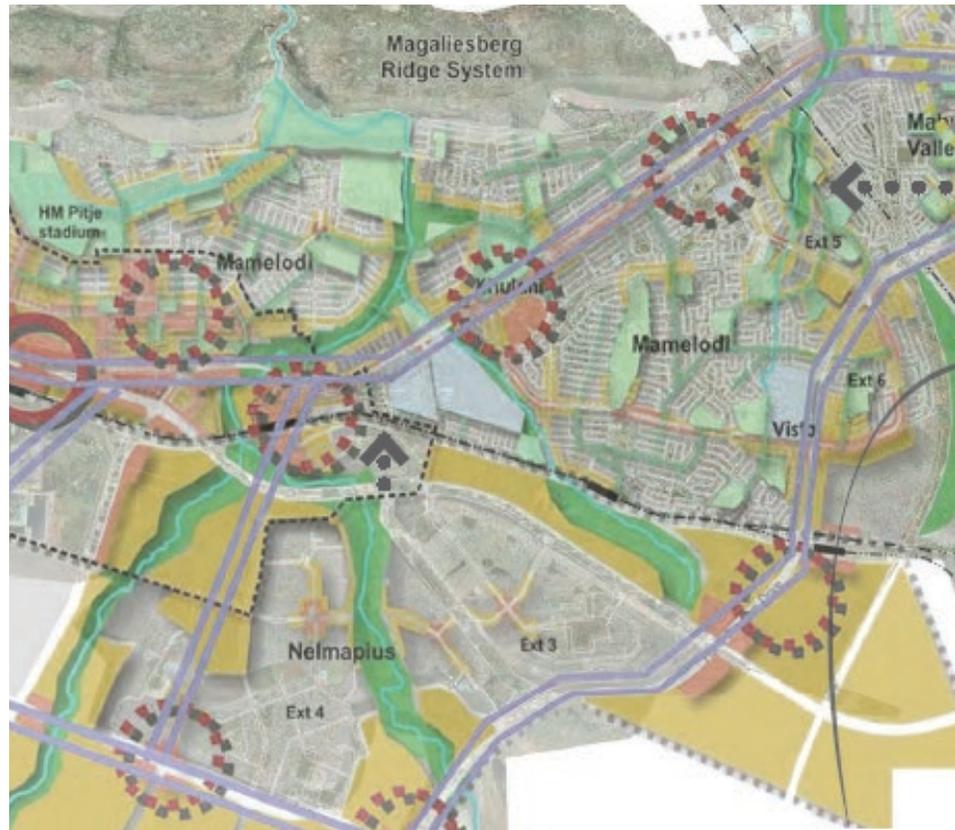
The GAPP strategy aims to establish the core public realm as a utilizable and managed resource as well as pro-actively promote up-front infrastructure (GAPP 2010:55).

Dewar and Uytendogaardt cite that South African cities require a shift from considering outlying areas as 'suburban' to considering them in terms of city development (Dewar & Uytendogaardt 1991: 45). This is seen in the concept of GAPP's framework which is summarised as:

STRATEGIC DEVELOPMENT THROUGH CORRIDORS OF NODAL DEVELOPMENT.

These corridors aim to encourage development at certain nodes which would then further encourage development along activity spines, linking these nodes.

Our urban vision aims to use this as a base but use the on site knowledge gained to further develop this framework.



Figures: GAPP Framework (GAPP 2010)

// ENERGY CALCULATIONS

Standard Appliance/Item you want to use on solar power	Kilowatt rating	Quantity you use	Peak load in watts	Hours item is used in 24 hrs	Energy used in 24hrs
LED Lights	5	0,0	0	0,0	0
Energy Saver Bulbs/Lights	14	200,0	2800	2,0	5600
Computer	120	55,0	6600	6,0	39600
Laptop	70	50,0	3500	2,0	7000
Modem	10	1,0	10	24,0	240
Network Router	15	2,0	30	8,0	240
File Server	500	0,0	0	0,0	0
Inkjet Printer	130	4,0	520	3,0	1560
Alarm System	30	1,0	30	24,0	720
Large Fridge/Freezer (same)	200	6,0	1200	24,0	28800
Kettle	2000	1,0	2000	0,5	1000
Toaster	1400	1,0	1400	1,0	1400
Microwave	1300	1,0	1300	0,5	650
Dish Washer	2000	2,0	4000	4,0	16000
Large Hotplate (try use gas)	2000	4,0	8000	2,0	16000
Pool/Water Pump	750	1,0	750	2,0	1500
Totals: The Calculator gives maximum/peak load needed in watts, and daily power needed to power everything you want to use, plus 20% fixed/system power losses. Final figure has to be generated by the solar system every day.	Peak power in watts =		Daily consumption in watts =		
	32140,0		120310,0		
Plus 20% losses = energy needed:					144372,0

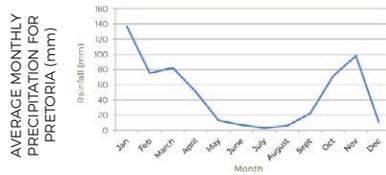
LIGHTING REQUIREMENTS	LUX LEVELS	LIGHT TYPE	LUMENS
	(SANS 10400 & SANS 204)		
Major passages	100	LED Globe	300
Vertical circulation	100	High bay warehouse light	6700
Printing room	300	LED Panel Light	3256
Studios	500	LED Tube	3256
Offices	400	LED Tube	1120
Lecture Room	500	LED Panel Light	3256
Workshops	500	LED Tube	110
Ablutions	100	LED Globe	300
Server Room	100	LED Panel Light	3256
Kitchen	300	LED Globe	300
Classrooms	200	LED Tube	1120

Figures: Energy Calculations (Ecotech Energy Calculator 2018, www.ecotechenergy.co.za)

// WATER CALCULATIONS

AREA CALCULATIONS

Catchment	Area, A (m ²)	Runoff Coefficient,	
		C	C (weighted)
Roof	8974	0,85	0,61
Paving	3500	0,8	0,22
TOTAL	12474		0,835970819



RAINWATER YIELD CALCULATION

Month	Ave. rainfall, P (m)	Yield (m ³) (Yield = PxAxC)
January	0,154	1605,8966
February	0,075	782,0925
March	0,082	855,0878
April	0,051	531,8229
May	0,013	135,5627
June	0,007	72,9953
July	0,003	31,2837
August	0,006	62,5674
September	0,022	229,4138
October	0,071	740,3809
November	0,098	1021,9342
December	0,15	1564,185
ANNUAL AVE.	0,674	7633,2228

ALT SOURCE (Grass)

Month	Source 1 (m ³ /month)
January	215
February	105
March	115
April	72
May	18
June	10
July	5
August	9
September	31
October	100
November	138
December	210
ANNUAL AVE.	1028

TOTAL YIELD

Month	Total Yield (m ³ /month)
January	1820,8966
February	887,0925
March	970,0878
April	603,8229
May	153,5627
June	82,9953
July	36,2837
August	71,5674
September	260,4138
October	840,3809
November	1159,9342
December	1774,185
ANNUAL TOTAL	8661,2228

IRRIGATION DEMAND

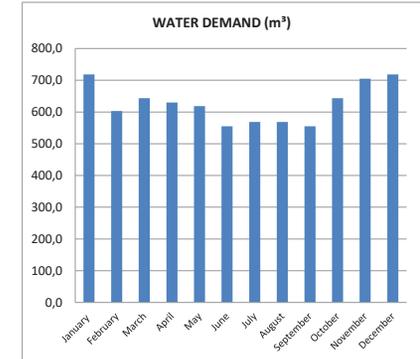
Month	Planting area (m ²)	Irr. depth / week (m)	Irr. depth / month (m)	Irrigation demand (m ³ /month)
January	2500	0,03	0,12	300
February	2500	0,03	0,09	225
March	2500	0,03	0,09	225
April	2500	0,03	0,09	225
May	2500	0,02	0,08	200
June	2500	0,03	0,06	150
July	2500	0,03	0,06	150
August	2500	0,03	0,06	150
September	2500	0,03	0,06	150
October	2500	0,03	0,09	225
November	2500	0,03	0,12	300
December	2500	0,03	0,12	300
			ANNUAL TOTAL	2600

ALT DEMAND

Month	Entity (Persons ?)	Entity demand / day (l)	Alt demand (m ³ /month)
January	900	15	418,5
February	900	15	378
March	900	15	418,5
April	900	15	405
May	900	15	418,5
June	900	15	405
July	900	15	418,5
August	900	15	418,5
September	900	15	405
October	900	15	418,5
November	900	15	405
December	900	15	418,5
		ANNUAL TOTAL	4927,5

TOTAL DEMAND

Month	Total demand (m ³ /month)
January	718,5
February	603,0
March	643,5
April	630,0
May	618,5
June	555,0
July	568,5
August	568,5
September	555,0
October	643,5
November	705,0
December	718,5
ANNUAL TOTAL	7527,5

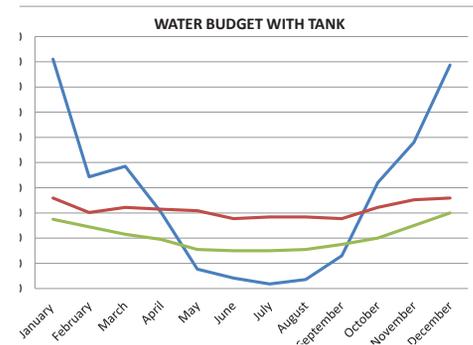


WATER BUDGET

Month	Yield (m ³)	Demand (m ³)	Monthly balance
January	1820,9	718,5	1102,4
February	887,1	603,0	284,1
March	970,1	643,5	326,6
April	603,8	630,0	-26,2
May	153,6	618,5	-464,9
June	83,0	555,0	-472,0
July	36,3	568,5	-532,2
August	71,6	568,5	-496,9
September	260,4	555,0	-294,6
October	840,4	643,5	196,9
November	1159,9	705,0	454,9
December	1774,2	718,5	1055,7
ANNUAL AVE.	8661,2228	7527,5	

WATER BUDGET (ACCUMULATIVE)

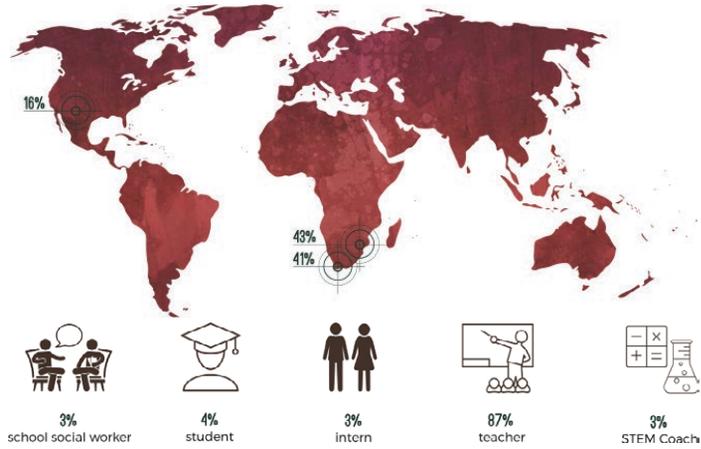
Month	Yield (m ³)	Demand (m ³)	Monthly balance	Vol. water in tank (m ³)
January	1820,9	718,5	1102,4	550,0
February	887,1	603,0	284,1	490,0
March	970,1	643,5	326,6	430,0
April	603,8	630,0	-26,2	390,0
May	153,6	618,5	-464,9	310,0
June	83,0	555,0	-472,0	300,0
July	36,3	568,5	-532,2	300,0
August	71,6	568,5	-496,9	310,0
September	260,4	555,0	-294,6	350,0
October	840,4	643,5	196,9	400,0
November	1159,9	705,0	454,9	500,0
December	1774,2	718,5	1055,7	600,0
ANNUAL AVE.	8661,2228	7527,5		



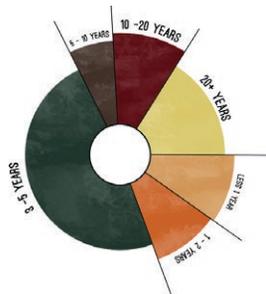
Figures: Water Calculations (Water calculator: AAL320 CSIR Workshop, Fourie Pieterse 2016)

// ONLINE WORKSHOP

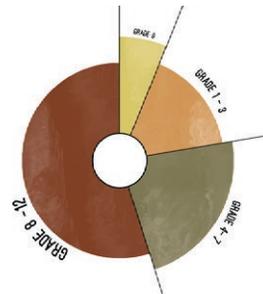
LOCATION & OCCUPATION



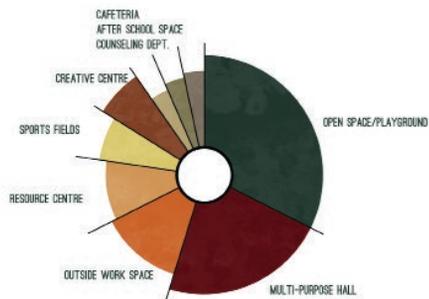
NUMBER OF YEARS TEACHING



GRADE TAUGHT



MOST IMPORTANT SPACE OTHER THAN CLASSROOM



// WORKSHOPS





Figures: Workshops images (Author 2018, Marsh 2018, P...



Workshops images (Author 2018, Marsh 2018, Porter 2018)



C

Co-design in the architectural process

The transformation of the design process into a creative commons for ongoing change. Illustrating the impact of collaborative design on the architectural design process within a Professional Master of Architecture dissertation.

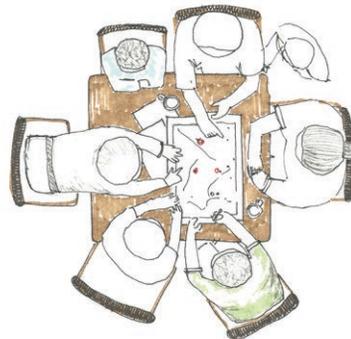


Fig. 01. Above: Collaborative thinking - making space at the table for different voices Author 2018, adapted from Diagram adapted from Stratos Innovation Group 2016

Keywords: Participatory design, collaboration, co-design, design research, place-making, authorship

ABSTRACT:

The problem of authorship in the discourse of architecture has always persisted. The question arises if what we are doing is relevant and will it remain so tomorrow? Questions like these often lead to radical changes. This is especially true within the architectural profession. It is argued that if the profession of architecture is to be celebrated and discussed, then it needs to be a craft that proves its indispensability. This means that not only the true beauty, but the genuine accomplishments of the architecture should be pointed out. The aim of this article is to illustrate the impact of collaborative design on the architectural design process. This other way of making architecture is investigated through three workshops with secondary school learners in a township setting. The study aims to simulate the co-design¹ process in the design of a secondary school and test the impact of the collaboration on the design process within the master's year. For this collaboration, children of a school going age were selected as co-design partners. A series of three workshops with 15-25 secondary school learners was designed to simulate the work stages prescribed by South African Council for the Architectural Profession's (SACAP). It is suggested that this other way of making architecture not only adds to the vocabulary of the designer and user, but also adds to the resilience of place through place-making that is socially and environmentally responsive. It argues that there are key lessons to be learnt from alternative ways to making architecture.

1. Alternative ways to making architecture

Until 1994, the majority of South Africa's population had been excluded from an official role in decision-making. The result was a society accustomed to top-down planning, labour exploitation and white minority domination, which lacked a tradition of democracy and public participation (Lyons et al 2001:276). The importance of community participation in urban renewal projects has gained currency over the last ten years as a means of empowering communities and making physical improvements more resilient in the long term (Teder 2018; Manzini 2015; Doucet & Coupers 2009:1; Lyons & Smuts 1998: 923).

At the 2010 Design Indaba, Jo Noero (2010) commented that there is an alternative form of practice for architecture that breaks from the traditional 'cover image building'. He stated that this alternative form of practice is to create fine buildings that are socially relevant and make the world a better place. They harness the energy of the people and context to create purposeful architecture. Through engagement and dialogue with people outside of the design professions, design practice is transforming into a 'creative common for ongoing change' (Teder 2018:2).

In Awan et al (2011:38) it is stated that architecture, or more specifically space, affects and effects social relations in the most profound ways from the very personal, which includes the phenomenological engagement with light and space, to the very political which includes how the dynamics of power are played out in space. Users around the world are becoming more involved in the creative process. The extent of this involvement, however, depends on the way professionals practice design (Teder 2018:1). The key responsibility of the architect therefore lies not just in the refinement of the building, but as a contributor to the creation of empowering spatial and therefore social relationships (Awan et al 2011:38). This shift in perspective acknowledges that there is power in the collective and in collaborative thinking. If the fundamentally individualist nature of the architect shines through in the

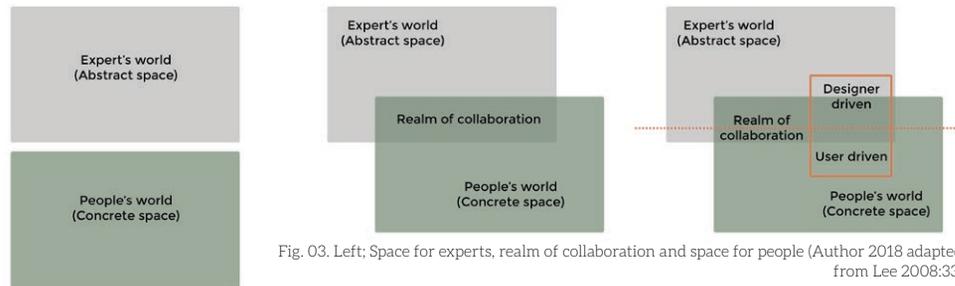


Fig. 03. Left; Space for experts, realm of collaboration and space for people (Author 2018 adapted from Lee 2008:33)

conventional process of design, one must question whether there are other ways of making architecture (Awan et al 2011) which embrace the power of the collective and of collaborative thinking. What distinguishes this literature and what makes it an unusually enlightening terrain is the ability to conceive new ways in the making of architecture.

This paper argues that there are key lessons to be learnt from these alternative ways of design practice. An overview of the architectural design process, with reference to the South African Council for the Architectural Profession's (SACAP) work stages, is considered to gain a better understanding of the current traditional of architectural design and to illustrate the benefits and shortcomings of this process in comparison to the co-design process. Current literature on the development, content and implementation of a collaborative design approach is reviewed in order to identify potential roles and involvement of participants. As an empirical engagement with the tension between these two systems, a series of workshops with school children is presented as a framework for understanding difference between these. The design, implementation and results of these workshops are used to illustrate key opportunities in design thinking as well as reflect on challenges in the participation process. The concluding discussion highlights the lessons learnt and suggests ways to move forward with collaborative design in the architectural process that not only adds to the vocabulary of the designer and user, but also adds to the resilience of place through place-making

that is socially and environmentally responsive.

2.1. Discourse of architectural authorship

Throughout the continuum of the architectural discourse, the problem of authorship in architecture has persisted (Adjaye et al 2011). The tension between the architect as an artist, and the architect as a social worker, demands that we broaden the issues to look at how buildings relate to their contexts and communities (Adjaye et al 2011). This becomes a provocative investigation according to Adjaye (2011), as it reflects on how the architect and the community connect in the practice of architecture.

Henri Lefebvre's (1991) socio-spatial concept touches on how the world is divided into two worlds of practice: abstract space for experts and concrete space for people. Dating from the era of modernism, these two worlds were separated, with professionalism being held above, and people being treated as subjects for information. When these two worlds re-join, a new in-between space is created called the 'realm of collaboration' (Lee 2008:33). More and more designers are designing for the 'user'. 'Design for users' has become a design trend. However, it must be questioned whether the users are merely subjects for analysis or active participants in the design decision making process (Lee 2008: 33).

2.2. Space for experts

There are many approaches to the architectural process. Most are purely intuitive but scholars agree that the process can be divided into

phases and that different people work through these phases in different ways (Heath 1984, Mahmoodi 2001:64). Rooted in the world of experts, design is seen as a sequential process in which the architect is singular, having sole authorship of the building (Lawson 2005:239, Mahmoodi 2001:82).

The South African Council for the Architectural Profession (SACAP), outlines certain work stages and outcomes for the architectural process based on such a sequential process. This six-stage process takes a project from inception to close out, with the architect being the primary author. The six stages include inception, concept, design development, submission to authority, construction documentation, construction and close out (SACAP 2010:5). The SACAP process is similar to both the Royal Institute of British Architecture's (RIBA) and the American Institute of Architecture's (AIA) traditional work stages. These work stages include pre-design, schematic design, design development, construction documents and construction administration. Where these two differ from SACAP's approach is that there is a work stage for post design and feedback. Here, a post occupancy study as well as developing user manuals and evaluation research is done (Mahmoodi 2008:83).

The essential skills and knowledge required to practice architecture in a sustainable, socially responsible and financially viable way are grouped into ten specific outcomes (SACAP 2010:3). The ten outcomes include architectural design, environmental relationships, construction technology, building structure, contextual and urban relationships, architectural history and precedent, building services, contract documentation, computer applications and office practice and ethics. The higher the qualification, the higher the level of understanding needed to achieve the outcome. These groupings must allow for the professional to compete and operate on a local, as well as international level, therefore the SACAP learning levels are derived from RIBA's Outline Syllabus (1999). These learning levels include awareness, knowledge, understanding

and ability. Each of these learning levels is then applied to the work stage within the architectural process (SACAP 2010:4).

2.3. Space for people

Reliance on the typically individualised authorship of architectural production contradicts the representation of a collective identity of a community (Combrinck 2017:215). Concrete space is the everyday world in which people live. Küsel (2018:41) states that somewhere in the making of our towns and cities, we have exchanged the human element to a number of zoning classes which are strung together around a number of roads and basic services. Currently, when human experience is taken into consideration it is understood as the experience that people are supposed to have rather than what they are actually experiencing (Lang 1987:16). Kotze (2017:2a) argues that, "the language of the ordinary is more difficult to read, but if we uncover it, it offers a world of greater and lasting inspiration". When architects begin to understand the rhythm of the ordinary, there is a realisation that although there are many problems with places, the sense of community is tangible and that it is missing in many of our cities (Küsel 2018:42).

Through collaborative design, the role of the everyday user can be exposed through facilitating agency by relinquishing the role of the primary author. The intention is not to abandon architectural intelligence. It is in fact the opposite. Spatial agency is used to illustrate how intelligence can be exercised in a much broader spatial field that acknowledges the social, global, ecological and virtual networks (Awan et al 2011:31, Mahmoodi 2001:80).

2.4. Collaborative space

Between these two worlds is the realm of place-making. Place-making started as a reaction against auto-centric planning and has grown into a practice of creating collaborative environments for the improvement of community life and social interaction (Project for Public spaces 2016, Silberberg et al 2013 Wyckoff 2014 in Teder 2018:2). The origins of place-making can be traced back to the

writings of Jane Jacobs, Kevin Lynch and William Whyte (Silberberg et al 2013:2, Teder 2018:2). Place-making in a public sphere implies engaging with design beyond the practice of expert culture, connecting various people with their built environments. There is a common belief in the value of the process itself and in collaborations between users. This can be described as participatory design or co-creation. There are many definitions of place-making. However, there is a common belief in the value of the creation process itself and in non-hierarchical collaborations (Teder 2018:2).

The participatory design process is an alternative method to the conventional architectural process which aims to bring the users, the people, back into the conversation and give them a voice. The core idea of participatory design is that people who are affected by a decision or an event should have the opportunity to influence all stages of design as they are experts on their own needs (Hussain 2010:100, Teder 2018: 2). All parties gather field data, initiate ideas, test and develop new prototypes. This uncovers the rich content and hidden meanings in the user's context which allows for deeper and more grounded issues to surface (Taffe 2017:18). The users are the witnesses you need to find out about the quality of good architecture (Fereiss & Bouman 2011:16).

Participation is not important for its own sake. Rather, it is important because it has the potential to add value to a project and its outcome through empowerment (Hussain 2010:105). Participatory design is about giving the community the tools and the space to allow them to rebuild and regrow the way they want to. It is about building densely interconnected networks, crafting linkages between unlikely partners which facilitates emergence. It builds on what there is and allows it to go to scale (Hamdi 2004: xviii). For advocates of design empathy, designers must not only be informed and inspired by users, but also be able to observe and feel for the users (Ho et al 2011:95).

In the collaborative process, architects have to look beyond the design intentions and analysis

and listen to the users themselves (Fereiss & Bouman 2011: 16). This approach looks at the design process as a learning process. There have been a number of attempts to classify levels of participation. These include Arnstein's ladder of participation (1969) and Lindsay's pyramid of user led design (2003). These, however, are intended to create hierarchies rather than encourage interactions. It is important to note that the expression of this spatial agency given to users may lie in something that is physical, such as a building, or in something that is less tangible, for example a map. There is a shift away from the building and the focus lies on the processes that connect the different parts of the production of the built environment. This is not new as it is all a part of spatial production but participation acknowledges the importance of these processes and therefore gives them new significance (Awan et al 2011:55). Table 1 shows the relationships between user, space and designer for the above-mentioned spaces.

		What is design participation for?	Relationship between architect and user's space	Role of the users	Role of the architect
Abstract Space	Designer driven	Little/none	Separated as two individual realms	Imagined	Master
Realm of collaboration	Designer driven	Collaboration	Overlapping of two realms	Co-designers	Co-designers
	User driven	Freedom from existing conditions	User taking over expert's space	Creative	Advisers
Concrete space	User driven	Individual motivation	User's exist within expert's space	Active users	Craftsmen

2.5. Children in co-design

The evolution in design research from a user-centred approach to co-designing is changing the landscape of design practice, creating new domains of collective creativity and giving them new significance (Sanders 2008: 5). It is hoped that this evolution will support a transformation towards a more resilient way of living (Gilchrist & Kyprianou 2011). Young people aged 12-18 are the generation that will be most affected by all intractable challenges. Expert and government led initiatives have developed research capability that remains detached from the lives of the poor and the young who are often most affected by the negative impacts of change. The consequence is that many opportunities are missed to allow people in poorer communities to develop skills and to lead innovation in resilient development policy in ways that address the interconnectedness of environmental challenges whilst reflecting local priorities, cultures and environments (GCRF 2017:2).

This can be explained by looking into the social and historical constructs of children and childhood as well as the spaces allocated to children. Before the eighteenth century,

children in the West were protected until the age of six. After this they took part in working life. The beginning of the twentieth century saw the introduction of compulsory primary education. Due to this, children were taken out of labour and public spaces which created a stronger divide between adults and children. Children became a separate social group and only two places were appropriate, namely home and school (Cunningham 1995; Jans 2004). Current opinions about children's capability of taking part in design are rooted in this background. Children also usually belong to social groups with almost no financial resources and are therefore ignored (Hussain 2010:100).

Educators and practitioners are seeking broader definitions for what architecture can do rather than what is already is (Wright 2017:26). Tackling the many layers that surround the elements of space, practice takes on a different position. If this position is underpinned by the interaction with society, the process of producing appropriate responses opens doorways that enable a continuous feed back into practice that includes delivering the architecture to broadening the impact of architecture. Each

action in this process of design and delivery therefore contributes to nurturing a societal understanding of what architecture really is and does (Wright 2017:27). What distinguishes this literature and what makes it an unusually enlightening terrain is the ability to conceive new ways in the making of architecture. It allows for exploration and connections far above the standard production of architecture. The following section explores how children can be included in the co-design process.

3. Method

This study formed part of understanding the process of co-design within a Professional Master of Architecture degree. There are certain learning levels namely, awareness, knowledge, understanding and ability that are required for a Masters dissertation. The study aimed to simulate the co-design process in the design of a secondary school and tested the impact of the collaboration on the design process within the master's year. For this collaboration, children of a school going age were selected as co-design partners. A series of workshops were designed to simulate the work stages prescribed by South African Council for the Architectural

Profession's (SACAP). These included activities such as mapping and analysing (inception and concept) through to exploring model building (design development). Data collection was done through three workshops held over three Friday afternoons for two hours. The collaboration group consisted of 15-25 Grade 8 learners who are enrolled at two different secondary schools in a township setting. Grade 8 learners were used as collaboration group as they have just entered the secondary school system and the workshops would not be interrupting university applications or work.

Inclusion of children and youth in participatory processes started in the 1970's with Lynch's "Growing Up in Cities" (Lynch 1977 in Derr 2015:120). Participatory projects can be empowering processes resulting in empowered outcomes (Hussain 2010:99). Designers are encouraged to talk to the user group in the design process, however, when designing for children, designers tend to only consult with carers such as parents and teachers (Ghaziani 2008:225). This is contrary to the current trend of emphasizing user involvement. Empowering children through participation is not about giving them the same role and responsibilities as adults in the design process (Hussain 2010:105). Children can be empowered by gaining confidence through experiencing that adult designers are interested in knowing their opinions. The co-design process should enable children to become reflective practitioners who understand how to establish partnerships and communicate with people who hold diverse views (Derr 2015:120).

The interpretive paradigm is identified as a framework for the research in order to describe and understand the learner's experiences and situate the study in terms of the context (Thomas 2010:291). The research design for this study is participatory research that is analysed through the qualitative method of thematic analysis. Both visual and narrative thematic analysis are used as a method for identifying, analysing and reporting themes within the data (Braun & Clarke 2006:6).

Data was collected through observations, drawings, photographs and informal conversations from the three workshops. This data was then analysed through an interpretation of Braun and Clarke's (2006:16-20) six stages of a thematic analysis. The first phase was to actively read the raw data from the workshops in order to observe and identify important aspects. Following this, initial codes were drawn up from the raw data to identify interesting details and features that could contribute to generating themes. The extracted information presented a collection of data where patterns started to emerge. This started to give a sense of main and sub themes. The raw data presented with two main themes, namely visual and narrative observations. Sub themes, which support these main themes, were also developed. The work stages were used as a guide to show where each theme would fit into the architectural design process. The fourth phase involved the refinement of these themes in order to establish data sets that were distinguishable and defined. Lastly, the themes and sub themes were presented and described in an understandable manner which can be further used for discussion. Through unpacking the data, and generating themes, a better understanding of the process and outcomes is provided. As a result, it becomes evident how the workshops impact on the design process and how the literature can be used to support the findings. A summary of the results is presented below.

Since it is a qualitative study, and the researcher had to interact with the participants, appropriate steps were taken to adhere to the ethical guidelines in order to uphold participants' privacy, dignity, rights and anonymity. Silverman (2000:1) reminds researchers that they should remember that they are entering the private spaces of participants and they have the obligation to respect the rights, needs, values and desires of the participants (Thomas 2010:325). The research proposal was cleared by the University of Pretoria's Engineering, Built Environment and Information Technology's ethics committee (Number:). The ethical issues have been addressed by



Table. 03: Different roles (Author 2018 adapted from Lee 2008)
Fig. 07: Above opposite: Including many voices (Author, 2018)

obtaining informed consent, guaranteeing participants that there are no risks involved, maintaining privacy and confidentiality by securing information and avoiding showing faces and by making the workshops voluntary.

4. Findings

Co-design is based on the belief that all people are creative in their own way and can contribute to design if provided with the appropriate setting and tools (Vaajakallio & Mattelmäki 2014:63). The following section explores the potential impact on the architectural design process through three workshops. A summary of the workshops, as well as their results is discussed below.

4.1. Workshop One

The purpose of workshop one was to research and understand the context of the township and the secondary schools that the learners attend. Eighteen learners attended this workshop. In this workshop, learners were first asked to draw their desired profession. The aim of this warm up task was not only get the learners to think but also to investigate how schools could aid children in achieving these goals. The next two activities involved mapping of the learner's routes to school and the schools they attend. This was to 'define a complex architectural problem' (SACAP 2010:5) through

an understanding of what the barriers and opportunities were within these environments.

4.2. Workshop Two

The purpose of workshop two was to begin to build design competency of learners and exchange perspectives with specific reference to school design. Twenty-six learners attended this workshop. The first activity was to evaluate a series of images of schools. This was done to acquire an 'understanding of architectural precedent as part of a wider social and cultural system' (SACAP 2010:8). This allowed the author to understand how schools were perceived by users after their completion. Following this, learners were asked to divide their pages in twelve and choose from a series of design elements such as type of roof, wall material, colour for school, number of learners and extra activities needed. The learners were given options for each heading and this allowed the author to see which elements of architecture learners were drawn to and if there were any trends. Lastly, learners were asked to design their dream school in groups of 4-5. They were given two pieces of A3 paper, pencils and coloured stickers. The aim of this task was to evaluate what elements they used within their schools and how spaces related to each other.

4.3. Workshop three

The purpose of the third workshop was to continue to build design competency of learners and create different scenarios in order to see how learners interacted with space. Sixteen learners attended this workshop. Learners were first asked to close their eyes and imagine their favourite space. They were then asked to draw or write about the space they had pictured. The aim of this task was to see if there was a trend in the types of spaces learners described. Next, learners were divided into four groups and allocated to a station. At the first station they were asked to fill in furniture on a basic RDP house6 plan using only paper and pencils. At the second station learners were asked to design a park using paper, straws and pencils. At the third station learners were asked to fill in the spaces of the plan of a school using coloured clay. The purpose of

this was to understand social dynamics and spatial and aesthetic aspects of the learner's ordinary environments (SACAP 2010:8).

5. Discussion

Throughout the research there has been the question of what is the purpose of co-design and where does it happen in the process of architectural design? Four potential answers to these questions are identified. These potential answers lie within the SACAP learning levels of awareness, knowledge, understanding and ability. These answers can also be related back to the co-design purposes of research, building design competency, empowering users and engaging multiple stakeholders. The purpose and place of these four answers are explored through the SACAP work stages.

5.1. Inception

In the traditional design process, a site and brief are given to the architect who then undertakes the design. Inception of this project was undertaken from a novel perspective. Instead of having a preconceived idea about site and program, the author allowed the workshops to inform this decision. Through mapping of the context, it was found that there were not enough secondary schools in the area. The workshops were therefore focused on secondary schools and through mapping of the routes to schools, and the schools themselves, the author could see what was missing in township schools as well as what spaces the learners focused on which included creative and sports orientated programs. The program was then further developed to include after-school activities, creative centres and sports facilities.

In workshop two learners were asked to place their dream schools on a map of the township and give a reason why they placed it there. The actual spaces learners placed their schools was not considered as the majority of learners just placed it where there was a large empty space, however, the reasons they gave were applied to the site choice for the design project. These reasons included: in an area where there were no schools, close to the university or other public building. As was predicted by Taffe

(2017:18), a deeper uncovering of the user's context was revealed which allowed for a more grounded argument.

The workshops allow the learners to switch roles between the designers and the user. As was predicted in literature by Derr (2015:120), children can be empowered through experiencing that adults are interested in their opinions. A stand out point in every workshop was that learners are never limited by what they receive. Learners were given an A3 paper and a pencil for exercises. The outcome was 3D models of paper or learners who joined their papers together to have bigger pages. The ability to do a 'competent building design of a complex nature, based on parameters and constraints' (SACAP 2010:5) is outlined in the work stages. The design was approached from the perspective of 'what opportunities can be brought to the table' rather than 'what problems can we fix'.

5.2. Concept

A theme that continued to emerge was that of home versus aspiration. There is a need for a sense of familiarity but a want for something that is greater than what they currently have. Learners continued to draw familiar elements of home within their design work. This point reinforces the theory that children are still only allocated two spaces: home and school (Cunningham 1995, Jans 2004). When asked to imagine their favourite place, the majority of learners chose buildings such as the White House, the beach or castles. These are places learners have never visited before. Home elements become familiar points of reference as they have no knowledge of other inspiring public spaces. Translated through to the design process, this shows the architect that there needs to be elements that reflect familiarity but also elements that stand out and make a statement. The secondary school must create a presence and be something that inspires learners to attend. A further investigation into the articulation of these elements is needed.

5.3. Analysis

Precedent analysis in the architectural process

is usually done in terms of spatial outcomes. The co-design process extends this process by evaluating the space in terms of the impact it has on the surroundings. Images of school precedents were given to learners in workshop two. Learners were asked to express their likes and dislikes. This moves users from subjects for analysis to active participants in the design process as pointed out by Lee (2008:33). It was discovered that learners were drawn to the schools, such as Vele Secondary School, that had outdoor spaces and covered walkways. The majority of learners were impressed by the colourful, bold signage of Inkwenkwezi School by Wolff Architects but were not impressed with the sheet metal materiality of it as they associate sheet metal with being poor. This was also true for Usasazo Secondary School, also by Wolff Architects. Learners thought the school was a factory or prison as it is grey with no addition of a natural landscape. This further reinforces the need for a school to have familiar elements within in.

5.4. Design development

Drawing on the theme of home versus aspiration, a sub-theme that emerged that is prevalent in the design development phase is that of safety. This was seen in the workshops through different aspects. Firstly, it was revealed in the mapping of schools. Learners expressed a concern when entering the schools as the entrances are often small and concealed. The younger learners are scared off by older learners who hang around in these areas. Secondly, in the precedent analysis learners did not like schools if they lacked fences as there was no way to enclose the school. Thirdly, some learners were hesitant to enter the classroom and sit down when there were older learners from a different school already seated in the classroom. When these younger learners did enter the classroom, they grouped together near the back of the class. With time, the younger learners warmed up to the older learners and began to talk with them. As predicted in literature, the co-design process crafted linkages between partners (Hamdi 2004: xviii). Translated spatially, elements that are enclosed or circular create a sense of safety whereas

open spaces encourage interaction. Drawing this through to classroom design, it emphasises the articulated classroom with different areas of learning.

Throughout the workshops it was observed that learners chose to draw on elevation at eye level. Traditionally, space is viewed on plan or by bird's eye view. On making this observation, the design process was altered to design the building from the inside out. In other words, the classroom was the first module designed, then the space surrounding the classrooms and finally how the classrooms interlock to fit the site.

The ability to do a 'competent building design of a complex nature, based on parameters and constraints, developed through independent scientific research, which is sensitive to issues of environment and sustainability, as well as cultural issues in a responsible way' (SACAP 2010:5) is the desired outcome for the architectural design work stage. This views the project as a holistic outcome. Through the process of co-design, the design development stage starts to integrate user, environment and space specific to the context therefore viewing the process and product as a continuous, holistic loop instead of separate entities.

5.5. Construction

The outcome for the construction technology level in SACAP's work stages is the 'ability to implement innovative application of construction methods that are durable and cost effective'. In a township setting people build with what they have. It is therefore very effective if architects can learn from their surroundings and be taught by local craftsmen who have the ability to see potential in the materials. The ability to make 'something out of nothing' was also observed in the workshops. Learners used pencils as rulers, stuck pages together when they felt like they had too little space and built objects out of the paper instead of just using pencils to draw 2D objects. Rather than applying fancy building technologies, the co-design process can help an architect realise the beauty in materials and discover what the

materials want to be. The use of local materials and craftsmen is further emphasised in the learning outcome of 'ability to evaluate materials in an ethically and responsible manner' and the 'ability to recognise the demands of context'.

Another observation that continued throughout the workshops was that learners always designed their buildings in brick with careful consideration to how the bricks were placed. The most time in the exercises was spent drawing individual bricks. This relates back to two of the themes previously discussed: safety and home versus aspiration. Firstly, learners associate bricks with a sense of stability and therefore safety. It is a known element which brings about a sense of comfort. The ability to implement innovative application of construction methods and materials is part of the construction technology outcome for the SACAP work stage. Through taking this known element of brick and investigating ways to use the brick beyond the standard production, the architect has not only met the SACAP requirement but also provided the user with a sense of home.

5.6. Close out

The close out process is not affected when working with children in co-design. In order to integrate co-design and the traditional process with regards to this stage, a different user group that is more involved with the management and running of the building would need to be involved.

5.7. Post occupancy and feedback

The post occupancy and feedback stage of the architectural design process is included in the RIBA and AIA work stages; however, it is missing in the SACAP stages. The co-design process is included in this stage to engage with the user on their thoughts on the physical manifestations of architecture. Typically, Department of Public Works government schools are typically located in the centre of the site and enveloped by fences and parking lots. The shortfalls of the Usasazo school are again reinforced with the post occupancy feedback. This school is placed on the boundary line with roll up hatches so

that students can trade directly with the public. Usasazo School is featured in many architecture journals for leading school architecture. It was found that the classrooms with hatches directly on to the street had to be blocked up as children were blowing smoke and banging on the hatches, therefore disrupting the classes inside. Through the collaborative process, a deeper understanding of how buildings operate within their setting is gained, which would allow for a higher level of learning being achieved in the SACAP outcome of 'architectural precedent and history'. As referred to by Wright (2017:27), this feedback enables a continuous feedback into practice that broadens the impact of architecture.

6. Conclusion

A tension between traditional design practice and co-design practice exists. Co-design implies that the architect must relinquish sole authorship that is so admired in the abstract world, and step into new roles of design which embrace the power of the collective. By investigating the different work stages of the design process, it is evident that the level of collaboration will depend on the way professionals practice. There is opportunity in each stage for collaboration with different user groups. When designing with children as the collaborative group, it is evident that both parties will benefit the most in the inception, concept and design development phases. Thereafter lies an opportunity to collaborate with a different user group. It is in this way that collaborative thinking underpins and supports the traditional design process rather than competing with it.

Through the three workshops, it was discovered

that co-design activities that are focused and designed according to the user uncover information that supports the design process. The workshops introduced in this paper were an effective way in developing site, program and the beginning of a spatial outcome. In order for co-design to genuinely impact the design process throughout the work stages, there is a need for the workshops to not only delve deeper into specific aspects of design but also to involve more than one user group. The co-design process is a learning process, both for the architect and for the users. It is argued that every project should have an element of co-design within it. This is especially important in public buildings, and more specifically schools, as it illustrates that architecture can begin to impact the lives of people before the physical manifestation of the architecture.

It can be seen, however, that the roles of people in the concrete and abstract spaces, as defined by Lefebvre, are changing and adapting to current times. Co-design in the traditional practice will change how we design, what we design and who designs (Sanders et al 2008:12). Co-design illustrates how architectural intelligence can be exercised in a much broader spatial field that acknowledges more than just the building itself but social, global, ecological and virtual networks.

The design process, and the object of design, will continue to change as design and research blur together. Hamdi (2010: xvi) states, *'The knowledge that participation is not something you tag on if you have time or good will, but an integral part of making design and planning efficient and effective. It underpins today's concepts of partnerships and good governance.*

It cultivates ownerships and, with it, a sense of belonging and responsibility, both of which are important to the health of place and community.' Co-design not only adds to the vocabulary of the designer and user, but also adds to the resilience of place through place-making that is socially and environmentally responsive. It is in the realm of co-design that the beauty of architecture oscillates between strangeness and the ordinary. If we embrace the power of the collective and collaborative thinking we are able to conceive new ways in the making of architecture.

Endnotes

- 1.Co-creation/co-design - the creativity of designers and people not trained in design working together in the design development and arises in a realm of collaboration which both the professional designers and the other participants need to enter together (Lee 2008:32,33; Teder 2018:2).
- 2.Design expert - individuals whose field of interest, research and/or work is the practice and culture of design (Teder 2018:1).
- 3.Agency - the ability of an individual to act independently of the constraining structures of society (Awan et al 2011:30)
- 4.Spatial agency - the agent is one who effects change through the empowerment of others, allowing them to engage in their spatial environments in ways previously unknown or unavailable to them, opening up new freedoms and potentials as a result of reconfigured social space.
- 5.Code - feature of the data that appears interesting to the analyst, refers to the most basic element of the raw data that can be accessed in a meaningful way (Braun & Clarke 2006:20).
- 6.RDP House - Reconstruction and development programme houses provided by the South African government



Fig. 08: Collage of design intentions (Author, 2018)

a way of acknowledging //

SOURCES

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acknowledging help

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PERSONAL COMMUNICATIONS

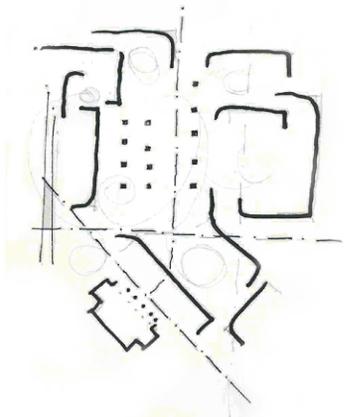
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In accordance with Regulation 49c0 of the General Regulations (G.57) for dissertation and theses, I declare that this thesis, which I hereby submit for the degree of Master of Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

I further declare that this degree is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

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