Teacher's implementation of construction play in early childhood learning environments

by

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MAGISTER EDUCATION

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DECLARATION OF ORIGINALITY

I, **Karen Pienaar,** declare that this MEd thesis:

Teacher's implementation of construction play in early childhood learning environments

Which I hereby submit for the degree **Magister Educationis** 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.

31 March 2023

K. Pienaar

DEDICATION

I dedicate this work to my patient and loving

Father

D. J. Pienaar

Thank you for teaching me to look at the world from different angles, for showing me what hard work entails and encouraging me to follow my dreams.

'I will not pretend I wasn't petrified. I was. But mixed in with the awful fear was a glorious feeling of excitement. Most of the really exciting things we do in our lives scare us to death. They wouldn't be exciting if they didn't.' – Danny Campion of The World

~ Roald Dahl ~

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ABBREVIATIONS AND ACRONYMS

BEd: Bachelor of Education

ECE: Early Childhood Education

GED: General Education Diploma

KEY CONCEPTS

- Block play
- Construction play
- Experiences
- Learning environment
- Preschool teachers
- Play
- Problem-solving

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- No significant changes,
- Informed consent/assent,
- Adverse experience or undue risk,
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26 January 2023

CERTIFICATE OF EDITING

To whom it may concern,

This letter confirms that the Master's dissertation titled *Teachers' implementation of construction play in early childhood learning environments* by Karen Pienaar was proofread and edited by All-done Editing Services.

The document was edited for grammar, punctuation, spelling, overall style and consistent use of South African English spelling conventions. All amendments were tracked using Microsoft Word's "Track Changes" feature, and consequently, the author had the option to accept or reject each change. A complete edited copy was provided, but the final decisions as to which changes to implement, rested with the author. The document formatting and list of references were also edited according to the shorter Harvard reference style.

Sincerely,

M Schutte

Marietjie Schutte

ABSTRACT

Historically, the concept of play has been at the centre of early childhood programmes. Early childhood educators have observed and emphasised that young children bring energy and enthusiasm to their play, which seem to drive development and form an inseparable part of a child's development. This study determined how construction play occurs in different preschools and learning environments - looking at indoor and outdoor learning environments. I focused on six preschools in different socio-economic settings, in the Gauteng and Mpumalanga provinces of South Africa. I looked at how regularly construction play occurs, what form of construction play the children engage in, what the learning environment looks like, and whether the teachers have enough knowledge, understanding and practical application. I also investigated if teachers know and understand how to implement construction play and if they know how to use this form of play in different learning environments. In conclusion, I investigated whether construction play is beneficial and how teachers can better implement this form of play in different learning environments. For my data generation, I used semi-structured interviews, structured narratives, observations and photo voice to gather data related to preschool teachers' perspectives on the importance of exposing young children to construction play and whether they are mindful of the benefits of construction play, such as for cognitive and problem-solving skill development. The process I used to document this information was: voice recordings of the interviews, which were transcribed for data analysis purposes; structured narratives, which are the teachers' stories about construction play written with given guidelines, visual representations of the learning environment, children engaging in construction play and the teachers engaging with the children and classroom observations. The findings are thoroughly explained in Chapter 5, where the findings show that this form of play develops the young child in a holistic way. The literature and research findings agree that the teachers' background plays a role in their implementation of this form of play. There is further agreement between the literature and research findings that it can be beneficial to pair construction materials with other resources and toys. Construction play is a well-loved form of play with an abundance of developmental properties and aspects.

CHAPTER 1

Dream it, believe it, build it – Anonymous

1. Overview of the study

1.1 Introduction

Play and playing are human phenomena that occur across the lifespan of most humans and different cultures. Humans enjoy engagement in play and are often fascinated by the play of others (Van Hoorn, 2007: 5). There is a diversity of definitions regarding play and some longstanding researchers have noted that almost every activity a child participates in can be labelled as play (Rubin, 1983). Traditional approaches to defining play have focused on qualities that differentiate play from other forms of behaviour. Authors, like Fleer (2011) in early childhood education research, agree that play is a child-centred activity. Play is free from externally-imposed rules and is usually initiated and driven by the child, often showing some form of pretence (Fleer, 2011).

1.2 Background and orientation

Research presents an opportunity to answer questions about the world, concepts humans do not understand, or phenomena researchers find exciting or disturbing. Research is conducted in a systematic manner that allows us to connect the observations we, as researchers, make or the data generated and theories about the world (Best, 2012: 3).

According to the *Oxford Handbook of the Development of Play,* the concept of play is considered a phenomenon of youth. Still, it can occur well into the maturity phase (Burghardt, 2015: 24). The control characteristics of play involve studying the direct internal and external factors that cause obstacles or expedite play. These control characteristics affect the study of sensory and perceptual signals, physical activity and movement, toys, playmates, space and other aspects, including the importance of encouraging free play in natural settings (Burghardt, 2015: 23).

Play can be a planned, naturally-occurring activity where the series of actions carried out in play is more significant than the play environment. Play can also be accessible, fun, spontaneous activities that can include different exercises voluntarily engaged in, with or without adult supervision (Yildirim, 2017: 1-10).

Playing is typically regarded as how all young children discover and interrelate with their circle of friends. Yelland (2011) identifies play as a comprehensive part of early childhood curricula. The freedom of playing has come to be equal to education in the early years of childhood (Yelland, 2011: 4). Historically, the concept of play has been at the centre of early childhood programmes. Early childhood educators have observed and emphasised that young children bring an energy and enthusiasm to their play that seem to drive development and seem to be an inseparable part of development. A young child can play with blocks for hours, fascinated and captivated by the potential these blocks offer, but that same child might squirm when asked to sit down and practice writing alphabet letters in a formal setting (Van Hoorn, 2007: 5). Sheridan (2011) states that studies investigating what play means to children have been fruitful and have led to much deeper insight into what distinguishes play from other types of activity. Research demonstrates that preschool children identify play as a freely chosen and self-directed activity. Children do not often define play as necessarily fun (Sheridan, 2011).

Monighan-Nourot (1987), who studied play, suggests possible motives for its importance in the development of young children. As information-processing research expanded over the past three decades, a new area of the investigation surfaced, called developmental cognitive neuroscience. Cognitive neuroscience development brings together researchers from psychology, biology, neuroscience and medicine to study the relationship between changes in the brain and the developing children's cognitive processing and behaviour patterns. Throughout infancy and early childhood, the brain is highly plastic and it is incredibly open to growth and reorganisation due to experience (Berk, 2017: 23). The brain development principles relate directly to the timing of the emergence of many skills and abilities seen in infants and young children. Brain development has many components, and a young child’s brain is fascinating. A child’s brain growth goes through two distinct growth stages. Firstly, young children experience expectant brain growth, this form of brain growth happens when children

are very young, and their brains are rapidly developing. Experience-–dependent brain growth comes second, and this form of brain growth occurs throughout a child's life (Berk, 2017: 191). The ability to gain control of physical movements and mental activity can be attributed to hierarchical development, lateralisation and differentiation (Abbe & Ahola, 2011: 84). A critical element that can help improve growth and different aspects of development in young children is play.

According to Monighan-Nourot (1987), classical theorists, like Piaget and Vygotsky, characterise the concept of play by the following features: 1. Intrinsic motivation, 2. Active engagement, 3. Attention to means rather than ends, 4. Nonliteral behaviour, and 5. Freedom from external rules (Monighan-Nourot, Scales & Van Hoorn, 1987). When young children are actively engaged and intrinsically motivated, it is easy to observe their zest and focused attention. It can be seen that children will use language to communicate with others, solve problems, draw and much more. Children's sense of autonomy is rooted in intrinsic motivation and active engagement with constructive play, also known as construction play, which entails combining elements in the play environment to create something innovative and new. This form of play may include unique construction methods like packing, assembling, disassembling, classifying or building (Ryan, 2019: 1-3).

It is believed that there is a three-step ladder that young children developmentally climb, which involves moving from one phase of play to another (Ryan, 2019: 1-3). The first phase can be labelled as active play when children find straightforward gratification in repetitively moving objects and investigating toys or other objects to play with through their senses. The second phase of play is constructive play. In this phase, children have a profound awareness of what numerous objects and toys can do. In this phase, they will try to construct things with toys and other ordinary objects they find around them (Ryan, 2019: 1-3). At two years of age, children start to develop a larger attention span. Gaining a larger attention span means that children can now spend lengthier periods sitting and concentrating on activities with one set of toys. During this time of prolonged play, stage three takes place. During phase three, one might observe children moving from the plain, straightforward banging of toys around to moving the toys with an objective, like moving a toy car back and forth (Ryan, 2019: 1-3).

Constructive play involves manipulating resources to make things: sand, art textiles, water, woodwork activities, sticks and stones, and a range of different-sized and different types of blocks (Wardle, 2000). Constructive play is organised, goal-oriented play in which children use play materials to create or build something (Johnson, Christie & Wardle, 2005). Constructive play involves open-ended exploration and is gradually more functional, evolving to make-believe transformations. Four-and five-year-olds often switch back and forth between dramatic play and construction play, and it can be tricky to distinguish between the two forms of play (Kostelnik, Soderman & Whiren, 2007; Drew, Christie, Johnson, Meckley & Nell, 2008). Creating or building constructions out of nothing is an activity that is key to successful learning for young children. Constructive play inspires creativity, stirs the imagination, and presents opportunities for meaningful problem-solving. Constructive play makes learning fun. The ability to physically construct new connections between thoughts and objects is the act of innovation and change (Park, 2019).

Constructive play involves exploration, tactile stimulation, problem-solving, social interaction, engagement and concentration, and attention to processes and outcomes. Young children symbolise their ideas, knowledge and interests in multimodal ways such as layouts, buildings, plans and sculptures (Wood, 2013). Children who play with blocks learn how to manipulate and build from a young age. They can put together a few blocks, stack them or lay them out in a line. They begin a rudimentary understanding of mathematics as they assemble simple towers and streets. Young children build on that experience and knowledge and expand their scope by creating block structure scenarios. Young children develop their mathematical understanding by combining shapes, quantities and design patterns. Children practice mathematical concepts, scientific theories and language skills in the block area using their creativity and imagination (Gellens, 2013: 109).

The construction play area is appealing because construction toys are open-ended. With these materials, there is no wrong or right way to build and construct. Children can control the manipulation and move them around to create different structures. Children can play in the construction area day after day, year after year and never tire of the activity. Repetition of gross and fine motor movements brings about

permanence in the brain connections. Thinking is at a high level and creates new pathways. Different brain regions are activated as the child's activity changes from one aspect of play to another (Gellens, 2013: 110). The more time spent building, the more complicated the construction becomes. Each creation differs and creates new problems for the child to solve. The child learns that the blocks must have a foundation to stand through trial and error. As the child builds higher, gravity is a foe, seeing that it can cause any construction to tumble over. The base of the structure must be broadened to make the construction higher. The child must have hands-on experience building the tower, watching it fall and rebuilding it. Each time, brain connections are reinforced. The first time the child makes the foundation wider than the top, it might be accidental, and they finally achieve success. The child will need to repeatedly build the structure until they understand how to balance the weight of the blocks to gain height (Gellens, 2013: 110).

As stated by Newby Leisure (2018), one may notice when children participate in this way of playing, they may begin to ask themselves questions like, "What if I place the big block on top of the tower?" or "How high can I stack the blocks before they tumble over?" or "What will happen if I remove one block from the middle?". When children question themselves, it is a sign that they are starting to challenge themselves. For example, a child may try to pile a few blocks as high as possible until the blocks fall over. Alternatively, children may decide to put a specific volume of liquid into a container and place it on their constructions. Using scales can show how full the container needs to be before it becomes unstable and topples over. Constructive play frequently includes cooperative, collaborative learning, which helps young children grow socially and emotionally. Constructive play also enhances physical growth and development (MacDonald, 2001). In addition, through constructive play, problem-solving ability should improve (Park, 2007). These uncomplicated actions continuously stimulate children's brains, supporting their education. Playing with a range of building and innovative products helps children build self-confidence and promotes independent learning (Newby Leisure, 2018: 2).

1.3 Context and rationale

I enjoyed playing with blocks from a young age and was fascinated with the possibilities blocks had to offer. From my perspective, every child should have the

opportunity to experience the wonders of construction play. Unfortunately, construction play is not an option for many South African public schools because the construction materials are too expensive and, therefore, unaffordable for many. Furthermore, classroom space is limited to accommodate construction materials. Additionally, many teachers are unfamiliar with the concept of construction play and the possibilities and advantages it can offer children to develop their problem-solving skills.

In retrospect, having had such a rich experience growing up with blocks and different construction toys, I know what a significant educational gap it is not having access to these toys in early childhood learning environments. All young children should be given the opportunity to play with blocks and other construction materials from a young age and grow and develop in new and exciting ways. Learning about the world and interacting with it is integral to constructing knowledge. Gellens (2013) highlights that young children need a chance to explore their surroundings and different materials. Young children learn best when touching and holding something, using their senses to discover an object's properties. Many of these discoveries occur during construction play; therefore, not being exposed to construction materials at a young age can leave a significant gap in a child's developmental process.

My goal was to explore the implementation of construction play in the early years. I wanted to discover what teachers understand about construction play and how these teachers implement construction play to promote young children’s problem-solving skills in early childhood learning environments. By conducting semi-structured interviews, I determined what form of teacher training the participants had and what they learned about construction play through their training. At the end of the study, suggestions and recommendations are made regarding the implementation of construction play in an early childhood learning environment. These suggestions and recommendations are made based on the participants' initial training, professional development and their understanding and implementation of construction play. The benefits of conducting this study determined that a better understanding of construction play will equip teachers with more knowledge, will help them with their professional development and give them a new perspective on how to implement construction play in their teaching environments.

1.4 Problem statement

To understand how to implement construction play in early learning environments it is essential to know how young children make sense of concepts in the world around them, which form part of their everyday lives. As Venter & Dicker (2013) stated, Piaget and Vygotsky's theories of constructivism underline the teaching and understanding of mathematics and problem-solving. Constructivism, therefore, implies that learners must be actively involved in their discovery and understanding of the world. If optimal learning occurs, children need to actively assemble their knowledge while engaging in hands-on activities (Venter & Dicker, 2013: 191). An excellent example of these hands-on activities is construction play.

Children acquire new knowledge through different types of play. Construction play is one of these types of play and is defined by the theorist, Piaget, as activities generating symbolic products and is believed to build on logico-mathematical knowledge. According to Swiya and Szücs (2014), construction play and playing with blocks are some of the most well-known play activities seen in young children. Children can start early and engage in construction play, which can serve as a self-education tool (Swiya & Szücs, 2014: 73).

Davin (2013) identifies that one of the challenges regarding construction play is the amount of space it can take up in the learning environment. To engage in effective construction play, children need resources and sufficient space. An adequate amount of space should be sectioned off by the teacher so that the children can play without any unnecessary disturbance or traffic. If possible, the children should leave their constructions in the classroom overnight to continue playing with them the next day (Davin, 2013: 17). Not breaking the structures down will, in turn, inspire children to build more intricate constructions. The play area should be large enough to create constructions without being bothered by other children in the class. The floor surfaces in this area must be smooth and flat so that the construction can stand firmly and not topple over. It is required that the number of children playing in this area should also be restricted, so that the children have enough boxes and blocks to build realistic constructions (Davin, 2013: 17). An essential element of construction play is finding ways to share resources and building materials. Allowing children to access resources

classroom-wide enables them to deepen their play themes, deepen their intellectual commitment to the activity, and immerse themselves in their oral culture and their associated design quests. Such a flexible use of resources and their management require a classroom discussion and some strategic thinking and planning by the teacher (Broadhead, 2004: 120).

In several South African public preschools, the ideal learning environmental layout is not achievable due to the large number of children the teacher must accommodate in one classroom. The lack of space in the learning environment does not allow the teacher to section off certain areas for different types of play. Not enough space leads to the blocks or construction toys not being displayed under different block outlines on shelves but instead packed away in crates and put away. If the construction toys are not neatly displayed in an open learning environment, they will forget about the toys and not play with them. The construction play area usually tends to fall away because it takes up a lot of space. Construction play cannot happen if the school does not have the necessary resources to build its construction or if teachers do not have enough knowledge (Davin, 2013: 17).

This study determined how construction play occurs in different preschools and learning environments, looking at indoor and outdoor learning environments. I focused on six preschools in different socio-economic settings. I looked at how regularly teachers implement construction play, what form of construction play the children engage in, what the learning environment looks like, and whether the teachers have enough knowledge, understanding and practical skills to apply construction play. In conclusion, I investigated how, where and when teachers implement construction play in a preschool learning environment. I further explored if these teachers implement construction play to promote young children's problem-solving skills.

1.5 Purpose statement

This study aimed to investigate teachers' understanding and implementation of construction play in early childhood learning environments. The study further intended to determine if these teachers use construction play to enhance young children's problem-solving skills. The central objective of this study was to explore whether preschool teachers understand the importance of construction play and how this form

of play benefits young children's development. The better preschool teachers understands the concept construction play the better this form of play will be implemented in early learning environments.

This study attempted to achieve the following objectives:

1. To define the importance of construction play concerning young children's problem-solving skills.
2. To learn what teachers understand under construction play and its importance in a preschool learning environment.
3. To investigate how teachers implement construction play to enhance young children's holistic development.

1.6 Research questions

1.6.1 Primary research question

1. How do teachers implement construction play in early childhood learning environments?

1.6.2 Secondary research questions

1. How do young children participate in construction play?
2. How do teachers promote play and construction play in early learning environments?
3. What challenges do teachers experience during the implementation of construction play with young children?

1.7 Concept clarification

1.7.1 Block play

Conventionally, playing and constructing with blocks are essential elements of any early childhood curriculum and playing is defined as an open-ended play-based activity in which young children discover and understand new matters. Block play is regularly mentioned as a free play action that may offer situations for creating and using problem-solving, communication and collaborative skills at a young age (Yelland, 2011: 6). Young children are engineers in that they modify the world to satisfy their own needs and wants (Chalufour & Worth, 2004). Block play contributes to scientific experiences supporting and scaffolding inductive thinking and discovery

through early engineering. It encourages children to explore the properties of matter, interactions of matter and, in particular, core science concepts such as gravity, stability, weight and balance (Park, 2019).

1.7.2 Construction play

Constructive play, also known as construction play, involves manipulating elements in the play environment to construct something original. This form of freedom may include unique construction methods like packing, collecting, undoing, grouping or creating (Ryan, 2019: 1-3). Constructive play involves making things and building creations one has never seen before (Drew, Christie, Johnson, Meckley & Nell, 2008). As young children experiment with sorting and arranging materials, ideas and imagination begin to flow: Questions arise naturally and, in this way, constructive play serves to focus the minds of children through their fingers and leads them to invent and discover new possibilities, as a way to fulfil their sense of purpose (Park, 2019).

1.7.3 Experience-expectant brain growth

Experience-expectant brain growth refers to the young child's brain rapidly developing the ability to organise, which depends on ordinary experiences, opportunities to interact with people, hearing the language spoken and other sounds, seeing and touching objects and moving about and exploring the environment (Berk, 2017: 191).

1.7.4 Experience-dependent brain growth

Experience-dependent brain growth occurs throughout our lives. It consists of additional development and refinement of established brain structures resulting from specific learning experiences that vary widely across individuals and cultures (Berk, 2017: 191). Both the concepts of experience-expectant and experience-dependent brain growth are discussed in Section *2.2.1 the brain and its role in child development*.

1.7.5 Learning environment

At birth, the human brain is set up to be attracted to innovation. Infants and young children tend to respond more strongly to a new element that has entered their environment, a feeling that ensures that they will continually add to their knowledge base (Berk, 2017: 142). Thus, a learning environment needs to add to young children's innovation and creativity. An indoor and outdoor learning environment examines the

different physical locations, contexts and cultures children learn (Venter & Dicker, 2013). It is vital to make sure that a learning environment is consciously arranged. The learning environment needs to promote rich experiences for all children (Van Hoorn, 2007: 190).

1.7.6 Preschool teacher

It has been mentioned by Hughes and Kwok (2006) that children describe good teachers as being caring, helpful and stimulating (Hughes & Kwok, 2006). The preschool teacher should endorse and manage a team that proposes high-quality *early childhood education* and supports children. They should provide continuous support and assistance to the management team and develop connections that help families (Venter & Dicker, 2013).

1.7.7 Problem-solving

A great discovery solves a significant problem, but there is a grain of discovery in the solution of any problem (Polya, 1973). Problem-solving skills refer to our aptitude to solve problems effectively and quickly without obstructions. It includes identifying and distinguishing the problem, generating alternative solutions, evaluating, selecting the best alternative, and implementing the chosen solution (Venter & Dicker, 2013). Problem-solving is an active effort to discover what must be done to achieve a goal that is not readily attainable. In problem-solving situations, one must go beyond the information given to overcome obstacles and reach a goal (Weiten, 2013: 310).

1.7.8 Play

Play is a planned, naturally-occurring activity where the series of actions carried out is more significant than the play environment. Play is any activity in which a young child engages with the main purpose of recreation, relaxation and fun (Roberts, Stagnitti, Brown & Bhopti, 2018). Play activities can include voluntarily engaging in play with or without adult supervision. Playing can be a free, fun, spontaneous, self-initiated, intense activity. However, play can also incorporate a variety of structured play opportunities with degrees of parent or adult supervision and mentoring (Yildirim, 2017: 2). Play can further be defined as a behaviour, an approach to a task and a process. Young children move in and out of play according to their wants, wishes and other influences within the environment. Other effects on children's play might include

location, the availability of materials, time and other people's involvement. Sturrock and Else dvocate that play is a cycle of activity (Sheridan, 2011).

1.8 Preliminary literature review

The preliminary literature review's goal is to give the reader an idea of what is to come. Here the reader has the opportunity to see what concepts will be discussed in detail in Chapter 2. The preliminary literature review serves as an introductory section discussing development, play, construction play and teachers' perceptions.

1.8.1 Developmental stages in young children

All the domains of development and learning, the physical, social, emotional, and cognitive domains, are essential and closely interrelated. Children's development and learning in one area are influenced by what takes place in other environments (Darragh, 2010: 77).

The first stage of development mentioned by Piaget is the sensorymotor period. Weiten (2013) highlights that this stage stretches from the child's birth to the age of two years. Throughout the first stage, newborns develop to organise their sensory involvement and gross motor actions (Weiten, 2013: 426). The second stage is the preoperational stage. This period extends from the ages of two to seven. It is during this stage that children's mental images improve. The third stage is the concrete operational period, lasting from seven to 11 years. Children can accomplish growth and development through touchable objects and actual, concrete proceedings (Weiten, 2013: 427). The fourth and last stage is the formal operational period; this stage starts at about 11 years of age. Children begin to apply their mental processes to abstract concepts, not just concrete objects (Weiten, 2013: 428).

Figure 1.1 shows Piaget's four-stage child development theory. This figure summarises the four key stages of cognitive development as stated by Weiten (2013: 426-428).

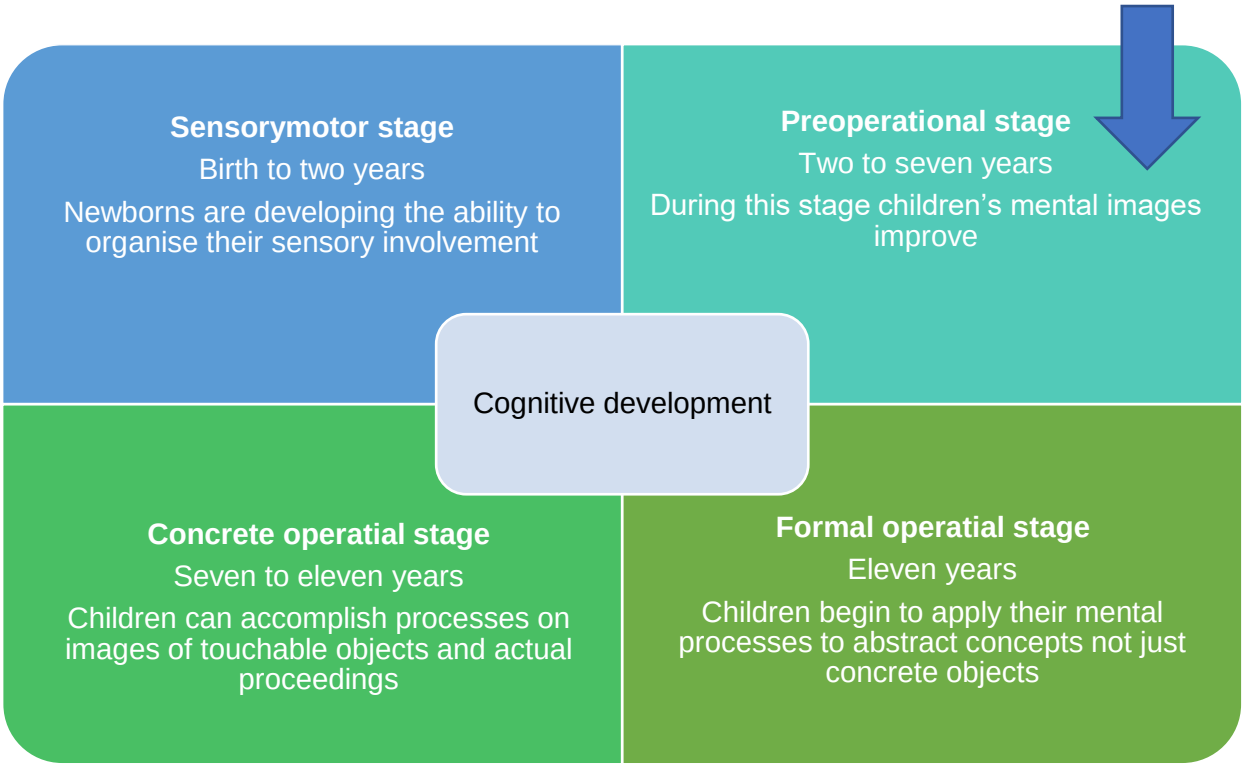


Figure 1.1: Piaget's four stages of cognitive development (Weiten, 2013)

Although Piaget's theories have had a great impact on developmental psychology, his notions have not been fully accepted without critique. Piaget's theory has some shortcomings, including overestimating the ability of adolescence and underestimating infant's capacity. Piaget also neglected cultural and social interaction factors in the development of children's cognition and thinking ability (Babakr, 2019).

1.8.2 Problem-solving

Problem-solving skills refer to the problem solver's aptitude for solving problems efficiently and suitably without obstructions. The ability to analyse complex material and solve problems is a skill just like any other. It entails distinguishing and describing the problem, generating alternate solutions, evaluating, selecting the best alternative and implementing the chosen solution (Venter & Dicker, 2013).

According to Whimbey (2013), the ability to analyse complex material and solve problems is like climbing a tree or doing a handstand. However, there is an unusual difficulty in teaching analytical and problem-solving skills. Commonly, there are two stages to teaching a skill. Firstly, the child demonstrates the craft; then, the child is guided and corrected while practising the new skill. The difficulty comes in with the

fact that analysing complicated material is an activity that is primarily done inside one's head. Seeing that this activity is done in one's head makes it rather difficult for a teacher to teach and for a child to learn (Whimbey, 2013: 21 & 22).

In other words, people cannot see how other people think, perceive problems, and attempt to solve problems. These aspects apply to children who need to learn problem-solving skills from teachers and teachers to see how children perceive issues (Whimbey, 2013: 21 & 22).

One way to overcome this obstacle is to have people think aloud while solving problems. A suggestion would be for both the child and teacher to verbalise their thoughts as they work through complicated ideas and associations. The steps they take are open to view, and their activities can be observed and communicated (Whimbey, 2013: 21 & 22). Gellens (2013) stated that problem-solving first occurs in a child's life in the form of play. Play provides numerous possibilities where children are challenged in new and exciting ways. These challenges then need to be overcome, which is done through problem-solving.

1.8.3 Play and associated benefits

The word play suggests pleasure and playfulness. The act of playing is not possible without the presence of these two elements. Christian (2012) suggests that “it is the child’s playfulness that renders an activity as play. Such playfulness is recognised as the essence of play.” The words play and playfulness have a variety of connotations. Both these words induce many feelings, experiences, and memories (Mardell, Wilson, Ryan, Ertel, Krechevsky & Baker, 2016). Play happens spontaneously and suddenly. Play can also be solitary, social or imaginary (Eberle, 2014).

Play activities involve a wide range of behaviours, actions and interactions, which may have multiple meanings for children. Play can be considered as profoundly serious and purposeful or uncomplicated and purposeless. It can be distinguished by high levels of motivation, creativity and learning, or perceived as aimlessly messing about (Wood, 2013: 5). Essa (2011) stated that a commonality among all children is the need for play, which serves the purpose to learn about and make sense of the world. Still, playing is essential to all aspects of a child's development (Essa, 2011: 43). Play is a

behaviour, an approach to a task, and a process. Children move in and out of play according to their own needs and wishes and other influences within the environment. Other impacts on children's play might include location, the availability of materials, time, and other people's involvement (Sheridan, 2011).

Play is how children understand the world (Essa, 2011: 43). The early years in a child's life are the learning years. The first five years of life set the tone for acquiring knowledge for the rest of our lives. Everything a young child does is a learning experience. Young children learn by doing and experiencing. Learning occurs when their bodies handle and interact with objects in their surrounding environment. This hands-on education brings about lifelong learning that will be an integral part of their knowledge base that they will never forget. Young children have an inner motivation and an innate curiosity to explore and learn (Gellens, 2013: 69).

The act of free, unrestricted play fosters creativity, curiosity, a sense of wonder and problem-solving while the child is physically exploring the world. Play facilitates deep learning and ensures that children become aware of the necessary properties of their world to make sense of it. Creativity, logical thinking and problem-solving are a few of the many cognitive developmental outcomes of play and will be enhanced by a solid play foundation (Van Heerden & Veldsman, 2021).

1.8.4 Play in the African culture

Culture influences the type of play young children engage in, and these cultural backgrounds provide the settings for the beliefs about play. Different cultures worldwide have their own outlook on play (Lester & Russel, 2010).

In cultivated African societies, learning is passed on from one generation to another and perspectives on play are influenced by the following:

- Young children have to be involved in their family’s work to survive (Michelet, 2016). These children tend to spend most of their time with their families in and around their homes (Boyette, 2016).
- It is common for young children to voluntarily partake in work carried out by the grownups in their family, and as these children grow older, they are expected

to perform and complete daily chores. The act of play is unavoidably replaced with participation in the family economy (Ng'asike, 2014).

- Children do not necessarily distinguish between working and playing, and at some point, work has to be prioritised over playing (Boyette, 2016). As mentioned by Wadende, Oburu and Morara (2016), young children in the African culture and community learn how to play by engaging in tasks, such as caring for siblings and helping older siblings clean up and even prepare a meal.
- The power of young children learning from one another is especially vital in an African context, where child-to-child mentorship helps children learn skills like independence, intelligence and social responsibility (Ng'asike, 2014).
- It is expected that most young children in Africa and South Africa do not have access to large numbers of toys or play materials, especially not materials designed for the play of young children. Instead, these children play with everyday objects and loose objects that are used by adults in their family or objects they have found and constructed into toys (Boyette, 2016). These African children's play and learning happen in a more natural context, such as playing with sand and water in dried-out riverbeds (Ng'asike, 2014).

Young children's play and learning are intensely centred on the local indigenous cultural knowledge in their community, which should be embraced and included in the early years of learning and education (Ng'asike, 2014).

1.8.5 Construction play and learning

One type of play that notably demonstrates learning is construction play. Constructive play can teach young children mathematics, science and social studies. Constructive play often involves cooperative, collaborative learning, which helps children grow emotionally and socially. Constructive play also enhances young children's physical growth and development. In addition, children's problem-solving ability improves through constructive play (Park, 2019). Children learn through play. Construction play is defined by Piaget as activities producing symbolic products and is thought to develop logico-mathematical knowledge (Swiya & Szücs, 2014).

Yelland (2011) regards construction play as an indispensable element of early childhood agendas and is justified in open-ended play activities that young children can develop. Playing and constructing with blocks and materials are believed to lead to learning about the physical properties of objects. Mastering these properties will help children develop hand-eye coordination, improve object handling and help children understand detailed concepts associated with, for example, gravity and shapes (Yelland, 2011: 6). Constructive play involves exploration and discovery, tactile stimulation, problem-solving, social interaction, engagement and concentration, and attention to process and outcomes. Children represent their ideas, knowledge and interests in multimodal ways, such as layouts, buildings, plans and sculptures (Wood, 2013).

One type of construction play is playing with blocks. Blocks are one of the most versatile and enjoyable materials found in early childhood environments. Blocks come in many shapes and sizes, are made of various materials, can be used on their own or in combination with other items and lend themselves to an infinite variety of play possibilities (Essa, 2011: 304).

1.8.6 Block play

Blocks support all domains of development, but for this study, I focused on how construction and block play, in particular, provide many opportunities for problem-solving in young children. Children use both large and small muscles during block play as they lift, bend, stretch, reach, turn and manipulate and balance various blocks. Furthermore, blocks that promote learning are a natural vehicle for learning similarities and differences and classification. Children learn mathematical and science concepts related to quantity, addition and subtraction, weight and balance. They also develop vocabulary and visual memory related to shapes, sizes and patterns, creativity and problem-solving skills. Blocks and construction play are versatile mediums that meet many needs and provide development opportunities (Essa, 2011: 304).

Bredekamp (2011) reminds us that one of the main contributors to block play was Caroline Pratt. Pratt focused her energy on studying children directly. She became captivated by the potential of engaging children with open-ended play apparatus and materials. She wanted blocks to allow children to freely express their ideas about the

world. Caroline Pratt's most lasting influence and contribution is undoubtedly her design of wooden unit blocks. Her blocks are made of natural hardwood in various three-dimensional shapes and are mathematically precise because each block is a fraction or multiple of the standard unit. Pratt created wooden figures representing families and community workers to add a pretend element to block play. She also designed large hollow wooden blocks to encourage significant muscle play and to be used outside (Bredekamp, 2011: 57).

When investigating block play, Verdine (2014) suggests that there are two main types of play with blocks. In free block play, children are given blocks and build designs of their choice. Children attempt to make a particular structure from a model in structured block play. These tasks call on different processes: the former invokes children's imagination and ability to produce complex relationships without prompting. The latter calls upon the ability to analyse a spatial representation to create a pre-defined model. Structured block play has been hypothesised to develop skills in estimation, measurement, patterning, part-whole relationships, visualisation, symmetry, transformation and balance (Verdine, 2014).

In essence, block play provides children with multiple opportunities to touch, play with and manipulate different objects. According to Gellens (2013), manipulative play is the avenue for children to refine their fine motor skills and learn interrelated items. Infants and toddlers use their hands, fingers and arms to pick up and manipulate objects. The materials encourage children to gain control of their fine motor movements. Infants begin with grasping, dropping and eventually throwing objects and things. Young children learn to make something happen when they pick up a toy or move it from one place to another. Children's knowledge is increased through playing with these toys. Through trial and error, children begin to solve problems. They learn new skills and reinforce other skills while playing. Coordination and skills learned while playing with one toy are transferred and applied to another. These young children build a rudimentary knowledge of mathematics, science and language concepts accompanying each toy (Gellens, 2013: 74).

1.8.7 The learning environment and teachers' perceptions

When looking at learning, especially how young children learn, educators should look closely at the learning environment. An essential part of any learning environment is the teachers' perception of learning. Essa (2011) explains that all teachers have to gauge their involvement in play according to children's cues. Observation may tell teachers that some children avoid particular play and games, like visiting the construction play area, while others frequently play there. Thus, teachers may need to encourage reluctant children to play in certain parts of the learning environment.

As a formal leader in the classroom, the teacher is the conductor who controls and influences all the other elements in the learning environment to create a particular type of learning climate (Kruger, 2013: 88). The teachers' understanding of certain types of play dramatically influences the way they teach and, ultimately, what children learn. In some learning environments, block and construction play may seem like an activity more geared towards accommodating boys, and the teacher may not feel the need to encourage girls to engage in construction play. Teachers need to inspire all children to visit and play with all the different toys and educational materials available in the learning environment. When children are engaged in block play, teachers need to use descriptive talk when talking about children's block constructions. The teacher conveys that they carefully looked at the building and structures. In return, the teacher may be promoting language development by using new vocabulary, and the child will be encouraged to look closely at their work (Essa, 2011: 307).

Young children grow by being exposed to various teachers that provide learning opportunities. These learning opportunities should supply rich, hands-on play experiences using a variety and abundance of open-ended materials. Teaching practice is a powerful strategy for helping teachers develop a deeper understanding of developmentally appropriate practice and the essential role of constructive play in quality early childhood programmes. Adults who construct knowledge through creative exploration with materials are more likely to encourage children to do the same. In this way, teachers understand and appreciate how play helps children develop character

virtues, such as tenacity, flexibility, creativity, courage and resilience. These are characteristics practised in constructive play by children and adults (Walter, 2008).

1.9 Theoretical framework

For the theoretical framework of this study, I have chosen Lev Vygotsky's constructivist theory. Vygotsky's theory of constructivism underpins the teaching of problem-solving skills. A succinct summary of constructivism is that learners must be actively involved in their discovery and interpretation of the world. Children must construct their own knowledge while actively participating in hands-on activities, for optimal learning to occur in young children.

Lev Vygotsky was born in Russia in 1896. Vygotsky was part of the new modernism that was influencing continental thought. During this time, Vygotsky was primarily influenced by the social theory of his time and the changes accompanying the Russian revolution. He was interested in how social interaction affected individuals and how individuals and society are influenced by history and culture (Davydov, 1995).

In granting social experience a fundamental role in cognitive development, Vygotsky's theory helps people understand the wide variation in cognitive skills. Whereas Piaget emphasised universal cognitive change, Vygotsky's theory leads us to expect highly diverse development paths. The reading, writing and mathematical activities of children who attend school in literate societies generate cognitive capacities different from those in rural or village settlements, where children receive little formal schooling (Berk, 2017: 272).

Vygotsky's theory also underscores the vital role of teaching in cognitive development. According to Vygotsky, while communicating with more expert adults, children engage in verbalised self-observation, reflecting on, revising and controlling their thought processes. In this way, parents' and teachers' engagement with children prompts profound advances in the complexity of children's thinking (Berk, 2017: 272). Several theorists will be mentioned throughout the duration of this study. All of these theorists, pedagogical or grand theorists, contributed to child development, play or construction play. Vygotsky's constructivist theory is the focal point of the theoretical framework. Vygotsky's theory of constructivism reinforces the teaching of problem-solving skills.

It emphasises that young children must actively be involved in their learning if they are to discover the wonders of the world. Following in Section *2.3.2 Pedagogical theories and play and* Section *2.3.3 The grand theories and play,* figures will further be explaining the importance of each pedagogical and grand theorist.

1.10 Research paradigm

1.10.1 Meta-theoretical paradigm: Interpretivist

It has been outlined by Sefotho (2018) that a paradigm is a comprehensive belief system, world view or framework that guides research and practice in a field. Thomas Kuhn is credited with propagating the term paradigm within the research and scientific communities (Sefotho, 2018: 21). When looking at the interpretive paradigm, people look at a paradigm that emphasises an inseparable relationship between the researcher and the research subject. Interpretivism provides subjective experiences about phenomena that cannot be quantified. Interpretivism is a paradigm that does not pretend to establish absolute truth (Sefotho, 2018: 26).

In this study as the researcher, I used an interpretive paradigm to determine teachers' views, experiences and opinions to interpret their understanding of the generated data. These views allowed me to gain wisdom, insight and data from the participants' actual experiences regarding construction play and the implementation of construction play with young children. The teachers' thoughts and opinions brought new insight to the study. By interpreting participants' knowledge of the construction play concept, I gained new insight and a better understanding of how construction play is implemented in the early years of childhood education.

1.10.2 Methodological approach: Qualitative research

The methodology looks at how researchers go about obtaining knowledge about the world. This approach includes how researchers generate data depending on their views of what exists and can be known, how they describe phenomena, and how they explain them (Bertram, 2020: 25). The methodological approach I focused on in this study is the qualitative research approach. Researchers conduct qualitative research because a question or matter needs to be investigated. Researchers conduct qualitative research to encourage people to share their tales, hear their voices and

reduce the power relationship that frequently exists between the participants and a researcher in a study (Creswell & Poth, 2018: 45). The qualitative research approach was utilised to interview teachers and better understand their opinions regarding construction play. This approach was appropriate for insight into the teachers' views regarding construction play. The qualitative approach and interpretive paradigm were used in a neutral setting to generate data to help understand the concept of construction play and problem-solving.

1.10.3 Assumptions

All research, quantitative and qualitative, is based on underlining assumptions about what establishes valid research and which research methods are suitable for a particular reason and in a particular context. To help researchers decide what constitutes valid research, they need to be able to answer the following four questions (Maree, 2018: 56).

- What is the truth or reality?
- What is the nature or phenomena?
- How can we know?
- What is the relationship between the knower and the known?

In this study, what is known to be the truth is that play and construction play have historically been characterised as multi-faceted educational tools for all young children. Playing involves self-initiated activities, free choice, and the interaction between a child’s emotional, academic and social connections. Play confronts young children to explore their environment and socialise with friends. Play frames the development of cognition, language, social competence and creativity, if carefully planned and organised. Construction play focuses on the process rather than the end product and includes special needs and diversity (Isabelle, 2021).

The nature is that in numerous South African preschools, the optimal learning environmental layout is not achievable. This is due to the children-teacher ratio in many South African schools. A lack of space leads to blocks or construction toys not being displayed under the different block outlines on shelves but instead these materials are packed away in crates. If the construction materials are not neatly presented in an open learning environment, young children will forget about the toys

and not play with them. The construction play area usually tends to fall away because it takes up a lot of space. Construction play cannot take place if the school does not have the necessary resources for children to build their constructions or if teachers do not have enough knowledge on the subject matter (Davin, 2013: 17).

How can researchers know that construction play forms an integral part of the learning environment? As the researcher, I conducted an in-depth study on construction play and the concepts relating to construction play, like block play, experiences, learning environment, preschool teacher, play and problem-solving. The known was further established through conducting semi-structured interviews with all the participants, having the participants write structured narratives, learning environment observations at each research site, construction play observations and photo voice.

What was the relationship between the knower and the known? The relationship between the researcher and the participants was professional. As the researcher, I adhered to the ethical standards by using code names to represent the teachers who participated in this study. I informed the participants that the interview sessions were recorded and documented. All the interviews and observations were conducted at the research site. I obtained the participants' permission to take part in the study. I also obtained permission from the parents before observing any children. When observing the children, no photographs were taken where a child's face could be seen. The participants were protected from harm and deception throughout the course of this study.

1.11 Research methods

1.11.1 Research type: A case study

A case study is a systematic and in-depth study of one case in its context, where the case may be a person, a group of people, a school or a community. Case studies aim to describe what it is like to be in that situation, which is generally descriptive. However, they can also be used to generate claims for future verification. The researcher aims to capture the participants' lived experiences and thoughts about a particular situation (Bertram, 2020: 48). I chose the instrumental case study research design to understand a specific topic: how construction play is implemented with young children. An instrumental case study provides insight into an issue or helps refine a theory. This

multiple case study design helped me understand teachers' perceptions of construction play in-depth.

1.11.2 Selection of participants and sites

The participants and research sites were purposefully selected, with a focus on available preschools located in the Gauteng and Mpumalanga provinces. I focused on six different preschools in two provinces. Four research sites were in the Gauteng province and two in the Mpumalanga province. The schools varied in their location and socio-economic status. They were 1. private suburb school, 2. public suburb school, 3. public outer-city school, 4. public inner-city school, 5. rural public school and 6. private outer-city school. The goal was to have a variety of private and public schools to achieve data saturation. The teachers from each school were chosen at random by the school itself.

For my sample, I focused on preschool teachers. I visited six different schools in the Mpumalanga and Gauteng provinces, both private and public schools. I generated my data using semi-structured interviews, structured narratives and observations with each teacher from each research site. I visited diverse; registered preschools that followed the CAPS curriculum and varied in size and teacher qualifications. For my observations, I focused on children between the ages of four and five who attended preschool. The justification of the age groups of four-to-five years will be mentioned and discussed throughout this study in Chapters 1, 2 and 4, under the following sections and sub-sections: *1.2 Background and orientation, 1.8.3 Play and its benefits, 2.2.2 The role of play in development and learning, 2.3.1 Play behaviour and 4.3.1 Background of the research participants.*

1.12 Data analysis and interpretation

Analysing data is the systematic application of statistical or sound methods to evaluate, illustrate and describe the data. An analysis is often an enduring procedure during which the data is constantly gathered and analysed instantaneously (Shamoo & Resnik, 2003).

As outlined by Miles and Huberman (1994: 10 &11), data analysis is defined by three activity movements: data reduction, data display, and conclusion drawing and verification.

Data reduction is the process of selecting, focusing, simplifying, abstracting and transforming the data that appear in written-up field notes, interview transcriptions, photographs, drawings and much more. Data reduction happens throughout the process of a project. Before recording the data, the researcher decides what data will be generated within the boundaries of a conceptual framework or the research questions. Since qualitative data can consist of hundreds of pages of text, the researcher needs to find ways to reduce all these pages so that it becomes easier to make sense of them. Data reduction involves organising and sorting data into codes or categories and looking for patterns or relationships between these categories (Miles & Huberman, 1994). My data reduction process consisted of transcribing all my field notes, organising the notes under the selected research sites, and creating an individual folder for each research site.

Data display is an organised, compressed assembly of information that permits the researcher to draw conclusions and take action. The most frequent display of qualitative data is extended text, and these extended texts might consist of verbatim quotes from interviews, short vignettes or narratives. Alternatively, data can be displayed as graphs, charts, and visual data, such as photographs, can also be displayed (Miles & Huberman, 1994). I chose to display my generated data through diagrams and tables explaining my data-generated process. Later on, I used photo voice to clearly display the different types of construction play at each research site.

Conclusion drawing and verification forms the third stream of analysis activity following data reduction and verification. Researchers start to conclude from data generation, noting patterns and possible explanations. But these conclusions should only be finalised once the analysis is complete (Miles & Huberman, 1994). I concluded my data generation process by making use of thematic analysis. Through thematic analysis, it became clear what the main focal point of the study was.

1.13 Quality criteria

Interpretive research generally tries to understand a social situation from the participants' perspective, a prolonged engagement with data sources is usually required. Confirmability can be improved by making the research process transparent, with enough details for the reader to check if they would have reached the same or similar conclusion. When analysing data, the researcher should strive for intercoder reliability. Intercoder reliability can be established if the researcher produces a set of rules or instructions for analysing the generated interviews. The researcher then keeps to this set of regulations throughout the analysis of the interviews (Bertram: 2020, 208).

This study protected participants from physical and psychological harm and ensured anonymity and confidentiality. Participants were made conscious of their role in this study and were allowed to withdraw from the research study whenever they liked. All the participants gave informed consent and agreed to partake in this study. When analysing the data, rules were drawn up to ensure that all the documents received the proper attention.

Trustworthiness was increased by maintaining high credibility and always being objective as a researcher. Throughout this study, the code of ethics was followed. In doing so, no participant was harmed during this study and no children were exploited (Gunawan, 2015).

The level of credibility was maintained by conducting meaningful data sampling, using effective data-gathering methods and providing an open reflection of the data sampling process (Nieuwenhuis, 2016).

To increase the transferability of this study, a whole picture was painted. The literature review takes the reader on a full background journey, explaining the importance of all the concepts mentioned and investigated throughout this study (Stringer, 2014).

Confirmability was maintained and increased by keeping an open research approach and being transparent with all the research findings. During this study, no research was falsified or changed to better the outcome of the study (Bertram, 2020).

1.14 Ethical considerations

Ethical considerations should be highlighted while carrying out the study. One relevant and vital moral issue is protecting the identity of the parties involved (Maree, 2016:44). Trustworthiness can be increased by maintaining high credibility and objectivity. The purpose of reliability is to assure the reader that the research results are actual. A research proposal is trustworthy only if the reader of the study judges it to be so (Gunawan, 2015).

In interpretive research, it is important that the researcher is credible; it must reflect the participant's reality. There are various ways to enhance credibility during data generation and analysis. The researcher may use mechanical means to record the data. For example, I was using an audio-recording device to record interviews. Using an audio recorder means that the transcript would be more accurate than if the researcher jots down notes during the interview. (Bertram, 2020: 206). During the data-generation process, I was attentive to the fact that the data needed to be credible. I made use of photographs and recordings of the interview sessions to increase the credibility of this study. The participants showcased in these photographs were also protected. The participants were mainly photographed from behind and their faces were covered to provide complete anonymity.

1.15 Synopsis of chapters

A summary of Chapters 1 to 5 is described below.

1.15.1 Chapter 1

In Chapter 1, an outline, as well as the reason why I performed the study, are given. The introduction states the primary and secondary research questions, and the rationale of this study is also explained. Important topics related to the study are specified in the concept clarification. Finally, the research methodology is presented, focusing on the research paradigm, research approach, research design and the participants and sites of the study. In closing, Chapter 1 provides an overview and encourages the importance of this study.

1.15.2 Chapter 2

Chapter 2 reviews existing literature regarding the vital role of construction play in young children's development. The chapter starts with a broad explanation of developmental advantages. Furthermore, this chapter proposes the theoretical framework of Vygotsky's constructivist theory in explaining significant concepts and their relevance to this study.

1.15.3 Chapter 3

Chapter 3 is dedicated to explaining the methodology and case study research design used to present the teachers' perceptions and views of construction play in young children. Chapter 3 outlines the qualitative research approach and delves into the interpretive paradigm that underlies this study. To address the research questions, suitable research methods and strategies are employed to engender data from the participants. The qualitative thematic data analysis strategies for this study are described in this chapter. Ultimately, reference is made to this study's trustworthiness and ethical considerations.

1.15.4 Chapter 4

Chapter 4 shows the processes followed during data analysis, the participants and the research sites. In this chapter, the demographic information of participants is first outlined. The data produced from the semi-structured interviews, observations and narratives at six different schools was analysed and is discussed. Coding was applied to analyse data into themes and sub-themes. Likewise, in Chapter 4, I explain the findings of teachers' experiences and views of construction play. Finally, the generated data is presented and linked to the four themes developed through the data analysis.

1.15.5 Chapter 5

In the final chapter, the findings of this study are linked and challenged against existing literature. Additionally, the primary and secondary research questions are answered, relating them to the produced data. The limitations and new insights into the topic of construction play are emphasised. Chapter 5 concludes by offering recommendations and potential contributions for further research.

1.16 Conclusion

This study investigated teachers' implementation of construction play regarding young children. Providing young children with opportunities to participate in construction play is essential for their development, and therefore, teachers play an indispensable role in making sure options are available to them. Another factor that impacts whether children will partake in construction or block play is the role of the learning environment.

CHAPTER 2

It is not the beauty of a building you should look at; it is the construction of the foundation that will stand the test of time – David Allan Co

2. Literature review

2.1 Introduction

Chapter 2 addresses literature documented about development, play and construction play. This chapter starts with the different brain development stages children go through. First, attention is paid to how children's play evolves, after which a closer look is given to see what construction play is and how children engage in it. An overview is provided about what has been said by all the grand theorists. Attention is given to how problem-solving links to play, and construction play and how vital the teachers' perceptions are on matters revolving around play and development.

2.2 Cognitive development

Cognitive development refers to transitions in young children's patterns of thinking. This form of development includes reasoning, remembering and problem-solving (Weiten, 2013: 425). At birth, the entire brain is formed but not yet developed. Brain development occurs from low to high; this process is called *hierarchical development.* Young children's reactions are reflexive, and this is due to the strong development of the lower part of the brain. Although it is a good sign to see reflexive responses initially, it is also a good sign when these reflexes begin to disappear. The developmental goal is that thoughtful actions start to take the place of reflexive action. Reflexive reactions should give way to controlled action. When young children begin making purposeful, controlled movements, it is known that the higher parts of the brain are connecting up and developing (Ahola, 2011: 84).

2.2.1 The brain and its role in child development

A commonality that all children share is the link between the predictable sequence of visible development and the development of the brain. The rapid-fire development of

the brain cells in infancy, the fantastic learning in the earliest years, and the potentially lasting effects of negative experiences have helped to underscore just how important the early years of development of children's lives are. The most rapid brain development concerning sensory and language development must occur during the first year of life, while cognitive development peaks by age two to three. That makes the early years crucial because the brain is the most flexible. The brain's capacity to change decreases with age, especially after three. The powerful influence of early experience on brain architecture makes the early years of life a period of great opportunity and significant vulnerability for brain development (Essa, 2011: 42).

A sequence of optimal experiences is tied to brain development, which controls the mastery of skills in childhood. Researchers have always known that babies follow a specific line of action: crawling, standing, walking, running and jumping. Neuro research has pinpointed the areas of the brain that develop to facilitate learning in motor and language, cognitive, social, and emotional areas. In addition, different regions of the brain are primarily involved at different ages of the child's life. The more primitive parts of the brain are dominant during prenatal and early infant development. In contrast, increasingly more integrative aspects of the brain, such as the cortex and frontal cortex, are involved as the child becomes more mature (Essa, 2011: 42).

Berk (2017) suggested that brain stimulation is vital when the brain is growing most rapidly. Berk (2017) states that the brain is particularly "spongelike" during the first few years, enabling children to acquire new skills easily and quickly. To characterise appropriate stimulation, people have to look at and distinguish between two types of brain development. These types of brain development are *experience-expectant* brain growth and *experience-dependent* brain growth.

The first type is **experience-expectant brain growth**. This form of growth refers to the young brain's rapidly developing organisation. It depends on ordinary experiences, opportunities to interact with people, hear the language, and sounds, see and touch objects, move about and explore the environment. As a result of millions of years of evolution, the brains of infants, toddlers, and young children expect to encounter these experiences, and if they do, they usually grow (Berk, 2017: 191).

The second type of brain development is **experience-dependent brain growth**. This type of brain growth occurs throughout our lives. It consists of additional growth and refinement of established brain structures resulting from specific learning experiences that vary widely across individuals and cultures. Reading and writing, playing computer games or practicing a musical instrument are just a few examples. The brain of a poet and a musician differ in specific ways because each has exercised different brain regions for a long time.

Experience-expectant brain development occurs early and naturally, as teachers offer young children age-appropriate play materials and engage them in enjoyable daily routines. The resulting growth provides the foundation for later experience-dependent growth (Berk, 2017: 191).

There are times in children's lives that are critical for development. Very young children need to be lovingly touched, held, rocked and cuddled. They need to experience language, music and other pleasant sounds. They also need ample time and opportunity to play. They need many sensory experiences that stimulate and broaden their repertoire of brain connections. They need to develop a special bond with a small number of significant adults who are positive, responsive and predictable. In other words, young children need to have numerous, repeated positive experiences and encounters to create templates or internal models of what the world holds in store for them. Through such experiences, very young children develop a picture of the world and, most importantly, build attachments. Attachments are that special bond intimately linked to safety (Essa, 2011: 43).

When young children do not have such experiences, they cannot fully develop that built-in relationship template if they do not have that particular person or persons who deeply care about them. They may never feel entirely safe because they have not developed a strong, trusting relationship with someone they can trust. A lack of solid and secure attachments to at least one caring adult can result in a child living in a stressful state because needs are never satisfactorily met (Essa, 2011: 43). Parents or adults can expose young and growing children to play to ensure easy cortex development.

2.2.2 The role of play in development and learning

Children's play is a phenomenon that has openly been investigated by educators and psychologists alike, according to Bredekamp (2011). Early childhood professionals deeply value play. Despite the large body of research supporting its benefits, child-initiated play is becoming less valued and is disappearing from children's lives today. Numerous factors conspire against play, like electronic devices, lack of safe playgrounds, overemphasis on direct teaching and highly structured activities. To use play effectively in teaching children, it is essential to be clear about what types of play matter and why it is worth defending the different kinds of play (Bredekamp, 2011: 120).

Play is a complex concept because there are different kinds of play; play with toys, movement play, rough play, fantasy play and games. Play is often described as freely chosen, enjoyable, initiated and controlled by children. Different types of play have additional benefits for children. Children's pretend play becomes more complex over time, especially if people play with them and provide props.

Play and pretend play can become more complex over time. As children grow and develop, so does the type of play they engage in. The following describes how functional play develops into constructive and symbolic play and develops into children playing games with rules. This progression is valid because young children tend to combine pretend and fantasy play with construction play.

Functional play: babies and toddlers engage in functional or operational play activities, focusing on objects and people who use things with them. Toddlers enjoy repetition and practice as they play, like when a toddler bangs a toy repeatedly. Toddlers will begin to act too if parents and teachers pretend with young children during functional and active play (Bredekamp, 2011: 121).

Constructive play: Constructive play begins as functional or operational play and becomes more symbolic as children use objects to create new ones (Bredekamp, 2011: 121). As construction play is the main concept in this study, it is discussed as a section of its own later in Section *2.4 Different types of play.*

Symbolic play: Play helps build symbolic representation, using one thing to mean something else, such as when letters represent sounds. At first, toddlers use natural objects or toys in their pretend play, such as picking up a cup and pretending to drink tea. Children use other objects in their play activities if adults encourage this type of play. They might start to pretend that a block is a teacup. Finally, children who have lost experience with pretending and acting no longer need an object to pretend, and they use their hands to represent drinking from a teacup.

This type of play helps children move from thought to physical actions to using words and other symbols to illustrate concepts. By the time most children turn four years old, they develop more complex play with roles and symbolic uses of props. Many young children, however, still play at a toddler level. Bredekamp (2011) defined this kind of repetitive, unimaginative play as immature play distinguished from mature play expected of four- and five-year-olds. Mature play contributes more to children's development than juvenile play and promotes self-regulation in young, developing children (Bredekamp, 2011: 121).

Games with rules: As children move to primary grades, they spend less time in pretend play and more time playing games with a set of rules and laws. These games require children to follow the established rules; they hardly get a chance to discuss, negotiate or change the rules, contributing to social competence and self-regulation. When pretend play is replaced by sports or other activities during preschool, these critical foundational skills may not fully develop (Bredekamp, 2011: 121).

Figure 2.1 shows how pretend play becomes more complex over time and contributes to cognitive development, especially when teachers, adults and other children play together and provide props.

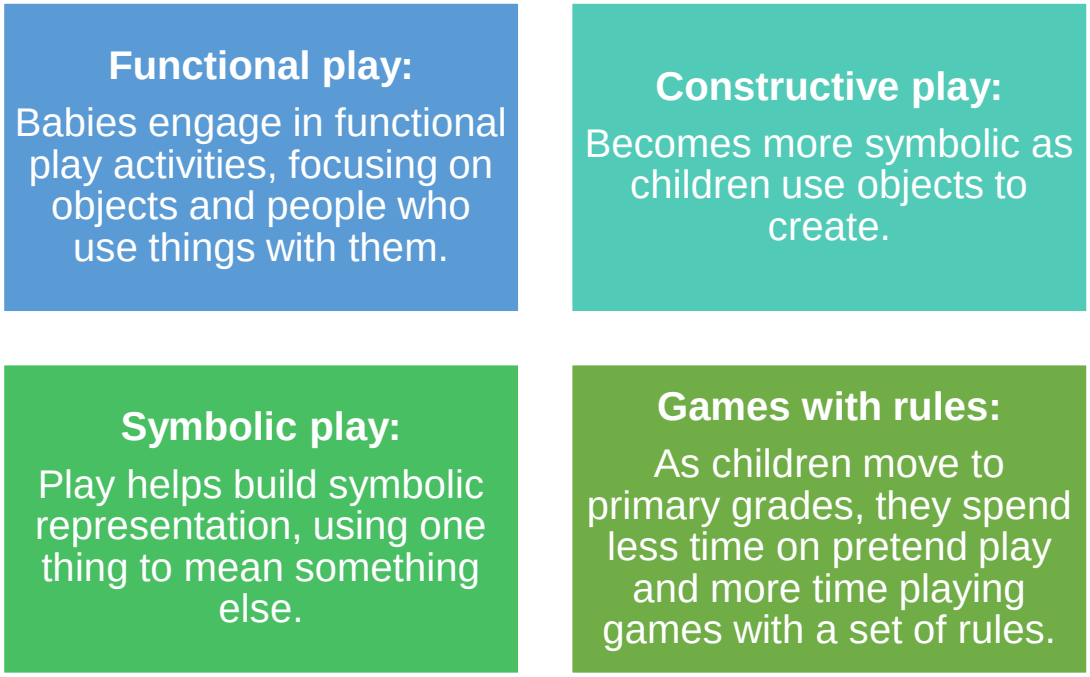


Figure 2.1: How children's pretend play becomes more complex (Bredekamp, 2011)

Piaget linked types of play to stages of development. He theorised that functional play dominates the sensorimotor stage of a child's life, stretching from birth to two years. The preoperational stage, two to seven years, is characterised by symbolic and constructive play. Children in the concrete operational stage, seven to eleven years, tend to play games with rules (Bredekamp, 2011: 120).

Figure 2.2 shows how Piaget related the different types of play to the stages of development in young children.

Sensorimotor stage	Preoperational stage	Operational stage
• Birth to two years: • Functional play	• Two to seven years: • Constructive play	• Seven to eleven years: • Games with rules

Figure 2.2: Piaget's types of play and linked to the stages of development (Bredekamp, 2011)

2.2.3 Developmental levels and teacher interactions

Considering how all the aspects of development are interrelated, teachers need to reflect that their teaching methods should be holistic since every child should be seen as a whole person. These holistic methods imply that teachers need to view all the aspects of development and not concentrate just on one.

The first level that teachers should be aware of is the **level of intellectual development**. Jacobs (2013) declares that child development specialists have become particularly interested in examining the qualitative changes in children's thinking. When young children communicate ideas, attempt to discover information or solve problems, it is believed that they are revealing something about their intellectual structure. Children disclose a unique way of perceiving things, thinking about matters and operating in the world (Jacobs, 2013).

The concept of cognition refers to knowledge and thought, and it also relates to the acquisition, organisation, retention and application of knowledge. Teachers would do well to ensure that they do not attempt to teach a skill or concept before the readiness for learning has occurred. This readiness combines maturity, ability, prior knowledge and motivation. Teachers need information about the cognitive development of the children they are teaching. Teachers can use this knowledge to choose teaching strategies and techniques for which young children are ready (Jacobs, 2013: 103).

The second level is **affective development**; affective or emotional development goes hand in hand with cognitive development. Information about children's interests, aspirations, attitudes and self-concept are essential, and young children are more interested in learning about the things that interest them most. This implies that, where possible, teachers should use children's already established interests or develop other attractions to help them to understand their world better. Once the children's needs have been identified, teachers should try to address them in their lessons and as the opportunities present themselves (Jacobs, 2013).

The third level is the **level of physical and psychomotor development**. Determining the children's level of readiness for attempting specific learning tasks implies that

information about the level of physical and psychomotor development is needed. Teachers need to note that success in one motor skill does not mean success in others. Any new skill or learning generally requires that the child be ready to learn new skills. A certain degree of maturity and several preliminary skills must be present before the young child can profit from formal learning (Jacobs, 2013: 104).

2.3 Play

In context, play is often defined as freely chosen, personally directed, intrinsically motivated behaviour that actively engages the young child (Moyles, 2015: 107). Children play to explore possibilities and so to learn about the world. Throughout this section, I describe play and the different developmental aspects of play. In doing so I explain the progression of play to object play, construction play, playing with blocks and how block play promotes spatial concepts.

2.3.1 Play behaviour

Infants are sitting up by four to five months and can reach for and grab blocks and toys to manipulate. Very young children who can freely move and engage in play with various objects have more enhanced networks in their brains. Therefore, it is easy to connect that play helps build children's brains. Playing is how young children interact and learn in their environments. Children are constructing new knowledge when, through experimentation, they stack blocks onto each other for the first time. Once they know how to do this, they will repeat the action, practising what they have learned. They use their senses and practice using their muscles. Every experience becomes a learning opportunity (Gellens, 2013: 72).

Cognitive development researchers have examined children's actions, explanations, and questions as they explore novel toys and physical phenomena in laboratory studies. Their findings support the proposition that children investigate the physical world through play (Gopnik, 2012). These researchers have found that when children encounter different objects in playful situations, they ask questions (Legare, Mills, Souza, Plummer & Yasskin, 2013). Children entertain various theories about their use (Legare, 2012, 2014), frame "experiments" and play more to possible causes or effects

(Cook, Goodman & Schulz, 2011), and learn about the fundamental structure of objects through their interventions (Sobel & Sommerville, 2010).

Play is innate and integral to a young child's life. Play must be a part of any early childhood environment. It helps children adjust to new situations, and it enhances learning readiness. Through play, children practice behaviour and problem-solving skills. As young children play, they develop motor and language skills and social skills such as sharing and negotiating. Young children learn better from play activities than from direct instructions (Soils, 2017). Play is simple and can be seen as authentic learning. Play that comes after education takes place allows the knowledge to be internalised – in doing so children practice what they know. It will enable children to rehearse the information and help them move the data into permanent memory. Play allows children to reach their potential. Henricks (2008) described playing as a "laboratory of the possible". This metaphor suggests that as young children play, they invent, discover, evaluate, and make sense of the causal patterns and scientific phenomena they encounter in flexible ways that have meaning beyond the play scenario. It suggests that children can derive ideas from these play experiences to inform their interpretation of the natural world (Soils, 2017).

Gellens (2013) stated that putting just any toy into the play environment will not satisfy young children's need to play. Many toys are designed as learning devices. They are meant to teach a specific concept. Children need free time to explore and create fantasies with open-ended play materials, such as blocks, dolls, dress-up clothes and different types of hats. They can then use their skills and imagination to create play scenarios. Children become ready for advanced viewing of and thinking about their world when they play. They can learn self-control and improve their literacy skills through mature, dramatic play. Teachers should focus on creating environments that encourage play with diverse materials. Children's imagination must be valued. Playing can increase vocabulary, provide solutions to problems, help children learn socialisation skills, and allow them to master their ever-changing emotions. An environment with too many toys, noise, activity or too much stimulation is as harmful as a bare environment and limited play. Overstimulation harms the brain development of young children. Young children need a balance of play, quiet time and hands-on activity to thrive (Gellens, 2013: 96).

Playing has historically been identified as a multi-faceted learning tool for all children. It involves self-initiated activities, free choice, and the interaction between a child's emotional, intellectual and social connections. Play challenges young children to explore their environment and socialise with peers and adults. Play scaffolds the development of cognition, language, social competence and creativity, if carefully planned and organised. It focuses on process rather than product and includes diversity and special needs (Isabelle, 2021). Play is a significant undertaking necessary for healthy development in all children. Play is how children understand the world (Essa, 2011: 43). The early years in a child's life are the learning years. The first five years of life set the tone for acquiring knowledge for the rest of our lives. Everything a young child does is a learning experience. Young children learn by doing and experiencing. Learning occurs when their bodies handle and interact with objects in their surrounding environment. This hands-on education brings about lifelong learning that will be an integral part of their knowledge that they will never forget. Young children have an inner motivation and an innate curiosity to explore and learn (Gellens, 2013: 69).

Play is another familiar concept that many parents and professionals often misunderstand. Most people have heard sayings such as "play is children's work" and "children learn through playing." Early childhood professionals have worked hard to eliminate the idea that professionals are merely guardians and referees who intervene when everyday child's play gets out of hand. To early childhood education professionals, playing does not occur chaotically when a few children share a bit of space and some random toys. Play is one of a multitude of methods by which children learn. Play fosters learning when children experiment with societal norms, roles and values. Supporting play requires children's developmental stages, curricular goals and strategies, observations, and assessments. It also requires the ability to design environments based on children's ever-changing needs (Darragh, 2010: 93).

In figure 2.3, Darragh (2010) identifies the five criteria that qualify as play.

Figure 2.3: The five criteria of play (Darragh, 2010)

Playing has an impact on the following different developmental domains:

Physical development: Play often involves physical activity, providing opportunities to refine gross and fine motor skills and body awareness. The vigorous exercise that accompanies play can impact children's competence and confidence, supporting each development area. The opportunity for physical navigation through playing supports children's physical prowess and helps to instill a belief in their varied capabilities (Darragh, 2010: 94).

Social-emotional development: Play allows children to form critical social-emotional skills, as children can experiment with different roles. In addition, play activities allow children to consider viewpoints that differ from their own and match their behaviours to others. Play provides children with rich experiences to learn social skills, become sensitive to the needs and values of others, experience conflicting emotions and work through conflict (Darragh, 2010: 94).

Cognitive development: Through play, children engage in problem-solving and form their conceptions of the world. In turn, they may modify these conceptions based on

the information received from the environment. Children's abilities can have an impact on their play. Children with a disability, for example, might be affected by how they play, the kinds of play and games they engage in, and how effectively play is used as an avenue for learning and generalising new skills and concepts (Darragh, 2010: 94).

2.3.2 Pedagogical theories and play

During this pedagogical section, I will be describing the different views of Montessori, Waldorf, Moyles and Reggio. These pedagogical theorists and their ideas and beliefs regarding development and play are defined throughout this section. These theorists all have essential insights on the subject of play and contributed significantly to how play is regarded in a pedagogical sense. Figure 2.4 provides an overview of the four pedagogical theorists and how they contributed to what we now know and understood about play.

In Figure 2.4, four pedagogical theories and how these theories contributed to play, are discussed.

Montessori's Theory:

Montessori's theory features a developing child, specifically one who is involved in constructing his own learning experience.

Montessori believed in whole-child development and that learning involves the growth of both mind and heart through the classroom experience.

Waldorf's Theory:

Waldorf education focuses on a child's freedom and holistic child development.

Developing a personal freedom to its most significant potential is the goal of the Waldorf educational system.

Reggio's Theory:

Reggio Emilian preschool is one of the best regarding a constructivist learning theory.

Constructivists state that children construct their knowledge and values from interactions with and actions in the physical and social world.

Moyles' Theory:

Moyles has argued that play is so complex that it defies description.

Considering the struggle to define playing provides a critical narrative that reveals the complexity of play activities as a behaviour, a process, and an approach to a task.

Figure 2.4: Overview of the pedagogical theories that are discussed in this section (Aljabreen, 2020)

2.3.2.1 Montessori's theory

Montessori's theories regarding child development are distinct and historically strong and are often cited as a framework to inform other educational approaches. Like Dewey's constructivist theory, the Montessori model features a developing child, specifically one involved in constructing his/her own learning experience, with a teacher creating a supportive child-centred environment (Mooney, 2013).

The aims of the Montessori model emphasise the whole child's development and learning support by the teacher, who is a guide for the child's learning. Maria Montessori believed in whole-child development and that learning involves the growth of both mind and heart through the classroom experience (Aljabreen, 2020).

Montessori was the first theorist to talk about sensitive periods of development. During a child's development, sensitive periods are when some inner force drives the child to learn something and achieve inner peace or reach a state of normalisation. Montessori identified several distinct sensitive periods in a child's development.

The first sensitive period of a young child's development occurs in the first three years of life. In this period young children place and replace items and objects properly (Ahola & Kovacik, 2011: 255). Between ages one and two, children fix their attention on detail. During this time, children demonstrate a sensitive period for using their hands and they open, shut, fill, dump, grasp and manipulate. As children grow, they become susceptible to touch as they explore objects and textures (Ahola & Kovacik, 2011: 255).

Montessori described the sensitive period of walking as a second birth, as the child passes from a helpless to an active being. Children are driven by the desire to walk, and they walk to do so without a specific destination in mind. As a child begins to walk and gain greater mobility, they enter into a sensitive period for independent skill development. During this time, the child insists on separate acts such as dressing, eating and bathing (Ahola & Kovacik, 2011: 255-256). Montessori states that it is essential for adults to allow the child to engage in these acts even though they may experience mild frustrations or find it more time-consuming (Ahola & Kovacik, 2011: 255).

2.3.2.2 Waldorf's theory

Waldorf education focuses on a child's freedom and holistic child development. There is also a role for the teachers as a guide for the child and as artistic directors. The most powerful characterisation of the child within Waldorf education is the picture of a free, developing human. Developing this personal freedom to its most significant potential is the goal of the Waldorf educational system (Aljabreen, 2020).

Waldorf works to develop the whole child's appreciation and love for the value of beauty. Waldorf education pictures child development in seven-year stages. During these periods, the child is still the same free, developing, teachable human being. Teachers in the Waldorf systems guide these developing children, always supporting

their interests and learning in the areas of the arts: goodness, beauty and truth. Dealing with the child's behavioural issues in the Waldorf classroom is often approached by a change of activity, introducing a new story providing the child with an art project or letting the child make something with his hands (Aljabreen, 2020).

The Waldorf programme has been described as an open curriculum. The learning and educational methods and contents are adapted depending on the child's age, physical and spiritual needs and capacities (Aljabreen, 2020).

2.3.2.3 Reggio's theory

The Reggio Emilia programme began with teachers and families working together to create schools for very young children in the Italian public education system. It is mentioned by Aljabreen (2020) that the Reggio Emilia preschool is one of the best regarding a constructivist learning theory. Constructivists state that children construct their knowledge and values from interactions with and actions in the physical and social world.

Three aims of the Reggio Emilia school of thought have been identified: the child's rights, the importance of the role of the teacher as a professional researcher, and community partnerships in the child's education. One of the primary goals of the Reggio Emilia school is to conduct learning experiences with an emphasis on the rights and values of the child in the education process. The programme's audience has always been infants, toddlers and preschool- or kindergarten-aged children. These children must be allowed to touch, move, listen, see, taste, discover and explore the world around them in an enriching and supportive environment. The child is rich, competent and naturally creative (Olsson 2009), an individual with the right to creativity (Aljabreen, 2020).

The second aim of Reggio Emilia education concerns an image of knowledgeable teachers and professional researchers (Olsson 2009), actively interweaving theory and practice-learning, doing and reflecting. In contrast to top-down curriculum traditions, which rely on outside educational researchers, Reggio Emilia teachers are acknowledged as sources of research and consider research as their permanent attitude and a technique for their work (Aljabreen, 2020).

The third aim of Reggio Emilia is its focus on partnerships in education. The structure makes teachers, children and parents equal academic or learning participants. In Reggio Emilia schools, parents and other community members are involved in school decision-making by participating in school-based parent-teacher boards. Supported by a partnership with other educators, parents, and community members, teachers, work to observe, listen, reflect and learn about the children in their care (Aljabreen, 2020).

2.3.2.4 Moyles' theory

When researchers begin to study any given concept or phenomenon, one of the first steps they take is to define what they understand that concept or phenomenon to mean. What is play, and how is it different from other types of behaviour? While everyone has some idea about what it means to play and what playing might look like, deciding on a clear and agreed definition has proven problematic. Indeed, Moyles has argued that play is so complex that it defies description. However, considering the struggle to define playing provides a critical narrative that reveals the complexity of play activities as a behaviour, a process, and an approach to a task. In particular, the freedom and choice inherent in spontaneous play make it a vital ingredient for children's healthy development (Sheridan, 2011: 4-6).

Dictionary definitions of play suggest it is characterised by being frivolous, fun or light-hearted. However, this is at odds with the deep seriousness that can often be apparent when observing children at play. Some theorists have suggested that specific characteristics must be followed for an activity to be regarded as play. For example, Krasnor and Pepler indicate that for an activity to be defined as play, it must observe voluntary participation, enjoyment, intrinsic motivation, pretence and a focus on process over product. However, a problem with this type of approach is that while these characteristics might be evident in some instances of play, in other situations, they are more difficult, if not impossible, to identify. Pellegrini proposes that the more characteristics are present, the more like play the activity becomes. However, what if some of these characteristics are more important to play than others? Or what if two different observers see things differently? For example, one observer might believe that voluntary activity is far more critical than not having an end product. In contrast,

another observer might base his/her decision on signs of fun and enjoyment. Let us consider two examples of children playing with LEGO® bricks (Sheridan, 2011: 4-6).

- *Child (A)* takes the blocks from the toy shelf in their bedroom. The child brings them to the table and becomes intently focused on building a replica of the model presented on the box packaging. There is no laughter or smiling; the child appears lost in concentration, searching for the pieces and frequently glancing towards the box, checking if the structure is the same as the one pictured.
- *Child (B)* is handed the Lego blocks by the teacher, and the child takes them to the carpet. The child appears to be randomly building the bricks, the structure takes no particular form, and the child changes what he/she does as he/she goes along. Sometimes the child organises the bricks into piles by colour and puts them in piles according to size. The child occasionally smiles and laughs as he/she builds the bricks and then knocks them down.

Which of these activities would be defined as play? *Child (A)* chooses to take part in the activity, there is an end product, and there are no overt signs of pleasure and enjoyment. The activity was selected for *Child (B),* who shows signs that the activity is enjoyable and fun, and the child did not appear to be working towards an end product or goal. Neither of the scenarios demonstrates any element of pretence. Both children described their activities as play, highlighting how seeing the play from an observational perspective can be problematic. Our approach to defining play is often based on adult views of what play looks like, rather than taking the child's perspective, and play means different things to different people at other times (Sheridan, 2011: 4-6).

2.3.3 The grand theories and play

Throughout this grand theorist section, I am describing the different views of Vygotsky, Piaget, Erikson and Froebel. These grand theorists and their ideas and beliefs regarding development and play are defined throughout this section. These theorists all have significant understandings of the subject of play and contributed in a great way to how play is considered in a grand sense. Figure 2.5 provides an outline of the four grand theorists and how they influenced what we now know and understand about development and play.

In Figure 2.5, I discuss four grand theories and how these theories influenced development, play and construction.

Vygotsky's Theory:

Vygotsky's views of play focused primarily on make-believe play, typical among preschool- and kindergarten-aged children.

Vygotsky states that play has three distinct features: children create an imaginary situation, take on and act out roles, and follow a set of rules determined by these roles.

Piaget's Theory:

Piaget's theory of cognitive development placed action and self-directed problem-solving at the heart of learning and development.

Piaget's image of the child as a scientist is based on children's abilities to work actively to construct knowledge and understanding through discovery, active learning, experience and social interaction.

Erikson's Theory:

Erikson's theory focuses on human development's social and emotional qualities.

Within each stage of Erikson's theory, particular tasks are achieved, or a predicament is overcome, enabling the developing young child or person to pass through one stage to the next.

Froebel's Theory:

Froebel was the first educationalist to place wooden blocks at the heart of a child's education.

Froebel stressed the significant role of play in young children's development, and he saw playing as a pure and natural learning mode through which young children achieve harmony.

Figure 2.5: Overview of the grand theories that are reviewed in this section (Bodrova, 2019)

2.3.3.1 Vygotsky's theory

Vygotsky (1978) stated that play mediates children's learning. A solid and growing body of knowledge identifies the link between play and the development of cognitive and social skills that are prerequisites for learning more complex concepts as children grow. Playing allows children to control their world and satisfy their curiosity, focusing on process rather than product (Isabelle, 2021).

Lev Vygotsky's views of play focused primarily on make-believe play typical among preschool- and kindergarten-aged children. Thus, the play features identified by Vygotsky do not necessarily characterise other activities such as games, object manipulations or explorations frequently called play by parents and educators. Vygotsky's definition of play would also not apply to teacher-initiated activities. However, engaging is sometimes presented to children as play and games. According to Vygotsky, make-believe play has three distinct features: children create an imaginary situation, take on and act out roles and follow rules determined by these roles. These features are essential in developing the competencies necessary for children's success in school and beyond (Bodrova, 2019: 38-40).

Much of the research on play within developmental psychology has been inspired by the theoretical writings of Vygotsky. During play, when it is spontaneous and child-initiated, children exercise control over their activity, set appropriate challenges and create their own 'zone of proximal development' within which learning is most powerfully enhanced. In 2005, Karpov reviewed the work of Vygotsky, supporting the notion that, in play, children are required to regulate their behaviour, making it a significant factor in their development of self-regulation (Whitebread, 2017: 5).

The earliest type of play observed in most mammals is physical play. In human children, this includes activity play. Second, to physical play, we find object play, which is also widely observed in primates, that concerns children developing explorations of the world and the objects they find within it. It also has interesting and important links to physical play, particularly in fine motor development and pretence when it involves

building models of real or imaginary objects and creatures and imagining a scenario or narrative. Play with objects and things begins as soon as infants can grasp and hold on to them; early investigative behaviours include mouthing, orbiting, rotating while looking, rubbing or stroking, hitting and dropping. Playing with things might be described as sensory-motor play when the child is exploring how objects and materials feel and behave (Whitebread, 2017: 11).

From around 18-24 months, young children begin to arrange objects, gradually developing into sorting and classifying activities. By the age of four, building, making, and constructing behaviours emerge. While no systematic reviews have been published in this area, there has been a fair number of empirical studies. Several key theoretical contributions underpin the practical work concerning this type of play. First, it is in playing with objects that it is claimed that young children start to develop their representational abilities. This suggestion was first made by Vygotsky and has been further elaborated by Stroud. Stroud then argues that once children begin to build models of natural objects, their play becomes depictive and serves as an introduction to symbolism. Second, Vygotsky also argued that play activities of this type are mainly related to developing thinking, reasoning and problem-solving strategies. This suggestion was primarily taken up by Bruner, who argued that a primary function of play during human children's long period of immaturity was to support the development of their 'flexibility of thought' (Whitebread, 2017: 11).

The emergence of abstract symbolic thinking: One of the more essential outgrowths of play is the ability of children to "think in their heads," signalling the emergence of abstract symbolic thinking critical for success in school and beyond. When playing children act according to interior ideas rather than external reality: a piece of yarn is not a stethoscope, but it becomes one once a child decides that they need it to play doctor (Vygotsky, 1967). In other words, play requires substituting one object for another, requiring a child to begin to separate the meaning or idea of the object from the object itself (Bodrova, 2019: 38-40).

Developing emotion control: Vygotsky's child development theory includes the principal idea that children learn to master their behaviour as they engage in specific culturally-determining activities and interactions. Mastering one's emotions is a part of

this process, and mature make-believe play provides one of these activities. While playing, a child sometimes needs to express imaginary emotions associated with a particular role and imaginary situation, such as when a child needs to act as an angry parent in one episode and as a scared child in another. Expressing emotions on demand, children take a first step toward becoming aware of their own emotions and learning to control them. Controlling pretend emotions is easier for a child than containing real ones, so make-believe play provides a safe context to practice initiating and restraining various emotional behaviours, including those still hard to control in real life (Bodrova, 2019: 38-40).

Developing self-regulation: As counterintuitive as it may sound, Vygotsky argued that make-believe play is not spontaneous but contingent on players abiding by a set of rules. Make-believe play makes play the primary context for young children to develop self-regulation. They are now driven not by their need for instant gratification prevalent at this age but by the need to suppress their immediate impulses. As Vygotsky explained, “a child experiences relegation to a rule in the renouncement of something he wants, but here relegation to a rule and refusal of acting on instant impulse are the method to utmost pleasure” (Vygotsky, 1967). In explaining play’s role in child development, Vygotsky states that play is “the leading cause of development” in early childhood. “Play development relationship can also be linked to the instruction-development relationship. Play offers a background for changes in needs and perception of a much larger nature” (Bodrova, 2019: 38-40).

2.3.3.2 Piaget’s theory

Piaget was interested mainly in the origins of logical, mathematical and scientific thinking and his theory aimed to establish between biological and cognitive development. Piaget’s theory of cognitive development placed action and self-directed problem-solving at the heart of learning and development. By acting in and on the environment, the learner discovers how to control tools and materials and understand the consequences of actions (Wood, 2013: 24).

Piaget’s image of the child as a scientist is based on children’s abilities to work actively to construct knowledge and understanding through discovery, active learning, experience and social interaction. The emphasis on the internal construction of

cognitive structures is the basis for his constructivist theories of learning. Piaget conceptualised learning as a series of transitions through age-related stages, in which forms of thinking progressed from immature to mature, simple to complex, and concrete to abstract. These stages are linked to the concept of readiness and critical periods when a child has developed the capacity to learn and to progress to a new level of understanding (Wood, 2013: 24). These progression stages can be seen when children play and how their form of play is constantly developing.

Play is an action, an approach to a task or project, and a process. Young children move in and out of play, and these play-like situations change according to their demands and wishes and other influences within their rotating environment (Sheridan, 2011: 7).

The attributes associated with play and non-play become particularly important when children enter a kindergarten or learning environment and begin to live through structured activities regularly. With these activities, we begin to see young children linking play with work activities in their way. Therefore, many of the actions we can witness in young children might be categorised as discovery, adventuring and exploration. Nevertheless, what about the play of babies and infants who have not yet made a distinction between play and other types of activity? Piaget suggests that movement evolves from adventure to play as children become acquainted with objects and their environment. At the discovery and adventure stage, children discover what different things do; however, during play, young children begin to contemplate what they can do with that object. This discovery or exploration is comparable to the more structured learning experienced in later childhood. Early adventure and exploration are vital foundations for developing future play skills (Sheridan, 2011: 7).

2.3.3.3 Erikson’s theory

Erik Erikson’s theory focuses on human development's social and emotional qualities. Within each stage of Erikson’s theory, particular tasks are achieved, or a predicament is overcome, enabling the developing young child or person to pass through one stage to the next (Ahola, 2011: 271). This stage theory bridges development from birth through to old age. Erikson further went on to talk about the emotional benefits of play

and suggested that children's play served as a means of developing a sense of competency and positive self-admiration for oneself:

Autocosmic play: Early play focuses on young children's discovery and exploration of their bodies and senses throughout the first year of life. Perception of the bodily self is seen as an essential forerunner to self-esteem. Researchers cannot evaluate the self without having an uncomplicated understanding of self-comprising.

Macrospheric play: In their second year, young children begin to play with different objects, and during this time, they begin to comprehend the effect that their actions can have on their surrounding environment.

Macrospheric play: At around three years of age, when young children enter preschool or a formal learning environment, playing becomes more social. Activities are shared, and children become aware that their environment and sense of self are controlled by themselves and are influenced by others. They learn to maintain a positive self in the broader social world (Sheridan, 2011: 17).

2.3.3.4 Froebel's theory

Essa (2011) highlighted that Froebel was the first educationalist to place wooden blocks at the heart of a child's education. He saw that playing with wooden blocks could educate children in mathematics, language, beauty and artistic endeavours, scientific construction, stories, the representation of everyday life, and being physically competent and skilled (Bruce, 2012: 6). Froebel as mentioned in Essa (2011) also strongly stressed the significant role of play in young children's development. He saw playing as a pure and natural learning mode through which young children achieve harmony. Froebel developed a carefully programmed curriculum utilising specific materials; this program centred on play and sensory awareness (Essa, 2011: 126).

Froebel invented several educational gifts: the first gift he came up with was a soft sphere. The second gift is a wooden sphere, cube, and cylinder, dangling on a string. These gifts demonstrate the law of opposites. What is understood by us as humans are questioned by experience and new connections with what is being made. These days the first and second gifts are practically never seen anymore. Only the Froebelian principle behind the gifts remains, even though infants are often and usually given the soft sphere as a first gift. Most people do not realise that this is a link to Froebel's educational approach (Bruce, 2012: 6).

These first and second gifts can be alternated and turned into various shapes. It is substantial that the wooden blocks were introduced to children in a complete box with a sliding lid on top, which was slid from underneath, leaving a cube made up of smaller cubes. The parts make the whole, a central Froebelian message. These boxes contained small blocks of unique shapes, meticulously thought through. These gift boxes are not used in their earliest form today. Froebel was a trained mathematician and a forester, and it is these qualities that make wooden block play especially critical in children's schooling. The up-to-date form of Froebel's gifts can be found in unit blocks, hollow blocks, mini-unit, and mini-hollow blocks. Each block, in the Froebelian practices links with one another. The natural wood of the blocks links the child to nature and natural elements, and this relationship to trees needs to be made clear. The children must fully see the tree from which the blocks are made in order to understand (Bruce, 2012: 6).

2.4 Different types of play

Throughout this section of play, I focus on four different types of play. I pay attention to object play, construction play, block play and spatial skills. The focus is on how object play develops into construction play, how construction play can only focus on block play, and how these forms of play are beneficial for young children's spatial skill development.

Figure 2.6 clearly indicates how each concept of play flows into one another (Bjorklund & Gardiner, 2010).

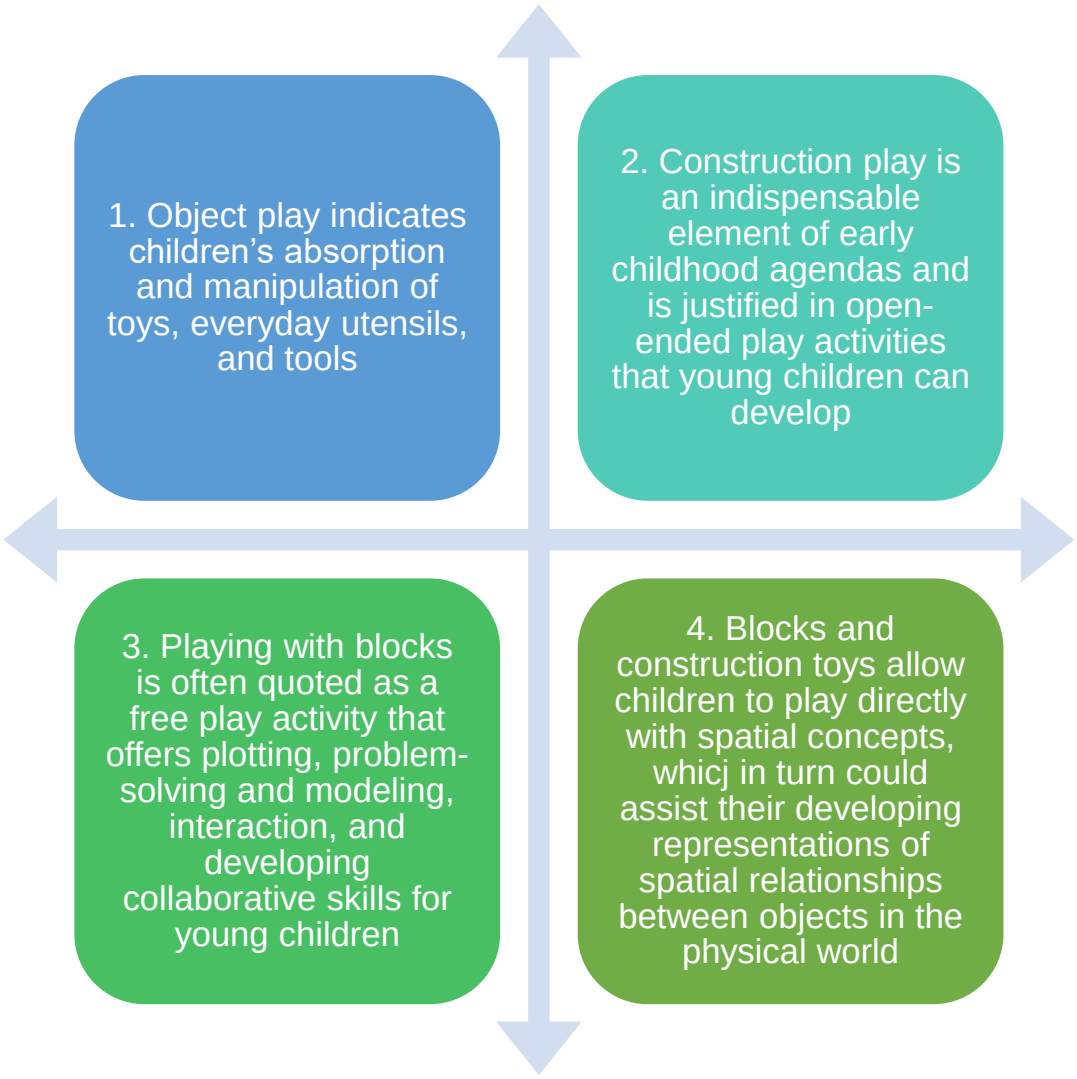


Figure 2.6: How object play develops and influences young children's spatial skills

2.4.1 Object play

Object play is incorporated in this study because this concept focuses on young children handling and exploring an object. Exploring an object leads to playing with an object and in the end, can lead to constructing with an object.

An area of play that deserves more attention is the connection between object play and young children's development of scientific thinking. Object play indicates children's absorption and manipulation of toys, everyday utensils, and tools like pots and pans. They also tend to manipulate natural materials like sticks, rocks, shells and other found objects around the house, such as beads and cloth, into their play activities (Bjorklund & Gardiner, 2010). Although object play may occur within a make-believe episode, it is different from dramatic play. The play behaviours focus on handling,

exploring and acting on an object instead of simply using the object as a prop in a play storyline. As Hughes (2012) puts it, “children experience the world by exploring the tactile and cognitive properties of objects” during object play. According to Smith and Connolly (1980), this form of play constitutes 10% to 15% of young children's behaviours in Western early childhood settings (Smith & Connolly, 1980). It is related to higher problem-solving skills (Sylva, Bruner & Genova, 1976) and spatial-mathematical reasoning (Caldera, 1999). Other scholars, like Bjorklund and Gardiner (2010) have suggested the possible role of object play in helping children discover and explore causal relationships and mechanisms embedded in objects (Bjorklund & Gardiner, 2010).

Scientific reasoning suggests the knowledge, investigative tactics and sense of science (Zimmerman, 2000), and it appears that when young children play and manipulate different objects, they participate in the types of causal assumption and hypothesis testing conducted by scientists (Gopnik, 2012). Grand theorists of development and play, like Piaget (1930), suggested that through tangible experiences with objects, young children reason about the physical world and develop abstract perceptions of causality. One set of concepts obtained during object play entails the physical principles, for example, force, motion, and energy, that operate when children manipulate objects (Bairaktarova, Evangelou, Bagiati & Dobbs-Oates, 2012). Researchers suggest that encounters with these principles through objects and items can help young children voice abstract ideas that can lay the foundation for learning in areas like science, technology, engineering and mathematics (Evangelou, Dobbs-Oates, Bagiati, Liang & Young Choi, 2010; Gur, 2011; Stoll, Hamilton, Oxley, Eastman & Brent, 2012).

2.4.2 Construction play

Free, unstructured play is centred around the child. Picture a group of peers on a playground, deciding amongst themselves that the swing set is the base and that a game of tag will begin when the bell tolls, or imagine children who go into their learning environment and are given the freedom to do whatever their heart desires. In this play, adults and teachers ensure that children have time, space and materials for immersive and inclusive experiences (Jensen, 2019). In this kind of self-governed play, children are often physically and mentally active (Reuamo, 2014). The fact that young children

exercise the most autonomy of all practices listed here speaks to essential learning opportunities. Children practice self-regulation and executive functions as they control and direct their learning (Moreno, 2017).

One type of play that notably demonstrates learning is construction play. Yelland (2011) regards construction play as an indispensable element of early childhood agendas and is justified in open-ended play activities where young children can develop. Blocks support all domains of development, but for this study, I only focus on how construction and block play provide many opportunities for problem-solving in young children. Children use large and small muscles during block play as they lift, bend, stretch, reach, turn, manipulate and balance various blocks. Furthermore, blocks that promote concept learning are a natural vehicle for learning matching, similarities, differences and classification. Children learn mathematical and science concepts related to quantity, addition and subtraction, weight and balance. They also develop vocabulary and visual memory related to shapes, sizes and patterns, creativity and problem-solving skills. Blocks and construction play are versatile mediums that meet many needs and provide development opportunities (Essa, 2011: 304).

2.4.2.1 Seven stages of block play

Essa (2011) also mentions that as one observes young children using blocks, one will notice differences in the type and complexity of such play among children. Children go through stages of block play development, stages related to age and experience. The first stage is where young children under two often spend considerable time carrying blocks around, perhaps banging them together and exploring their weight and feel. Children's earliest constructions are either vertically or horizontally arranged blocks during the second stage, ranging between two and three years of age. The flat structures may suggest a road, and the earliest dramatic play with blocks often involves small cars driving on the road. The third stage occurs when children are between the ages of three and four. Here children begin putting blocks into more deliberate constructions, like enclosures, bridges or decorative patterns. Chambers or enclosures can lead to dramatic play with play animals, people figurines or furniture accessories. In the final stage, reached between the ages of four and six, children engage in more representational constructions, naming their structures, building to

create props for dramatic play and making quite complex and elaborate structures. Each of these stages reflects children's increasing understanding of spatial concepts. Children would have mastered primary spatial relationships earlier than the age of four. Spatial skills such as on top of, next to, and side of the container. As learners progress in the stages of block building, they demonstrate more advanced spatial concepts as they manipulate space in symbolic representations of structures such as houses, farms and other enclosures (Essa, 2011: 304 & 305).

Figure 2.7, adapted from Van Heerden and Esterhuisen (2021: 148 - 149), explains the seven different stages of construction play experienced by young children.

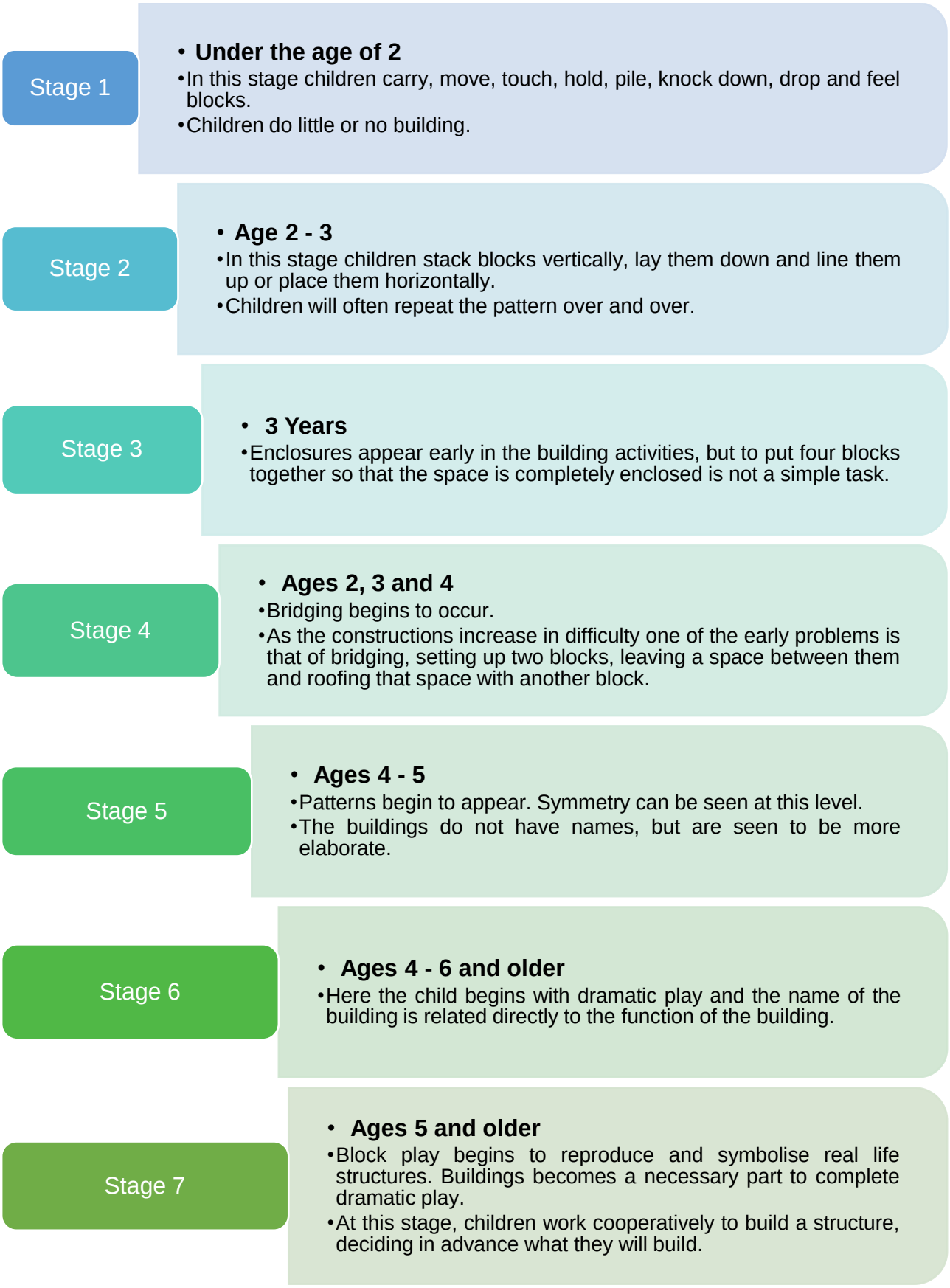


Figure 2.7: Seven different stages of block play (Van Heerden & Esterhuisen, 2021: 148-149)

2.4.3 Block play

There are two main types of play with blocks. In free play (as discussed in Stiles-Davis, 1988), children are given blocks and can build designs of their choice. Children attempt to make a particular structure from a model in structured block play (Stiles & Stern, 2009). These tasks call on different processes: the first process evokes children's imagination and their ability to produce complex relationships without prompting. The last process calls upon analysing a spatial representation to create a pre-defined model (Stiles & Stern, 2009). Structured block play has been hypothesised to develop estimation, measurement, patterning, part-whole relationships, visualisation, symmetry, transformation and balance (Casey & Bobb, 2003). The concept of measurement, for example, is involved when a child compares the height of their construction to the size depicted in a model or when two children argue about how to figure out whose tower is “bigger” (Cross, Woods & Schweingruber, 2009). Thus, structured block play is an excellent venue for studying spatial skills in young children (Verdine, 2014).

We are reminded by Bredekamp (2011) that one of the main contributors to block play was Caroline Pratt. Pratt focused her energy on studying children directly. She became captivated by the potential of engaging children with open-ended play apparatus and materials. She wanted blocks to allow children to express their ideas about the world freely. Caroline Pratt’s design of wooden unit blocks is undoubtedly her most lasting influence and contribution. Her blocks are made of natural hardwood in various three-dimensional shapes and are mathematically precise because each block is a fraction or multiple of the standard unit. Pratt created wooden figures representing families and community workers to add a pretend element to block play. She also designed large hollow wooden blocks to encourage significant muscle play and to be used outside (Bredekamp, 2011: 57).

Conventionally, construction play is an indispensable element of early childhood agendas and is vindicated in terms of being open-ended play activities in which young children can develop. Blocks are appealing to children of all ages. Infants and toddlers like to pick them up, put them in their mouths and manipulate them. Playing and constructing with blocks and materials are believed to teach children about objects'

physical properties, develop hand-eye coordination, better object durability, and help children understand detailed concepts associated with gravity and shape (Yelland, 2011: 6). Gellens (2013) says that playing with construction toys from a young age leads to children understanding one-to-one correspondence, matching objects to objects. When young children try to stack blocks, gravity affects their play. They enjoy knocking down a pile of blocks as much as building it up. Through trial and error, they learn that the blocks must be stacked carefully with the weight and size equally balanced on the one underneath and in time, a tower is built. These actions are the beginning of mathematical understanding and knowledge. Young children explore spatial relationships as they place one block next to another and form a fundamental knowledge of shapes (Gellens, 2013: 73).

Playing with blocks is often said to be a free play activity that offers plotting, problem-solving and modelling, interaction and developing collaborative skills for young children. More explicitly, it can be associated with learning the primary aspects of mathematical notions, such as pairing, classifying, clustering, cataloguing and those linked to spatial and number interpretations (Yelland, 2011: 6). Providing the opportunity for new technologies together with traditional materials, like blocks, supports and expands lively discoveries. Furthermore, these technologies can document early learning situations that explain the types of learning that transpired, and the documented learning experiences can be shared with the children's parents (Yelland, 2011: 6). Mathematics and technology go hand in hand. For example, there may be an area in the classroom where learners can use a computer to play mathematical computer games. Other useful technological devices in the school include programmable toys and recording equipment. There are many practical applications for the technology. Children can use a video recorder to film their building process during construction play (Venter & Dicker, 2013: 194).

No hesitation in forming and fabricating structures with blocks can present a framework for prosperous learning scenarios. Yelland (2011) described an adolescent boy called George who tended to create buildings and structures with wooden blocks and other construction materials. Once George was guided and supported by grownups, the boy designed and developed detailed plans using illustrations and

computers. George also used a digital recorder to establish a lasting recording of his elegant block-building escapades.

The educational tale of George and his building exposes his enhanced spatial knowledge and his capability to embody his concepts in both two- and three-dimension aspects (Yelland, 2011: 7). The following year, as George entered his first year of school, he expanded his block building with new objects to create a short, animated film, in which he watched wild animals that move in space and time to form a group by a watering hole. Old-style play supporters may complain that this type of learning process is too organised and controlled by the teacher. Nevertheless, when teachers act together with the children and concentrate on demonstrating and communicating such abilities and knowledge during construction play, the case for lively discoveries and links to particular learnings are made (Yelland, 2011: 7).

In essence, block play provides children with multiple opportunities to touch, play with and manipulate different objects. According to Gellens (2013), manipulative play is the avenue for children to refine their fine motor skills and learn interrelated objects. Infants and toddlers use their hands, fingers and arms to pick up and manipulate objects. The materials encourage children to gain control of their fine motor movements. Infants begin with grasping objects, dropping objects, and eventually throwing objects. Young children learn to make something happen when they pick up a toy or move it from one place to another. It is exciting, and they want to repeat the action repeatedly to see if the outcome is always the same. These toys increase their knowledge and do so through the child's movement. By children playing with these toys, they increase their knowledge. Through trial and error, children begin to solve problems. They learn new skills and reinforce other skills while playing. Coordination and skills learned while playing with one toy are transferred and applied to another. These young children build a rudimentary knowledge of mathematics, science and language concepts accompanying each toy (Gellens, 2013: 74).

The child can now use their knowledge to make sense of what the teacher is presenting at a higher level of understanding. The teacher needs to provide an environment rich with mathematical tools, such as language, symbols, and media.

These tools establish a society of mathematics and help the children to think mathematically (Venter & Dicker, 2013: 192-193).

Research done by Trawick-Smith (2017) mentioned that playing with blocks presents numerous openings for early mathematical thinking. It is also stated that mathematical discussions and problem-solving happen as children assemble their blocks and play together. In a block play situation, children tend to talk and think about a different size, the shape of the blocks, the length, the area in which they are building and the number of blocks used. Trawick-Smith (2017) detected that playing with blocks consists of a high level of mathematical talk. Mathematical talk means that children have conversations about mathematics as they are busy building. The frequency of the mathematical dialogue spoken by young children correlates with early mathematical understanding and learning (Trawick-Smith, 2017: 433-448).

It has been specified that block play is a highly social and vocal activity children share, and complicated language interactions amongst children have been observed in classroom block play centres. One study done by Trawick-Smith indicated that more social collaborations were documented when young children were busy with block play than when they were using any other sort of play materials (Trawick-Smith, 2017). This type of peer interaction in any classroom section has been found to forecast mathematical capability at the end of a preschool year (Trawick-Smith, 2017: 433-488). When looking at mathematical ability, it is vital to take a deeper dive into understanding spatial skills and how this skill is a critical element in childhood development.

2.4.4 Spatial skills

Spatial skills are a crucial component of human intellect. Spatial skills allow humans to encode information about small and large-scale objects — such as the location of our watch under a book or which way to turn to reach a destination (Burnett, Lane & Dratt, 1979). Spatial skills also allow young children to mentally transform this information by imagining what these children might see if approaching an intersection from an alternative direction. Spatial skills provide a foundation for learning (Verdine, 2014).

When looking at how spatial skills develop, one meaningful connection may lie between human spatial cognition and the symbol systems we use to describe spatial concepts. In particular, the representational system afforded by spatial language may provide an accessible introduction to spatial concepts, such as the relationship between objects, as illustrated by words like under, next to and over. Language and speech highlight patterns that might otherwise go unnoticed by directing children's attention to spatially relevant aspects of their environment. For example, how one block is situated under another is a tower (Verdine, 2014). This spatial language offers a categorical label emphasising qualitative divisions in otherwise continuous space. As such, spatial language might support spatial reasoning ability. The role of vocabulary as a guide for future behaviour and learning has already been demonstrated in literacy (Christie & Enz, 1992; Christie & Roskos, 2006).

Despite its relevance to the development of spatial skills, little is known about the contexts in which children may be exposed to rich spatial language or the settings in which they are prone to use spatial language on their own. Research suggests that exposure to different words predicts vocabulary development (Hart & Risley, 1995). Primarily when the words are used in a way that helps the child understand their meaning (Weizman & Snow, 2001). Block play is one everyday spatial activity in which spatial language might naturally occur. Blocks have been frequently mentioned as contributing to the development of spatial skills (Brosnan, 1998; Caldera et al., 1999). During the second and third years of life, children pile blocks on top of one another (Shutts, Ornkloo, von Hofsten, Keen & Spelke, 2009). As their play becomes more sophisticated, children pay special attention to the blocks' colours, shapes, and sizes. They may also compare the relative sizes of the towers they create (Leeb-Lundberg, 1996).

Reifel (1984) suggests that blocks and construction toys allow children to play directly with spatial concepts, which in turn could assist them in developing representations of spatial relationships between objects in the physical world. In an analysis of open-ended forms of block play, researchers concluded that the inherent geometric properties of blocks encourage logico-mathematical thinking in young children (Kamii, Miyakawa & Kato, 2004). A relationship has also been found between three- and five-year-old's block building skills and spatial visualisation abilities (Caldera, 1999).

Furthermore, Wolfgang, Stannard and Jones (2003) identified a significant relationship between complex LEGO® building during preschool years and later achievement in school mathematics.

A review of the current literature highlights several kinds of block play. Children sometimes engage in free play with blocks but may also strive to copy a structure depicted on a box or follow step-by-step instructions (Verdine, 2014). It seems likely that block play will encourage more spatial language than simple free play. However, free play with blocks may still elicit more spatial language than playing with materials that do not involve construction (Ferrara, 2011).

2.4.5 Visual documentation and construction play

Human beings have heard the phrase “seeing is believing”. It means that someone can tell you something repeatedly, but until you see it with your own eyes, you cannot believe it. More importantly, you cannot understand it. Visual documentation is critical to a children’s learning, it allows us to delve into their development using a concrete and permanent record. We can look at visual documentation to gain insight into the child’s development, and it can take many different forms (Ahola & Kovacik, 2011: 57).

The Reggio Emilia educational approach, named after a village in Italy, uses visual documentation as a means of helping children explore ideas, understand more about themselves and others, and reflect on their work. Young children engage in enquiry through language activities, problem-solving, collaborative efforts, and project work. More than a product resulting from a particular activity, the Reggio Emilia approach uses documentation as an agent as well as a reflection. For the Reggio Emilia approach, documentation is part of the learning process, and documentation serves as an agent for planning, communicating and reflecting. This display, presented in documentation boards with photos, graphs and stories, reflects the young child’s perspective on their learning (Ahola & Kovacik, 2011: 60).

Ahola and Kovacik (2011) reflect that documenting children’s work sends a message that the work is worthy of recording. They further state that once, during a visit to a classroom, they observed a teacher sketching children’s block buildings as they engaged in construction play. The young children checked their accuracy as they

focused on their representation. The children took pride in the detail of their work as they assessed and reflected on the block structure and its representation (Ahola & Kovacik, 2011: 59). This activity can be taken to the next level by asking the children to sketch their construction. The children can start drawing as soon as they are done with the building process. The activity can be taken a step further by having the class go around and sketch all the different constructions built and then putting the sketches up on the documentation board for everyone to examine.

2.5 Problem-solving

This section of the research study covers problem-solving. Here I am describing Polya's outlook and his four stages of problem-solving. I take this section further by defining the barriers to problem-solving and how these barriers influence young children's decision-making.

2.5.1 Polya and problem-solving

It has been specified by Polya (1973), that a great discovery solves a significant problem. However, there is a grain of discovery in the solution of any problem (Polya, 1973: 5). George Polya, a retired Stanford professor, was known to the public for his book, "How to solve it," and his efforts to teach teachers how to teach mathematics. Polya was regarded as the father of the modern emphasis on problem-solving in mathematics education.

Polya believes in four stages of problem-solving. He says that young children start at the first stage, understanding the unknown problem. This stage seems so apparent that it is often not even mentioned. Yet children are frustrated in their efforts to solve a problem because they do not fully understand it (Polya, 1957: 8).
The second step in Polya's four stages of problem-solving is to devise a plan. There are many reasonable ways to solve a problem; the skill is choosing the appropriate strategy that is only achievable and learned by solving many problems (Polya, 1957: 8).

In the third step of Polya's four stages of problem-solving, a plan needs to be carried out. This step is usually easier than devising the plan. In general, all that is needed is

care and patience, given that the child has the necessary skills. Persist with the goal that you have chosen. If it continues not to work, abandon it and choose another (Polya, 1957: 9).

Lastly, children have to look back and check their work. Polya mentions that much can be gained by taking the time to react and look back at what you have done, what worked, and what did not. Doing this will enable you to predict what strategy to use to solve future problems (Polya, 1957: 9).

Figure 2.8 explains the four different stages of Polya's problem-solving strategies:

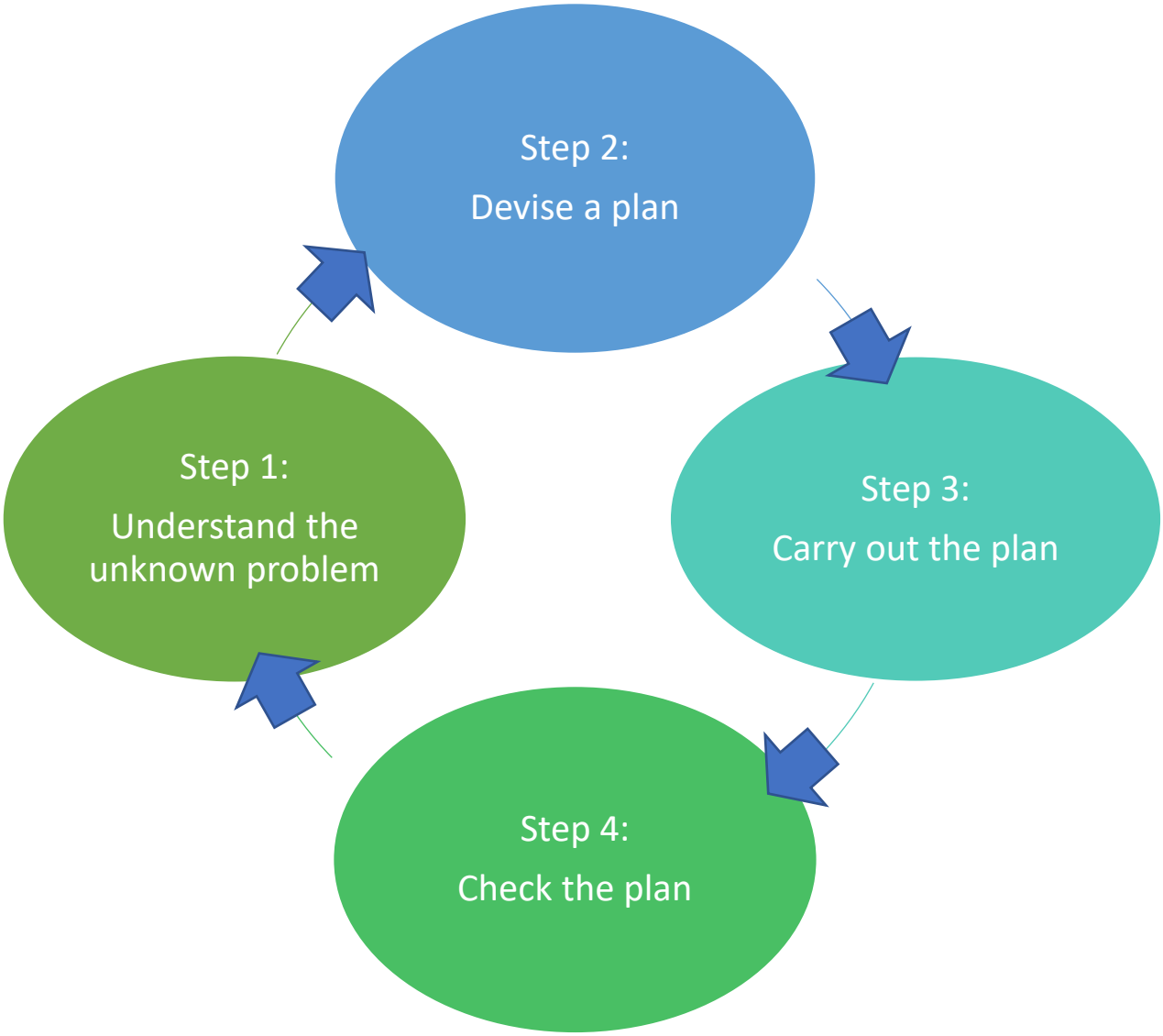


Figure 2.8: Polya's problem-solving steps (Polya, 1957)

2.5.2 Problem-solving skills

Problem-solving refers to active efforts to discover what must be done to achieve a goal that is not readily attainable. Suppose the goal is readily attainable, in that case, there is no problem, but children must go beyond the provided information to overcome obstacles and reach a goal (Weiten, 2013: 310).

Problem-solving can be seen as a process to overcome unknown situations, obstacles, or barriers, where a direct solution or method of resolution is not immediately apparent. Learners engage with their environment through problem situations, take risks, observe, generate data, reason, make decisions, reflect, and learn about success and failure (Bosman, 2014: 104). According to Thorndike learning takes place by trial and error. Some educationalists call this theory, “Learning by selection of the successful variant,” accordingly when no ready-made solution of a problem is available to the child, he or she then adopts the method of trial and error. The child first, tries one solution. If the solution does not help, the child rejects it, then, tries another solution and so the process continues. In this way the child eliminates errors or irrelevant responses which do not serve the purpose and finally discovers the correct solution (Thorndike, 1927).

Constructivism is concerned with how people come to know what they know. Constructivism tells us that sensations, perceptions and knowledge form part of who we are as humans. Constructivists believe that gaining knowledge of problem-solving, for example, is not an act where teachers teach learners how to solve problems. Instead, it is an act where children gain knowledge from within themselves as they play and experiment with the objects around them. We say they construct their knowledge internally. Constructivism explains that children should engage in problem-solving through concrete experiences to learn problem-solving skills. Curiosity and discovery should be the basis of problem-solving skills in the learning environment because that will eventually lead children to form their ideas. They should actively be involved in these concrete problem-solving experiences; they should discuss and share ideas and think thoughtfully and carefully about what they learn. The goal of

learning and teaching problem-solving skills through a constructivist approach should help young children become critical thinkers (Jacobs, 2011).

According to Jacobs (2011), many research projects have shown that young children's problem-solving abilities improve if teachers have faith in the children. Suppose the teachers adopt an encouraging attitude and are willing to devote time and effort to teach higher-order thinking skills will in result lead to children better understanding how to solve a problem (Jacobs, 2011: 69).

2.5.3 Barriers to effective problem-solving

Based on their studies of problem-solving, psychologists like Srenberg, Maier and Luchins have identified several barriers that can impede young children's efforts to effective problem-solving including a focus on irrelevant information, functional fixedness, mental health set and unnecessary constraints (Weiten, 2013: 311). These concepts are discussed in detail below.

2.5.3.1 Irrelevant information

Irrelevant information is information that leads some people astray. Focusing on irrelevant information can have adverse effects on reasoning and problem-solving. Therefore, effective problem-solving requires that young children attempt to figure out what information is relevant and what is irrelevant before proceeding to solve a problem (Weiten, 2013: 312).

The first photograph was taken at research site one. In this photograph, it is indicated that three children are playing with boxes. Two of these children have the boxes on their heads and the remaining child is investigating the box. This is a scenario of irrelevant information. These children are not focusing on solving the problem at hand; they find it far more fascinating to engage in their activity.

Table 2.1 Irrelevant information

Photograph indicating barrier to problem-solving:	Explanation of irrelevant information:
	• The photograph was taken at research site one.

	• Here you can see three young children and two of them have boxes on their heads. • The young children seem to be focusing on irrelevant information and not on the problem. • Instead of building a structure to solve the problem, these children focus on fitting into the boxes and neglecting the problem.

2.5.3.2 Functional fixedness

Functional fixedness is the tendency to perceive an item only in terms of its most common use. Ironically, young children appear to be less vulnerable to functional fixedness than older children or adults because they have less knowledge about the conventional use of various objects (Weiten, 2013: 312).

Photograph 2 was taken at research site two. This photograph is an indication of functional fixedness. This photograph points out the young child's fascination with and fixation on these toy animals. The young child showed no indication of play. The child was fixated on these toy animals and kept on observing them. There was no interest in any of the other materials that were laid out, this child was happily observing the toy in its simplest form.

Table 2.2 Functional fixedness

Photograph indicating barrier to problem-solving:	**Explanation of functional fixedness:**
	• The photograph was taken at research site two. • Here you can see the young child's fascination with the toy animals. This child was the only child with one exclusive fascination.

	• This one set fascination caused the child only to observe the toy. • There was no interest in any other materials laid out, and no active play took place. • The child was happily observing the toy in its simplest form.

2.5.3.3 Mental set

A mental set exists when people persist in using problem-solving strategies that have worked in the past. Mental sets may explain why expertise in areas sometimes backfires and in fact hampers problem-solving (Weiten, 2013: 313).

The third photograph was taken at research site five. This photograph is an indication of a mental set. The task given to these children was that they needed to build a solution to help the toy dog out of his predicament. These young children decided that due to all the rain this dog needed a new house, because his house is under water. The goal was to build a new house. Unfortunately, the goals were never met. The young child had a preexisting plan on building this enclosure and this caused a "backfire" action. A backfire action is when a mental set hampers the problem-solving process. In the end, the toy dog could not fit into the enclosure.

Table 2.3 Mental set

Photograph indicating barrier to problem-solving:	**Explanation of mental set:**
	• The photograph was taken at research site five. • Here you can see a young child piling blocks to form a structure.

	• The problem that needed solving required the building of a standing enclosure. • The child had a preexisting plan on building this enclosure and this caused a “backfire” action. In the end, the toy dog could not fit into the enclosure.

2.5.3.4 Unnecessary constraints

Effective problem-solving specifies all the constraints governing a problem without assuming any constraints that do not exist. A common mistake that young children and people often make regarding problem-solving is making assumptions that impose unnecessary constraints on problem-solving efforts. These assumptions can then cause difficulties to emerge from how people structure the problem, how prior knowledge is applied and how much people need to juggle information in working memory (Weiten, 2013: 313).

The fourth photograph was taken at research site four. This photograph is an indication of unnecessary constraints. This photograph shows a young boy towering blocks of different shapes and sizes. This photograph relates to unnecessary constraints because the child assumed the structure would stand. The child assumed because the structure has an unorthodox foundation that the same technique can be used at the top of the structure.

Table 2.4 Unnecessary constraints

Photograph indicating barrier to problem-solving:	**Explanation of unnecessary constraints:**
	• The photograph was taken at research site four. • Here you can see a young child towering blocks.

	• This photograph relates to unnecessary constraints because the child assumed that the structure would stand. • The child assumed that the same technique can be used at the top of the structure because the structure has an unorthodox foundation.

2.5.4 Information processing

It is mentioned by Berk (2017) that the design of digital computers that use mathematically specified steps to solve problems suggested to psychologists that the human mind might also be viewed as a symbol-manipulating system through which information flows, a perspective called information processing (Berk, 2017: 21).

From the time information is presented to the senses at input until it emerges as a behavioural response at the output, the data is actively coded, transformed and organised. Information-processing researchers often design flowcharts to map the precise steps individuals use to solve problems and complete tasks, much like the plans devised by programmers to get computers to perform a series of mental operations. They seek to clarify how task characteristics and cognitive limitations influence performance (Berk, 2017: 21-22).

An example given by Berk (2017), is a researcher who provided a pile of blocks varying in size, shape and weight and asked school-age children to build a bridge across a river that was too wide for a single block to span. The researcher tracked one 5-year-old girl's efforts as she repeatedly tried unsuccessful strategies. Eventually, her experimentation triggered the idea of using blocks as counterweights, and her mistaken procedures helped her understand why the counterweight approach worked. Although this child had no prior understanding of counterweight and balance, she arrived at an effective solution. Her actions within the task facilitated problem-solving (Berk, 2017: 22).

Like Piaget's theory, the information-processing approach regards children as active, sense-making beings who modify their thinking in response to environmental demands. I used a theoretical framework based on Vygotsky's constructivist and social constructivism theories in this study.

2.6 Additional components

These additional components are extra aspects that contribute to young children's play and construction play. The additional components that I chose to focus on were the daily programme of young children, green playscapes, and how they contribute to construction play and teachers' perceptions.

2.6.1 Daily programme and young children

Free, unstructured play is centred around the child. Picture a group of young children on a playground, deciding amongst themselves that the jungle gym is the starting point and that a game like "hide and seek" will begin when the bell rings (Jensen, 2019: 12). Free play is an unstructured activity that encourages young children to use their imagination and cognitive skills, such as building blocks or playing with toy animals. While still supervised, the child can decide what they would like to do during these periods. Young children acquire social skills through play (Davin, 2013: 11-12). In this kind of self-governed play, children are often physically and mentally intensely active. The fact that young children exercise the most autonomy of all practices listed here, speaks to essential learning opportunities. Children practice self-regulation and executive functions as they control and direct their learning (Jensen, 2019: 12).
When children are engaged in self-chosen play, they do not need constant guidance. However, adults have essential roles in providing time and space for children's safety and inclusive play activities. Adults can support children's free play by observing, acknowledging, listening, accepting, and meeting requests that assist their play initiatives when necessary. Sometimes, free play becomes repetitive, and adults can inspire children with new experiences and challenges (Jensen, 2019: 12).

In guided play, adults support children to achieve learning goals within a play context. The idea is to scaffold children's attempts and not direct their actions. In guided play,

children and adults share control of what to do and how. Adults can join the children's playtime to extend the learning possibilities through questioning or suggestions. They can also initiate a guided play activity that builds on children's interests by choosing materials that teach children to discover a learning goal (Jensen, 2019: 14). Structured activities are short teaching and learning activities that the teacher guides. They can be done with individual learners, in small groups or as a whole class, depending on the nature of the activity. The concepts, content and skills from emergent mathematics, language and life skills are taught during these activities (Davin, 2013: 10).

In addition to extending children's existing play, adults can initiate guided play. First, a play scenario is prepared using materials; this could be old packaging and boxes for a grocery store. Before starting the play, children are introduced to concepts such as writing a shopping list, using simple addition to determine how much the items will cost and jobs in a store. Then they are invited to play, choosing what roles they want, negotiating how much the food will cost and playing through imagined scenarios. In this example, the adult constrains the space by setting up a play context with learning goals in mind, but children decide what happens in the grocery store. Adults can scaffold learning targets within this play when appropriate by drawing children's attention to certain features, providing comments and questions, or becoming active play partners (Jensen, 2019: 14).

2.6.2 Green playscapes and construction play

In the early decades of the twentieth century, when the playground movement took root in the United States of America, outdoor play areas were generally equipped with swings, slides, seesaws and sandboxes – not that different from most of today's playgrounds. The design of play structures has also come a long way from the traditional, single-purpose pieces of equipment. Many of today's outside play areas contain equipment constructed of materials such as tires, cargo nets, railroad ties, telephone poles, barrels and many more. Traditional structures were primarily made of metal, which could become dangerously hot or very cold depending on the weather. The new playground materials include more natural materials allowing young children to experiment with a wide range of outdoor structures (Essa, 2011: 199 – 200).

As Essa (2011) mentioned in more recent years, a movement to promote natural playscapes has emerged in more preschools and learning centres. Unlike traditional playground structures, natural playscapes contain a variety of plants, pathways, open areas, sand, water and designs that promote dramatic and cooperative play. Playscapes offer enjoyment for all the child's senses, but they also suggest different ways children use the space (Essa, 2011: 200).

One way of using a natural playscape is to add loose parts. Loose parts or open-ended materials are natural or manmade resources that can be used in more than one way, allowing children to experiment through play (Nicholson, 1971). By incorporating loose parts into children's play spaces and giving them little or no instruction, children are provided with the opportunity to engage with objects how they choose (Gibson, 2017). Loose parts play allows children to create their play experiences based on their ideas and goals rather than materials with one purpose predetermining their play (Anggard, 2011). Loose parts can encourage children to explore their environments, take risks during play, and develop confidence and motivation (Casey, 2016). Several studies have examined outdoor loose parts play's benefits in early years settings. These benefits range from cognitive and socio-emotional benefits, including happiness at school, social benefits and enhanced exploratory, creative and dramatic play (Houser, 2016). Others have noted that loose parts can promote physical development through the encouragement of active play, the development of physical literacy and fundamental movement skills (Houser, 2016).

According to Park (2019), previous studies on children's growth and development showed that natural elements positively affect children by inducing physical and mental changes in various aspects, thereby helping them become happier and healthier. Thus, an environment rich in natural ingredients positively influences activities, such as children's display of physical abilities, expression of multiple skills, division of ego-centred territory, and pursuit of social contact (Park, 2019: 2).

Children are physically and mentally immature and their personalities develop as they are constantly influenced by surrounding stimuli. Early childhood is when basic concepts and attitudes towards the world and positive attitudes towards particular objects are formed around the age of four. From an early age, it is essential to

education that nature coexists with humans and is highly valued. Young children respect and wonder about all living things by interacting with them as they play and engage with nature, stimulating their unlimited imagination and innovative associations. Young children form a comprehensive relationship with nature through this direct encounter. They can enjoy a prosperous life in early childhood while also developing the refinement necessary for coexisting with nature (Park, 2019: 2).

It is crucial to draw the elements of nature through all learning experiences. Educators and children should not be confined to a traditional classroom setting. A point should be made that the traditional learning environment extends to the outdoors. Researchers, like Park (2019), mention that children are drawn to natural elements; it gives them a sense of calm and triggers their curiosity. Educators who feel that construction play takes up too much classroom space could move the station outdoors. Young children may feel inspired to construct and create impressive and more significant structures using wooden blocks, box materials and open-ended materials in a natural learning environment. Raw materials, such as trees and rocks, provide more opportunities for problem-solving development and challenge children's creativity.

2.6.3 Teachers' perceptions

When we look at learning, especially how young children learn, it is crucial to look closely at the learning environment. The teachers' perception of learning is an essential part of a learning environment. Essa (2011) explains that all teachers must gauge their involvement in play according to children's cues. Observation may tell teachers that some children avoid certain play activities, like visiting the construction play area, while others frequently play there. Thus, teachers may need to encourage reluctant children to play in certain parts of the learning environment.

There has been a rising curiosity regarding the impact of teacher-child collaborations in the preschool years of learning and developing. Several surveys have indicated that discussions about mathematics between young children and teachers can improve mathematical development and learning. It is also stated that preschool teachers logically used a range of verbal approaches, such as asking open-ended and mathematical-related questions, to widen thinking throughout problem-solving

situations. A more significant degree of studies done in the United States of America revealed that a high regularity of child-adult mathematic discussions in preschool classrooms or at home predicts later mathematical accomplishment (Trawick-Smith, 2017: 433-488).

A child's ability to engage in complex play scenarios constitutes one sign of mature play. Children, however, often lack the background knowledge required to build such strategies. Even to play something so familiar as "hospital," children need to know what hospitals look like and who works in them, what their titles are, what each of them does, and so on. Elkonin (2005) states that teachers use field trips, guest speakers, books and videos to build this knowledge. Elkonin's (2005) notion that role forms the core unit of play guides the choice of locations for field trips and books and videos. Children re-enact very little in make-believe play. For a field trip to become the background for make-believe play, teachers must explicitly show children the roles involved, what those encountered would say and do and how they would interact with each other (Elkonin, 2005: 22 - 48).

Play facilitation is the science and art of fuelling children's engaged learning in play. A good facilitator inspires play, creates space and time for many playful activities, and adapts their role to match children's needs as they take on new challenges. Skilful facilitators can spot opportunities to integrate learning goals in playful settings without disrupting children's engaged and playful endeavours. The reality is that adults often struggle with this balancing act and feel unsure about their role and how to support children's learning outcomes in playful settings (Jensen, 2019: 5).

2.7 Theoretical framework

A theoretical framework is a framework that underpins a study. A theory could be described as a well-developed, coherent set of concepts, ideas and principles that may be used to interpret, explain, or even judge intentions, events, actions or experiences. Theories provide a possible explanation for why things happen, or they can provide models for how things happen (Bertram & Christiansen, 2020: 133 & 134).

2.7.1 Vygotsky's constructivist theory

Children are always mentally active in seeking to understand the world around them. Children learn in various ways; a wide range of teaching strategies and interactions effectively support all these kinds of learning (Darragh, 2010: 91).

As detailed by Darragh (2010), the stages of cognitive development affect how children perceive the world around them and what environmental factors are chosen for exploration. A critical theorist, Lev Vygotsky, advanced our understanding of social, emotional and cultural literacy and how children respond to the world around them. Vygotsky is thought of as a constructivist, meaning that he believed that children gain knowledge and literacy based on their interactions with the environment (Darragh, 2010: 91). Constructivists uphold that learners structure their understanding and grasp of the world by evaluating what they come across in the physical and social world with their current knowledge. According to this knowledge children apply their prior experience and expertise to make sense of new, incoming information (Vakalisa, 2011: 5).

Naudé and Meier (2018) advocate that constructivism is mainly concerned with how we come to know what we know. This theory proposes that our sensations, perceptions and knowledge form part of our identity. As such, constructivists believe that gaining knowledge of calculations, for example, is where learners gain knowledge and form concepts from within themselves as they play and experiment with the objects around them (Naudé & Meier, 2018: 8).

We can, therefore, say their knowledge is constructed internally. Constructivism will tell us that learners should learn through concrete experiences as an approach to learning. Curiosity and discovery should be the basis of learning experiences in the learning environment. Their curiosity will eventually lead children to form their ideas and deepen the formulation of concepts in their long-term memories (Naudé & Meier, 2018: 8).

Therefore, children should be actively involved in the concrete experiences of learning; they should discuss and share ideas and think thoughtfully and carefully about what

they are learning. The goal of learning and teaching using a constructivist approach should help children formulate deep concepts through their internal thinking and education processes and become critical thinkers who are proficient in all learning aspects (Naudé & Meier, 2018: 8).

Figure 2.9 highlights the main aspects of Vygotsky's constructivist theory, as adapted from Naudé and Meier (2018: 8).

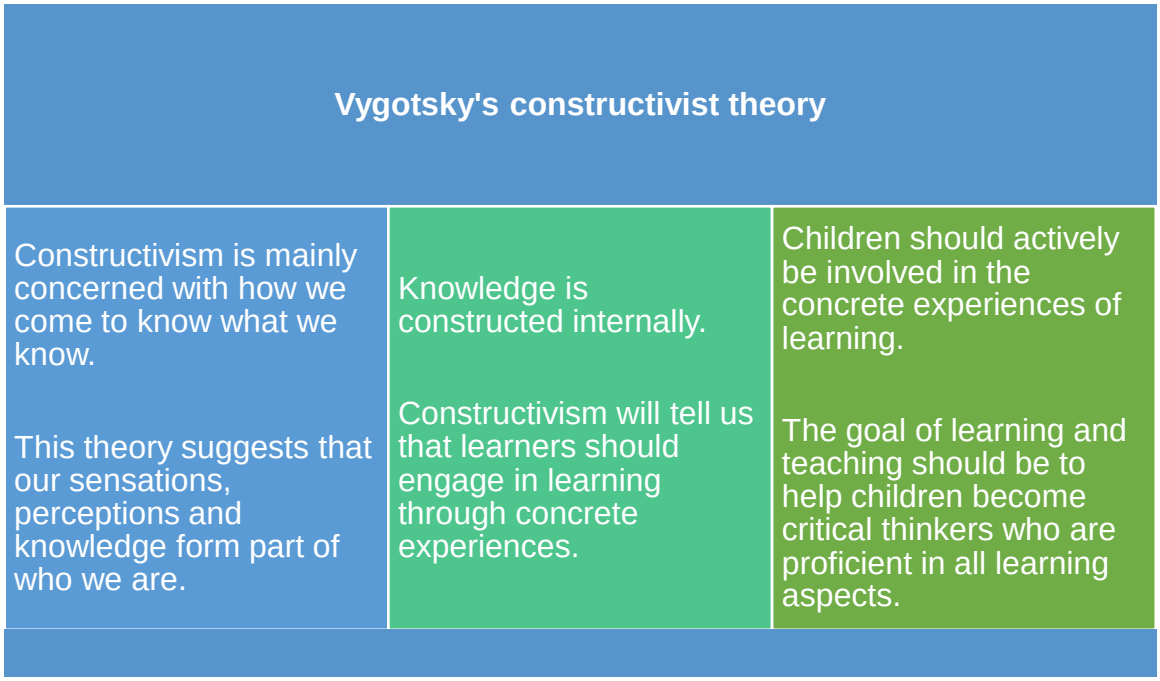


Figure 2.9: The central concept of Vygotsky's constructivist theory (Naudé & Meier, 2018)

Vygotsky's theory of constructivism underpins the teaching of problem-solving skills. In short, constructivism means that learners must be actively involved in their exploration and understanding of the world. If optimal learning occurs, they need to construct their knowledge while actively participating in hands-on activities.

Therefore, the teacher should provide ample opportunities to explore and create an environment rich with problem-solving activities and tools to stimulate children's curiosity. The teachers should provide these opportunities in keeping with Vygotsky's observation that learners learn best when an older peer or adult guides their learning experience (Venter, 2013).

For children to construct their knowledge, they need tools, just as a builder would need tools to build a house. The tools that children use are the knowledge and ideas they already possess. They have already gained this knowledge and these ideas through hearing, touching and seeing in their environment. When new learning occurs, existing ideas or knowledge are used to make sense of the new knowledge. Each time a person learns something new, they modify their existing knowledge base so that their knowledge base becomes increasingly complex and enlarged. Understanding can be defined as the fundamental connections between current and new knowledge. Understanding refers to connecting what is already known and newly developed understanding. From this, the teacher cannot tell learners what to learn. Instead, they must help learners make new connections using the ideas and knowledge they already possess. The teacher cannot leave a child to play around and automatically discover and make new connections. It is important to stimulate children's metacognition when developing problem-solving skills. To learn and make new connections, children need to be mentally active.

Children learn from one another as well as from the teacher. In the preschool learning environment, this happens through play activities where children work together interactively and then where they also interact with the teacher. They share ideas, assess strategies and results, and determine the correctness of their thinking and solutions. The children can use their knowledge to make sense of what the teacher presents at a higher level of understanding (Venter, 2013: 191-193).

2.7.2 Vygotsky's social constructivist theory

Social constructivists believe that knowledge is constructed through social experiences in different social contexts, and therefore, learners need to collaborate on an interpersonal level. Knowledge is built when discourses between people in different social contexts take place. Underlining values, assumptions, and world views are analysed during these discourses, vital for developing learners' critical thinking skills.

Cooperative learning is an essential aspect of cognitive constructivism. In collaborative learning, meaningful interactions, like solving a problem collectively, must take place, and it is required that the teacher mediates or facilitates the learning process. Consequently, lessons must be cognitively challenging, or the purpose of constructing

knowledge will be lost. Teachers are thus compelled to create exploratory activities for the learners by adopting a process-centred teaching approach where the teacher facilitates learning by providing cues and suggestions (Nel, 2016: 42 & 43).

Jacobs (2011) states that since 1997, the South African school curriculum has been based on the constructivist theory. This theory, often referred to as socio-constructivist, is a diverse theory that fundamentally stems from two mature theories, specifically the experiential and behaviourist theories. Many elements of behaviourism also became part and a piece of constructivism. By tradition, learning has been thought to be an imitative activity, which involves children reciting or mimicking newly introduced information. But constructivist teaching practices help children internalise and reshape or convert new details. Constructivism is founded on the belief that children should be allowed to construct significant and beneficial knowledge in their own lives. What is essential is that children learn, but how they learn. The skills young children learn and require are more valuable than the content. According to constructivists, once young children have obtained practical learning skills, they can use these skills to learn anything they wish to learn (Jacobs, 2011: 41 & 42).

2.8 Conclusion

Chapter 2 explored the literature regarding the importance of play and construction play for children's learning and development. There is consensus in the literature that construction play in early childhood is vitally important. Constructivism is mainly concerned with how we humans come to know what we know. Especially how young children come to know and understand the world by evaluating what they come across in the physical and social world with their current knowledge. Chapter 3 is dedicated to explaining the methodology and research design developed to address the research questions. The interpretive paradigm, data generation strategies and ethical considerations are described in the following chapter.

CHAPTER 3

Success is a project that is always under construction – Pat Summit

3.Research methodology

3.1 Introduction

As stated in the previous chapters, the objective of this study was to explore preschool teachers' perceptions of construction play and how they implement this form of play to enhance young children's problem-solving skills. The central objective of this study was to determine how teachers implement construction play in early childhood learning environments. Chapter 3 summarises the research methodology applied in the study and further describes the sampling technique used to generate the data. The chapter concludes with a thorough explanation of the data analysis process, how trustworthiness was achieved and the applicable ethical considerations.

3.2 Introduction to epistemology

A study is undertaken in terms of a specific epistemological paradigm. This paradigm offers a lens through which the result of the research study can be understood. Epistemology is concerned with ways of knowing and learning about the world and focuses on issues, such as how we can learn about reality and what forms the basis of our knowledge (Ritchie, 2014: 6). At its core, the epistemological paradigm provides a body of reference for acquiring and conveying information to other people. For example, when conducting a qualitative study to explore community members' perceptions regarding social challenges in a community, an interpretive paradigm may be the most suitable, helping the researcher understand the involvement and perceptions of the participants (Ferreira, 2012: 3).

3.2.1 Interpretive paradigm

Bertram and Christiansen (2019) draw attention to the interpretive paradigm. They note that this paradigm states that researchers do not aim to predict what people will do or understand. Instead, they define and understand how people make sense of the world around them and their specific actions. The drive is to better understand how

people make sense of the environment in work and life. The researcher's location within a broadly interpretivist frame is reflected in practices which emphasise the importance of understanding people's perspectives in the context of the conditions and circumstances of their lives. This has implications both for the inductive and deductive approaches across the research process and for the way researchers analyse and develop interpretations of the data (Ritchie, 2014: 22).

For the interpretive researcher, social research aims to comprehend the meaning, which informs human performance. People respond in a given situation depending on their past experiences and circumstances; thus, their context is critical (Bertram & Christiansen, 2019: 30-31). Ritchie and Lewis (2003) claim that epistemology is concerned with ways of knowing and learning about the social world. When linking an interpretive paradigm with epistemology, researchers look at how things can be known, if they do exist, can be discovered and disclosed. The concept I wanted to explore and discover was teachers' perceptions of construction play and how they implement this form of play to enhance young children's problem-solving skills (Ritchie & Lewis, 2003).

Researchers tend to make clarifications to identify human agency, performance, mindsets, opinions, and perceptions. These clarifications influence the method that the researcher chooses. It makes sense that meaning can only be understood in the interaction between the researcher and the participants. Therefore, we know that the relationship between the researcher and the participants will be subjective. The epistemology of interpretivism is relative because the researcher is not separate from the research process. The methodology is ideographic because interpretive researchers often focus in-depth on a particular case to describe and understand it in detail (Bertram & Christiansen, 2019: 31). An idiographic approach is characterised by a focus on the individual or participant and on understanding the participants' behaviour (Cohen, 2018).

The interpretive perspective leads to a stronger emphasis on what has become known as naturalistic research. Naturalistic research is conducted in naturally occurring contexts, with the researcher aiming to be non-intrusive. The researcher needs to consider the larger social, cultural, or political context with any research attempt. The

interpretive paradigm is underpinned by the idea that people's behaviour is context-dependent (Bertram & Christiansen, 2019: 31). This perspective also implies that the researcher needs to engage with the situation from the participants' viewpoint. An interpretivist paradigm is described by Creswell and Creswell (2018:17) as most often adopting qualitative approaches encompassing observation of behaviour. They further state that in this qualitative approach, the researcher's goal is to establish the meaning or interpretation of an event or phenomenon from a group of participants, and one of the essential elements of generating data in such a way is the observation of the participants' behaviour while engaged in activities (Creswell & Creswell, 2018: 17).

As the researcher, I have chosen to use the interpretive paradigm to observe how teachers and children respond to construction play. People like preschool teachers and young children react to a particular situation depending on their past experiences and circumstances. Furthermore, I interpreted conversations and activities; observed the teachers' and children's interactions with each other and the learning materials; and gained insight into how teachers perceive construction play and how children's problem-solving skills are developed in their learning environment.

3.3 Research approach

3.3.1 Methodological approach

Methodology concerns how researchers go about obtaining knowledge about the world. This includes how researchers generated data depending on their views of what exists and what can be known, how the researcher describes phenomena and how they explain concepts (Cohen, Manion & Morrison, 2018). Hesse-Biber and Leavy (2011) argue that a methodological approach is the methods and tools that researchers use to generate data. These tools enable us to gather data about social reality from individuals, groups, artefacts and texts in any medium. I focused on the qualitative research approach as the the methodological paradigm in this study. A qualitative research approach is a strategy or plan using the fundamental theoretical model to specify the range of contributors – this method is used to gather data and then data analysis needs to be done. The research approach can be chosen based on the researcher's epistemological perspectives. Their research skills and practice

influence how the generated data will determine the research approach (Nieuwenhuis, 2016: 72).

Creswell and Poth (2018) suggest that the qualitative research approach starts with suppositions and theoretical frameworks that inform the study of research problems addressing groups or individuals assigned to a human or social situation. To study such a problem, qualitative researchers use a developing qualitative method to review the generation of data in a more natural setting, sensitive to the people and places being studied, and the researchers choose a data analysis approach that is both inductive and deductive and establishes designs and themes (Creswell & Poth, 2018: 42-43).

Creswell and Poth (2018) explain that researchers conduct qualitative research because a question or matter needs to be investigated. Researchers also manage qualitative research because it requires a dense, comprehensive interpretation. This aspect can only be determined by communicating openly with people, going to their place of work or homes, and permitting them to tell the stories unfettered by what researchers expect to uncover or what has been read in literature. Researchers conduct qualitative research to encourage people to share their tales, hear their voices and reduce the power relationship that frequently exists between the participants and researchers in a study (Creswell & Poth, 2018: 45). To embark on qualitative research entails a solid obligation to investigate a problem, and it demands several resources and time. The researcher must be committed to spending large amounts of time in the field. The researcher devotes numerous hours in the area, accumulates wide-ranging data and labours over field problems to obtain access and establish a rapport. Collaborating with participants takes time yet developing an insider's perspective is essential for the research (Creswell & Poth, 2018: 47).

I chose a qualitative research approach because I am interested in the story behind construction play. I had the opportunity to make participating teachers' voices heard. The structured narratives and the semi-structured interviews I conducted with the participants gave me in-depth information on how they felt about construction play. I openly communicated with study participants and offered them the chance to give me insights into their experiences of construction play and reasoning. This approach is

time-consuming, but it allowed me to gather vast data, leading to a more concrete conclusion and data saturation.

A researcher needs to know how to conduct a qualitative study and have a detailed understanding of the research topic. The first thing a researcher needs in order to conduct a qualitative study, is a complex understanding of the issue being investigated. There needs to be a desire to empower individuals, and it is necessary to have a flexible style of reporting. The researcher will have to understand the context in which participants in a study address a problem. By doing this, the researcher will develop a theory to address gaps in understanding. The main idea behind qualitative research is that it is conducted because of a problem that needs to be explored. It is also important for the researcher to have a flexible style of reporting. It will always be required that the researcher understands the context he/she wishes to address and investigate. The researcher needs to remember that a theory needs to be addressed and that qualitative research is conducted because a problem needs to be investigated. Figure 3.1 is a summative description of when qualitative approaches are adequate for solving a research problem (Adapted from Creswell & Poth, 2018).

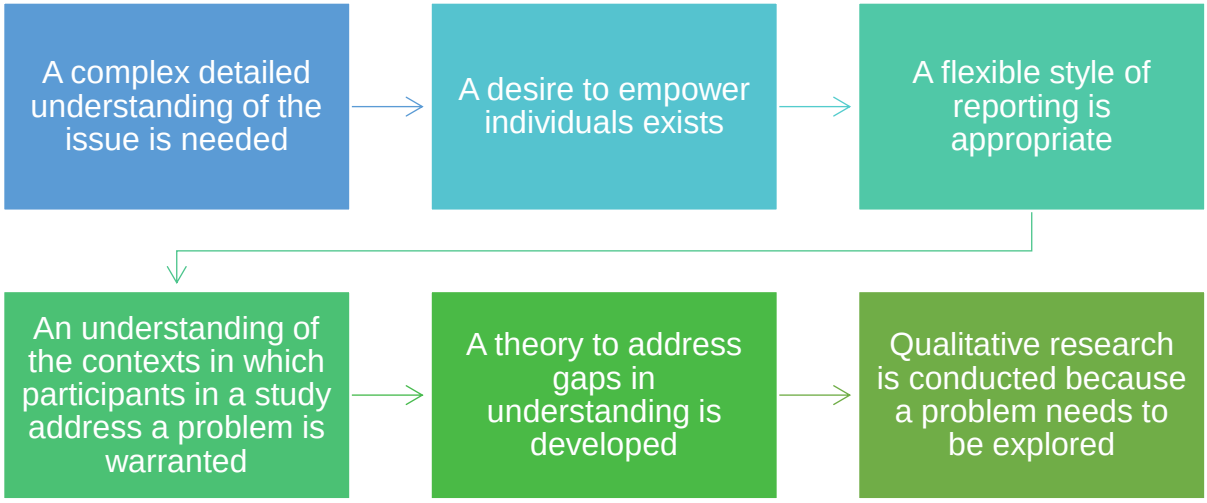


Figure 3.1: When to use a qualitative approach when conducting research (Adapted from Creswell & Poth, 2018)

3.4 Research methodology

3.4.1 Methodological paradigm

The methodological paradigm I focused on in this study is the qualitative research approach. A qualitative research approach comprises an interpretive paradigm and is a strategy or plan that changes from the fundamental theoretical moulds to specify the range of contributors, the method used to gather data and how the data will be analysed. (Maree, 2016:72). A qualitative research approach is also used to explore and understand the meaning individuals or groups assign to a problem they experience (Creswell, 2013: 4).

3.4.2 Research design

Once a researcher has identified a research question, the researcher develops a research design. Essentially, the research design is a plan of how the researcher will systematically generate and analyse the data that is needed to answer research questions (Bertram, 2020: 46). For this study, I chose a case study research design. Case studies can be described as concentrating on the explicit requirement to produce a profound and complete knowledge of a distinct context or phenomenon. Researchers using a case study research design will depend on the complexity and valued insights discovered through a small number of vastly focused interviews as a critical methodological approach (Burton, Brundrett & Jones, 2008:80). It has been pointed out that when “how” and “why” questions are asked, a case study is a preferred strategy. The close collaboration between the researcher and the participant is one of the advantages of this research study, enabling the participants to share their stories. Creswell (2014) defines a case study as an investigation where the researcher develops an in-depth interest in the case, which may consist of multiple individuals. An essential feature of a case study is that it has a habit of being centred around the researcher, frequently including observation of participants and trying to offer a complete understanding and description of the research situation (Nieuwenhuis, 2016:107).

The level of complexity included in a case study will also vary from a study involving interviews with only a few participants compared to a study involving interviews with a

number of participants and also incorporating data from documents, observations and other additional information. The integration of different perspectives on the context or interaction means that case study designs can build up a very detailed in-depth understanding. Case studies are used where a single perspective cannot provide a full account or explanation of the research issue and where understanding needs to be holistic, comprehensive and contextualised (Ritchie, 2014: 67).

It has been distinguished by Rule and John (2011) that there are different senses in which the term case study is used in qualitative research. One of these senses is that a case study is used to refer to the process of conducting an investigation. According to Rule and John (2011), a case study can also be regarded as a unit, a process and a product. To add to this, we can view a case study as an example of a genre (Rule & John, 2011: 5).

The *unit* of a case study is the identified case that you investigate. This case can be a particular person, a programme or a situation.

As a *process*, a case study involves following a number of steps, such as identifying a case, gaining access to people, documents and places, gathering information about the case, analysing the data and writing down all the findings. As a *product*, a case study takes the form of a visual or printed text that comes out of the process of investigation. This printed text can be in the form of a master's dissertation, a report or a journal article.

A *genre* is a particular type of text that is characterised by certain features, such as its purpose, audience, language and structure. As a product, a case study takes on the features of that genre. For example, a case study within the thesis genre would have the purpose of describing, analysing and interpreting the case (Rule & John, 2011: 5).

Figure 3.2 explains how my research study fits into the different senses of a case study.

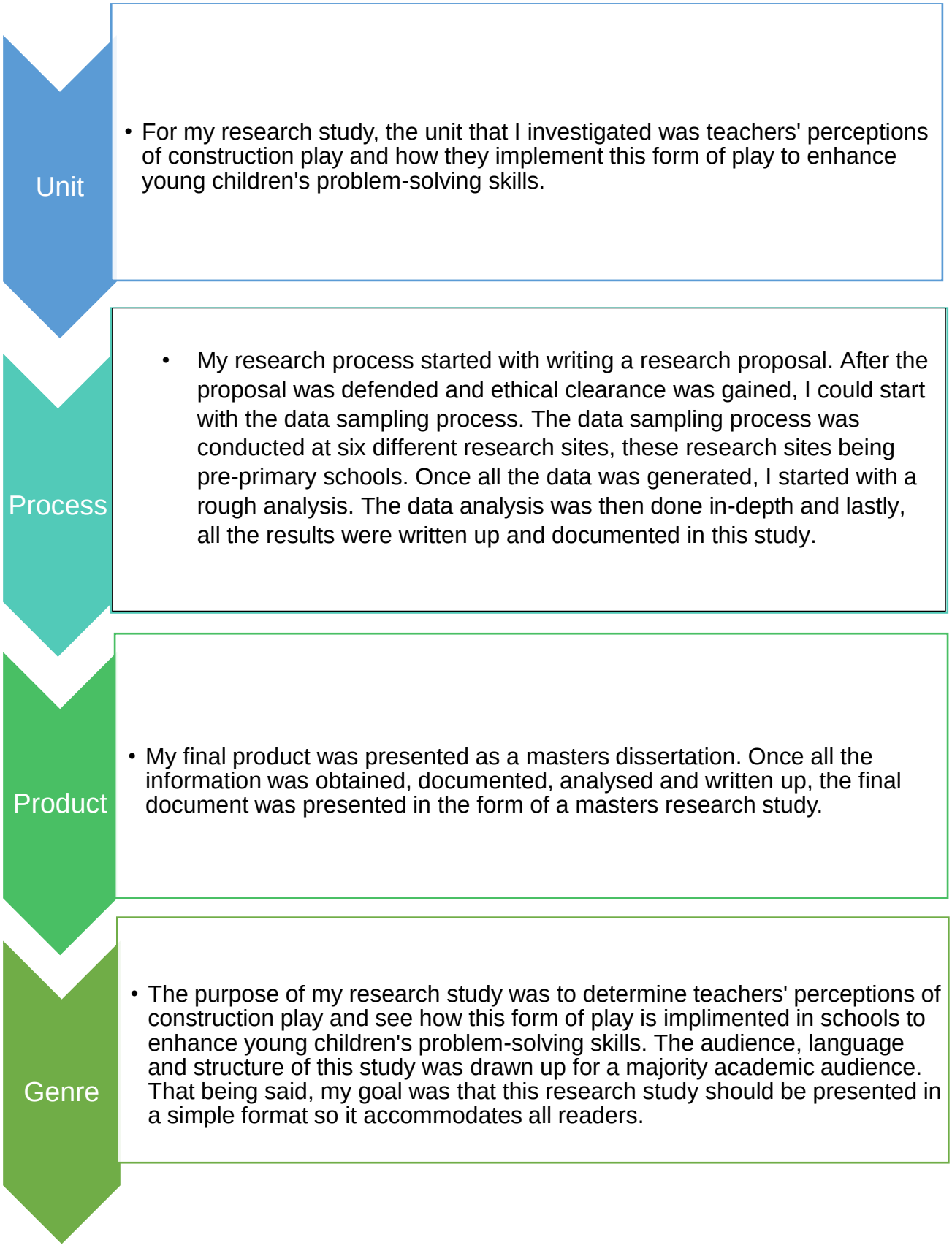


Figure 3.2: How my research process fits into different senses of a case study design

I chose the instrumental case study research design to focus on understanding a specific situation. An instrumental case study provides insight into an issue or helps refine a theory. In some cases, formal sampling occurs before selecting a topic to ensure that the case will give meaningful findings and will answer the research questions (Grandy, 2010:474).

An instrumental case study is used to accomplish something other than to understand a particular situation. It provides insight into an issue or helps to refine a theory. The case is secondary, it plays more of a supportive role, by facilitating our understanding of something else. The case is often looked at in depth, it is context analysed, because it helps the researcher to pursue the external interest (Baxter & Jack, 2008).

This instrumental case study plays a supportive role by easing our understanding of something else; it is seen as a secondary interest (Nieuwenhuis, 2016:107). That means that this design focused on the preschool teacher. My goal was to explore the experience and understanding these teachers relate to construction play, whether they perceive construction play as crucial, determine if they use construction play to promote problem-solving in young children and if the learning environment influences this form of play.

3.4.3 Sampling

Maree (2016) states that sampling can be described as a procedure used to gather and analyse certain information from a predetermined number of people who have been selected from a more significant population. One generally uses purposive sampling when utilising a qualitative research approach (Maree, 2016:85). When members of a sample are chosen with the aim to represent a phenomenon or a group, this can be seen as purposive sampling. The criteria used as a basis for sampling form part of the critical aspects of purposive sampling. These criteria explain that there should be a vital meaning of the sampling strategy within the study's conceptual framework. The requirements should generate relevant and rich information on the type of phenomena that needs to be studied; enhance the transferability of all observations; produce plausible/credible explanations; take into consideration ethical preconditions; and, lastly, prove to be financially feasible, time-driven, and practical (Maree, 2016:85).

When using purposive sampling to generate data, the researcher is selecting the participants, setting or other sample units on purpose. The sample units are chosen because they have particular characteristics that will enable detailed exploration and understanding of the phenomenon under investigation (Bryman, 2012). These may be socio-demographic characteristics, or relate to specific experiences, behaviours or roles. Purposive sampling is precisely what the name suggests. Members of a sample are chosen with the purpose to represent a type in relation to a key standard. This form of sampling has two principal aims. The first is to ensure that all the key constituencies of relevance to the subject matter are covered. The second is to ensure that, within each of the key criteria, enough diversity is included so that the impact of the characteristic concerned can be explored (Ritchie, 2014: 113).

Sampling involves making decisions about which people, settings, events or behaviours to include in the study. Researchers need to decide how many individuals, groups or objects will be observed. In doing so researchers must consider the population from which they are sampling. In research, the word population is used to mean the total number of people, groups or organisations that could be included in a study (Bertram, 2020: 71). From the study population, I focused on six preschool teachers to explore their perspective on the concept of problem-solving and how it is implemented in schools.

The sampling process took no more than a day at each school. I started the sampling procedure by asking the teachers to write a guided narrative about what they understand about construction play and their experiences as a child engaging in construction play. Secondly, in a semi-structured interview, I asked the teachers more detailed questions about construction play. Throughout my observation period, I observed the teachers and children as they went about their daily programme. I closely monitored and watched how they engaged in construction and block play, and in the case where the school did not have any materials, I provided the necessary construction toys.

For my sample, I focused on preschool teachers. I visited six different schools in the Mpumalanga and Gauteng provinces, both private and public schools. I generated my data through purposive sampling. The criteria were registered preschools that follow

the CAPS curriculum, these preschools varied in size and teacher qualifications. I focused on children between the ages of four and five years. The language of teaching and learning at these schools was English, and the qualification of the six different teachers at each school was taken into consideration. No teacher was eliminated based on their teaching qualification, but it was stated for the record to form an accurate conclusion at the end of the study. The sampling criteria for the teachers that I used in my research were that all the teachers should be English-speaking and proficient in the English language, they should not be in their first year of teaching, the teachers' qualifications were not the main element I focused on. The teachers' qualifications were documented and taken into consideration, but no teacher was excluded for not having a formal degree and the age of the teachers participating in the study also varied.

My sample size consisted of six teachers from six different schools. These teachers came from different backgrounds and socio-economic statuses, which provided me with a diverse view of the teachers' perspectives. I also observed children between the ages of four and five years that attended these preschools. I watched all the children in the learning environment. I determined how many of these children got the opportunity to play with construction materials, how regularly they used the opportunity to enjoy construction play, and whether the teachers and learning environment have the necessary tools to make this possible. The group of children consisted of both male and female children for a more diverse observation.

Table 3.1 demonstrates the sampling criteria I used to generate data. This table gives information describing the type of school, the province where the schools are located and the school's language of learning and teaching.

Table 3.1 The different research sites that were visited

Research site:	**Criteria:**	**Province:**	**School's language of learning and teaching:**
School 1 S1:	**Private** stand-alone school in the city	Gauteng	English
School 2 S2:	**Public** school separate from primary school in the city	Gauteng	English
School 3 S3:	**Public** school joined with a primary school in the outer city	Gauteng	Afrikaans
School 4 S4:	**Public** school separate from primary school in the inner city	Gauteng	English
School 5 S5:	**Public** school separate from primary school in a rural area	Mpumalanga	English
School 6 S6:	**Private** stand-alone school out of the city	Mpumalanga	Afrikaans

3.4.4 Data generation methods and data documentation

Qualitative research is a situated activity that locates the observer in the world. Qualitative research consists of interpretive, material practices that make the world visible. These practices transform the world, and they turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings and memos to oneself. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that the qualitative researcher studies things in their natural setting, attempting to make sense of or interpret these phenomena in terms of the meanings people bring to them (Creswell & Poth, 2018: 7).

3.5 Data generation and data documentation

Once the researcher has made up their mind about their research strategy and tactics, they then need to describe how they intend to generate their data to answer their research questions. It is important for the researcher to give a clear and specified explanation of how the data is to be generated, how the themes and categories have been developed and the reasons for their decisions made. The researcher needs to keep their research questions in mind when deciding on the research designs, because more than one research strategy could be appropriate for the data generation process (Maree, 2016: 37).

The research questions that I as the researcher kept in mind during the data generation process were:

Table 3.2 Primary and secondary research questions

Primary research question: • How do teachers implement construction play in early childhood learning environments?
Secondary research questions: • How do young children participate in construction play? • How do preschool teachers promote play and construction play in early learning environments? • What challenges do teachers experience during the implementation of construction play with young children?

3.5.1 Semi-structured interviews

A qualitative study combines data generation and analysis into a single, continuous, interactive procedure. I used interviews, structured narratives, observations, photo voice and document analysis to generate data for this study. Interviews refer to a bidirectional conversation during which an interviewer asks the interviewee certain research-specific questions related to the research to accumulate data and learn about the ideas, norms, possible predispositions, thoughts, views and feelings of the individual being interviewed (Nieuwenhuis, 2016:93). Qualitative interviews provide an

opportunity to view and appreciate the world and specific scenarios through the interviewee's eyes. During the interviews I had with the different teachers, I understood how they perceive construction play and if they think construction play has any beneficial factors that contribute to developing a child's cognitive and problem-solving skills.

The goal was always to acquire rich data that will assist the researcher in better understanding the collaborative and accumulative knowledge the interviewee has about social reality. I used semi-structured interviews to interview preschool teachers (Nieuwenhuis, 2016:93). The use of semi-structured interviews in research projects documents data from various participants. The researcher needs specific and well-developed open-ended questions to carry out these types of interviews and discussions. Following the previously mentioned questions, probing questions were asked to clarify the topics at hand further. As a researcher, one must focus on the interviewees' responses to formulate new enquiries that are openly connected to the phenomenon under investigation (Nieuwenhuis, 2016:93).

I used semi-structured interviews, structured narratives, observations, photo voice and visual methods, and document analysis to gather information related to preschool teachers' perspectives of the importance of exposing young children to construction play and if they are aware of the benefits of construction play development problem-solving skills. I interviewed six preschool teachers from six different schools in two other South African provinces, Mpumalanga and Gauteng. The level of experience of these teachers varied.

3.5.2 Structured narratives

Nieuwenhuis (2016) identifies narrative research in social sciences as a form of research in which linguistic data is central to the work. People by nature lead storied lives and tell stories of those lives. The narrative researcher generates these stories that describe such lives, then analyses and retells the stories in terms of a narrative of the experience (Nieuwenhuis, 2016: 76). The inevitable interpretation that occurs does not make narrative writing fiction. The telling of stories is an exercise in sense-making and is integral to the identity-creation process. One main thing that stories do is to integrate disparate elements of human experience into a clear whole. Therefore, a

narrative is not just a listing of events, but an attempt to link them both in time and meaning (Mariano, 2000).

I chose a structured narrative because I as the researcher wanted to hear the teachers' stories. I wanted to dive deep into their first memory of construction play and examine what type of experience they had with construction play and toys. I called these narratives structured because I gave a few guidelines for writing these narratives.

When it came to having each teacher write a narrative history about their experiences with construction play, I gained better insight into how they felt towards this form of play. This new insight led me to draw a better conclusion at the end of the study. Guidelines and focus points were provided to assist the participants, making the narrative more structured. The following indicates the guidelines I gave the preschool teachers for writing their structured narratives.

Please write a 150-word story about your own experiences with construction play as a child:

A few things to keep in mind when writing your narrative:

- What is your earliest memory of construction play?
- Did you have your own construction toys (blocks, big or small LEGO) growing up and what were they?
- Did you enjoy construction play as a child? (Please explain why or why not)
- What constructions did you build as a child?
- Did you combine construction play with fantasy play? (Please explain why or why not)
- When building constructions did you make use of open-ended materials? When you were young or in your learning environment now (Please provide examples)
- If you have a photograph of yourself engaging in construction play, please will you provide a copy of the image?

3.5.3 Unstructured observations

Observation is the systematic process of recording the behavioural patterns of participants in a research study, without necessarily questioning or communicating with them. Observation is an everyday activity where researchers use their senses and intuition to gather data. As a qualitative data-gathering method, observation is used to enable the researcher to gain a deeper understanding of the phenomenon being observed. The risk is that observation by its nature is highly selective and subjective. The researchers seldom observe the whole situation and end up focusing on a specific event, thereby not observing as a whole (Nieuwenhuis, 2016).

Unstructured observation means that the researcher does not go through a checklist ticking off boxes or rating activities they have seen but instead writes an accessible description of what they observed (Bertram & Christiansen, 2019: 106). People say a lot through their actions, where observation plays a key role. There was some structure to the observation by having a few critical aspects that the children and teachers needed to adhere to:

1. Such as is the age of the children consistent with the type of constructions they are building.
2. By observing how the teachers interact with the children during construction play or if there is no interaction from the teachers' side.
3. How the children interact with each other and handle the construction materials allowed me to form a concrete conclusion.
4. How the children went about solving the problem that was stated and if they immersed themselves in the activity or continued with their own constructions.

During the observation session at each research site, as the researcher I resumed the role of a complete observer. This means that I was a non-participant observing the construction play sessions from a distance. I only participated when needed and to set the problem that the young children needed to solve by use of construction materials.

I had drawn up a guided observation checklist to ensure the critical aspects of the phenomenon regarding construction play are fully observed. The following figure is an indication of the type of observation that took place during the children’s construction play session.

Play observation of children with construction and play resources: **School code:**				
Date and time:	**Situation:**	**Participants:**	**Action observed:**	**Reflection:**
	Is construction play taking place indoors or outside:	**Number of children, girls and boys taking part in construction play:** **Teacher interaction towards children:** **Teacher's general attitude towards this form of play:**	**Type of construction play:** • **Box play** • **Block play** • **Big LEGO play** • **Small LEGO play** • **Open-ended material play** **Materials and resources used:**	

3.5.4 Photo voice and visual methods

Most research methods are dependent on the use of language, either spoken or written, in the process of data generation. However, people also communicate with each other by the use of a wide range of non-verbal methods such as gestures, facial expressions, body language and gazes. These and other visual representations provide an insight into the culture and offer an alternative to the assumption that social researchers can only investigate the social world by asking people questions. The aim of visual research methods is to gain an understanding of social life by exploring the

significance or meaning of images with the participant. Visual images can be useful when issues are hard to put into words, especially when researchers use academic language. Visual images can help enhance empathy with the respondent, draw the reader's attention to things in new ways and even help the researcher to look at the world from the perspective of the respondent (Best, 2012: 193).

Bertram (2020) tells us that researchers can also ask participants to generate visual data by taking photographs, creating collages or drawing pictures. The photo voice method involves giving researchers digital devices with which they are encouraged to photograph anything they think is of significance to the study (Bertram, 2020: 113). I used photographs to document the construction play materials, the environment where the constructions are built and the children's different structures, for this study. I adhered to the ethical considerations, and therefore, no child's face is visible in the photographs, and I received permission from all the parents to use these visual images in my research.

3.6 Document analysis

Researchers can also use various existing documents as their data sources, for example, curriculum statements, textbooks, daily programmes and much more. In such a case, researchers are not creating new data from scratch but are using existing documents. Researchers can analyse these documents using a method called document analysis. Document analysis means analysing the text for themes and patterns related to the study (Bertram, 2020: 115). I used document analysis by evaluating the preschools' daily programme for their four- to five-year-old children and looking at how much time a week or day they spend on construction play activities.

3.7 Data analysis and interpretation

Data analysis refers to the systematic application of statistical or other sound methods to evaluate, illustrate and describe the data. Data analysis in qualitative research consists of preparing and organising the data for analysis. Once the data has been organised then the data needs to be reduced into themes through coding and condensing the codes. Lastly, the data needs to be represented in figures or tables for discussion (Creswell & Poth, 2018: 183).

As stated by Shamoo and Resnik (2003), numerous analytical processes “provide a way of drawing inductive inferences from data and distinguishing the signal from the noise present in the data”. Evaluation processes are implemented while analysing data during the qualitative part of the research. An analysis is often an enduring procedure during which the data is constantly gathered and analysed instantaneously. A researcher typically looks for outliers in their data throughout the data analysis period. This analysis method is estimated by the exact qualitative methodology and the data's form (Shamoo & Resnik, 2003).

When using an instrumental case study method, the data that has been generated is carefully coded and written up in a case report. In general, the case report focuses less on the case's complexity and more on the research question. A case study focuses on identifying themes and patterns and does not generalise. A case study is used so that the researcher can explore the phenomenon and compare cases with one another (Grandy, 2010:474).

When analysing the data gathered during an interview where open-ended questions were asked, it tends to be somewhat more problematic than closed-ended questions. Rigorous preparation is required if one wants a well-planned semi-structured interview, and careful preparation and consideration must be taken to develop the interview schedule and conduct the interview. It is also essential to analyse data correctly (Mathers, Fox & Hunn, 2002:16-17).

Semi-structured interviews, structured narratives, observations, photo voice and document analysis were utilised to generate data for this study. Thematic analysis is

a method of analysing qualitative data, and it is usually applied to a set of texts, such as interview transcripts and written narratives. The researcher closely examined the data to identify common themes generated from codes that emerged from the documented data. The recorded data contained different topics, ideas and patterns of meaning that come up repeatedly. When I reached the point of data saturation, I processed all the interview transcripts, written narratives, visual representations, observations, photo voice, and document analysis through thematic analysis and examined the teachers' different responses. By interpreting the gathered information, I could draw conclusions that helped me to answer my primary and secondary research questions (Maree, 2016:105).

3.8 Ethical considerations

Ethical considerations should be highlighted while carrying out the study. One relevant and essential moral issue is the protection of the identities of the parties involved (Maree, 2016:44). Among the challenges researchers encounter during the data sampling, analysis and representation processes are ethical issues related to participant protection from harm and disclosure of comprehensive findings. This reminds researchers to carefully consider ethical issues across all approaches of enquiry. For the protection of participants, researchers must mask the names and identities of participants. During the disclosure of findings, the researcher has to embed strategies to enhance confidence in the data interpretations (Creswell & Poth, 2018: 182). For this reason, I handed out letters of consent to all the schools that I visited.

The consent letters had to be signed by the school principal, the teachers doing the interview and the parents of the children participating in the research study. In this letter, the participants were made aware that all the interviews and data generated will be recorded, and the findings will be published together with the study. These schools then had the choice to grant me permission to interview and observe the chosen teachers and children. Informed consent was obtained from all research participants, including the option to withdraw from the research project before formal transcription. Before any observation began, I obtained permission from the parents or guardians of the children. The participants' confidentiality was protected by using code names and

not showing any of the participants' faces in the photographs taken. All the interviews and writing of the structured narratives were conducted professionally in a neutral environment where the teachers could speak openly and freely. If the teacher felt uncomfortable with the voice recording and documentation process, the session was stopped or conducted without recordings. I conformed to all the ethical rules and principles and did not alter or change any of the participants' answers, thus ensuring the study's trustworthiness.

According to Maree (2016), ethical consideration relates to when the researcher conducting the study respects moral norms and standards. These standards help the researcher distinguish between right and wrong (Maree, 2016: 44). The primary goal of ethical consideration is to promote knowledge and truth. It helps the researcher to be aware of falsified and fabricated data, always get the participants' consent, consider anonymity and conduct the study professionally. Once the proposal was approved and ethical clearance obtained, the University of Pretoria permitted me to conduct this study. I adhered to the ethical standards by using code names to represent the teachers who participated in my research study. I informed the participants that the interview sessions were recorded and documented. The place where the interviews were conducted and the narratives were written was in a neutral setting. I obtained the participants' permission to take part in the study. Participants were asked to sign a formal letter of consent before they were allowed to participate in the study. I also obtained permission from the parents before observing any children. No photographs were taken when observing the children where a child's face could be seen. All the participants were protected from harm and deception throughout this study. In no way did I falsify any of my research findings. All my interviews and sampling methods were conducted formally and professionally.

Trustworthiness can be broken down to its root word, trust. Trust means a firm belief that a person or item is reliable. Trustworthiness is described as the extent to which a researcher can persuade audiences that their findings are worth paying attention to (Teddlie & Tashakkori, 2009: 296). Trustworthiness can be increased by maintaining high credibility and objectivity. The purpose of trustworthiness is to assure the reader that the research results are accurate. A research proposal is trustworthy only if the

reader of the study judges it to be (Gunawan, 2015). I increased trustworthiness in my research by keeping to the code of ethics provided by the University of Pretoria.

Credibility is the question of how aligned findings are with reality. Furthermore, it considers ways in which researchers can ensure that readers of their study will consider their results to be plausible. Credibility is enhanced by establishing and early development of acquaintance with the readers or participants. Together with meaningful sampling, effective data gathering methods and triangulation, those mentioned above further establish credibility. Other ways to strengthen credibility include frequent debriefing sessions with my research supervisors, during which notes were reflected upon and checked. Furthermore, credibility was supplemented by detailed descriptions of the phenomenon being investigated (Nieuwenhuis, 2016:123). The credibility of my study was strengthened by the regular feedback sessions I had with my supervisors, where all notes and sampled information were checked. I further improved my credibility by making use of member-checking, this means that I contacted all the participants of this research study and asked if they were still comfortable partaking in this study and having their data published. All the participants agreed to the terms of this research study.

Transferability validates the extent to which the findings of the qualitative study can be applied to different contexts with other persons. Transferability is the explanatory means of generalising information (Stringer, 2014:94). Transferability invites readers to make associations and possible connections between aspects of a study while comparing them to their own experiences and research. To maximise transferability, a researcher should focus on how knowledgeable the participants are on the topic being investigated and the context of the researcher's observations and conclusions. The researcher has the responsibility to provide the reader with a holistic picture of the investigation's context and decide whether the research is relevant to them (Nieuwenhuis, 2016: 124). Transferability was increased by providing the reader with the whole picture and enough information on the studied topic.

Confirmability refers to the extent to which the findings of a study can be confirmed by others (Yin, 2014:57). Secondly, it refers to data that is not fabricated, but obtained (Anney, 2014:279). Confirmability is seen as the extent to which the observations and

conclusions of a study are described by the participants and not by the researcher's motivation. Strategies to increase confirmability include limiting the researcher's predispositions. To reduce the researcher's potentially biased opinion, the researcher must admit their ideas and preconceptions (Nieuwenhuis, 2016:125). Confirmability can be improved by making the research process transparent, with enough details for the reader to check if they would have reached the same or similar conclusions (Bertram, 2020: 208). I increased the confirmability of the study by not being biased toward the information sampled and by letting the participants describe the conclusions.

The word **dependability** is used in preference to the word reliability in qualitative research. Dependability addresses the constancy of results after a while and that the information obtained can be relied upon (Creswell, 2014). Dependability is showcased via the research design and during the project's implementation and reflective appraisal. The research design often changes as the study is being conducted. These changes are due to the addition of information from new sources and the application of data-gathering techniques to increase the study's validity (Nieuwenhuis, 2016:124). The researcher can strive to increase dependability. This refers to when the researcher can account for why there may be variations in the study. It can also mean comparing this study to previous studies in the field and explaining key differences (Bertram, 2020: 209). The reflective evaluation of the study gained dependability.

Authenticity means to establish truth, authorship, and validity. Authenticity is dependent on reliable descriptive data being demonstrated well. The need for authenticity will lead the researcher to a deeper understanding of the meaning of the study (Nieuwenhuis, 2016:122). I increased my research's authenticity and realism by including the data findings in the final product. Including the results alone went a long way in ensuring the integrity and trustworthiness of the study and the interpretation of the data.

3.9 Conclusion

The aim of Chapter 3 was to discuss the research methodology carried out this study. I explained the research design and how case studies guided the research. Additionally, the sampling techniques and data sampling methods as applied to teachers in terms of construction play were expressed throughout this chapter. I justified the data analysis process and the quality criteria considered in the research process. Lastly, the ethical considerations during the data generation phase were discussed. Chapters 4 and 5 offer a comprehensive analysis of the qualitative data and the findings of this study.

CHAPTER 4

Your imagination is a weapon of mass construction; use it – Anonymous

4. Data analysis

4.1 Introduction

Chapter 3 explained the methodology and research design used in this study. This qualitative research study adopted an interpretive paradigm and utilised a case study research design.

The purpose of this study is aligned with the primary research question; *How do teachers implement construction play in early childhood learning environments?* Both the primary and secondary research questions, as well as the themes generated from the data, are laid out and discussed. In this chapter, I describe the profiles of the participants, the research sites, the observations documented and the data generated.

The central goal of Chapter 4 is to present the research findings that have been broken down into three themes and nine sub-themes. Chapter 4 starts with a brief reflection on what a data analysis process is. The chapter then continues to discuss the different steps that were taken to analyse the data that was generated from all the participants. This chapter also discusses the process of presenting the participants' information and research sites. The profile of each research site is described and an in-depth discussion of all the research sites along with a photo voice analysis are provided. The research findings from the semi-structured interviews, photo voice, observations and narratives were analysed, and themes and subthemes were drawn up. These themes and subthemes provided an understanding of the subject matter investigated. The subject matter being teacher perceptions of construction play and how they implement this form of play with the young children they teach. All the pre-primary schoolteachers were coded as 'ST', short for schoolteacher. The numbers, 1, 2, 3, 4, 5 and 6, indicate the participant's number. For example, ST1 is schoolteacher one from school one. All

the research sites were named as ‘S1’, short for school 1, ‘S2’, short for school 2, and so forth. This shorthand method is apparent throughout the whole chapter.

4.2 Reflection of the data generation process

For my data generation process, I focused on data generated through semi-structured interviews, structured narratives, photo voice and field observations (Maree, 2016: 37). I started the data generation process at each research site in the same way. On arrival, the first thing my assistant and I did was to greet the school principal and teachers who were assisting in the research project. Once the greetings had taken place, the teacher escorted us to the learning environment. A quick tour of the learning environment was given before the interview process started. At this time, the young children were busy playing outside or were busy with other activities. While I was interviewing the teacher, my assistant was setting up all the construction stations. The interview process took roughly 20 to 30 minutes per teacher. This time frame depended on external distractions caused by the young children.

As soon as the interviews with the teachers had ended the children participating in the construction activities were called and the stations were explained to them. The young children were told that they were allowed to play with all the toys and materials that were laid out in the sectioned-off area. These stations varied from wooden construction blocks, LEGO® blocks, toy animals, open-ended materials and boxes of different sizes. During this child-centred activity, the teachers had the option of observing or not.

Table 4.1 below shows the different play stations. The children had the option of playing with any of these materials.

Table 4.1 Different play stations

Wooden construction blocks: Wooden blocks of different shapes and sizes were laid out for the young children to construct with.	
LEGO® blocks: LEGO® Duplo blocks of different colours and sizes made up another construction station.	
Toy animals: Along with the construction toys, the children had the option to add or play with toy animals. The children could decide to play with the animals individually or combine their play with the construction materials.	

Open-ended materials: Open-ended materials consisting of water bottles, bottle caps, toilet rolls, and other cardboard materials and objects, were given as an alternative option for the children to construct with.	
Boxes: Lastly, the young children had the option of building with boxes. A number of boxes of different sizes were given to the children and they had the option to play with any and all the materials.	

While the children were busy exploring and playing with the materials laid out, I took on the role of an observer, only intervening when needed. My research assistant assumed the role of photographer, and the schoolteachers had the option of staying and observing or stepping out to complete the structured narrative of their first experience with construction play. The majority of teachers stepped out to complete their narratives. Only ST1 stayed in the learning environment, where she completed her narrative and then sat quietly and watched the children engage in play activities.

The only time I stopped the children's play, was when I stated the problem that needed to be solved. This problem could only be solved through building a construction. My role was only to introduce the problem to the young children, they then identified the problem and stated what they could build to solve the problem. The children had the choice of working individually or coming together and building a solution as a group. Once the children knew what to do, I assumed the role of a quiet observer.

Introducing the problem: This photograph sets the setting of how I introduced the problem at each research site. I made use of a prop to help the children better envision the problem setting. The stuffed animal in the form of a dog had a problem due to all the rain we have been experiencing lately. The children had to tell me what they thought his problem was and how they could address this problem.	

This problem-solving station is discussed in more detail later on in this chapter.

4.3 Reflection of the research participants

For the duration of this study, I focused on two research participants. The primary research participants were the primary schoolteachers and the secondary participants were the young children between the ages of four and five years. Figure 4.1 indicates how my data sampling techniques overlapped with each research participant.

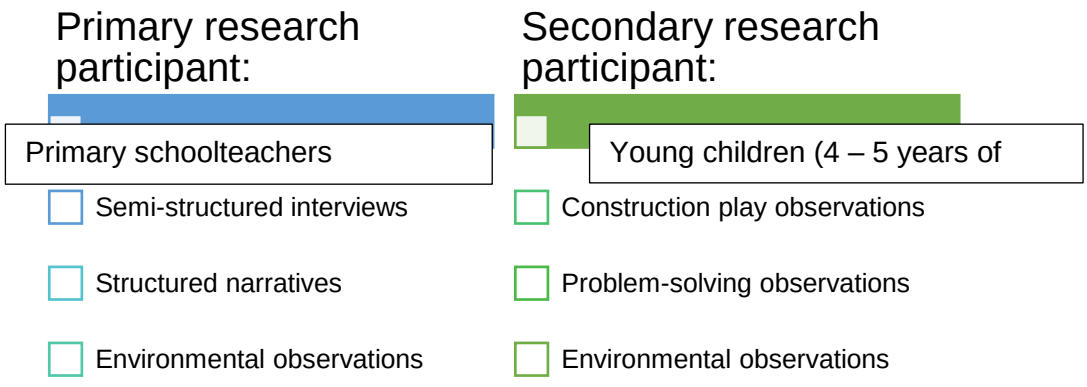


Figure 4.1: The primary and secondary research participants and the data that was sampled under each of these participants

The following section gives a detailed discussion of the primary and secondary research participants and how the preoperational period was applicable to the selection of the secondary research participants.

4.3.1 Background of the research participants

The participants that took part in this study were primary schoolteachers, as primary participants, and young children between the ages of four and five years, as secondary participants. For this study, I focused on teachers' perceptions on construction play and how they implement this form of play in the early childhood learning environment. This study focused on young children between the ages of four and five years, because developmentally they are at a stimulating phase called the *preoperational period* (Weiten, 2013: 426).

The *preoperational period* extends roughly from the ages of two to seven years. During this age, young children gradually improve in their use of mental images. Although progress in symbolic thought continues, Piaget emphasised the shortcomings of preoperational thought. For example, consider a simple problem presented to young children. Imagine asking a young child to construct a specific shape using other shapes. The child has to build and identify the shape by using other shapes provided. For this experiment, the young child has to construct a circle, rectangle and square out of the wooden blocks provided. The blocks that have been provided are semi-circles, bigger triangles cut at an angle and smaller triangles. Confronted with a problem like this, young children in the preoperational period generally struggle with envisioning a final product. Even though the two semi-circles put together form a whole circle, two triangles cut at an angle form a rectangle and two triangles placed together form a square, young children find it difficult to see this picture. Children in this phase have not yet mastered the principle of conservation (Weiten, 2013: 246).

Conservation is Piaget's term for the awareness that physical quantities remain constant in spite of changes in their shape or appearance. As previously stated, a circle consisting of two semi-circles is still viewed as a circle. According to Piaget, preoperational children are unable to solve conservation problems, because their inability to understand conservation is caused by some basic flaws in preoperational thinking. These flaws include centration, irreversibility and egocentrism (Weiten,2013: 246).

Centration is the tendency to focus on just one feature of a problem, neglecting other important aspects. When working on the conservation problem with shapes, preoperational children tend to concentrate on the concrete shape while ignoring the fact that the concrete shape can be broken up into different shapes. These children have difficulty focusing on several aspects of a problem at once (Weiten, 2013: 427). *Irreversibility* is the inability to envision reversing an action. Preoperational children cannot mentally "undo" an action. For example, in wrestling with the conservation of shapes, the children do not think about what would happen if this circular shape got cut in half (Weiten, 2013: 427).

Egocentrism in thinking is characterised by a limited ability to share another person's point of view. Piaget felt that preoperational children fail to appreciate that there are points of view other than their own. These young children are unable to view a concept from someone else's perspective (Weiten, 2013, 247).

4.3.2 Introducing the participants

I interviewed six preschool teachers from six different schools in two South African provinces, Mpumalanga and Gauteng. The level of experience of these teachers varied, and the sampling process took no more than one day at a school. I used semi-structured interviews, structured narratives, observations, photo voice, and document analysis to gather information related to preschool teachers' perspectives on the importance of exposing young children to construction play and if they are aware of the benefits of construction play development problem-solving skills.

Table 4.2 is a clustered column indicating the age of all the teachers who took part in this study compared to their years of teaching experience.

Table 4.2 Demographic information of participants and research sites of this study

Questions:	ST1:	ST2:	ST3:	ST4:	ST5:	ST6:
Teacher's age:	67 years	28 years	33 years	30 years	31 years	64 years
Gender:	Female	Female	Female	Female	Female	Female
Teacher's years of teaching experience:	47 years	5 years	13 years	5 years	7 years	40 years
Teacher's home language:	English	Afrikaans	Afrikaans	Xhosa	English	Afrikaans
Teacher's qualification and training:	BEd Early Childhood Education	BEd Foundation phase	BEd Early Childhood Education	BEd Early Childhood Education	Sports science degree, postgrad Foundation phase	HOD/GED Diploma
School's language of teaching and learning:	English	English	Afrikaans	English	English	Afrikaans
Type of school:	Private suburb school	Public suburb school	Public outer-city school	Public inner-city school	Public rural school	Private outer-city school
School province	Gauteng	Gauteng	Gauteng	Gauteng	Mpumalanga	Mpumalanga

It is evident that only two teachers have more than 40 years of teaching experience; one teacher has 13 years of teaching experience, and most teachers have less than ten years of teaching experience. Importantly, none of the primary research participants has only one year of teaching experience. I wanted to determine if the teachers' years of teaching experience could influence the way they implement construction play to enhance young children's problem-solving skills. I wanted to regulate if more years of teaching experience led to better construction play implementation.

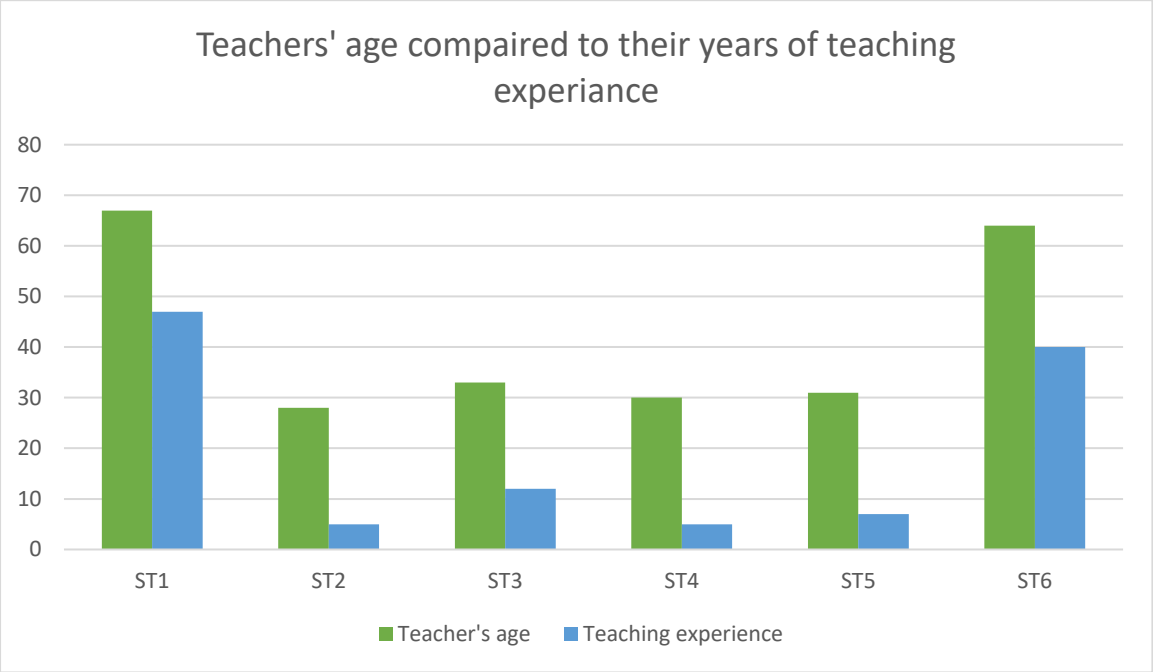


Figure 4.2: Teacher's age compared to years of teaching experience

4.4 Data breakdown

It has been clarified by Bertram (2020) that data analysis consists of three flows of activity: data reduction, data display, and conclusion drawing and verification. Data reduction is the process of selecting, focusing, simplifying and transforming the data that appears in written-up field notes, interview transcriptions and photographs. Data reduction involves organising and storing data into codes and categories and looking for patterns between these categories (Bertram, 2020: 132).

Data analysis grounded within the interpretive paradigm enables the researcher to explore participants' "perceptions, attitudes, understandings, knowledge, values, feelings and experiences" to make sense of multiple realities (Nieuwenhuis, 2016:

109). Table 4.3 outlines the process that was followed to analyse the data generated from participants' answers. Analysing the raw data was a deductive process. A deductive process involves beginning with a theory, developing that theory and then generating and analysing data to, in the end, assess the theory (Creswell & Clark, 2007). Creswell and Plano Clark (2007) say that a deductive researcher works from the top-down, they further state that the researcher works from a prior existing theory to developing a theory, and the researcher then generates data to add to and prove their theory (Soiferman, 2010). Deductive reasoning takes the researcher from a general understanding to a specific conclusion. As part of this study, the reader is taken from a general understanding of construction play to a specific understanding of how teachers promote construction play in early childhood learning environments.

Table 4.3: Steps taken to analyse generated data from participants

Teachers
Semi-structured individual interviews
Step 1
The interview recordings were organised following the six preschools from which data was generated. Tables were created to note teachers' responses and assist in the organisation of the transcription processes.
Step 2
I transcribed the interviews conducted at the six preschools to gain access to the generated data. During this process, I listened to the interview recordings numerous times to accurately transcribe the responses. During this section of the data analysis, it was important to remain objective at all times.
Step 3
I reviewed the transcribed interviews several times, making notes, breaking down information into categories and reflecting on the data and forming a detailed understanding of teachers' views, experiences and opinions about construction play.

Step 4
I started coding the generated data from the semi-structured interviews by using various coloured highlighters. The coding first took place on paper and by hand and later moved on to coding on the computer. Similar responses were coded with the same colour. After that, I sorted the colour-coded phrases and grouped similar topics together.
Step 5
From the different groupings, three themes and nine sub-themes were identified. The sub-themes were broken down into more detailed sections, consisting of nine sub-themes. Data was interpreted by discussing and considering the identified themes and sub-themes compared with the theoretical framework.
Step 6
The themes and sub-themes descriptions were validated against existing literature and finalised and concluded.

Different steps, like reading, analysing and interpreting, were used to analyse the teachers' responses from the semi-structured interviews conducted – completing this process was completed step-by-step, ensuring that the accurate sub-themes and themes were identified.

4.5 Research procedure

The data generation and analysis procedures were undertaken with the theoretical framework in mind. The theoretical framework is based on Vygotsky's constructivist theory. Vygotsky's constructivist theory informs the researcher that learners should learn through concrete experiences as an approach to learning. Curiosity and discovery should be the basis of learning experiences in the learning environment. Young children's curiosity will eventually lead children to form their ideas and deepen the formulation of concepts in their long-term memories (Naudé & Meier, 2018: 8).

4.5.1 Research site background

The following section is a descriptive analysis of each research site I visited. In each of these sections, a breakdown is given of where the school is located, the number of secondary participants that took part, if the construction play observation session took place indoors or outside, the layout of the learning environment, construction materials played with, the teacher's presence and if problem-solving occurred during these observation sessions.

4.5.1.1 Research site: School 1

School 1 is a private stand-alone school situated in the Waterkloof/Hazelwood area of Gauteng. During my observation sessions, the participants who took part were two girls and two boys. The construction play observation session also took place indoors.

In terms of the layout of the learning environment, every classroom had its construction area and construction play took place indoors. The school had a good variety of construction toys – wooden blocks, LEGO® bricks and open-ended toys and materials. Materials were stored in the classroom in different containers. Most of the materials were accessible; however, some were stored on shelves at some height. The older children knew where all the toys were. Both boys and girls engaged in construction play, whether individually or in a group. The children took part in this daily. The teacher promoted construction play by having daily construction periods and external people with construction toys engaged with the children. The children appeared to be between stages 4-7; observed bridging, patterns of dramatic play and real-life structures. The stages of play were consistent with the age of the children.

Problem-solving did occur to a certain extent. The children understood how the blocks worked, and they planned structures and replanned them when they fell over. One girl was very driven and built a large construction. She checked the construction by building higher, and if her attempt failed, she would redo it by trying a different plan. The children preferred the wooden blocks, they did not like the open-ended materials, and they did not use the LEGO® bricks. Later they discovered some open-ended materials, like toilet rolls, water bottles, small lids and cardboard material, and put the toys in the boxes.

4.5.1.2 Research site: School 2

School 2 is a public school separate from the primary school in the city, in the Waterkloof area of Gauteng. The participants who took part were three girls and two boys. This observation session took place indoors.

There was no dedicated construction area; the toys and materials were packed in containers. Construction play primarily took place indoors. The construction area's materials consisted of wooden blocks, large LEGO® bricks, Small LEGO®, sensory toys and toy animals. The research site only had a small amounts of construction material. The materials were stored in containers in the classroom, and therefore, were not very accessible; the teacher had to unpack the materials. The children knew where the materials were kept, but they could not access them independently. Both boys and girls were involved in construction play; however, the boys preferred the construction toys. The children got 90 minutes to play with the construction materials. The teacher promoted construction play by scheduling set play sessions. The children showed levels between stages three to seven; they built different patterns and structures that symbolised real-life buildings. The stage of the construction play was consistent with the children's ages. Four to five years of bridging, patterns and real-life structures occurred.

To some extent, problem-solving did appear. The children knew they wanted to build a castle and they started working together to achieve this. However, two boys began building together; the children did not check their constructions. The children only played with the wooden blocks. There was group and individual play. Throughout the observation session, it became clear that boys and girls preferred to play separately.

4.5.1.3 Research site: School 3

School 3 is a public school joined with a primary school in the outer city, the Montana area of Gauteng. The participants who took part in the construction play observation session were four girls and two boys. The construction play also took place indoors.

There was no dedicated construction play area; the children had to play on the carpet. Construction play primarily took place indoors. The play area had many wooden

blocks, a few large LEGO® bricks, sensory material and toy animals. The construction materials were stored in the classroom in different containers. The materials were not very accessible; children had to ask the teacher when they wanted to play with the materials. The children knew where all the materials were stored, but they were not accessible – both genders liked this form of play. The children had daily scheduled construction play sessions. The teacher promoted this form of play by preparing daily construction periods for the children. The children varied between stages two to six, and they mainly built enclosures for the toy animals and then dramatic play took place with the toy animals and wooden blocks. The children mostly played in stage three, where they built a lot of enclosures. Some of the children understood the problem given to them; they planned by trial and error, building different constructions, but none of the children checked their structures. One of the boys did not engage in any form of play; he only observed the other children while they played. Later on, he stacked some bottles. The children liked playing with the toy animals, and they rarely played with the open-ended materials.

4.5.1.4 Research site: School 4

School 4 is a public school separate from a primary school in the inner city, in the Sunnyside area of Gauteng. One girl and seven boys took part in the data sampling process. The construction play observation session took place outside, where there was more space.

There was no dedicated construction play area; all the materials were stored in containers. Construction play usually took place outdoors. There was a small number of wooden blocks, large and small LEGO® bricks, toy animals and no open-ended materials. All the materials were stored in the classroom in containers. The children had to ask the teacher when they wanted to play with any materials. The children knew all the materials were stored in containers. There was only one girl in the class, and she usually preferred to play with other toys. Construction play was promoted by a daily construction play period, and the teacher gave the children examples of what they can build. The stage of play varied between stages one to four. Piling, knocking down, stacking and bridging occurred. The children's building development ended at stage four. One boy showed problem-solving skills; he started planning and building with another boy. The constructions were only carried out halfway and not checked by

any of the children. Only two boys started building together on the construction and the other children just played around.

4.5.1.5 Research site: School 5

School 5 is a public school separate from the primary school in a rural area in Mpumalanga. Two girls and three boys participated in the construction play observation session, which took place outdoors.

Construction play took place on the carpet or at the children's desks, constructing with six bricks. This form of play took place both indoors and outside. Various wooden blocks, big and small LEGO® bricks, toy animals, jungle toys, boxes, lids and toilet rolls were laid out. The construction materials were stored in the classroom, displayed and the rest was stored in containers. Even though the materials were in containers, they were still easily accessible. The children knew where the materials were kept. Both genders enjoyed and participated in construction play. There was a daily opportunity for the children to play with the construction toys in the mornings and afternoons. The teacher promoted construction play by being actively involved during the sessions. The children built between stages one to three, piling, towering and building small enclosures. Unfortunately, the age of the children was not consistent with the steps of their building. The children only seemed to want to pile the blocks on top of each other.

It appeared that the children did not show problem-solving skills. No planning took place; the children only stacked the blocks. They only wanted to carry and pile the blocks. No constructions were checked. All the children wanted to play with the toy animals. Some children started building with the big LEGO®. The children did not want to play with the boxes or other open-ended materials.

4.5.1.6 Research site: School 6

School 6 is a private stand-alone school out of the city, situated in the Hazyview area in Mpumalanga. Seven girls and three boys participated in the construction play observation session. This observation session took place outdoors, as the classroom environment was too small.

The school had a small indoor construction area and a sizeable outdoor construction play area. The construction play area had many toys and materials, wooden blocks, large and small LEGO® bricks, boxes, trucks, train sets, road construction, wild animals, plastic bottles and toilet rolls. All the materials were stored in the classroom in containers. The materials were not very accessible; children had to ask the teacher when they wanted to play with the materials. The school is small, so the children knew where everything was. Both boys and girls enjoyed and took part in construction play. The children had daily opportunities to play with the materials. The teacher put in effort by providing fun construction toys for the children. The children were mainly building between stages three to seven, and the age of the children was consistent with their building stages. Patterns began to show bridging, vertical and horizontal play.

The children showed problem-solving skills. They planned the constructions together and built them with the boxes. They checked the structures by putting toys on top of the building. When playing, the children communicated in English, while their home language is Afrikaans. They split up into groups and played together, not next to each other. Only one boy played alone. They did not mix up the materials. the children did not want to play with the open-ended materials.

4.6 Sampling process

Data does not speak for itself but needs to be interpreted by the researcher. Researchers conclude the data they have generated and then decide what the data means or what kind of story the data can tell. Thus, it is essential to remember that interpretation of your data will depend on your data analysis process (Bertram, 2020: 139).

4.6.1 Semi-structured interviews

The semi-structured interviews formed the central part of my data generation process. During this part of the data generation, the focus revolved around the teachers and their opinions and outlook on the concept of construction play and how they implement this form of play. The main objective of the interviews was to better understand how and where the teachers implement this form of play. I set out to better understand the

background of each of these teachers and had a close look at how the young children in their classes interact with these materials and the situations laid out for them.

I used semi-structured interviews, structured narratives, observations, photo voice and document analysis to gather information related to preschool teachers' perspectives on the importance of exposing young children to construction play and if they are aware of the benefits of construction play developing problem-solving skills. I interviewed six preschool teachers from six different schools in two South African provinces, Mpumalanga and Gauteng. The level of experience of these teachers varied. Sampling the data took no more than a day at each research site. I started the data sampling process by asking each teacher to write a guided narrative about what they understand about construction play and their experiences as a child engaging in construction play.

Secondly, in a semi-structured interview I asked the teachers more detailed questions about construction play. Throughout my observation period, I observed the teachers and children, after consent from all participants was obtained, as they went about their daily program. I closely monitored and watched how they engaged in construction and block play, and in cases where the schools did not have any materials, I provided the necessary construction toys.

All participants from the six primary schools were asked the same questions, and in cases where I did not receive sufficient responses, I probed for more information. All of these questions and answers were documented on-site and later written down neatly under a category for each research site. Participants were allowed to provide their experiences and views on construction play and how it was implemented in the learning environment. The themes and sub-themes that emerged are presented and discussed below.

4.6.2 Structured narratives

Nieuwenhuis (2016) identifies narrative research in social sciences as a form of research in which linguistic data is central to the work. People by nature lead storied lives and tell stories of those lives. The narrative researcher generates these stories

that describe such lives, and then analyses and retells the stories in terms of a narrative of the experience (Nieuwenhuis, 2016: 76).

All the participants were asked to write a structured narrative explaining their earliest construction play memories. The narratives are classified as structured, because guidelines were given to help the participants with their writing process. Reading through all the structured narratives, it became apparent that all the participants had very different experiences with construction materials and this form of play. Seeing as the ages of these participants vary, the way they engaged in this form of play also differed to a certain extent. ST1, the oldest teacher, was born in the 1950s and, according to her, construction play and construction toys were very gender-biased and seen as toys boys played with. This teacher's memory of construction play was constructing with home appliances. She built constructions with items from the pantry and made houses out of tables and table-cloths.

Two of the teachers had older brothers and their construction play was based around the construction toys their brothers had. ST2 mentioned that she and her older brother used to build houses for her dolls and ST6 combined her construction play with toy animals and cars.

ST3, on the other hand, grew up with two sisters and did not have a vivid construction play experience as a child. Now that she is a mother of two boys, she can see through their play, the importance of construction play. ST4 is unique, seeing that she only started playing with construction materials from the age of 12 years. She did not have her own construction toys and only constructed with blocks when she went to visit her friend's house. She saw this form of play as something new and combined it with fantasy play. "I grew up on a farm with lots of space and freedom, so we used to build all sorts of things" (ST5). Space, freedom and natural elements are rather important to ST5. Having grown up with all this freedom, she likes to give the young children in her class the necessary freedom when they are constructing, only offering guidelines when she wants to assess certain aspects. The full narratives from all the participants can be found in Addendum B.

4.6.3 Observations

Observations played a key role in my data sampling process. I observed the young children as they participated in unstructured construction play. This unstructured play and construction play refers to the different stations that were laid out for the children to explore. The children had the option to play with any of the materials that had been laid out. Later on, during the observation session, a problem was stated, and the children had to identify the problem and come up with a solution. The children then needed to use the construction materials to build this solution. The problem that was stated was that we in South Africa had experienced a lot of rain these past few weeks, and the stuffed toy dog I used as a prop had been experiencing a problem due to all this rain. The children then had to come up with a solution and build this solution using the construction materials.

Table 4.4 indicates the problem-solving steps of the children at the different research sites. I as the researcher observed and documented the children's problem-solving techniques according to Polya's problem-solving steps. The summary of the problem-solving observations can be found in Addendum E.

Table 4.4 Problem-solving steps

School 1: **Understand:** The majority of the children understood the problem that was set: "There had been a lot of rain in South Africa the past few weeks and now these children decided to build a house to keep the dog dry from the rain". One girl continued with her own thing and continued building her own constructions. One boy rather wanted to build a car and not a house. It was clear that the children had a lot of distractions. **Plan:** They tried out different boxes to see what works the best. Varies from group play to individual play. One boy took the wrapper of the water bottle to make a TV for the dog in his new house. **Carry out:**

The boys started playing with the boxes and pretending they are cars. The children rather wanted to play with the boxes than build a house for the dog. One boy ended up crawling into a box. One girl continued with her own construction and never even tried to build a house for the dog.

Check:

None of the children checked their constructions. In the end, there was no construction built to solve the problem.

School 2:

Understand:

The children understood the problem that was set: “There had been a lot of rain in South Africa the past few weeks and now these children decided to build a house to keep the dog dry from the rain”. The children decided to build him a new kennel/doghouse, so he will not get wet.

Plan:

Most of the children forgot that they needed to build a house for the dog. They found the wooden blocks and toy animals more interesting and wanted to continue building their own constructions. They did not plan on how to build the dog a new house.

Carry out:

In this group, only one girl started building a new doghouse, but then quickly lost interest and found the other children’s constructions more fascinating.

Check:

None of the children checked any constructions.

School 3:

Understand:

There was one strong girl in the group. She understood the problem that the dog was wet because of all the rain South Africa has been experiencing over the past few weeks and decided to build him a house. Most of the other children only

wanted to play with the toy animals. One girl was very possessive over the toy animals and did not want to share with any of the other children.

Plan:

Some of the children came together and as a group roughly started to plan a house so the dog would not get wet. The majority of the children shorty lost interest and started building their own structures.

Carry out:

One of the girls started carrying out her plan and she put the dog in some of the boxes and said, “this is his new home”. The girl did not actually build her own construction with the boxes, just took one box and imagined it was a home.

Check:

The same girl that imagined one of the boxes was the dog’s new home roughly checked her plan by putting the dog into the box and seeing if it would fit.

School 4:

Understand:

This was a difficult group to get focused on the problem at hand. In this group, only one boy paid attention and understood the problem that there was a lot of rain in South Africa over the past few weeks and they had to help the dog stay dry. This boy then suggested that they build the dog a car.

Plan:

The same boy started to plan how to build a car using the boxes and open-ended materials.

Carry out:

The boy started to build the car using the open-ended material, boxes and bottles, but he never completed his construction. He lost interest after a few minutes and started to play with the wooden blocks.

Check:

The boy did not complete his car and so he never checked the construction.

School 5:

Understand:

In this group, one girl understood that they had to build a house to protect the dog from all the rain that South Africa has been experiencing over the past few weeks. Two of the boys were not engaging with the other children and did not seem to want to help them build.

Plan:

Three children decided to use the wooden blocks to build a house for the dog. The dog did not fit into the first house, so they started building a new house.

Carry out:

The same three children worked together to build a house using the wooden blocks. The building stage of the children was not consistent with their age. There was more piling than building happening.

Check:

The children checked the construction by putting the dog in the house (The house resembled an enclosure and not a structure that looked like a house) and piling blocks on top of him.

School 6:

Understand:

The children in the group understood the problem that the dog got wet from all the rain that South Africa had been experiencing those past few weeks and wanted to build the dog a house, so he would not get wet.

Plan:

Five children planned and built a house together, these children decided to construct with the boxes. Another two children constructed using the blocks; thus, two different constructions took place.

Carry out:

Five of the children constructed together and built a big house for the dog, using the boxes.

Check:

The five children checked their construction by putting the dog in the house. They further took other toys and also placed them in the house along with the dog.

4.6.4 Photo voice

Photo voice contributed in a big way towards this research study. A lot of extra information and conclusions can be drawn from a photograph. The following describes the different photographs that were taken at each research site.

Photo voice of research site 1:

	**Photograph 4.1.1** **Wooden blocks** Two children can be seen busy building and matching the blocks together. The children were laying the blocks out and repeating the pattern. Stage two of construction play; laying blocks down and repeating the pattern.
	**Photograph 4.1.2** **Stacking wooden blocks** Three children can be seen constructing together; they had moved on from horizontal to vertical play. They were forming different towers out of all the wooden blocks. Stage two of construction play; stacking blocks and lining them up with the horizon.

	**Photograph 4.1.3 Vertical building** Two boys can be seen building vertical constructions. The wooden structures were more complex. Stage two of construction play; stacking blocks and lining them up with the horizon.
	**Photograph 4.1.4** **Balancing structure** One of the children balanced different blocks on top of each other. This form of balancing was achieved through trial and error. There was a symmetry to this construction, and it seemed more elaborate. Stages four and five; bridging begins to occur, and patterns start to appear.
	**Photograph 4.1.5** **Box play** The children can be seen discovering the open-ended material; this seemed to be a new concept. Stage one; carry, move, touch, pile and knockdown.

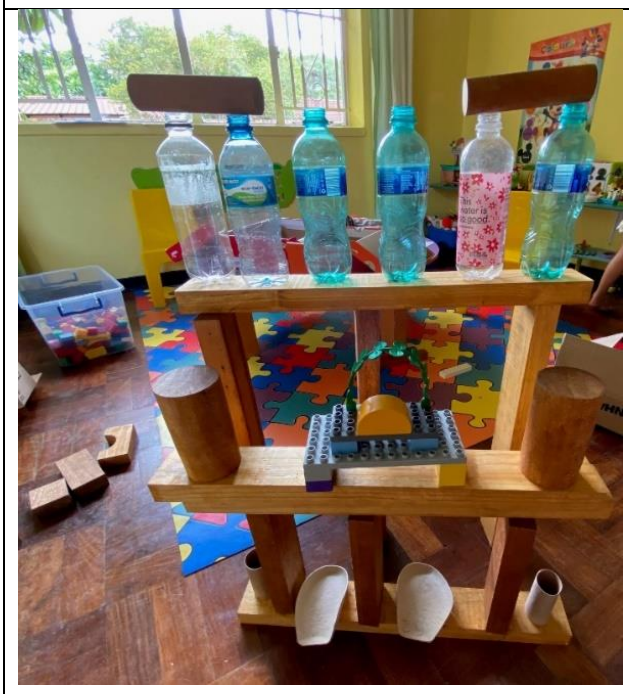
	**Photograph 4.1.6** **Combining elements** The children discovered the open-ended material and started combining and building with wooden blocks and other elements. Stages four and five; bridging begins to occur and patterns start to appear.
	**Photograph 4.1.7** **Balancing and bridging** Here the vertical play had been extended to a balancing act. The children started combining different materials to see how high they can build up the structure. There were also traces of symmetry, and more detail went into this construction. Balancing wooden cylinders on water bottles is not easy; thus, this construction took a lot of planning. Stages four and five; bridging begins to occur and patterns start to appear.

Photo voice of research site 2:

	**Photograph 4.2.1** **Discovering blocks** Two girls were making the transition from horizontal play to vertical play. The girls used semi-circular shapes as the base of their constructions. Stage two of construction play; stacking blocks and lining them up with the horizon.
	**Photograph 4.2.2** **Stacking wooden blocks** Two children were working through trial and error to figure out how to extend this construction vertically. On the photo, one can see an enclosure starting to form. Stage two of construction play involved stacking blocks and lining them up with the horizon.

	**Photograph 4.2.3** **Enclosure building** The children crossed over to the enclosure building. These enclosures took the shape of what looks like a city. They were also balancing oddly shaped blocks on top of each other. Stage three; enclosures appear.
	**Photograph 4.2.4** **Different fascination** One boy had no interest in the construction materials; he only wanted to play with the toy animals. His play was also of an individual nature.

	**Photograph 4.2.5** **Vertical enclosures** One girl tried to build a vertical enclosure for the toy animals. This new vertical enclosure balanced around a horizontal enclosure she had first created. She was repeating her pattern over and over to form her enclosure. Stage three; enclosures appear early in the activity.
	**Photograph 4.2.6** **Dramatic play** One boy started a primitive construction and extended it into building a whole city. This construction consisted of most of the blocks laid out, and he also balanced some of the blocks on top of each other. His construction was starting to symbolise real-life structures. Stages three and five; enclosures appear, patterns show symmetry and more elaborate structures.

	**Photograph 4.2.7** **Box play as an open-ended activity** This pair of children had little interest in the open-ended materials provided. Near the end, they started playing with the boxes provided. They did not construct with the boxes; they only crawled into them. Stage one; carry, move, touch, pile and knockdown.

Photo voice of research site 3:

	**Photograph 4.3.1** **LEGO® building** Two children can be seen engaged in parallel play, and they were constructing next to each other, but both of them were busy with their own LEGO® construction. Stage one; carry, move, touch, pile and knockdown.

	**Photograph 4.3.2** **Wooden block play** A small group of children were engaged in group construction play. They were building or building enclosures and joining the block construction with toy animals. Stage three; enclosures appear early in the activity.
	**Photograph 4.3.3** **Vertical enclosure** A small group of children were engaged in group construction play. The children mainly built with wooden blocks and added some LEGO® blocks and toy animals. One boy merely seemed to be an observer. Stage three; enclosures appear early in the activity.
	**Photograph 4.3.4** **Box play** The children did not find the boxes and other open-ended materials extremely fascinating, and they favoured the wooden blocks and toy animals. Here one can see two girls investigating the boxes and one girl started putting smaller boxes into the bigger boxes. Stage one; carry, move, touch, pile and knockdown.

	**Photograph 4.3.5** **Wooden enclosures** Two children decided to play together. They wanted to build a house (enclosure) for some toy animals. The material they chose to use was the wooden blocks. Here the building becomes a necessary part of completing the dramatic play. Stage three; enclosures appear early in the activity.
	**Photograph 4.3.6** **Small group play** It seemed very clear that most of the children were divided into smaller groups. The groups mainly consisted of two children. In this photograph, it is clear that the children were not crossing the gender line. Here they preferred to play with the same gender. Two boys played individually but parallel to the other children. Stage one; carry, move touch, pile and knock down.

	**Photograph 4.3.7** **Individual open-ended play** The open-ended materials were not a popular choice for the children. Here one can see one girl is engaged in individual play with the open-ended materials and some toy animals. They combined the cardboard shapes with the toy animals. It seemed like she was making beds or perhaps small boats for these animals and placing them inside to see if they would fit.

Photo voice of research site 4:

	**Photograph 4.4.1** **Playing with toys** Of all the materials provided for the young children to play with, this group of children preferred to play with the toy animals. The children found these toys very fascinating.

	**Photograph 4.4.2** **Block sorting and stacking** A group of four children straight away wanted to play with the wooden blocks. Although it was a group of four children, they mainly engaged in individual parallel play. They took the blocks that they wanted to play with and played next to each other. These children were primarily sorting through the blocks. Stage one; carry, move, touch, pile and knockdown.
	**Photograph 4.4.3** **Vertical, upside-down construction** This was a fascinating construction. The young boy used a round cylinder as the base of his structure. He then placed two smaller rectangular blocks on top of the cylinder and topped the construction off by placing larger rectangular blocks on top of the smaller rectangular blocks. A pattern was being repeated for the tower to form. Stage two; stacking blocks, lining them up with the horizon and repeating the pattern.

	**Photograph 4.4.4** **Towering blocks** Here one boy can be seen building a tower with different-shaped blocks. He used semi-circles and hollowed out rectangular blocks to construct this tower. The building seemed to be balancing quite well, considering the unconventional approach this boy took. Stage two; stacking blocks, lining them up with the horizon and repeating the pattern.
	**Photograph 4.4.5** **Towering blocks** In this photograph, a boy is seen building a tower of blocks by stacking them on top of each other. The blocks that he was using were cylindrical and square in shape. Next to the tower, bridging was occurring. The boy was making use of two large semi-circles to form the bridge. Stage two; stacking blocks, lining them up with the horizon and repeating the pattern.

	**Photograph 4.4.6** **Parallel play** Parallel play is an extensive occurrence in this age group. Here one can see the children were playing next to each other, but not together. All of these children were engaged in wooden block play. The primary occurrence here was towering with different shapes. Stage two; stacking blocks, lining them up with the horizon and repeating the pattern.
	**Photograph 4.4.7** **Box play** The open-ended material and boxes were not a popular option for the children. Only two boys showed some interest in these materials, and they wanted to build a car using the boxes. Stage one; carry, move, touch, pile and knockdown.

Photo voice of research site 5:

	**Photograph 4.5.1** **Investigating the material** Once the materials were laid out and all the instructions were given, the children seemed to hover around the LEGO table, looking and deciding what they wanted to play with. It took them a while to decide on what they wanted to build. Stage one; carry, move, touch, pile and knockdown.
	**Photograph 4.5.2** **LEGO® construction** In this photograph, one can see three children engaging in LEGO® construction play. The children seemed to prefer the big LEGO® blocks, and they were exposed to six bricks, and their frame of reference was playing and building with LEGO®. Stage one; carry, move, touch, pile and knockdown.

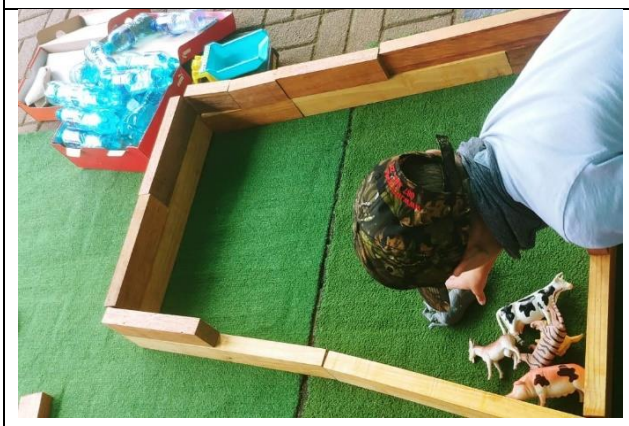
	**Photograph 4.5.3** **Piling blocks** Some of the children decided they wanted to play with the wooden blocks. Their construction was very primitive. The children started by moving all the wooden blocks. They formed the base of an enclosure and started piling blocks, not building with blocks. Stage two; stacking blocks vertically, lining them up with the horizon and repeating the pattern.
	**Photograph 4.5.4** **Enclosure forming** In this photograph, two girls were busy planning the base of their enclosure, and they were using large rectangular blocks to form a large enclosure. It seemed like one girl was taking the lead in this building experience, and it also looked like some sorting had taken place. Stage three; enclosures appear.

	**Photograph 4.5.5** **Enclosure forming and piling** Here the building process only consisted of the enclosure shape and the rest of the blocks were only pilled on. Thus, there was not much building taking place, only the foundation and then pilling. No apparent pattern or symmetry occurred in this construction. Stage two; stacking blocks, lining them up with the horizon and repeating the pattern.
	**Photograph 4.5.6** **Piling LEGO® blocks** It seemed that the children also liked to pile the LEGO® blocks. In this photograph, one can see that the larger rectangular LEGO® block was stacked on top of the toy animals. Instead of building houses, the children were piling blocks and pretended they are houses. Stage two; stacking blocks, lining them up with the horizon and repeating the pattern.

	**Photograph 4.5.7** **Individual play** One boy had no interest in playing with or alongside the other children, and he only wanted to play with the toy animals and not construct or build anything using the laid-out materials. Stage one; carry, move, touch, pile and knockdown.

Photo voice of research site 6:

	**Photograph 4.6.1** **Patterns begin to appear** In this photograph, one can see three children engaging in parallel play. One can see different enclosures forming and towers being built out of different shapes. Stage two; stacking blocks, lining them up with the horizon and repeating the pattern.

	**Photograph 4.6.2** **Symmetry begins to appear** This structure was more complex. The child made use of big and small rectangular-shaped blocks as well as small semi-circular blocks. The tower structure seemed to balance on one or two big rectangular blocks. There was symmetry in this construction and more detail. Stage four, bridging, begins to occur.
	**Photograph 4.6.3** **Toy animals** It became very prominent that the children liked playing with the toy animals. Here one can see a group of four girls playing together, and the children were sitting in a circle and engaging in fantasy play.
	**Photograph 4.6.4** **Enclosure building** In this photograph, one can see a large enclosure being built. The wall of the enclosure also seemed higher. There was a double layer of blocks. The child was combining his construction play with fantasy play. One can see him placing the toy animals inside the enclosure. Stage three; enclosures stars to appear.

	**Photograph 4.6.5** **Open-ended play** It became apparent that open-ended materials were not a popular option for the children. But here in this photograph, one can see one girl putting back all the lids onto the plastic bottles.
	**Photograph 4.6.6** **Box play** This photograph is evidence of a young girl testing her construction. She placed the toy dog into one of the boxes to see if her construction worked.
	**Photograph 4.6.7** **Testing constructions** One of the children built a tower using large and small rectangular blocks and small ramp blocks. The building seemed to be tilting more to one side. The child decided to test his construction by placing a small toy animal on it and seeing if the structure still held. Stage four, bridging, begins to occur.

4.7 Data analysis

By evaluating and coding all the interviews conducted with the participants, three themes and nine sub-themes were identified using the generated data. These themes and sub-themes were broken down even further and are discussed in total throughout the remainder of Chapters 4 and 5. This section starts by identifying the over-arching themes from Chapters 2 and 4. These over-arching themes were identified by evaluating the literature in Chapter 2 with the generated data from Chapter 4.

Figure 4.5 aligns the over-arching themes from Chapters 2 and 4.

Table 4.5 Over-arching themes

Over-arching concepts:	Literature from Chapter 2:	Data generated from Chapter 4:
• **Developmental aspects of play for young children**	Very young children need ample time and opportunity to play (Essa, 2011: 43). It helps children adjust to new situations, and it enhances learning readiness. Through play, children practice behaviour and problem-solving skills. As young children play, they develop motor and language skills and social skills such as sharing and negotiating. Young children learn better from play activities than from direct instructions (Soils, 2017).	By building, young children experience a diverse range of developmental components, such as fine and gross motor, cognitive, language and emotional development. By giving children the opportunity to build and reconstruct, you challenge their imaginations and creativity. Through this type of play, young children learn how to be more social and to interact more effectively with their peers.
• **Using different materials to engage in play**	Object play indicates children's absorption and manipulation of toys, everyday utensils, and	Comparing the materials the teachers frequently use for construction play, most of the

	tools like pots and pans. They also tend to manipulate natural materials like sticks, rocks, shells and other found objects around the house, such as beads and cloths, into their play activities (Bjorklund & Gardiner, 2010).	answers were very similar. All of the teachers use LEGO® blocks of different sizes; some, like ST1, use motorised equipment, wooden blocks and shapes that fit into each other. The teachers said they frequently use waste and recyclable materials for outdoor construction play.
• **Discovering and developing curiosity through play**	Playing is how young children interact and learn in their environments. Children are constructing new knowledge when, through experimentation, they stack blocks onto each other for the first time. Once they know how to do this, they will repeat the action, practicing what they have learned. They use their senses and practice using their muscles. Every experience becomes a learning opportunity (Gellens, 2013: 72).	Plenty of developmental benefits were cited by the teachers, such as physical and emotional benefits. ST1 said that she thinks construction play helps with a child's cognitive development, fine motor skills and expansion of the imagination. Furthermore, it helps young children learn how to share and the importance of group work.
• **Promoting play in different learning environments**	It is crucial to draw the elements of nature through to all learning experiences. Educators and children should not be confined to a traditional classroom setting. A point should be made that the	Most teachers said that construction play usually takes place indoors in the classroom environment. ST2 stated that when the children require more space for their constructions, they will move outside, like

	traditional learning environment extends to the outdoors. Researchers, like Park (2019), mention that children are drawn to natural elements; it gives them a sense of calm and triggers their curiosity. If educators feel that construction play stations take up too much classroom space, they could move the station outdoors.	constructing with boxes will take place outdoors.
• **Teachers' involvement in play implementation**	Play facilitation is the science and art of fuelling children's engaged learning in play. A good facilitator inspires play, creates space and time for many playful activities, and adapts their role to match children's needs as they take on new challenges. Skilful facilitators can spot opportunities to integrate learning goals in playful settings without disrupting children's engaged and playful endeavours. The reality is that adults often struggle with this balancing act and feel unsure about their role and how to support children's learning outcomes in playful settings (Jensen, 2019: 5).	When looking at the participants' narratives it became very clear that all the teachers had different first experiences regarding construction play and toys. ST1, the eldest schoolteacher, said that she was born in the 1950s and there were limited construction materials, especially for girls. All of these different constructions play experiences caused each teacher to have a different outlook and appreciation when it comes to this form of play.

• **Envisioning and solving problems through play**	Constructivism explains that learners should engage in problem-solving through concrete experiences to learn problem-solving skills. Curiosity and discovery should be the basis of problem-solving skills in the learning environment because that will eventually lead children to form their ideas. They should actively be involved in these concrete problem-solving experiences; they should discuss and share ideas and think thoughtfully and carefully about what they learn. The goal of learning and teaching problem-solving skills through a constructivist approach should help young children become critical thinkers (Naudé, 2014: 5).	Construction play puts these children in a position where they must think out of the box. ST3 said the children have the opportunity to think about what they are doing; they need to consider before acting. They are allowed to see where things balance and where that fine line is of how far I can push my construction and myself.

Table 4.6 Identifying themes from generated data

Theme 1:	**Theme 2:**	**Theme 3:**
Children's developmental capabilities of construction play	Children's capabilities of problem-solving	Construction play necessities and drawbacks
• Developmental aspects • Developmental properties • Play participation • Social capacity	• Construction play to enhance • Structural development • Teachers and construction play	• Resources and supplies • Outdoor equipment • Play necessities • Location • Time allocation

Once all the data had been sampled from the different research sites, I started with the process of writing up the findings. All the different sampling resources were analysed and the findings were retyped into neat sub-sections. Each research site had its own sub-section. After all the sampling resources were organised and analysed, the coding process to place. Different colours were assigned to each research site and all the sampling resources and documents went through a coding process. These codes were then broken down into categories, themes and sub-themes. After thematic analysis took place, the research findings were divided into three themes and nine sub-themes. The goal of these themes and sub-themes was to assist the researcher in answering the primary and secondary research questions, which is done in Chapter 5.

Theme 1: Children's development capabilities of construction play
• Sub-theme 1.1 Developmental aspects and properties of construction play • Sub-theme 1.2 Children's participation in construction play • Sub-theme 1.3 Construction play's social capacity

Theme 2: Problem-solving through construction play
• Sub-theme 2.1 Construction play to enhance problem-solving • Sub-theme 2.2 Teachers' background regarding construction play • Sub-theme 2.3 Experiences of problem-solving based on observations

Theme 3: Construction play necessities and drawbacks
• Sub-theme 3.1 Resources and supplies children use for construction play • Sub-theme 3.2 Learning environment construction play takes place in • Sub-theme 3.3 Time allocation towards construction play

4.4.1 Theme 1: Children's developmental capabilities of construction play

According to the interviews I conducted with all the preschool teachers, they all had different opinions and views on the concept of construction play. These opinions are discussed throughout this chapter.

It was established that building is the primary purpose of construction play. By building, young children experience a diverse range of developmental components, such as fine and gross motor, cognitive, language and emotional development. By giving children the opportunity to build and reconstruct, you challenge their imaginations and creativity. Through this type of play, young children learn how to be more social and better interact with their peers. The first theme was divided into three subthemes namely, *the developmental aspects and properties of construction play, children's participation in construction play* and *the social capacity of construction play*.

4.4.1.1 Sub-theme 1.1: Developmental aspects and properties of construction play

Plenty of developmental benefits were cited by the teachers, such as developmental and emotional benefits. ST1 said that she thinks construction play helps with a child's cognitive development, fine motor skills and imagination growth. Furthermore, it helps young children learn how to share and the importance of group work. ST3 pointed out

that this play is an excellent way of assessing different concepts. ST3 explained, "It helps the teacher assess different concepts" also stated that there are mathematical and problem-solving benefits for the children, like learning new shapes, balance, geometry, and spatial awareness. A few noteworthy opinions that came through from ST6 are that construction play benefits children's language development, teaches them to think out of the box and lastly, how to practice self-control. "It helps with their fine motor development and also develops their language" (ST6).

4.4.1.2 Sub-theme 1.2: Children's participation in construction play

It was interesting that the majority of the teachers stated that both boys and girls equally make use of construction materials. ST2 said that in her classroom, it is clear that the boys prefer the construction materials, "The boys prefer construction play, the girls sometimes like it and for some reason, the boys and girls do not like playing together" (ST2), and ST5 mentioned that she has noticed with some of her previous groups that more towards the end of the year the girls seem to play less with the construction toys. Still, currently in her class, both genders enjoy this form of play. "This group, yes, both genders like playing with construction toys, but in my previous classes, the boys liked it more towards the end of the year" (ST5).

4.4.1.3 Sub-theme 1.3: Social capacity of construction play

The question was asked if the children prefer constructing in a group or more independently. When the research participants answered this question, I did not receive the feedback I was expecting. The majority of the teachers said that the children chose to create as a group. Still, as stated by ST2, it also depends on the child's personality or the type of day the child is having. "Depends on the child's personality – one prefers to play alone, and other children will work together to build a bigger construction" (ST2). ST5 pointed out that the children are still only engaged in parallel play; they are building the same construction next to each other but not playing together. "Parallel play at the moment – they build the same thing next to each other" (ST5). ST6 mentioned that the wooden blocks are more of a group activity in her class and building with LEGO blocks is an individual activity that takes place at their desks. "Play in a group with the wooden blocks and on their own with the LEGO" (ST6).

4.4.2 Theme 2: Problem-solving through construction play

During the semi-structured interviews with all the schoolteachers, the topic of construction play was then taken a bit further by asking the teachers how it benefits a young child and how they think it helps young children's problem-solving abilities. The answers came down to that construction play is a hands-on activity, as stated by ST5, that challenges young children in numerous ways. "Helps them to understand the problem visually – they are hands-on learning" (ST5). Construction play puts these children in a position where they must think outside the box. ST3 says the children have the opportunity to think about what they are doing; they need to consider before acting. They are allowed to see where things balance and where that fine line is of 'how far I can push my construction and myself'. This play is a balancing act of understanding, seeing what needs to be done, thinking, and reasoning and communicating with others. One teacher stated that building and constructing is a calming experience where children can learn and put a scientific view on things. ST6 says that when the children sit and create and talk about their constructions, they find more manageable solutions.

4.4.2.1 Sub-theme 2.1: Construction play to enhance problem-solving

The teachers were asked if they used construction play to enhance problem-solving skills in the classes, and all of them answered yes to this question. ST1 said that she sets up a situation where the zoo animals need a new enclosure, and then the children need to come up with new constructions for all the animals. "Yes, we will take out things like zoo animals and say 'the gorilla needs a play area, can you construct a play area for him?'" (ST1) Or brain teasers, as mentioned by ST2, where the teachers say, "you all need to go somewhere, what can you build to take yourself there" (ST2), leaving where they need to go and what they need to build up for interpretation. ST3 revealed that she combines construction play with assessment; she uses construction play to assess the children's problem-solving abilities. "Yes, we also use it for assessment – group all the sizes blocks together. Problem-solving like building a house and seeing what the house consists out of [sic]" (ST3). Another exciting component was that ST4 would ask the children in her class what is missing from this

construction, for example, what is missing from this car? Then the children need to figure out what component from the vehicle is missing and build it so their car can drive on the road. "Yes, I will ask the children to build a car out of natural elements. If the car is not complete, you can ask them what they think is wrong with the car and how can they change it" (ST4). ST5 mentioned that balancing and building with different objects help with problem-solving. The children then constantly have to plan and replan and determine where the problem is to prevent their towers or constructions from tipping over.

4.4.2.2 Sub-theme 2.2 Teachers' background regarding construction play

When looking at the participants' narratives it became very clear that all the teachers had different first experiences regarding construction play and toys. ST1, the oldest schoolteacher, said that she was born in the 1950s and they had limited construction materials, especially for girls. "As I was born in the 1950s there were very few construction games available and, as a female, this was considered a very gender-related occupation, example, Meccano toys was [sic] for boys" (ST1). She stated that she ended up constructing a lot with household items.

ST3 pointed out that she grew up with two sisters and this hindered her construction experience as a child. Growing up with two sisters resulted in a lack of construction toys during their childhood. The most construction they did was building houses using boxes their toy dolls were packaged in. Now as a mother of boys she can see the importance of construction play with her own children. "As a mother with two young boys, I see they also love construction play and this can keep them busy for hours, playing with their LEGO® blocks. They will build anything they can think of, there is [sic] no limits to their imagination. When I see them playing like this, I wish we were more exposed as young girls to play with blocks as it is not only an activity for girls or boys" (ST3).

ST5, on the other hand, grew up on a farm with ample space and freedom. Here, she and her siblings were free to construct all sorts of things. Growing up with a lot of freedom contributed to ST5 allowing her learners to construct what they want. "Today, as a teacher, I try to create and build things that they want. At times I do feel it is

necessary to set guidelines of what the kids must build, but that is only when I am looking to assess or watch if they follow instructions or work within a criterion" (ST5)

All of these different construction play experiences caused each teacher to have a different outlook and appreciation when it comes to this form of play.

4.4.2.3 Sub-theme 2.3 Experiences of problem-solving based on observations

Based on the problem-solving observations I observed at each research site, it became clear that the young children struggled with solving the problem at hand. The problem was that South Africa had experienced a lot of rain over the past few weeks and what happened to the toy dog due to all the rain. All the children from all the research sites stated that the toy dog got wet due to all the rain, and that they could build the toy dog a house or a car to keep him dry from the rain.

One boy from research site four was the only child that mentioned that he wanted to build the toy dog a car to keep the dog dry against the rain. The children from all the other research sites came up with the plan that they wanted to build a house.

It was clear that the children who paid attention and listened to the problem understood the problem at hand. The issue for most children came after that, because no structure was given and the children had to build a solution on their own, they got distracted during the planning and carrying out phase. Some children did manage to plan and start building a construction, but the majority looked for more guidance. Only the children at research site six could manage to understand the problem, plan a construction, build the construction and check their construction by placing the toy dog and other toy animals inside their construction.

4.4.3 Theme 3: Construction play necessities and drawbacks

When it came down to the requirements of a construction play environment, the teachers stated that there had to be enough space and various construction materials for the children to play with. ST1 and ST2 felt that it is required that the children have to have plenty of space, a small number of children in the group, a good mix of materials and enough objects for all the children. "They should not be limited" (ST2). The teachers felt very strongly that the children and their creativity should not be

limited and that they should have enough options. ST3 specified that she thinks various blocks are essential in different colours and shapes. ST5 also mentioned that the children should have the freedom to construct and leave their constructions for a couple of days. "If constructions are left for more than one day, children have more freedom to use small world things along with their constructions" (ST5). Lastly, it was revealed by ST6 that the area should be safe, stable and has enough room.

Only ST1 felt that there are no disadvantages concerning construction play: "no disadvantages to address" (ST1). All of the other teachers said that they do not feel this form of play has any drawbacks, but after a while of thinking, they could name a few. It was revealed that the teachers, like ST2, feel there is usually not enough space for construction play and that the children tend to fight over the resources. "I don't think there are any disadvantages – maybe the amount of space it takes up, and if there are not enough resources, the children tend to fight" (ST2). A disadvantage that came up twice, mentioned by ST3 and ST6, is that children can get hurt during construction play; for example, they can put a piece of LEGO® in their mouth and then swallow it. Something interesting mentioned by ST5 is that she thinks playing with a lot of plastic is a disadvantage "The children end up playing more with plastic" (ST5). She would prefer it if they played with more natural construction materials. A teacher stated that the children in her class tend to argue over the different construction toys, and they do not always want to share. She pointed out that if constructions get knocked down by accident, the children can get very upset.

When asking the teachers how they think they can address these disadvantages, they all came up with solutions. ST2 said they could move their construction play outside and divide the children into smaller groups. "Move outside – we have a lovely outdoor area where they can play and maybe divide them into smaller groups" (ST2). The teachers also stated that they could make the play area and materials safer and say to the children that there are clear class rules and help them understand that they have to rotate between the different stations. Lastly, it was mentioned by ST6 that they have to be prepared and that there needs to be supervision at all times.

4.4.3.1 Sub-theme 3.1: Recourses and supplies used for construction play

Comparing the materials, the teachers frequently use for construction play, most of the answers were very similar. All of the teachers use LEGO® blocks of different sizes; some, like ST1, use motorised equipment, wooden blocks and shapes that fit into each other.

The teachers said they frequently use waste and recyclable materials for outdoor construction play. More extensive materials like wooden blocks and natural materials they collect from the ground "usually waste material for the outdoor construction area – recyclable material" (ST1). ST2 mentioned that she has noticed some of the children in her class build tiny houses for the ants by using small sticks. They also use boxes and things the children find on the lawn or in the sandpit. One teacher stated that they use the same materials for indoor and outdoor construction and another said they do not have any materials for outdoor construction.

A lot of the children from all the schools also use similar additional equipment when constructing. The majority of children like to play with toy families, dinosaurs and open-ended materials, and they also love using toy cars, and wild and farm animals.

4.4.4.1 Sub-theme 3.2: Learning environment construction play takes place in

Most teachers said that construction play usually takes place indoors in the classroom environment. ST2 stated that when the children require more space for their constructions, they will move outside, like constructing with boxes will take place outdoors. "If they are building with boxes, they need more space" (ST2). ST3 stated that the children only construct indoors in her classroom, but she has noticed that some of the children build constructions in the sandpit.

Only ST4 said that, for the children in her class, construction play takes place outside because there is not enough space in her classroom. ST5 indicated that although construction play takes place indoors, she is trying to move it outside. She feels the children are more unrestrained outdoors, and she wants this form of play to be free

and open to their interpretation "Try for more construction play outside. I like it if construction play is completely free, and the children feel freer outside" (ST5).

Lastly, ST6 mentioned that she prefers it if her class builds outside because there is more space, but when they are constructing with LEGO, they have to build indoors, the LEGO pieces are too small, and she does not want the children to lose them. "Prefer the children to build outside, the classroom is too small" (ST6).

4.4.4.2 Sub-theme 3.3: Time allocation towards construction play

The majority of teachers said that the children in their classrooms engage in daily construction play. Just ST4 mentioned that the children in her class only engage in construction play every Friday for about 20 minutes. "Every Friday for about 20 minutes" (ST4).

All the answers the teachers gave for their constructing sessions varied from 20 minutes, 30 minutes to about an hour.

When asked how often construction play takes place outdoors, the teachers answered very differently. ST1 and ST2 stated that play outdoors only occurs once a quarter to two or three times a term at their school's outdoor construction. ST3 said that her class takes part in weekly outdoor construction. "Once a week for 30 minutes" (ST3), and the remainder of the teachers pointed out that their classes take part in daily outdoor building for about an hour.

When asked how much time they think the children in their classes should play with construction materials, not all of the teachers' answers matched what they said regarding how regularly those children partake in construction play. The majority of the teachers indicated that they believe children should spend an hour per day engaged in construction activities, while one teacher said that 20 minutes per day is sufficient because the children attention span is limited. It was ST3 that said her class partakes in 20-minute construction sessions, twice a day if there is time.

Looking at the teachers' answers about if they had to give a percentage comparing how much time the children like playing with construction materials compared to other materials, the majority of the teachers said above 50%, only one teacher said 40%. The most common percentage that three teachers stated was 70%.

Comparing the answers, the teachers gave when asked if the children get to work on the same construction for more than one day, the answers were the same for the majority. Almost all the teachers said that the children's buildings get broken down after their session. ST1 mentioned that they keep the constructions until the parents come to fetch the children and break them down. "The constructions get broken down; we only keep them until their mothers come" (ST1). ST5 said that before the Coronavirus, the constructions were kept for a while, depending on the children, but now all the play materials need to be cleaned at the end of every day. As ST6 also states, her children have a yearly project where they are all given a sheet of LEGO®, and they get to add on as they like throughout the whole year. At the end of the year, everyone's creations get revealed "The small LEGO® blocks are a yearly project – the children get a LEGO® sheet and add what they like" (ST6).

Table 4.7 gives an overall summary of the data generated from each research site. This table focuses on the province the school is located in, the type of school, each school's language of teaching and learning, background information on each school, if the school had an allocated construction play area and if problem-solving did occur during the observation period.

Table 4.7 Overall summary of data generated from each research site

Research site:	**S1:**	**S2:**	**S3:**	**S4:**	**S5:**	**S6:**
School province:	Gauteng	Gauteng	Gauteng	Gauteng	Mpumalanga	Mpumalanga
Type of school:	Private suburban school	Public suburban school	Public outer-city school	Public inner-city school	Public rural school	Private outer-city school
Schools' language of teaching and learning:	English	English	Afrikaans	English	English	Afrikaans
Research site background:	School one is a private stand-alone-school situated in the	School two is a public school separate from the	School three is a public school joined with a	School four is a public school separate from a	School five is a public school separate from the	School six is a private stand alone school out of the

	Waterkloof/Hazelwood area of Gauteng. During my observation sessions, the participants who took part were two girls and two boys. The construction play observation session also took place indoors.	primary school in the city, in the Waterkloof area of Gauteng. The participants were three girls and two boys. This observation took place indoors.	primary school in the outer city, the Montana area of Gauteng. The participants who took part in the construction play observation session were four girls and two boys. The construction play also took place indoors.	primary school in the inner city, in the Sunnyside area of Gauteng. One girl and seven boys took part in the data sampling process. The construction play observation session took place outside, where there was more space.	primary school in a rural area in Mpumalanga. Two girls and three boys participated in the construction play observation session, which took place outdoors.	city, situated in the Hazyview area in Mpumalanga. Seven girls and three boys participated in the construction play observation session. This observation session took place outdoors, as the classroom environment was too small.
Construction play area:	The layout of the learning environment was that every classroom had its construction area, construction play took	There was no dedicated construction area; the toys and materials were packed in	There is no dedicated construction play area; the children have to play on the carpet.	There is no dedicated construction play area; all the materials are stored in	Construction play takes place on the carpet or at the children's desks, constructing six bricks. This form of	The school has a small indoor construction area and a sizeable outdoor construction play area.

	place indoors. The school had a good variety of construction toys.	containers. Construction play primarily takes place indoors.	Construction play primarily takes place indoors.	containers. Construction play usually takes place outdoors.	play takes place both indoors and outside.	
Did problem-solving occur	Problem-solving did occur, to a certain extent. The children understood how the blocks worked, and they planned structures and replanned them when they fell over.	To some extent, problem-solving did appear. The children knew they wanted to build a castle and they started working together to achieve this.	The children varied between stages two to six, and they mainly built enclosures for the toy animals. Because of the big construction gap between the children, it was not clear if problem-solving occurred in all the children.	One boy showed problem-solving skills; he started planning and building with another boy. The constructions were only carried out halfway and not checked.	It appeared that the children did not show problem-solving skills. No planning took place; the children only stacked the blocks. They only wanted to carry and pile the blocks. No constructions were checked. All the children wanted to play with the toy animals.	The children showed problem-solving skills. They planned the constructions together and built them with the boxes. They checked the structures by putting toys on top of the building.

4.8 Discussion

The data generation and analysis procedures were undertaken with the theoretical framework in mind. The theoretical framework I focused on in this study, was Vygotsky's constructivist theory. Vygotsky's constructivist theory focuses on three main aspects. The first aspect is that constructivism is mainly concerned with how we come to know what we know. This theory suggests that our sensations, perceptions and knowledge form part of who we are. Knowledge is constructed internally. Regarding the second aspect, constructivism will tell us that learners should engage in learning through concrete experiences. Children should actively be involved in the concrete experiences of learning. The third aspect relates to the goal of learning and teaching that should be to help children become critical thinkers who are proficient in all learning aspects.

The study is based on the theoretical framework. After completing data generation and data analysis, while keeping the theoretical framework in mind, three themes and nine sub-themes were linked to Vygotsky's constructivist theory. Theme 1: *Children's developmental capabilities of construction play* were linked with the fact that constructivism tells researchers that learners should engage in learning through concrete experiences. Theme 2: *Problem-solving through construction play* forms part of Vygotsky's statement that constructivism is mainly concerned with how young children come to know what they know. Theme 3: *Construction play necessities and drawbacks* relates to how the goal of learning and teaching should be to help young children become critical thinkers who are proficient in all learning aspects. Figure 4.3 indicates how Vygotsky's constructivist theory is linked to the three main themes of this study.

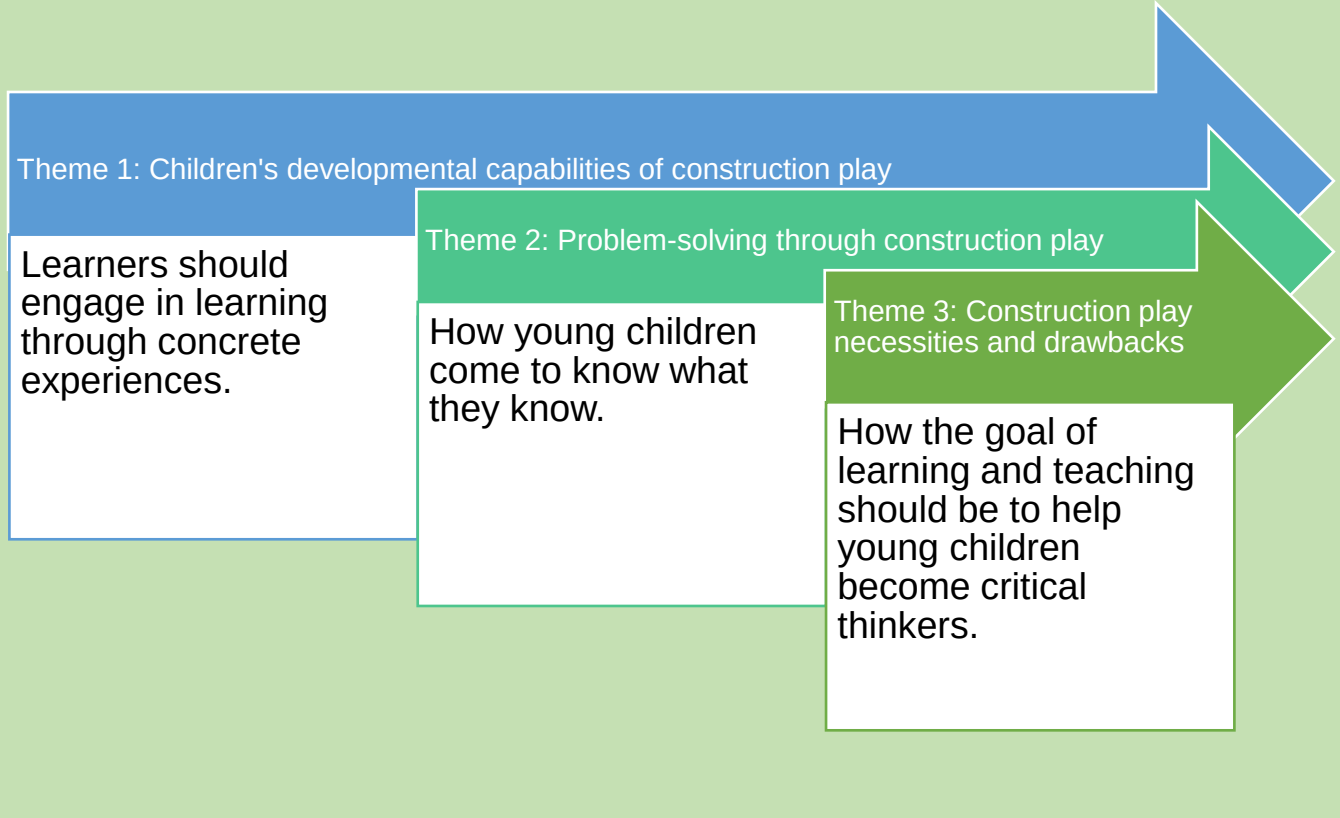


Figure 4.3: Vygotsky's constructivist theory and the three main themes generated through this study

4.9 Conclusion

Chapter 4 aimed to discuss the research findings and address this study's primary research question on which this study was based: How is construction play implemented to enhance young children's problem-solving skills? I generated data from six participants, teaching at six different schools, who met various criteria. After analysing the data, it became apparent that there are three themes and nine sub-themes. These themes and sub-themes were discussed in this chapter and are further addressed in Chapter 5.

CHAPTER 5

Construction is a matter of optimism; it is a matter of facing the future with confidence – Cesar Pelli

5. Conclusion and recommendation

5.1 Introduction

Chapter 4 contains the themes and findings from the data that was generated and analysed. Chapter 5 begins with an overview of the previous chapters. Thereafter, the literature is aligned with the findings of the study, highlighting supporting and contradictory data findings. Attention is paid to any gaps or silences in the literature. In addition, the limitations of the study are revealed. Lastly, the chapter sheds light on the new knowledge contributions that came about through the study. Chapter 5 concludes by answering the primary and secondary research questions, and provides recommendations to improve the implementation of construction play with young children.

5.2 Reflection on chapters

5.2.1 Chapter 1

Chapter 1 serves as an introduction to this study, outlining the primary and secondary research questions and defining the purpose of the study. The concept clarification section serves as background knowledge to the study. Lastly, the methodology of the study was introduced, paying attention to the research approach, paradigm and research design. Details on the participants and research sites were also explored. Chapter 1 provides perspective and direction to this study, motivating the needs and focus of the chapters to come.

5.2.2 Chapter 2

The second chapter focuses on reviewing existing literature related to child development, play, construction play and problem-solving. The chapter begins by discussing the brain and child developmental process, and then moves on to the role

of play in development and learning, play behaviour in young children, pedagogical theories and the grand theories of play, construction play and problem-solving. The chapter concludes with a discussion on the theoretical framework based on Vygotsky's constructivist theory.

5.2.3 Chapter 3

Chapter 3 outlines the research design and methodology used in the study. The chapter begins by defining the research epistemology and research approach, exploring the interpretive research paradigm on which the study is based. The methodological approach and paradigm, research design and sampling methods are also discussed throughout this chapter. The chapter concludes with a discussion of the research ethics applicable to this study and the means used to obtain ethical consent from all the participants involved in the study.

5.2.4 Chapter 4

Chapter 4 presents the practical component of the study. Reference is made to the diverse data generation methods that were used at the six research sites. The chapter provides demographic information about the participants and explores the data generation instruments used, including semi-structured interviews, structured narratives, photo voice and observation sessions. The data was analysed by means of manually coding the data into three themes and nine sub-themes. The chapter concludes with a discussion on how the data generation and analysis procedures were undertaken with the theoretical framework in mind.

5.2.5 Chapter 5

The fifth and final chapter highlights new literature, gaps, silences and insights into the topic of teachers' implementation of construction play in early childhood learning environments. The primary and secondary research questions are answered based on the generated data. Recommendations for further consideration are provided to conclude the study.

5.3 Comparing research results with relevant literature

Tables 5.1, 5.2, 5.3 and 5.4 compare the research findings with results from existing literature. Table 5.1 shows the themes and sub-themes of the study concerning the similarities found in the current literature and the data from the research gathered. An interpretive discussion accompanies the findings, which are reflected in existing knowledge of a similar kind.

5.3.1 Comparing results to existing knowledge: supportive evidence

Table 5.1 below summarises the correlation between the literature and the research findings. The existing knowledge and literature are compared to the research findings. Each similarity is accompanied by an interpretive discussion. In the columns, the existing knowledge and literature refer to notions studied in Chapter 2 regarding development, play and construction play. The findings column refers to the findings from the individual semi-structured interviews, structured narratives and construction play and learning environment observations. The interpretive discussions were based on the interpretation of the differences and similarities between the literature and research findings.

Table 5.1: Comparing research results to existing knowledge: supportive evidence

Themes and subthemes:	Existing knowledge and literature:	Findings:	Interpretive discussion:
Theme 1: Children's developmental aspects and properties of construction play **Sub-theme 1.1:** Developmental aspects and properties of construction play	One type of play that notably demonstrates learning is construction play. Yelland (2011) regards construction play as an indispensable element of early childhood agendas and is justified in open-ended play activities where young children can develop.	Plenty of developmental benefits were cited by the teachers, such as developmental and emotional benefits. The participants also stated that there are mathematical and problem-solving benefits for the children, like learning new shapes, balance, geometry and spatial awareness.	Literature and research findings agree that construction play is one form of play that is beneficial towards young children's development. This form of play develops the young child in a holistic way.

Theme 1: Children's developmental aspects and properties of construction play **Sub-theme 1.3:** Construction play's social capacity	It has been specified that block play is a highly social and vocal activity children share, and complicated language interactions amongst children have been observed in classroom block play centres. It is also stated that mathematical discussions and problem-solving happen as children assemble their blocks and play together. In a block play situation, children tend to talk and think about different sizes, the shapes of the blocks, lengths, areas in which they are building, and the number of blocks used (Trawick-Smith, 2017).	The question was asked if the children prefer constructing in a group or more independently. When the research participants answered this question, I did not receive the feedback I was expecting. The majority of the teachers said that the children chose to create as a group. Still, as stated by ST2, it also depends on the child's personality or the type of day the child is having. ST5 pointed out that the children are still only engaged in parallel play; they are building the same construction next to each other but not playing together.	The literature and research findings agree with one another to a certain extent. The literature mentions that construction play is a very social form of play and when the children construct together it will help them with their mathematical discussions and problem-solving development. The participants on the other hand stated that it depends on the children and how they are feeling if they construct alone or as a group.

Theme 2: Problem-solving through construction play **Sub-theme 2.2:** Teachers' background regarding construction play	Play facilitation is the science and art of fuelling children's engaged learning in play. A good facilitator inspires play, creates space and time for many playful activities, and adapts their role to match children's needs as they take on new challenges. Skilful facilitators can spot opportunities to integrate learning goals in playful settings without disrupting children's engaged and playful endeavours (Jensen, 2019: 5).	When looking at the participants' narratives it became very clear that all the teachers had different first experiences regarding construction play and toys. ST1, the eldest schoolteacher, said that she was born in the 1950s and they had limited construction materials, especially for girls. "As I was born in the 1950s there were very few construction games available and as a female, this was considered a very gender-related occupation, example, Meccano toys was [sic] for boys." (ST1) She stated that she ended up constructing a lot with household items.	The literature and research findings agree that the teachers' background plays a role in their implementation of this form of play. All the participants had different construction play experiences growing up and these different construction play experiences caused each teacher to have a different outlook and appreciation when it comes to this form of play. In the interviews, all the participants were asked how much time they allocate towards construction play. The majority of the teachers stated that the children in their classes engage in daily construction play. Only ST4 declared that the children in her class only engage in indoor construction play once a week. Her reason for this is that the classroom is too small. The time allocation for these construction play sessions varied from 20 minutes, 30 minutes to roughly an hour.

Theme 3: Construction play necessities and drawbacks **Sub-theme 3.1:** Resources and supplies children use for construction play	Object play indicates children's absorption and manipulation of toys, everyday utensils, and tools like pots and pans. They also tend to manipulate natural materials like sticks, rocks, shells and other found objects around the house, such as beads and cloths, into their play activities (Bjorklund & Gardiner, 2010). Although object play may occur within a make-believe episode, it is different from dramatic play. The play behaviours focus on handling, exploring, and acting on an object instead of simply using the object as a prop in a play storyline.	Comparing the materials the teachers frequently use for construction play, most of the answers were very similar. All of the teachers use LEGO® blocks of different sizes; some, like ST1, use motorised equipment, wooden blocks and shapes that fit into each other. The teachers said they frequently use waste and recyclable materials for outdoor construction play, as well as more extensive materials, like wooden blocks and natural materials they collect from the ground.	The literature and research findings agree that it can be beneficial to pair construction materials with other resources and toys. A number of the children from all the schools also used similar additional equipment when constructing. The majority of children liked to play with toy families, dinosaurs and open-ended materials, and they also loved using toy cars and wild and farm animals.

5.3.2 Comparing research results to existing knowledge: contradictory evidence

Table 5.2 below summarises the differences between the literature and research findings. The existing knowledge and literature were compared to the research findings, and below, each contradiction is accompanied by an interpretive discussion. In the columns, the existing knowledge and literature studied in Chapter 2 regarding development, play and construction play are summarised. The findings column refers to the findings from the individual semi-structured interviews, structured narratives and construction play and learning environment observations. The interpretive discussions were based on the interpretation of the differences and similarities between the literature and research findings. Table 5.2 shows the themes and sub-themes of the study concerning the contradictions found in the current literature and the data from the research gathered.

Table 5.2: Comparing research results to existing knowledge: contradictory evidence

Themes and subthemes:	Existing knowledge and literature:	Findings:	Interpretive discussion:
Theme 1: Developmental aspects and properties of construction play **Sub-theme 1.2:** Children's participation in construction play	Free play is an unstructured activity that encourages young children to use their imagination and cognitive skills, such as building blocks or playing with toy animals. While still supervised, the child can decide what they would like to do during these periods. Young children acquire social skills through play (Davin, 2013: 11-12). In this kind of self-governed play, children are often intensely active, physically and mentally. The fact that young children exercise the most autonomy of all practices listed here, speaks to essential learning opportunities. Children practice self-regulation and executive functions as they control	It was interesting that the majority of the teachers stated that both boys and girls equally make use of construction materials. ST2 said that in her classroom, it is clear that the boys prefer the construction materials. ST5 mentioned that she has noticed with some of her previous groups that, more towards the end of the year the girls seem to play less with the construction toys. Still, currently in her class, both genders enjoy this form of play.	There is a discrepancy between the literature and the research findings. According to the research findings, construction play can be seen as a free play activity that in some cases boys enjoy more than girls.

	and direct their learning (Jensen, 2019: 12).		
Theme 3: Construction play necessities and drawbacks **Sub-theme 3.2:** Learning environment construction play takes place in	Davin (2013) identifies that one of the challenges regarding construction play is the amount of space it can take up in the learning environment. To engage in effective construction play, children need resources and sufficient space. An adequate amount of space should be sectioned off by the teacher so that the children can play without any unnecessary disturbance or traffic.	Most teachers said that construction play usually takes place indoors in the classroom environment. ST2 stated that when the children require more space for their constructions, they will move outside, for example, constructing with boxes will take place outdoors. Only ST4 said that construction play takes place outside for her class because there is not enough space in her classroom.	There is a discrepancy between the literature and the research findings. According to the research findings, the majority of the construction play takes place indoors, but the construction area at all the schools was not ideal. It was identified that the majority of the participants struggle with the amount of space in their learning environments and do not leave constructions overnight.

5.3.3 Comparing results to existing knowledge: silence in the literature

Table 5.3 below summarises the silence in the literature. The silence in the literature refers to aspects which were highlighted in the findings gathered from the data generation that were not originally considered in the literature review in Chapter 2. In this section, there are only three columns in the table. The silence in the literature is listed according to themes and subthemes. The findings column refers to the findings from the individual semi-structured interviews, structured narratives, and construction play and learning environment observations. The interpretive discussion column addresses the silence in the literature by evaluating the findings and looking at the listed trend holistically.

Table 5.3: Comparing research results to existing knowledge: silences in literature

Themes and subthemes:	Findings:	Interpretive discussion:
Theme 2: Problem-solving through construction play **Sub-theme 2.3:** Experiences of problem-solving based on observations	Based on the problem-solving observations I observed at each research site, it became clear that the young children struggled with solving the problem at hand. It was clear that the children who paid attention and listened to the problem understood the problem at hand. The issue for most children came after that. No structure was given, and the children had to build a solution on their own – they got distracted during the planning and carrying out phase. Some children did manage to plan and start building a construction, but the majority looked for more guidance. Polya describes the four stages children go through when they engage in problem-solving, but he does not mention how to provoke the children's curiosity about the problem.	There is silence in the literature about how to get young children interested in solving the problem at hand. As a researcher, the biggest setback I had was getting the young children to solve the problem that was stated. The children who listened, identified the problem and came up with a solution that they could build, could not execute the four problem-solving steps. The children would understand and engage, but soon be looking for more guidance or just completely stop what they were doing and start a new activity, thus there was hardly any follow-through when it came to solving the problem identified by the young children. During the observations, the role I took on, was one of a quiet observer. I only gave little input when needed, thus it was not my place to encourage the young children to solve the problem at hand. The children had to use their own intrinsic motivation to follow through with all the problem-solving steps.

5.3.4 Comparing results to existing knowledge: new insight

Table 5.4 below summarises the new insights gained from the research findings that are interpreted and briefly discussed. In Table 5.4, new insights gathered after completing data generation and data analysis are discussed. The new insights are listed according to the themes and subthemes from which they emerged. The description column provides an explanation of the new insight, and the interpretive discussion column provides an overview of the context of the new insight and the relationship it has with teachers' perceptions of construction play to enhance young children's problem-solving skills.

Table 5.4: Comparing research results to existing knowledge: new insight

Themes and subthemes:	**Description:**	**Interpretive discussion:**
Theme 1: Children's developmental aspects and properties of construction play **Sub-theme 1.2:** Children's participation in construction play	**Gender preferences:** During the semi-structured interviews when asking the participants if both boys and girls liked participating in construction play the answers were consistent. The majority of teachers felt that both genders like and engage in this form of play. The observations I made also support this statement. ST2 and ST5 feel otherwise, as they have noticed that in their classes the boys tend to play more with the construction materials.	In some aspects, construction play has, for the majority, been seen as a gender-biased form of play. As mentioned by ST1: "As I was born in the 1950s there were very few construction games available and as a female, this was considered a very gender-related occupation, example, Meccano toys was [sic] for boys." The question is, is this form of play still centred around the male gender and would girls engage in this form of play willingly without any boys around?

Theme 3: Construction play necessities and drawbacks **Sub-theme: 3.1** Resources and supplies children use for construction play	**Requirements:** When it came down to the requirements of a construction play environment, the teachers stated that there had to be enough space and various construction materials for the children to play with. The teachers felt very strongly that the children and their creativity should not be limited and that they should have enough options.	All of the teachers that partook in this study felt that there are no disadvantages regarding construction play. After a moment, they could name a few drawbacks, like the materials are expensive, children can get hurt and that young children tend to argue over the materials. The participants felt that the children should not be limited when they engage in this form of play. They do not want the children's creativity to be limited, but construction materials are expensive, and a number of schools do not have the necessary resources.
Theme 3: Construction play necessities and drawbacks **Sub-theme: 3.3.** Time allocation towards construction play	**Construction left for later building:** Comparing the answers the teachers gave when asked if the children get to work on the same construction for more than one day, the answers were the same for the majority. Almost all the teachers said that the children's buildings are dismantled after their session.	In an ideal construction play environment, the young children would have the opportunity to leave their constructions for a certain amount of time or until they are happy with their build. Unfortunately, this is not the case as at all six research sites the constructions were dismantled at the end of the day or play session. It would have been preferable if all the learning environments had a large enough construction area, where the constructions could be kept for a certain amount of

		time. This would allow the children to add on to their constructions. A new way of implementing construction play could be to combine this form of play with natural elements and free outdoor play. The teacher could encourage the young children to gather a variety of natural construction elements. Once the children feel they have enough elements and materials they can start building their construction outdoors using what they have gathered. By doing this, the young children will have to think about what natural materials are good to build with, how can I make my construction more stable and where can I build it so the construction will last until the next day.

5.4 Identifying research findings for Chapter 5

The following section identified all the main concepts of this study. After a clear investigation of Chapters 2 and 4, the following concepts were outlined and identified. Six concepts were identified, and all these concepts have been aligned according to *concept, existing knowledge and literature and findings*. The section below identifies the concepts, the literature revolving around these concepts and how these concepts link Chapters 2 and 4 together. The main goal is to find supporting evidence in Chapter 2 and in the data that has been generated and reported on in Chapter 4. By finding supporting evidence, the evidence will then conclude by answering the primary and secondary research questions of this study.

Teachers' development of young children's construction play:

Existing knowledge:

Essa (2011) explains that all teachers must gauge their involvement in play according to children's cues. Observation may tell teachers that some children avoid certain play activities, like visiting the construction play area, while others frequently play there. Thus, teachers may need to encourage reluctant children to play in certain parts of the learning environment.

Play facilitation is the science and art of fuelling children's engaged learning in play. A good facilitator inspires play, creates space and time for many playful activities, and adapts their role to match children's needs as they take on new challenges (Jensen, 2019: 5). The following findings were established through the semi-structured interviews conducted with all the primary research participants.

Findings:

All the teachers who participated in this study had their own opinions, experiences and ways of implementing construction play.
The majority of teachers stated that the children in their classrooms engage in daily construction play, ranging from indoor and outside construction play. The teachers promote this form of play by scheduling daily construction play sessions with a number of resources and materials. Most of the teachers use LEGO® blocks of different sizes, DUPLO blocks, motorised equipment, wooden blocks and shapes that fit into each other. The teachers also provide additional materials for the children to use alongside the construction toys.

A number of the children from all the schools also make use of similar additional equipment when constructing. It seems that the majority of children like to play with toy families, dinosaurs and open-ended materials. They also love using toy cars, and wild- and farm animals.

Children's exploration and discovery through play:

Existing knowledge:

Playing is how young children interact and learn in their environments. Children are constructing new knowledge when, through experimentation, they stack blocks on top of each other for the first time. Once they know how to do this, they will repeat the action, practicing what they have learned. They use their senses and practice using their muscles. Every experience becomes a learning opportunity (Gellens, 2013: 72). Fascinatingly, when the teachers were asked what the children in their classrooms tend to build in their construction time, the answers were very similar across the board. The teachers revealed that the children like building constructions, such as houses and helicopters, different things they see on the television, roadways and cars, tall towers and sometimes they like just to stack blocks on top of each other, the children enjoy building enclosures and gardens using the colourful LEGO® blocks.

Findings:

Exploring the more social aspect of play, the question was asked if the children prefer constructing in a group or more on their own. This question received broad feedback. The majority of the teachers said that the children prefer to construct as a group, but that it also depends on the child's personality or the type of day the child is having. One teacher pointed out that in her classroom, the children are still only engaged in parallel play, they are building the same construction next to each other, but not playing together. Another teacher mentioned that the wooden blocks are more of a group activity in her class and building with LEGO® blocks is an individual activity that takes place at their desks.

The product versus the process of play:

Existing knowledge:

Play challenges young children to explore their environment and socialise with their peers and adults. If carefully planned and organised, play scaffolds the development of cognition, language, social competence, imagination and creativity. It focuses on process rather than product and includes diversity and special needs (Isabelle, 2021).

Play is a significant undertaking necessary for healthy development in all children. Play is how children understand the world (Essa, 2011: 43).

Findings:

Based on the construction play and problem-solving observations conducted at each research site, I would state that for the age group of four to five years, unstructured play focuses more on the process of play rather than the end product produced by the child or children.

By observing the way these young children play, it became clear that the majority of their play was based on investigating the materials and toys presented to them. For some of these children, it was playing and constructing with no set plan or end goal. There were also cases where the construction goal became apparent as the construction itself grew; this then led the children down a path of knowing what end product they want.

It was identified that some children found following through on a construction as difficult. A few children also never engaged in play, these children were happy with just touching, examining and fiddling with the open-ended objects.

Creating opportunities for play in the learning environment:

Existing knowledge:

It is crucial to draw the elements of nature through to all learning experiences. Educators and children should not be confined to a traditional classroom setting. A point should be made that the traditional learning environment extends to the outdoors. Researchers, like Park (2019), mention that children are drawn to natural elements; it gives them a sense of calm and triggers their curiosity. If educators feel that construction play stations take up too much classroom space, they could move the station outdoors. Young children may feel inspired to construct and create impressive and more significant structures using wooden blocks, box materials and open-ended materials in a natural learning environment.

Findings:

During the semi-structured interviews, all the teachers acknowledged that construction play takes place both indoors and outside. Most teachers said that construction play usually takes place indoors in the classroom environment. ST2 stated that when the children require more space for their constructions, they will move outside, like constructing with boxes will take place outdoors. "If they are building with boxes, they need more space" (ST2). ST3 stated that the children only construct indoors in her classroom, but she has noticed that some of the children build constructions in the sandpit.

When it came down to the requirements of a construction play environment, the teachers stated that there had to be enough space and various construction materials for the children to play with. ST1 and ST2 felt that the children require a lot of space, a small number of children, a good mix of materials and enough objects for the children. "They should not be limited" (ST2). The teachers felt very strongly that the children and their creativity should not be limited and that they should have enough options. ST3 specified that she thinks various blocks are essential in different colours and shapes. ST5 also mentioned that the children should have the freedom to construct and leave their constructions for a couple of days. "If constructions are left for more than one day, children have more freedom to use small world things along with their constructions" (ST5). Lastly, it was revealed by ST6 that the area should be safe, stable and has enough room.

The importance of teachers adapting their teaching techniques:

Existing knowledge:

Play facilitation is the science and art of fuelling children's engaged learning in play. A good facilitator inspires play, creates space and time for many playful activities, and adapts their role to match children's needs as they take on new challenges (Jensen, 2019: 5). Skilful facilitators can spot opportunities to integrate learning goals in playful settings without disrupting children's engaged and playful endeavours. The reality is that adults often struggle with this balancing act and feel unsure about their role and how to support children's learning outcomes in playful settings (Jensen, 2019: 5).

Findings:

During the semi-structured interviews, the teachers mentioned that there are certain disadvantages regarding construction play. The disadvantages named were that the teachers feel there is a lack of space and resources when it comes to construction play. Some of these teachers feel that construction materials are expensive and that the children tend to argue over the available materials.

When asking the teachers how they think they can address or adapt their teaching techniques to address these disadvantages, they all came up with solutions. ST2 said they could move their construction play outside and divide the children into smaller groups. "Move outside – we have a lovely outdoor area where they can play and maybe divide them into smaller groups" (ST2). The teachers also stated that they could make the play area and materials safer and state to the children that there are clear class rules and help them understand that they have to rotate between the different stations. Lastly, it was mentioned by ST6 that they have to be prepared and that there needs to be supervision at all times.

The importance of self-directed problem-solving:

Existing knowledge:

Constructivists believe that gaining knowledge of problem-solving, for example, is not an act where teachers teach children how to solve problems. Instead, it is an act where children gain knowledge from within themselves as they play and experiment with the objects around them (Naudé, 2014: 5). Constructivism explains that children should engage in problem-solving through concrete experiences to learn problem-solving skills. Curiosity and discovery should be the basis of problem-solving skills in the learning environment because that will eventually lead children to form their ideas. They should actively be involved in these concrete problem-solving experiences; they should discuss and share ideas and think thoughtfully and carefully about what they learn. The goal of learning and teaching problem-solving skills through a constructivist approach should help young children become critical thinkers (Naudé, 2014: 5).

Findings:

The teachers were asked if they used construction play to enhance problem-solving skills in the classes, and all of them answered yes to this question. ST1 mentioned a setup situation where the zoo animals need a new enclosure, and then the children need to come up with new constructions for all the animals. "Yes, we will take out things like zoo animals and say 'The gorilla needs a play area, can you construct a play area for him?'" (ST1). Or brain teasers, as mentioned by ST2, where the teachers say, "You all need to go somewhere, what can you build to take yourself there?" (ST2), leaving where they need to go and what they need to build up for interpretation.

The majority of techniques that these teachers used to promote problem-solving in young children were teacher-directed and not self-directed. This statement was further strengthened during the problem-solving observation.

It was clear from the children who paid attention and listened to the problem that they understood the problem at hand. The issue for most children came after that. Since no structure was given and the children had to build a solution on their own, they got distracted during the planning and carrying out phase. Some children did manage to plan and start building a construction, but the majority looked for more guidance. Only the children from research site six managed to understand the problem, plan a construction, build the construction and check their construction by placing the toy dog and other toy animals in their construction.

5.5 Answering of research questions

5.5.1 Primary research question

How do teachers implement construction play in early childhood learning environments?

5.5.1.1 Problem-solving

The teachers were asked how they use construction play to enhance the problem-solving skills of the children in the class. All teachers replied that they implement construction play. The teachers referred to scenarios, such as the case where teachers set up situations where the zoo animals need a new enclosure, and then the

children need to come up with new constructions for all the animals. Another example includes brain teasers where the teachers say “You all need to go somewhere, what can you build to take yourself there”, leaving where they need to go and what they need to build up for interpretation. One teacher replied that she combines construction play with assessment, she uses construction play to assess the children’s problem-solving abilities.

Another interesting component was that one of the teachers asked the children in her class what was missing from the construction, for example, what is missing from the car? The children needed to figure out what component from the car was missing and had to build it so that it was possible for their car to driven on the road. Another teacher mentioned that balancing and building with different objects helped with problem-solving. The children constantly had to plan and replan and determine where the problem was so they could prevent their towers or constructions from tipping over.

The topic was then taken a bit further by asking the teachers not only how construction play benefits a young child, but how they think it benefits young children’s problem-solving abilities. The answers came down to that construction play is a hands-on activity that challenges young children in numerous ways. It puts these children in a position where they have to think outside the box. They are allowed to see where things balance and where that fine line is of *how far I can push not only my construction but myself.* This form of play is a balancing act of understanding, seeing what needs to be done, thinking and reasoning and communicating with others. One teacher stated that building and constructing is a calming experience where children have the opportunity to learn and put a scientific view on things.

The implementation of construction play is discussed in light of the following sub-sections: the learning environment where this form of play takes place, the role of the teacher regarding construction play, the amount of time allocated towards this form of play indoors and outside and the teachers’ perspectives regarding construction play.

5.5.1.2 Learning environment

The majority of teachers said that construction play usually takes place indoors in the classroom environment. Some of the teachers stated that when the children require more space for their constructions they will move outside, like constructing with boxes will take place outdoors. One teacher stated that in her classroom the children only construct indoors, but she has noticed that some of the children build constructions in the sandpit.

Only one teacher said that for her class construction play takes place outside because there is not enough space in her classroom. Another indicated that although construction play is taking place indoors, she is trying to move it outside. She feels the children are freer outdoors and she wants this form of play to be free and open to their interpretation. Lastly, a teacher mentioned that she prefers it if her class builds outside because there is more space, but when they are constructing with LEGO® they have to build indoors, the LEGO® pieces are too small, and she does not want the children to lose them.

In many South African public and private schools, the classrooms or learning environment is compact and does not cater for the large number of children allocated per class. An indoor construction play area takes up a large amount of space in a classroom, is required to be placed out of the way of foot traffic and ideally, all the materials are placed and packed so the children can see the materials and gain easy access to all the construction materials and resources. Unfortunately, in many schools, this is not always achievable. In this study, I moved away from the word classroom and focus on the term learning environment. A learning environment refers to an indoor or outdoor space where learning can occur.

If space is an issue when looking at the concept of construction play, why not move this form of play outside where there is more space and freedom for constructing? Constructing outside presents new and different challenges that young children will have to solve or work around. Constructing outside, children have the opportunity to go big and build boldly. Outside there is no ceiling to hinder young children's creativity, they are free to build and construct as high as they please or as gravity will allow.

Children are taken outside of their comfort zone when they construct outside. There are new sensations and elements that stimulate them, and this may propose a challenge for construction play. These children will have to come up with a plan regarding aspects of the ground being uneven, building on multiple surfaces, combining man-made materials with natural materials and taking different natural elements into consideration, for example, if the wind blows will my construction still stand? All of these new elements prompt growth and development in young children.

5.5.1.3 Role of the teacher

As the researcher, the experience that I had at each research site was that the teacher plays an important role in play and construction play. At the beginning of the year when I visited all the schools, the children still relied on the teacher for guidelines, some children less than others. If the teacher has a positive outlook on this form of play and encourage the children in the classroom or learning environment to partake and challenge themselves with their constructions, automatically the children will start to show an interest.

It is important for teachers to have a positive connotation to play. Teachers should plan new and existing ways of implementing construction play, indoors and outside. Teachers should also remember that there is a bit of a naturalistic component behind construction play and they should encourage young children to build and construct using natural elements and materials they have collected outside.

In education, the teacher is seen as the facilitator when it comes to learning. Young children rely on the teacher for guidance and structure. As the child grows and develops throughout the years the child will receive less guidance and will become more independent. This is why it is crucial for teachers to set enough problem-solving opportunities for young children. These problem-solving opportunities should allow the children to grow and develop new skills. These opportunities should push young children to think outside of the box and allow them to come up with new, interesting solutions for the problem-set at hand.

5.5.1.4 Time allocation

The majority of teachers said that the children in their classrooms engage in daily construction play. Only one teacher mentioned that the children in her class only engage in construction play every Friday for about 20 minutes. The time frame all the teachers gave for their construction play sessions varied from 20 minutes, 30 minutes to about an hour.

When asking the question, 'How often does construction play take place outdoors?' the teachers answered very differently. Two of the teachers stated that at their school outdoor construction play only takes place between once a quarter to two or three times a term. Another teacher said that her class takes part in weekly outdoor constructing and the remainder of the teachers pointed out that their classes take part in daily outdoor constructing, for about an hour.

Asking the teachers how much time they think the children in their classes should play with construction materials, not all of their answers matched up with what they said regarding how regularly those children do partake in construction play. The majority revealed that they think the children should at least spend an hour daily busy with constructing, whereas one teacher said 20 minutes a day are enough because the children's concentration does not last very long. This was the same teacher that said her class partakes in 20-minute construction sessions, twice a day if there is time.

Looking at the answers the teachers gave concerning a percentage split they would allocate, comparing how much time the children like playing with construction materials compared to other materials, the majority of the teachers said above 50%, only one teacher said 40%. The most common percentage that was stated by three teachers was 70%.

Construction play is a form of play that requires enough time. The nature of the play needs to be decided on and then the setting needs to be set, meaning, will this play take place indoors or outside? If the construction play is more structured and the teacher proposes a problem that needs to be solved, more time will be needed. In an

ideal learning environment, this form of play will take place daily, alternating between indoor and outside construction play.

5.5.1.5 Resources

Comparing the materials the teachers frequently use for construction play, the majority of the answers were very similar. Most of the teachers use LEGO® blocks of different sizes, motorised equipment, wooden blocks and shapes that fit into each other.

For outdoor construction play, the teachers said they frequently make use of waste and recyclable materials, bigger materials like wooden blocks and natural materials they collect from the ground. A teacher mentioned that she has noticed some of the children in her class build small houses for the ants by using small sticks. Other materials they use are boxes and things the children find on the lawn or in the sandpit. One teacher stated that they use the same materials for indoor and outdoor construction, and another said they do not have any materials that they use for outdoor construction play.

A number of the children from all the schools also make use of similar additional equipment when constructing. It seems that the majority of the children like to play with toy families, dinosaurs and open-ended materials. They also love using toy cars, as well as wild- and farm animals.

5.5.1.6 Instructions

From the construction play observations I conducted, it was clear that the young children participating in this study required more structure and instructions regarding construction play.

Many of the young children found it difficult to follow through and complete all of Polya's problem-solving steps. The young children that paid attention and listened to the problem that was stated understood what was being said and could identify the problem. Planning happened to a certain extent. Some of the children roughly planned their construction and tried to adjust every time a structure fell over. The children did try to build a structure to solve the problem at hand, but most children lost interest and did not complete their constructions. It was hard for the children to follow through and

build a construction that they could check at the end of their build. In terms of the young children who participated in this study, most struggled with concentration and following through. From my perspective, it seemed that these children were looking for more instructions and guidance when it came to coming up with a solution and building a workable solution in the form of a structure.

5.5.1.7 Perspectives

By having each teacher who participated in this study write a structured narrative, I could see and conclude how their construction play background influence teachers' perceptions regarding this form of play.

It became apparent that the teachers who had a more vivid and fun experience with construction play from a young age are more prone to implement this form of play in their classrooms. From my point of view, ST1 had the most unorthodox construction play experience of all the participants. ST1 was born in the 1950s in an era when construction play and play in general were gender-orientated. Construction play and playing with blocks were seen as a form of play mostly boys would engage in. Having said this, ST1 still enjoyed constructing with household items, like pots and pans. She also enjoyed building forts and small houses using pillows and items found in the house.

ST1 also showed the most interest in the observation sessions I conducted with the young children. She was one of the few who attended the observation sessions and watched how the children participated and engaged in all the activities. ST1 also had the most constructive play resources and implemented this form of play on a regular basis indoors and outdoors. In my opinion, the teachers who showed more of an interest in the study I was conducting and implemented construction play on a regular and interesting basis, had a better experience with this form of play growing up.

5.5.2 Secondary research questions

5.5.2.1 First secondary research question

How do young children participate in construction play?

Each research site had its own interesting events regarding construction play and observing how these young children interact with each other and the construction materials laid out. There were unique situations that arose at each research site.

When looking back at research site one, the most memorable event that stood out was that there was one girl who was focused on and obsessed with her own construction. This young girl went straight for the wooden blocks and open-ended materials and started to create her structure. She was adamant that she wanted to play and build alone, and she also did not verbalise her play; she planned everything out in her head. It was interesting that she combined the wooden blocks with the open-ended materials and managed to build a perfectly symmetrical vertical construction.

Research site two had two small groups of strong children. Two girls and two boys divided into two groups and built a mostly horizontal construction with a resemblance to what looked like a small town. The girls and boys did not play together but rather parallel next to each other. It was fascinating that both groups only constructed with the wooden blocks and for a major part of their constructions only built horizontally. Even though these two groups did not build together, their building styles and constructions rather resembled each other.

One major aspect regarding research site three was that there was one dominant girl who did not want to share any materials. This girl was part of a small group consisting of boys and girls, but she was clearly in charge. She gave all the instructions, delegated jobs, decided on what they should build and kept all the toy animals for herself. She was extremely dominant regarding the toy animals, to such an extent that she did not even share any of these to animals with her small group. She kept all of these toys for herself and once the construction was finished, she placed all the animals in the enclosure. Not one of the other young children constructing with her felt the need to challenge her authority and went along with her lead.

Building vertically was a big element at research site four. There were four children, boys and girls sitting parallel to one another. These four children did not verbalise their play or engage with one another and they simply sat next to each other and constructed their own vertical towers. All of these children built vertical constructions but in unorthodox ways. One boy used a round cylindrical block for his foundation and then stacked bigger blocks on top of the cylinder until the block could not balance any more. These children all placed round or curved wooden blocks on top of each other, finding a way for the blocks to balance.

The young children at research site five engaged in a lot of piling. These children were also sectioned off into small groups, consisting of boys and girls. Here the children formed what looked like an enclosure using the wooden blocks and piled the remainder of the blocks in the enclosure. There was no apparent construction being built, no pattern or symmetry regarding their construction, only piling blocks on top of each other.

At research site six, all the children broke up into small groups. For the majority, the girls and boys formed separate groups. The boys were more focused on building and the girls were more fascinated with the toy animals. The constructions being built were more complex structures, consisting of more elements. All the children preferred building with the wooden blocks and then adding the toy animals, once the constructions were built.

5.5.2.2 Second secondary research question

How do preschool teachers promote play and construction play in early learning environments?

To promote play and construction play, a teacher has to understand the concept and the benefits the concept has to offer. According to the interviews I conducted with all the preschool teachers, they had different opinions and views on the concept of construction play. It became clear that building is the main purpose and by building young children experience a different range of developmental components, such as fine and gross motor, cognitive, language and emotional development. By giving children the opportunity to build and reconstruct, you are challenging their imagination

and creativity. Through this type of play young children learn to be more social and to better interact with their peers.

In the semi-structured interviews, it became apparent that the teachers use three main aspects to promote play and construction play. These aspects are resources and materials, learning environment and time allocation. According to these primary research participants, construction play is a form of play enjoyed by both boys and girls. These children enjoy construction play and according to the participants will choose this form of play 70% of the time over other play activities.

Although construction materials are expensive, these teachers still try their best to provide all the children with many construction materials and other toys to accompany them. The construction toys used by most of the teachers are LEGO® blocks of different sizes, DUPLO blocks, motorised equipment, wooden blocks and shapes that fit into each other. According to these teachers, most construction play takes place indoors alongside scheduled outdoor construction play sessions. The majority of teachers stated that construction play is a daily activity for the children in their classrooms. These construction play sessions can vary from about 20 minutes to roughly an hour depending on the children or the goal of the construction play.

All of the teachers I interviewed used different methods to promote construction play and problem-solving. Not one of the teachers stated in their interviews a method mentioned by another teacher. All of these teachers use methods they prefer that are unique to their teaching style and strategy.

5.5.2.3 Third secondary research question

What challenges do teachers experience during the implementation of construction play with young children?

Only one teacher felt that there are not any disadvantages concerning construction play. All of the other teachers said that they do not feel this form of play has any disadvantages, but then after a while of thinking, they could name a few. It was revealed that the teachers feel there is usually not enough space for construction play and that the children tend to fight over the resources. A disadvantage that came up twice is that children can get hurt during construction play, for example, they can put

a piece of LEGO® in their mouth and then swallow it. An interesting point brought up by one of the teachers is that she believes that excessively playing with plastic is a disadvantage. She would prefer it if they played with more natural construction materials. A teacher stated that the children in her class tend to argue over the different construction toys and they do not always want to share. She pointed out that if constructions get knocked down by accident the children can get very upset.

When asking the teachers how they think they can address these disadvantages they all came up with solutions. One of the teachers said that they can move their construction play outside and divide the children into smaller groups. The teachers also stated that they can make the play area and materials safer and state to the children that there are clear class rules and help them to understand that they have to rotate between the different stations. Lastly, it was mentioned that the teacher has to be prepared and that there needs to be supervision at all times.

5.6 Research limitations

The biggest limitation that I experienced throughout this study was the different implications that the COVID-19 pandemic had on the nation, especially on the schooling system in South Africa.

Owing to the nationwide lockdown, South African schools moved from in-person school attendance to online schooling. For months online schooling was the new norm for many children from primary right through to high school and even tertiary education. During this time of online schooling, many primary schools were closed and remained closed for months on end.

The fact that the majority of the pre- and primary schools remained closed for that long resulted in my data generation only being able to occur at the beginning of the new school year. I would have preferred to have conducted my data-generating process mid-year, once all the young children had settled into their new school routine and have adjusted to the school routine. Another difficulty I experienced was finding schools willing to participate in this study.

As the researcher, I had to abide by all COVID-19 rules and regulations. These regulations necessitated that I had to take all my own resources and material to each school. All of these materials had to be sanitised before and after each session. These factors caused a few schools to drop out of the study because they did not want an external COVID-19 risk entering their schools. Losing these schools as participants resulted in a smaller sample size for generating data. It also meant that I had limited time at each school. It would have been ideal for optimal data generation to spend three days at one research site observing the participants in numerous construction play and problem-solving activities. The participants would have felt more comfortable with my presence, and this may have led to some of the shy participants to engage in more play activities.

An additional limitation was that I only obtained permission to observe the participants for one day. The study would have benefitted from a longer observation period, which would have allowed me to observe multiple construction play sessions on different days to see how often construction play activities were implemented. It would also have allowed me to determine whether the teachers applied the same teaching technique more than once, and if their roles during construction play changed over time. When it comes to analysing the generated data, it would have been easier to use data analysis software rather than manually analysing all the data. Analysing by hand is a time-consuming process that can sometimes lead to confusion and frustration. I personally felt that analysing qualitative data by hand provided better structure and a clear understanding regarding the generated data.

5.7 Recommendations

According to the findings of the study, I would like to make the following recommendations for preschool teachers, parents with young children and future research. Throughout this study, it has been mentioned several times that construction play has many developmental prospects. This form of play helps the child to develop holistically.

5.7.1 Preschool teachers

As the researcher, I would recommend to teachers that this form of play should be a part of young children's daily programme. Play sessions can vary from 20 minutes to an hour depending on the ages of the children and the type of construction play these children are engaging in. I would further recommend that construction play takes place both indoors and outside, the switching of terrain will pose new challenges these young children will need to overcome. It could be beneficial if different construction materials are used and if children make use of loose parts and natural elements during their construction sessions. Natural elements will be somewhat more difficult to handle, seeing that the natural materials are not refined and shaped. Teachers should also allow children to be active problem solvers. Young children should be challenged to experience all the problem-solving steps on their own accord, while having the safety of their teacher there to ask for guidance when needed.

5.7.2 Parents with young children

I would recommend to parents with young children to invest in construction materials for their children and prompt them to challenge themselves to come up with new and exciting constructions. If construction materials are too expensive, challenge the children to construct using household items, constructing forts out of pillows and blankets, building cities with cereal boxes or even building a fort outside with natural materials.

5.7.3 Future research

For future researchers or students conducting studies on the topic of construction play and the implementation of construction play, it is important to remember that the literature study sets the tone for your research. It is essential that enough background knowledge is investigated and laid out in a logical order. The literature will guide the research through the data generation process.

I would also advise researchers first to have a mock session, where they have test out the research sampling method. A mock session better prepares the researcher and gives a good indication of what to expect at the research sites. During this mock session, the researcher will run through all the steps and methods of data generation.

This should give the researcher a clear understanding of how long the process will take. If construction play areas are being used, each area should be planned and set up beforehand to determine the best flow between construction areas and stations. Having a research assistant makes the process run smoothly and the assistant serves as an additional person who can help document the process. If possible, spend enough time at a research site, document everything using multiple recording techniques and use more than one method of data generation – doing so will give you a better chance of reaching data saturation.

5.8 Contributions

This study contributes to understanding construction play, how construction play develops problem-solving skills in young children and investigating how teachers in South African preschools implement this form of play. Readers who will benefit the most from reading this study are any early education student looking to learn more about the implementation of construction play, teachers working with young children and construction play and parents looking to better understand the developmental process of young children.

The contextual gaps addressed in this study are that construction play is implemented in South African schools, especially focusing on the Gauteng and Mpumalanga provinces. The big question was how construction play is implemented to help young children develop sufficient problem-solving skills. To a large extent, this gap is being addressed but in my opinion, more can be done. Teachers and teachers still in training should be made aware of the importance of this form of play and be taught how to successfully implement this form of play. Teachers need to think about how they can adapt construction play to better fit their classroom situation. Construction play is not a concrete concept revolving only around playing with blocks on the carpet. This is an abstract form of play, not only in thinking but also in the play itself and it is important for teachers to address it as such.

5.9 Conclusion

This study rests on Vygotsky's constructivist theory. Vygotsky's constructivist theory states that children are always mentally active in seeking to understand the world

around them. Children learn in various ways; a wide range of teaching strategies and interactions effectively support all these kinds of learning (Darragh, 2010: 91). For children to construct their knowledge, they need tools, just as a builder would need tools to build a house. The tools that children use are the knowledge and ideas they already possess. They have already gained this knowledge and these ideas through hearing, touching and seeing in their environment. The aim of this study was to observe and evaluate what teachers understand under the concept of construction play, how these teachers implement this form of play, if they use construction materials to promote problem-solving in young children, whether the learning environment plays a role in the implementation of construction play and lastly, if young children are active participants in these activities. Bertram and Christiansen (2019) mentioned that the objective of an interpretive paradigm is to define and understand how people make sense of the world around them. An interpretive paradigm aims to create a better awareness of how people come to understand their life and work environments. For this study, I chose an interpretive paradigm to observe how teachers and young children respond to construction play and if the learning environment influences how this form of play is implemented.

An instrumental case study was used to accomplish something other than to understand a particular situation (Baxter & Jack, 2008). The goal I wanted to accomplish was to explore the experience and understanding these teachers relate to construction play, whether they perceive construction play as crucial, determine if they use construction play to promote problem-solving in young children and if the learning environment influences this form of play.

To conclude this study, findings from the analysis and data gathered from the individual semi-structured interviews, structured narratives, play and environmental observations and photo voice were compared to the existing literature and knowledge in Chapter 2. The purpose of this literature control is to highlight areas where the literature supports or contradicts the findings, areas where the findings shed light on gaps in the literature and lastly, areas where the findings provide new insights into the topic being studied. The literature and findings in this study confirmed the importance of teachers' perceptions of construction play and how they implement this form of play to enhance young children's problem-solving skills.

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ADDENDUM I

Principal letter of consent

Dear Principal:

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

My name is Karen Pienaar, and I am a student at the University of Pretoria, Department of Early Childhood Education (ECE). I am a Master's degree student at the department and doing my research project on the **implementation of construction play with young children**. This study aims to determine the value and role that construction and block play have on the development of young children's cognitive and problem-solving skills, with specific reference to the teachers' point of view. This study will be looking at the teachers' understanding concerning the implementation of construction play. The primary goal of this study will be to establish whether construction play benefits young children's cognitive development and, in the end, improves their understanding of mathematics, science, technology, engineering and their problem-solving abilities.

This project will comprise obtaining data from preschool and Grade R teachers in the form of individual semi-structured interviews, narratives written by the teachers, and by observing these teachers and learners during the implementation of construction play.

You are kindly invited to be part of this project by allowing your teachers and learners to participate in this research project. The teachers will be invited to participate in the data generation phase of this project by taking part in a semi-structured interview, writing of structured narratives as well as guided observations.

The interview, writing of narratives and observation will be scheduled according to the teachers' availability and will not disturb the normal daily activities. The interview and writing of narratives will individually take between 30-45 minutes on the school premises. The

scheduled observation of playing with construction materials will not take longer than two hours. If you kindly decide to take part in this study, I will need your consent so that an audio recording on a voice recording device can be made during the interview and observation for accurate data generation purposes. The recording will only be used to ensure easy and more accurate transcription of the data.

Should you consider being part of this study, please note that the name of the school and the teachers will always remain confidential and no photograph will be used where a child's face can be identified. I will make use of an observation sheet, photographic images and research journal to record the findings of the observation of the respective activities. No photograph will be taken where a child's face can be identified and will only be used in this study with consent from the respective parents. I will be abiding by the COVID rules and regulations. Entering the school premises, I will wear a mask and have my temperature taken. When conducting the interviews, I will keep a distance of two meters and the observations will be done in small groups. All the learners will be divided into groups of five and take turns using the different construction toys and materials. The construction resources will be sanitised after each group had a turn using the materials. If possible, the activities will take place indoors and outdoors.

Participation in this research project is completely voluntary. Teachers and learners are free to withdraw at any given point. We also would like to request your permission to use your data, confidentially and anonymously, for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further research may include secondary data analysis and using the data for teaching purposes. The confidentiality and privacy applicable to this study will be binding on future research studies. We would like to ask your permission to use your answers to help other students in their studies, as the data sets are the intellectual property of the University of Pretoria.

The University of Pretoria will remain custodians of all data generated. The information will only be used for academic purposes, especially in article writing and planning for the improvement of the current core of pre-service teachers in the department. The University also needs to keep on record that all protocols in attaining this permission were followed.

You are more than welcome to ask questions before and during the time of participation. If you have any concerns, please feel free to contact my supervisor or myself.

Yours sincerely,

Ms Karen Pienaar
Student
University of Pretoria
Email: pienaarkaren@gmail.com

Dr Judy van Heerden
Supervisor
University of Pretoria
Email: judy.vanheerden@up.ac.za

ADDENDUM II

Teacher letter of consent

Dear Teacher:

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

My name is Karen Pienaar, and I am a student at the University of Pretoria, Early Childhood Education Department (ECE). I am a Master's degree student at the department and doing my research project on the **implementation of construction play with young children.** This study aims to determine the value and role that construction and block play have on the development of young children's cognitive and problem-solving skills, especially from the teachers' point of view. This study will be looking at the teachers' understanding or lack of understanding concerning the implementation of construction play. The primary goal of this study will be to establish whether construction play benefits young children's cognitive development and, in the end, improves their understanding of mathematics, science, technology, engineering and their problem-solving abilities.

The project will comprise working with different Foundation Phase teachers in the form of individual semi-structured interviews, structured narratives and observing these teachers and learners during the implementation of construction play over a period of three days.

You are kindly invited to participate in this research project. Different teachers will be invited to participate in the data generation phase of this project by taking part in semi-structured interviews, writing of structured narratives as well as guided observations. The interview, writing of narratives and observation will be scheduled according to the teachers' availability. The interview and writing of narratives will individually take between 30-45 minutes on the school premises. The scheduled observation with construction materials will not take longer than two hours. The interview, writing of narratives and observation will not disturb the normal

daily activities. If you decide to take part in this research study, I will need your consent so that an audio recording can be made during the interview and observation. The recording will only be used to ensure easy and more accurate transcription of the data.

Should you consider being part of this study, please note that the name of the school and the teachers will always remain anonymous and confidential and no photograph will be used where a child's face can be identified. The individual semi-structured interviews will be recorded on a voice recording device for accurate data generation purposes. I will make use of an observation sheet, photographic images and research journal to record the findings of the observation of the respective lessons. No photograph will be taken where a child's face can be identified and photos will only be used in this study with the consent of their parents. I will be abiding by the COVID rules and regulations. Entering the school premises, I will wear a mask and have my temperature taken. When conducting the interviews, I will keep a distance of two meters and the observations will be done in small groups. All the learners will be divided into groups of five and take turns using the different construction toys and materials. The construction resources will be sanitised after each group had a turn using the materials. If possible, the activities will take place both indoors and outdoors.

Participation in this research project is completely voluntary. Teachers are free to withdraw at any given point. We also would like to request your permission to use your data, confidentially and anonymously, for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further research may include secondary data analysis and using the data for teaching purposes. The confidentiality and privacy applicable to this study will be binding on future research studies. We would like to ask your permission to use your answers to help other students in their studies, as the data sets are the intellectual property of the University of Pretoria.

The University of Pretoria will remain custodians of all data generated. The information will only be used for academic purposes, especially in article writing and planning for the improvement of the current unit of pre-service teachers in the department. The University also needs to keep on record that all protocols in attaining this permission were followed.

You are more than welcome to ask questions before and during the time of participation. If you have any concerns, please feel free to contact my supervisor or myself.

Yours sincerely,

Ms Karen Pienaar
Student
University of Pretoria
Email: pienaarkaren@gmail.com

Dr Judy van Heerden
Supervisor
University of Pretoria
Email: judy.vanheerden@up.ac.za

ADDENDUM III

Parent letter of consent

Dear Parent:

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

My name is Karen Pienaar, and I am a student at the University of Pretoria, Early Childhood Education Department (ECE). I am a Master's degree student at the department and doing my research project on the **implementation of construction play with young children.** This study aims to determine the value and role that construction and block play have on the development of young children's cognitive and problem-solving skills, especially from the teachers' point of view. This study will be looking at the teachers' understanding or lack of understanding concerning the implementation of construction play. The primary goal of this study will be to establish whether construction play benefits young children's cognitive development and, in the end, improves their understanding of mathematics, science, technology, engineering and their problem-solving abilities.

I am going to make use of semi-structured interviews, structured narratives and observations to gather information related to preschool teachers' perspectives on the importance of exposing young children to construction play and if they are aware of the benefits of construction play, such as for the development problem-solving skills. The sampling process will take no more than three days at a school. I will start the sampling procedure by asking the teachers to write a guided narrative about what they understand about construction play and what their experiences were like as a child engaging in construction play. Secondly, a semi-structured interview will take place asking the teachers more detailed questions about construction play. Throughout the three days, I will be observing the teachers and learners as they go about their daily programme. I will closely observe how they engage in construction

and block play and in the case where the school does not have any material, I will provide the necessary construction toys.

Should you consider allowing your child to be part of this study, please note that the name of the school, the teachers and children will always remain anonymous and confidential, and no photograph will be used where a child's face can be identified. The individual semi-structured interviews will be recorded on a voice recording device for accurate data generation purposes. I will make use of an observation sheet, photographic images and research journal to record the findings of the observation of the respective lessons. No photograph will be taken where a child's face can be identified, and photos will only be used in this study with the consent of their parents. I will be abiding by the COVID rules and regulations. Entering the school premises, I will wear a mask and have my temperature taken. When conducting the interviews, I will keep a distance of two meters and the observations will be done in small groups. All the learners will be divided into groups of five and take turns using the different construction toys and materials. The construction resources will be sanitised after each group had a turn using the materials. If possible, the activities will take place both indoors and outdoors.

Participation in this research project is completely voluntary. Teachers and children are free to withdraw at any given point. We also would like to request your permission to use your data, confidentially and anonymously, for further research purposes, as the data sets are the intellectual property of the University of Pretoria. Further research may include secondary data analysis and using the data for teaching purposes. The confidentiality and privacy applicable to this study will be binding on future research studies. We would like to ask your permission to use your answers to help other students in their studies, as the data sets are the intellectual property of the University of Pretoria.

The University of Pretoria will remain custodians of all data generated. The information will only be used for academic purposes, especially in article writing and planning for the improvement of the current unit of pre-service teachers in the department. The University also needs to keep on record that all protocols in attaining this permission were followed.

You are more than welcome to ask questions before and during the time of participation. If you have any concerns, please feel free to contact my supervisor or myself.

Yours sincerely,

Ms Karen Pienaar
Student
University of Pretoria
Email: pienaarkaren@gmail.com

Dr Judy van Heerden
Supervisor
University of Pretoria
Email: judy.vanheerden@up.ac.za

ADDENDUM A

The purpose of the questions bellow is to broaden my understanding of how you as a teacher implement construction play regarding young children:

Semi-structured interview:

School code: S1

1. What do you understand under the concept construction play? Building cognitive play language fine motor
2. Where does construction play usually take place? Indoors or outside? Mostly indoors
3. How often do the children in your class engage in construction play indoors? Every day 30 min
4. How often do the children engage in construction play outdoors? Twice a term
5. Which materials do you frequently use for construction play? LEGO Big blocks Duplo blocks (2-4 years) Small LEGO (4-5 years) Motor

6. How do the available construction materials for the indoor and outdoor constructions differ? For the outdoor construction materials: Waste material and more open ended
7. What requirements do you value as important in a construction play environment? Please motivate your answer. Enough space Small number of children playing at a station A mix of different materials
8. How much time do you think the children should play with construction materials during a normal school day? Very important 1 hour for the whole day
9. What do you think are the benefits or advantages of construction play? Fine motor play Imagination play Group work – the children learn to share Cognitive development
10. In your opinion what are the disadvantages of construction play? None
11. How do you think you can address the disadvantages of construction play? The teachers feel there is no disadvantages to address at their school

12. Do you use construction play to enhance problem solving skills in young children? Please explain. Yes – the teachers use different zoo animals for problem solving during construction play The children have to construct different enclosures for all the animals
13. Do both the boys and girls equally make use of the construction materials? If not, how do they differ in play? Yes – both boys and girls equally make use of the construction toys
14. How do you think construction play benefits a child's problem-solving abilities? The children have to put their scientific view on things when they are busy constructing
15. When your class is engaged in construction play, do they make use of any toys or materials and if so, what are those and how do they do this? Yes – small family figures Dinosaurs Small toys
16. Percentagewise how much time do the children prefer to play with construction materials compared to other toys? 60%
17. What type of constructions do the children build when they engage in construction play? Do you have evidence of any constructions? The teacher does not allow the children to build any guns Houses Helicopters Superhero's (4-5 years) Things they see on TV programmes

18. Does it sometimes happen that these constructions are being built over the course of a few days? If so, please provide an example. The constructions usually get broken down Sometimes the constructions are kept until the parents comes and fetches them
19. Do the children engage in group construction play activities or do they prefer to build their own constructions? Mainly group construction play

Thank you very much for your willingness to share your time, knowledge, and expertise with me.

Is there anything else you would like to share?

Magnetic constructions

There is a LEGO club, junior builder, that comes to the school. They have a set programme that they do with all the children.

ADDENDUM B

Structured Narratives:

School code: S1

Please write a 150-word story about your own experiences with construction play as a child:

A few things to keep in mind when writing your narrative:

- What is your earliest memory of construction play?
- Did you have your own construction toys (blocks, big or small LEGO) growing up and what were they?
- Did you enjoy construction play as a child? (Please explain why or why not)
- What constructions did you build as a child?
- Did you combine construction play with fantasy play? (Please explain why or why not)
- When building constructions would you make use of open-ended materials? When you were young or in your learning environment now (Please provide examples).
- If you have a photograph of yourself engaging in construction play, please will you provide a copy of the image?

School teacher 1:

As I was born in the 1950s, there were very few construction games available and as a female this was considered a very gender-related occupation, example, Meccano toys was for boys.

Our play tended to be domestic and imaginative. The pantry was an excellent outlet for constructive play. Piling tins of different sizes on top of each other.

Table-clothes and tables made excellent houses. Pots and pans were also excellent for building. Empty boxes, generally large, were few and between, but when available were used for building houses.

School teacher 2:

My eerste herinnering wat ek het van konstruksie spel was toe ek so ses jaar oud was. Ek het vreeslik baie pop gespeel. Op daardie stadium was my broer so agt jaar oud en hy het verkies om met blokke te speel. Ek en hy was altyd besig om huise en klomp verskillende goed te bou vir my poppe.

Toe ek ouer word het ek minder pop gespeel en meer met LEGO® blokke begin speel en my eie stede gebou en myself so in die spel ingeleef dat ek vir ure gesit het en speel.

Op ‘n later stadium het my ouers saam met ons begin voëlvoerders bou uit toilet papier rolle en selfs huisies vir klein goggas wat ons gevang het.

My first memory of construction play I have was from the age of six. I played a lot with dolls. During this time my brother must have been around the age of eight and he enjoyed playing with wooden blocks. He and I were always busy building houses and a bunch of other stuff for my dolls. As I got older, I played less with my dolls and more with LEGO® blocks. I would build my own cities and I was so fascinated with this form of play that I could sit there and build for hours. At a later stage, my parents and I started building bird feeders out of toilet paper rolls and I even built small houses for bugs I use to catch.

School teacher 3:

As a child I grew up with two sisters, so as a girl-only household we did not often play with blocks. If I think back, I can remember us building houses with boxes for our dolls, so we did combine it with construction play.

In my classroom, it is important for me to incorporate construction play on a daily basis as I have seen it encourages problem-solving skills.

As a mother with two young boys, I see they also love construction play and this can keep them busy for hours, playing with their LEGO® blocks. They will build anything they can think off, there are no limits to their imagination. When I see them playing like this, I wish we were more exposed as young girls to play with blocks as it is not only an activity for girls or boys, and this is what I try to instil in my class as well.

School teacher 4:

I remember playing with blocks when I was 12 years of age. I never had my own blocks; I was playing with my friend's blocks when I visited her.

Yes, I enjoyed construction play because it was something new to me, so I enjoyed playing with the blocks. I used to combine fantasy play with construction play because it was more fun in that way than to only play with blocks.

Yes, I used open-ended materials like boxes, tins and toilet paper rolls. I unfortunately do not have any photographs of myself engaging in construction play.

School teacher 5:

I grew up on a farm with lots of space and freedom, so we used to build all sorts of things. We had a big set of wooden blocks which we used as our base to construct things.

We are three siblings so there must have been some fights although I do not remember them. I have very fond memories of spending days adding and changing things.

Today, as a teacher, I try to create and build things that they want. At times I do feel it is necessary to set guidelines of what the kids must build, but that is only when I am looking to assess or watch if they follow instructions or work within a criterion.

School teacher 6:

My earliest experience as a child was construction play with LEGO blocks. Joining my two older brothers. It was our favourite type of play. We did combine it with plastic animals and small toy cars.

If I were to play the same construction play, I would add more open-ended materials, for example, boxes of different sizes.

I am currently a pre-school teacher and encourage my learners to engage in different construction play with as many open-ended props as possible. The fine motor skills, creative and imaginary play enriched my life and enlightened my career.

ADDENDUM C

Addendum C:

Observation checklist of learning environment:

School code: S1

Scale: 1 – None

2 – Partial

3 – Almost fully

4 – Fully

Checklist:	Scale:	Comments:
1. Does the school's learning environment for 4–5-year-olds have a dedicated construction play area?	**1** | **2** | **3** X | **4**	Every class has its own construction area.
2. Where does the construction play take place? (Indoors or outside?)	**1** | **2** | **3** X | **4**	Indoors
3. What materials does the construction play area have? (Tick the various options) • Wooden blocks • Large LEGO blocks • Small LEGO blocks • Boxes • Open-ended materials	**1** | **2** | **3** | **4** X **1** | **2** | **3** | **4** X **1** X | **2** | **3** | **4** **1** | **2** | **3** | **4** X **1** | **2** | **3** X | **4**	Name the open-ended materials: Toys Dinosaurs Toy animals Trains sets Toy cars

• Other					
4. Where are the construction materials stored?	**1**	**2** X	**3**	**4**	In the classroom, in different containers.
5. How accessible is the materials to the children?	**1**	**2** X	**3**	**4**	Most of the materials are accessible, but some is stored high on shelves.
6. Do the children know where everything is?	**1**	**2**	**3** X	**4**	Yes, the older children know where all the toys are.
7. Do boys and girls take part in construction play?	**1**	**2**	**3**	**4** X	Both engage in group and individual play.
8. How often do the children get the opportunity to play with the construction materials?	**1**	**2**	**3**	**4** X	Every day.
9. How does the teacher promote construction play?	**1**	**2**	**3** X	**4**	Yes, the children have set construction periods a day and external people coming in.
10. What stage of construction play are the	**1**	**2**	**3** X	**4**	**Stage 1:** Carry, move, hold, pile, knock down X

observed group of children engaging in?		Pile the boxes **Stage 2:** Vertically and horizontally X **Stage 3:** Enclosures appear **Stage 4:** Bridging begins X **Stage 5:** Patterns begin X **Stage 6:** Begins with dramatic play X Pack the dinosaurs in the boxes **Stage 7:** Symbolise real life structures X
11. Does the stage of construction play cohere with the age of the children?	**1** | **2** | **3** X | **4**	Yes – bridging, patterns and real-life structures occurred.

12. Does problem-solving occur during construction play?	**1** | **2**X | **3** | **4**	1. Understand: Understood how the blocks worked. 2. Plan: Plan structures and replan when they fall over. 3. Carry out/act: One girl was very driven and built a large construction. 4. Check: She checked the construction by building higher and if it fell down, redoing it by trying something different.
13. Additional observation		Prefer the wooden blocks. Do not really like the open-ended materials. Do not use the LEGO.

		Later they discovered some of the open-ended materials and started putting the toys in the boxes.

ADDENDUM D

Addendum D:

Play observation of children with construction and play resources:

School code: S1

Date and time:	Situation:	Participants:	Action Observed:	Reflection:
11/02/2021	**Is construction play taking place indoors or outside:** Indoors, in the classroom	**Number of children, girls and boys taking part in construction play:** 4 - Children 2 – Girls 2 – Boys **Teacher interaction towards children:** Teacher is an observer, but very interested. **Teacher's general attitude towards this form of play:** Teacher has a positive attitude.	**Type of construction play:** • X **Box play** • X **Block play** • X **Big LEGO play** • **Small LEGO play** • X **Open-ended material play** **Materials and resources used:** Boxes Wooden blocks Toy animals Open-ended materials Big LEGO	The teacher was very open to the experience. The children preferred the wooden blocks and started playing with them and the toy animals. They did not like playing with the LEGO or some of the open-ended materials. Later on, they started playing with the boxes.

ADDENDUM E

Addendum E:

Polya's problem-solving techniques:

School code: S1

Do the children make use of Polya's problem-solving techniques when engaging in construction play activities?:

Understand: The children understood the problem that was set "they had to build a house to keep the dog dry from the rain". One girl did her own thing and continued building her own constructions. One boy rather wanted to build a car and not a house.	**Plan:** The children got distracted a lot. They tried out different boxes to see what works the best. Varies from group play to individual play. One boy took the wrapper of the water bottle to make a TV for the dog in his new house.
Carry out/ Act: The boys started playing with the boxes and pretending they are cars. The children rather wanted to play with the boxes than build a house for the dog. One boy ended up crawling into a box.	**Check:** None of the children checked their constructions. In the end there was no construction built to solve the problem.

One girl continued with her own construction and never even tried to build a house.	

ADDENDUM F

Addendum F:

Teacher's personal information:

School code: S1

Teacher's age:	67 years
Teacher's years of teaching experience:	47 years
Teacher's home language:	English
Teacher's qualifications and training:	B.Ed in Early Childhood Education
Schools language of teaching and learning:	English