

Children's Perceptions of Play and Learning with LEGO Bricks

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ABSTRACT

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Play is a crucial component of children's healthy growth and development. There are many different types of play, each with its own characteristics and benefits. Friedrich Froebel, the pioneer behind the concept of Kindergarten, was a strong supporter of play in early childhood among many other scholars and reinforced the idea of children's self-directed activities. The aim of this research was to explore how children perceived and experienced play and learning by observing them play with LEGO bricks. Free-building and structured building (with model cards) were offered. Four children in Grade 1 were chosen to participate in four LEGO play sessions and one drawing session. I took on the role of a participant-observer, facilitating conversations with the children to learn more about their ideas, thoughts, and perspectives on LEGO building. Incorporating children's narratives was a key component of this study, as it illuminated their perceptions of play and learning and how these experiences shape cognitive, social, and motor development. The results indicate that teachers should integrate hands-on experiences and intentionally designed play activities within their classrooms, as constructive play serves as a powerful mechanism for learning. When these experiences are paired with opportunities for dialogue, both between children and in child-to-teacher interactions, they create space for reflection, knowledge-sharing, and collaboration, thereby deepening the learning process.

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Children's Perceptions of Play and Learning with LEGO Bricks

Introduction

Throughout the years, research has addressed many aspects of children's play and development, which allow parents and professionals to learn about and try different teaching methods. As children begin to discover themselves and their preferences, they also learn to speak and share their thoughts with family and friends. In the early elementary years (Pre-k to Grade 2), children are often eager to contribute to discussions and conversations, yet there is a lack in the literature on the way they perceive and experience play and learning. Offering opportunities for children to express themselves can serve as a crucial role in supporting academic performance alongside personal development and well-being, as they become active participants in their classrooms (Urbina-Garcia et al., 2022).

Barnett (2013) mentions that only a few studies have addressed directly asking children about their play, so she created a scale called Children's Perceptions of Their Play (CPTP) to measure the way children in third through fifth grade perceive play. Results indicated that children characterized their play in terms of six aspects: freedom of choice, interactions with friends, guided activities with voluntary participation, engagement, physical activity, and free time (Barnett, 2013). Some of these concepts will emerge later on in this research, as a result of the data collected. An older study conducted by Boggiano, Main, and Katz (1988) explored how children's perception of personal control and academic competence affects intrinsic interest and preference for challenging school activities. Their research highlights the impact of children's self-perception and approach to challenges, and although not directly related to this topic, this inquiry emphasizes the importance of valuing children's contributions and perspectives. Given the research that suggests that adults sometimes overlook young people's knowledge of

themselves, the current research seeks to explore perceptions of play and learning through children's own eyes, in order to create more meaningful opportunities for them to engage, reflect, and develop holistically. By providing open-ended play sessions with the option to free-build or recreate a structure from a model card, children will have the opportunity to share their thoughts, ideas and narratives regarding the process.

As the researcher, my own experiences and background have influenced how I approach this topic. As a child growing up, I felt that I had safe spaces to share my thoughts and feelings with family and friends. Educators in my private elementary school were always encouraging us to participate, experience, and share what was on our mind. Now, as an elementary school teacher in the public system, I view this from a teacher's perspective and can see the importance of children's positive perceptions of playing and learning during their day-to-day experiences at school. My interest in this topic stems from wanting to learn more about what children have to say, and how they convey their experiences. As a teacher, this will allow me to develop stronger relationships with students and create more meaningful learning opportunities centered around play.

Literature Review

The Role of Play in Child Development

Play, as children's primary pastime, is not defined in one approach. Rather, this topic is often debated, with researchers disagreeing between the reasons for play, which actions should be included in play, and how it affects a child's learning and growth (Pyle & Danniels, 2016). One way to identify the concept of play is by associating it to various characteristics, and from there, one is able to distinguish several types of play. Wallerstedt and Pramling (2012) mention terms such as spontaneity, exploration, aimlessness, an end in itself, pleasurable, and non-utility

when they discuss how theoreticians have delimited play. Classical theorists such as Huizinga (1938) and Callois (1958) characterize play as freely chosen, opportunistic, and more focused with means than ends. With knowledge of these elements and after having observed how children play and with which objects they use, researchers can classify forms of play. Most play styles can be categorized as imaginary, social, rough and tumble, solitary, constructional, symbolic, and manipulative (Bateson, 2005).

For early childhood, play and learning are fundamentally interconnected in that a child's ability to learn is dependent on their play experiences (Wallerstedt & Pramling, 2012). This makes play a subject of vast importance in the field of childhood education and development. Bateson (2005) explains how a child's motivation to explore through play is intrinsic, with eagerness increasing if the activity is self-chosen. Once the child discovers that their skills can be strengthened through practice, they will feel more enjoyment towards the play experience and thus enhanced motivation to continue. Play, however, is the first expendable activity to depart when something is wrong or missing for the child (Bateson, 2005). If short-term needs are not met, play is not able to occur. In an ideal scenario, all children can play to their heart's desire and make it central to their development of creativity and communication (Henricks, 2020).

Alongside this, there are numerous benefits to playing which vary between stages and types of play. Henricks (2020) highlights one key outcome which can be applied to the concept of play across different stages of childhood: the facilitation of self-realization. He explains how in most play experiences, children start by understanding the situation they are in, recognizing the capabilities they hold, and then identifying action-strategies they can attempt. Broadly, other benefits of play consist of learning problem-solving skills, strengthening social relationships,

developing physical abilities, and regulating the nervous and musculature systems (Bateson, 2005).

Moreover, optimal play experiences require suitable environments where children feel secure. This means providing a supportive social atmosphere as well as ample opportunities for imaginative, self-managed behaviors (Henricks, 2020). Zinn (2019) explains that the educator's role is to use play as a stimulus to create and organize invigorating spaces where playful experiences and inquiry learning can unfold. Since "play is a self-propelling force for learning," early childhood environments should support the active development of experiences and meaning making (Zinn, 2019, p. 33). This reveals how play functions as developmental scaffolding for young children (Bateson, 2005). Particularly, social, emotional, and cognitive domains are positively supported and affected, until the moment arrives when play is believed to become less consequential on development, in early adolescence (Henderson & Shipway, 2024).

Structured and Unstructured Play. This research study will offer children the opportunity to play with LEGOs: either freely constructing or recreating a structure that is depicted on a model card. By offering these choices, children can opt between an open-ended or more direct approach to building. Structured and unstructured play have many common features, but the most prominent one is that the foundation of play is built on feelings of pleasure and enjoyment. Structured play, which some also describe as adult-guided play, is goal-oriented with rules, instructions, or directions associated with the actions (Pyle & Daniels, 2016). It can also be characterized as being situated between direct instruction and unstructured/free play. For example, Massey (2013) used props during a structured play session that followed the reading of a storybook as a method for enhancing children's vocabulary and literacy skills. Pyle and Daniels' (2016) perspective suggests that if an adult is involved in a structured play session, the

locus of control should remain with the child. That way, the concept of play as child-directed can be reinforced. The adult's objective is to enhance the learning experience by taking on various roles which allow the child to discover new ways of engaging with play materials while connecting objects to past lessons or activities (Pyle & Daniels, 2016; Massey, 2013).

Unstructured or free play is open-ended, spontaneous, and involves creative thinking as one imagines and builds based on personal ingenuity. Wallerstedt and Pramling (2012) explain that children's self-selected play is based on their past experiences and the cultural mechanisms they have learned. Henricks (2020) integrates into this idea the fact that pleasure from playing is achieved while children investigate themes relating to the everyday activities of older children or adults. Some individuals may be in the same space as their parents while they work from home, often mimicking the gesture of picking up a phone and having a conversation. Other children may be completely unaware of what their parents do for work and not represent these depictions in their play. If children are in control of their chosen activities and enjoying themselves, they will be able to take advantage of the numerous benefits of play (Pyle & Daniels, 2016).

Theory of Flow. An optimal experience, referred to as 'flow,' occurs when a person becomes deeply engaged in the activity so that their actions become practically instinctive (Csikszentmihalyi, 2014). For children, certain types of play allow for the transformation to a fully immersive experience, creating a harmonious connection between themselves and their environment (Primus & Sonnenburg, 2018). Pleasure and enjoyment are what fuel children's ability to get into the optimal state of flow (Csikszentmihalyi, 2014). During early childhood, children experiment with movements, language, and objects in different environments. Often, they will become completely immersed and concentrated while learning, a clear sign of what enjoyment is about (Csikszentmihalyi, 2014). Ultimately, when children reach the state of flow,

they are experiencing total engagement with the activity and develop feelings of motivation, happiness, and efficiency (Primus & Sonnenburg, 2018).

Primus and Sonnenburg (2018) expand on the theory of flow by describing certain features and elements relating to the experience. They explain how being in flow signifies a duality of feeling and performing at optimal level. Additionally, this phenomenon can be understood by most people, as they connect it to personal experiences (Primus & Sonnenburg, 2018). Since flow involves a significant sense of control, or rather the lack of worry about forfeiting control that is common in various situations of daily life, most cultures can relate to the feeling of flow as it applies in their own socio-cultural context (Csikszentmihalyi, 2014). The theory of flow, being nearly universal, also relies on the environment, an element that may change the amount of flow (Primus & Sonnenburg, 2018). When researching the theory of flow and its' relation to children's play, the concept of creative flow comes to light, as creativity is a key element in human progress. Creative flow differs from typical flow in that it includes the search for discovery and innovation (Primus & Sonnenburg, 2018). Most notably, while children or adults are in flow, they can set aside unpleasant aspects of life and focus on the feeling of profound enjoyment for a little while (Csikszentmihalyi, 2014).

After having conducted a thorough search online for academic articles pertaining specifically to children's perspectives of play and learning with construction toys, none were discovered. Two articles were found with similar concepts: one was relating to adult-child interactions and their implications for children's perceptions of play; the other was about differences in practitioners understanding of play and how that affects pedagogy and perceptions of play (see McInnes, Howard, Crowley, & Miles, 2013; McInnes, Howard, Miles, & Crowley, 2011). Interestingly, the constructivist perspective views children's perceptions as evolving from

various learning experiences over time and deems them significant in cognitive and motivational functioning (Bouffard et al., 2003). Similarly, constructive play facilitates the opportunity for children to guide their own play while interacting with peers, which are essential aspects for cognitive and social development (Allard et al., 2025).

Children's Perceptions on Play and Learning

Before delving into children's perceptions on play, it is worthwhile explaining that we are beings who are aware of ourselves, as the consciousness of the self is what distinguishes us from other life forms (Oyserman, 2001). This means that we have a self-concept, made up of one or more ideas about our nature. This concept, which also represents how we perceive ourselves, guides our development from infancy to late adulthood (Oliveira et al., 2024). Positive and negative self-perceptions are significant to people's daily lives, as they affect experiences, impact motivation and emotions, and guide behaviors (Molina, 2015). Oyserman (2001) mentions that some scholars view self-perception as a driving force of competency and self-improvement. Additionally, between the ages of two to eight, children's descriptive explanations regarding this concept change from "physical to psychological terms" as their language skills ameliorate (Oyserman, 2001, p. 505). To learn more, this current research will explore how children perceive and experience play and learning within a constructive play environment.

Taking into consideration children's views and perceptions on play, as well as other classroom related topics, such as the types of lessons teachers implement, can be valuable information to help strengthen curricula and play experiences. Although children are not expected to understand the causes and implications of play on their development, they still "have a contribution to make as partners in the search for educational improvement" (Hyland, 2000, p. 22). According to Hyland (2000), children are more self-aware and reflective than adults

commonly presume, especially in the realms of teaching and learning styles as they are the ones in the classrooms absorbing new knowledge. Thus, if given the opportunity to share their thoughts and feelings, children may surprise us with ideas that only young creative minds can come up with (Hyland, 2000).

A study conducted by Ivrendi et al. (2019) explored Norwegian and Turkish preschool children's perceptions of play. Their results presented one common theme for participants' description of play: the feeling of fun and happiness while playing. For Turkish children, their favored play material was LEGO bricks, whereas Norwegian children preferred fixed play structures, such as playground equipment (Ivrendi et al. 2019). Moreover, as children's perceptions are tied to direct experience, they also highlighted the social dimension of playing with friends and its' enhancement on the moment (Ivrendi et al., 2019). The researchers concluded their study with a recommendation geared towards educators and parents, suggesting the use of children's perceptions on play to restructure the environment by making it more suitable to youngsters' curiosities and interests.

Pyle and Alaca (2018) conducted a similar study, focusing on Kindergarten children's perspectives of play and learning. The findings indicate that play is identified by children when they have ownership and choice of the activity. Further, learning personal-social skills, such as collaboration and sharing, was also an element participants described (Pyle & Alaca, 2018). When it came to learning, children's perspectives varied. For classrooms where play and academic learning were seen as interrelated concepts, teachers were often engaged in play scenarios and collaborating with students to learn together. In classrooms where play and learning were seen as separate constructs, teachers were not around during play periods and would instruct using a whole group approach (Pyle & Alaca, 2018). Similarly to Hyland (2000),

Pyle and Alaca (2018) emphasize how understanding children's viewpoints can influence and shape educational experiences in different environments.

Miller and Kuhaneck (2008) chose to focus their qualitative study on 7- to 11-year-old children's perceptions of play experiences. Comparable to other research (Csikszentmihalyi, 2014; Ivrendi et al., 2019; Henricks 2020), enjoyment and fun were two main considerations for associating an activity to play (Miller & Kuhaneck, 2008). These key elements should be paired with a particular level of active participation among children. Additionally, since participants in the current study are in middle childhood, Miller and Kuhaneck (2008) indicate that the concept of fun becomes more subjective as children's play preferences expand and develop into more personalized activities. Taking this into consideration, actively listening to and engaging with children's perceptions of play and learning helps educators better understand these experiences and consider how they can be more effectively integrated into the classroom.

The LEGO Company and LEGO Play

In 1932, Ole Kirk Christiansen, a Danish craftsman, founded the LEGO company (Lauwaert, 2009). He began making toys in the ordinary fashion of the time: by using his spare wooden materials to create playthings. Up until 1960, the LEGO company used wood as the main element for building toys. When a fire destroyed all the spaces that had stored the wooden toys, LEGO shifted to using plastic as their main building material (Lauwaert, 2009). It is essential to highlight that LEGO was not the inventor of the plastic building brick. The company was inspired by a British child psychologist's work, Hilary Page, who had created The English Kiddicraft Self-Locking Bricks (Lauwaert, 2009). In 1981, the LEGO company bought the rights of Hestair-Kiddicraft, giving them the license to the interlocking brick design. Once LEGO began creating toys with plastic, they received mixed feedback from consumers. Although some

were content with the less expensive, easy to maintain and colorful designs, others correlated plastic, in contrast to wood, with superficiality and inauthenticity (Lauwaert, 2009). Despite this, during the 1950s and 1960s, the LEGO Company was able to create advertisements aligning with contemporary parenting concerns. For example, as the United States' participation in the Vietnam War started to intensify, LEGO shifted children's attention away from war-themed toys towards construction (DeLaCruz, 2021). LEGO gained popularity as a safe and creative children's toy which could be played indoors (DeLaCruz, 2021).

Learning Through LEGO Play. As a construction toy, LEGO bricks have many educational and positive outcomes. Building, as a gesture, is a meaningful activity where children learn about an item from dismantling and reassembling it (Lauwaert, 2009). During these moments, children are also actively applying their structure-forming and decision-making skills. Additionally, psychologist Dorothy Singer associated construction toys with children's development of patience, cooperation, delay of gratification, sharing, and strategizing, all while amplifying comprehension of the building process (see Lauwaert, 2009). In 1958, the LEGO Company released a new interlocking mechanism called the Stud-and-Tube Coupling System. This meant that bricks now had studs on top and tubes underneath, much like the LEGO bricks we have today (Lauwaert, 2009). This innovative design multiplied the creativity and potential of construction, allowing for bigger and more complex creations such as planes, cars, and boats (Lauwaert, 2009). After almost a century, LEGO bricks have gained global success in childcare and educational establishments, influencing play, teaching practices, and children's abilities.

Ng and Lim (2023) used LEGO construction as a means to help children develop their descriptive language abilities. They noticed children in the Kindergarten classroom had difficulties describing characters, settings and items in their narratives but observed how much

they took pleasure in playing with construction materials, notably LEGO bricks. Ng and Lim (2023) decided to have students use LEGO structures as props while storytelling; that way more interactive visualizations would be displayed throughout the presentation. Since constructive play materials support narrative recall for children revisiting a story, they can use a wider range of words to describe physical features and characteristics of story elements. The results of Ng and Lim's (2023) study revealed that children became more involved and engaged in the sequence of storytelling when paired with LEGO bricks. This is mainly because LEGO construction supported children's intrinsic motivation to partake in storytelling. Thus, a positive association between social interaction, constructive LEGO play, and language development was discovered throughout this research (Ng & Lim, 2023). In their study, Henderson and Shipway (2024) used LEGO Serious Play as a means for facilitating communication about students' anxieties relating to the yearly school transition process. LEGO Serious Play is an approach that was created on the basis that LEGO inspires children to "build their dreams [...], so perhaps adults could be asked to build their visions for future strategy" in businesses (LEGO, n.d., para.2). Alongside Kirk Kristiansen, this approach was designed in 1996 by two professors in Switzerland who wanted to emphasize the value employees bring to strategy development by offering them a creative outlet. By using LEGO bricks to promote problem-solving and conversations regarding individual challenges or larger issues, ideas were developed through building, creating, and modeling (LEGO, n.d.). The LEGO Serious Play approach is generally used by adults, however Henderson and Shipway (2024) wanted to explore its' effects with 7-to-11-year-old children. They explained that one notable quality of LEGO Serious Play is the 'unlocking,' which transpires throughout the process of recreating their anxieties through building, as children begin to focus more deeply on their LEGO models (Henderson & Shipway

2024). Consequently, students' stories, with elaborate explanations and meaning, can flow freely. Following the study, participants were able to address concerns that caused them anxiety by using LEGO bricks to recreate these scenarios and having discussions with peers and adults on possible management approaches to these transition stressors (Henderson & Shipway 2024).

Myhre's (2019) research centered on exploring territories of playfulness in Kindergarten. To rethink some sedimented practices, Myhre (2019) uses new materialism theory to explain how LEGO bricks represent matter which is constantly interacting with other materials and creating several meanings. According to Myhre, LEGO bricks are capable of emerging as an agential force which creates affects and effects when coming together with other play materials. Based on this, the traditional LEGO play discourse may be transformed and reinvented as something unconventional or innovative. For instance, this might mean seeing a child pour all the LEGO bricks onto the floor and taking a step back to think critically about why they did so before asking them to clean it back up (Myhre, 2019). Does the behavior show an expression of joy or anger? Was this action done to irritate the adults in the room? Is this typical behavior for the child? Myhre (2019) wanted to challenge and change the narrative of regular LEGO play for teachers to understand that there is not one proper way to play; rather, there are different types of perspectives on play. Ultimately, she states that "LEGO and humans release one another's potentialities when colliding in Kindergarten" and determines that unconventional LEGO play can also be used for children's constructive learning and development (Myhre, 2019, p. 213).

Theoretical Framework

Froebel's Play as a Holistic Developmental Practice

In the past two centuries, many early childhood and play theorists have made significant impacts on the field of child development. The most notable figures include Froebel, Vygotsky,

Piaget, Erikson, Montessori, Parten, and Sutton-Smith (Monroe University, n.d.). Despite Froebel's work being one of the first in the field, his influence helped create a strong foundation for more contemporary research as his ideas and principles are still relevant in current educational practices.

Friedrich Froebel (1782-1852) was a pioneer in early childhood education, most well-known for creating the concept of the Kindergarten, a space where children could explore and play under the guidance of an informed educator (Lauwaert, 2009). Froebel considered play as "the highest phase of child development" and believed it to be "the purest, most spiritual activity of man at this stage" (Froebel, 1887, p. 54-55). His key ideas revolve around children's self-directed activities, engaging with nature, and the centrality of play while respecting the value of childhood (Hoskins & Smedley, 2018). Eight Froebelian principles were developed in relation to these key ideas: unity and connectedness, creativity and the power of symbols, the central importance of play, engaging with nature, knowledgeable and nurturing educators, autonomous learners, the value of childhood in its own right, and relationships matter (Froebel Trust, n.d.). These principles have the purpose of emphasizing children's development, well-being, and learning through creativity, play, and personal experiences which are child initiated (Hoskins & Smedley, 2018). Additionally, Froebel created "gifts" for children to use in the Kindergartens, which were toys he designed that came with detailed instructions to help children develop connections in their learning (Lauwaert, 2009). Once they take a familiar object and experiment with it, children build on their previous skills and knowledge, thus enhancing the process of learning. Various types of gifts were created in sequential order, ranging from simple colored felt balls with strings attached to them, three wooden shapes hanging from a bar, and the more complex toys which were sets of differently shaped wooden building blocks (Froebel Trust, n.d.).

This indirectly led to Froebel becoming a central figure in the expansive adoption and commercialization of construction toys. While he did not invent the concept of building blocks, when his writings on early childhood education became more widespread, these toys gained popularity (Lauwaert, 2009). Toy manufacturers began producing and selling building blocks, basing the rationale on Froebel's then contemporary pedagogy. By the mid-19th century, these blocks were sold in Germany as 'Froebel's Building Blocks' (Lauwaert, 2009).

Froebel's writings and research go on to explain how play is the foundation for success in the later stages of life. He writes "a child that plays thoroughly, with self-active determination, perseveringly until physical fatigue forbids, will surely be a thorough, determined man, capable of self-sacrifice for the promotion of the welfare of himself and others" (Froebel, 1887, p. 55). As reinforced by numerous theorists since, this suggests the importance of play early in life, and as an expression of a child's understanding and imagination. Froebel believed self-directed play nourished the child's inner life, and with the gifts he provided to Kindergartens, children were able to reveal their ideas and thoughts through construction (Hoskins & Smedley, 2018). As a closure to his section on the significance of play during childhood in *The Education of Man* (1887), Froebel explains "the plays of childhood are the germinal leaves of all later life; For the whole man is developed and shown in these, in his tenderest dispositions, in his innermost tendencies" (p. 55).

Having brought to light the powerful role of play in childhood and its' ability to enhance the subsequent stages of life, I chose to base my study on Froebel's research about childhood and play, as he outlines and describes how it is a necessity in children's healthy development. Since I will be inquiring into the way children perceive and experience play and learning with LEGO building bricks, my research will mainly focus on two of Froebel's theoretical principles. They

are cited in full below as each one consists of aspects that are directly related to the data gathering process:

1. “Autonomous learners: Each child is unique and what children can do rather than what they cannot, is the starting point for a child’s learning. Children learn best by doing things for themselves and from becoming more aware of their own learning. Froebelian educators respect children for who they are and value them for their efforts. Helping children to reflect is a key feature of a Froebelian education.
2. The central importance of play: Play is part of being human and helps children to relate their inner worlds of feelings, ideas and lived experiences, taking them to new levels of thinking, feeling, imagining and creating and is a resource for the future. Children have ownership of their play. Froebelian education values the contribution of adults offering ‘freedom with guidance’ to enrich play as a learning context.” (Froebel Trust, n.d.)

Applying these principles, this study provided opportunities for children to build, recreate, and reflect on their creations through hands-on engagement; thus, reinforcing Froebel’s theory of play as a holistic developmental practice.

The Present Study

As noted in the literature on various components relating to children’s play, the way children perceive and experience play and learning requires further study. By offering participants the opportunity to free-build or recreate a structure, I aim to delve further into what aspects children recognize while playing, and how they relate these to their learning processes.

The following research question will inform the inquiry: *How do six-and-seven-year-old children perceive and experience play and learning when engaging with LEGO bricks?* This research

aims to support teachers in integrating constructive play in their classroom, while strengthening children's well-rounded development.

Methods

Research design. The present study was conducted using a qualitative method, based on a phenomenological approach exploring how young children perceive and experience play and learning with LEGO bricks. The essence of this research, focused on individuals' lived experiences, investigated the phenomenon of children's perceptions and experiences while engaging in constructive play. This qualitative approach, alongside Froebel's theoretical framework on play, allowed for children's perspectives to be seen and heard.

The data collection for this research involved a group of four children engaging in four play sessions and one drawing session, where I acted as a participant-observer, using a similar method as Chang-Kredl, Mamlok, & Venkatesh (2023), who acted as play partners while conducting naturalistic observations and asked the children questions to gather their perspectives (see Appendix A).

Participants

Four children from one Grade 1 class participated in this study. Students in Grade 1 were selected to take part in this study because, from my experience, those entering Kindergarten post-pandemic are still in the process of developing their expressive abilities. Consequently, after spending at least one year in the school system before starting Grade 1, children's expressive abilities are more advanced, and play optimally continues to be a part of the classroom curriculum. Although Froebel's framework centers on early childhood and Kindergarten, children in the early stages of primary education are often still learning through engaging and playful activities. This extends the relevance of Froebel's ideas to a Grade 1 context, reflecting

continuous holistic development and the increasing importance of play-based activities in classrooms. Therefore, this was the ideal age range to explore my research topic. The other inclusion criteria was that the participants spoke English as their first language; this was necessary as data collection involved recording their reflections and thinking while playing individually and with peers.

To recruit participants, e-mail communication was established with a small, private elementary school in Montreal. A meeting with administrators occurred to provide more information and discuss research protocol. After agreeing to have this research take place in the school, I sought and received consent from the following parties: the principal, the coordinator of clinical services/social worker, the resource coordinator, and the three classroom teachers (See Appendix C). Then, the school's social worker assisted in the selection process of participants who seemed to enjoy LEGO building from one class by reaching out to parents and providing all necessary information and documentation.

In terms of consent procedures, parents were sent information and consent forms by e-mail, with a description of the activities their child would take part in, the information collected and how it would be kept secure, and potential risks that may occur during the research process. After the parents had agreed to allow their child to participate and sent back the forms signed, I spoke to the teachers of the class, ensuring they were aware of the process which also permitted children to miss instructional time (See Appendix C). Before beginning the sessions, I explained to each child the activities we would do together and read to them the Child Assent Form (See Appendix E). I explicitly mentioned that there would be no consequences if they ever wanted to stop participating and that their parents had agreed to let them play if they were interested. To

maintain confidentiality, the four participants are identified with pseudonyms throughout this study: Adam, Ethan, Talia, and Jonah.

Materials

Four play sessions and one drawing session made up the data collection process. The primary material used for the LEGO play sessions were two LEGO Classic Creative Brick Boxes. Each set contained 790 pieces of varying sizes and colors made for children 4 years old and older. Each box comes with a catalogue of structures that can be built from the LEGO pieces provided. During these four sessions, children could browse the booklet and get inspired to create something they saw, or they could also choose to recreate something from a model card, which shows photos of various angles of the structure with a difficulty level ranging between easy, medium, and hard. Otherwise, children could freely build with LEGO. During the third play session, seashells and small pieces of wood were brought in as natural materials that children could choose to incorporate into their play. For the fourth play session, rubber elastics were brought in as requested by participant Jonah from the previous session. For the fifth and final drawing session, markers and white paper were brought in for the children to use, although some opted to bring their own pencil cases to the session.

Procedure

Once the participating classroom's teachers had received written consent from the four students to participate in the study, I spent two full days in the children's classroom so that they could become familiar with my presence prior to beginning the data collection. It was important that the children developed a comfortable and trusting connection with me, as they are more likely to share their perspectives when they feel secure with an adult (Pianta, 1997). At the beginning of the first day, I explained who I was and the project I would be working on with

some children. Then, I spent the rest of the days circulating the room, helping, and becoming familiar with the children. Before starting the play sessions, a comfortable and quiet space in the school had been allocated for the data collection. For each session, I would pick up the children from the classroom, and we would walk together to the space. Each time we began, I would read to them the script, which explained the process and that they could decide to stop playing or participating at any moment (See Appendix A). Throughout all the sessions, children were encouraged to talk amongst themselves and share their thoughts aloud. The participants were always eager to begin, often opening the bins before I had finished speaking. All sessions were video-recorded using equipment from Concordia's Technology Department. The camera was installed in an area of the room that captured both people and play space. Additionally, during the sessions the participants were asked to take photos of their LEGO creations using my personal mobile. Parents were explicitly made aware of the technology used in the consent form, and the children were reminded before each session. These photos provided a way to gain more insight into participants' perspectives, as they revealed ideas and expressions that were not said verbally but were clearly depicted through the captured images.

Each of the data collection sessions lasted about 45 minutes. This allotted timeframe allowed children to enter the optimal state of flow, where they could experience deep concentration on the tasks at hand (Csikszentmihalyi, 2014). Additionally, this is the recommended amount of time for play periods in Kindergarten, as mandated by the Quebec Ministry of Education (Québec Ministère de l'Éducation, 2025). In the two first sessions, the children had the opportunity to explore the LEGO bins or to recreate a structure from a model card. This gave them the chance to become comfortable with my presence and the research process. When the third session came around, I decided to bring in natural elements to see if and

how children would incorporate these into their building. For the last session, participants were also able to include rubber elastics within their structures.

Each play session was conducted by following the same protocol (see Appendix A). The drawing session had a similar routine, yet different protocol (see Appendix B). The data was collected by asking children open-ended questions about play, LEGO bricks, their feelings towards certain ideas, and their thoughts and stories. Sometimes, to probe further I would comment on their structures, pose specific questions, and encourage them to continue exploring. The table below depicts the chronological order and activities of the sessions.

Table 1

Description of the data collection sessions

Session Type (approx. 45 minutes each)	Material Provided	Activity
1st LEGO Play Session	Two LEGO Brick Boxes (catalogue included) and model cards.	Children can choose to freely build or recreate a structure from the catalogue or model cards.
2nd LEGO Play Session	Two LEGO Brick Boxes (catalogue included) and model cards.	Children can choose to freely build or recreate a structure from the catalogue or model cards.
3rd LEGO Play Session	Two LEGO Brick Boxes (catalogue included), model cards, seashells and pieces of wood.	Children can choose to freely build, recreate a structure from the catalogue or model cards, and incorporate natural materials into their play.
4th LEGO Play Session	Two LEGO Brick Boxes (catalogue included), model cards, seashells,	Children can choose to freely build, recreate a structure from the catalogue or model cards, incorporate natural materials and/or rubber elastics into their play.

	pieces of wood, and rubber elastics.	
Final Drawing Session	White paper and markers.	Children looked at all the photos they had taken from previous sessions and then were prompted to draw themselves playing with LEGO.

Example of Some Questions Asked During Play Sessions (see Appendix A):

- Tell me about the first time you played with LEGO.
- What do you like most about playing with LEGO?
- What are you building?
 - How do you feel about the way it's turning out? Why?
- How do you decide what to build?
- Can you tell me about a part of your building that was tricky or took more effort?
- What do you think you've learned while building with LEGO?
 - How does it feel when you figure something out while building?
- Can you show me something you've built that you're really proud of?
 - What makes you feel proud about it?
- If you could change or add something to your creation, what would it be?
- What do you like about playing with LEGO by yourself or with others?
- What new ideas have you tried with LEGO lately?

The inspiration for these types of questions came from O'Reilly and Dogra's (2017) book titled *Interviewing Children and Young People for Research*. They emphasize that using open questions and statements during the study invites the participants to share more and provide a

narrative on the topic. Additionally, this approach allows children to construct responses in their own words, a critical element to this qualitative study (Dogra & O'Reilly, 2017).

After the four play sessions were completed, a final 45-minute drawing session with the children was conducted. Drawing can provide a creative medium for children to extend their imaginative skills and when social exchanges are encouraged, their interests can be shared, also providing adults with insights into developmental abilities (Coates & Coates, 2006). To begin, we were situated in the same area as the LEGO play sessions and the participants were provided with white paper and markers, although some chose to bring their own pencil cases and markers. Before drawing, we looked at all the photos of LEGO structures taken from previous sessions in a slideshow presentation. Afterwards, I asked them to: "Draw a picture of you playing with LEGOs" (See Appendix B). They had about 15-minutes to draw and then were prompted to share and describe elements in their drawing, and their overall experience in this study (see Appendix B). This concluding session signified an end to the data collection process with the children, where they had a final opportunity to share any remaining ideas with the group.

Reflexivity and Validity

Researcher reflexivity is a crucial component in the process of conducting research ethically and honestly (Hayes & Singh, 2012). It requires active self-reflection and awareness of one's own biases, thoughts, assumptions, and feelings throughout the entire research process. As an elementary school teacher currently substituting at various EMSB schools, I came into the research with prior knowledge of child development and plenty of experience working with younger children. As a child, I was not interested in LEGO bricks as they were not readily available in my environment. However, as an adult, I have begun appreciating the concentration and skills required to build a structure and have acquired LEGO sets over the years. On the

positionality sequence, I lean closer to the insider researcher section, as I have some familiarity with the phenomenon of children's play, but not so much that of children's expression of competence (Hayes & Singh, 2012). Writing a reflexive journal at each stage of the research process assisted in the authenticity of the results (Hayes & Singh, 2012). This included documenting my thoughts, feelings and interpretations while collecting and analyzing the data. Hayes and Singh (2012) reinforce acknowledging subjectivity as a means for researchers to become closer to their work while understanding the phenomenon more profoundly.

Regarding validity to ensure my findings are credible and trustworthy, Maxwell (2012) suggests omitting leading questions while speaking with children and using respondent validation to affirm the true meaning of what was said. As required, I had asked children to clarify what they said or stated some phrases back to them in a more comprehensible manner. Since Maxwell (2012) encourages the researcher to understand their influence on the study, one of my goals was to outline and acknowledge my personal beliefs and how these may influence my results. Another goal was to approach all communication neutrally or without influencing children's answers, while demonstrating empathy and respect towards my participants (Hayes & Singh, 2012). This took some practice at first, although by the second half of the data collection I was more aware of the way I was staging questions, or probing for information. Additionally, when including children's voices in my analysis, I aimed to represent both the accuracy and emotions as precisely as possible. To do so, transcriptions included all spoken words, verbal and non-verbal gestures, and pauses (Saldaña, 2021). This also allowed for emotional content expressed to be captured and included in the analysis, as emotions conveyed about the phenomenon are important elements of children's voices and play (Hayes & Singh, 2012).

Data Analysis

Once the data collection period had been completed, each session was manually transcribed and organized into a table format to ensure selected codes would align with their data (See Appendix H) . First cycle coding began, which focused on disassembling data to discover meaning (Saldaña, 2021). A blend of in-vivo, descriptive, process, and emotion coding were used to uncover key words, phrases, and ideas that reflected participants' perceptions and experiences of play and learning with LEGO. First, I selected passages that addressed the children's perceptions, thoughts, and feelings about their experiences in playing and learning. This process led to 231 first cycle codes being identified across all five sessions. The first cycle codes were then categorized into 11 groups based on key ideas and emerging themes. Saldaña (2021) described the awkwardness of post-coding transitions when moving from one space to another and recommended using analytic transitions to begin forming concepts from categories. Through code landscaping, two word clouds were created based on common words, feelings, thoughts, and ideas present in the codes (see Figures 1 and 2). These offered visual images of the most salient concepts and themes in the data (Saldaña, 2021).

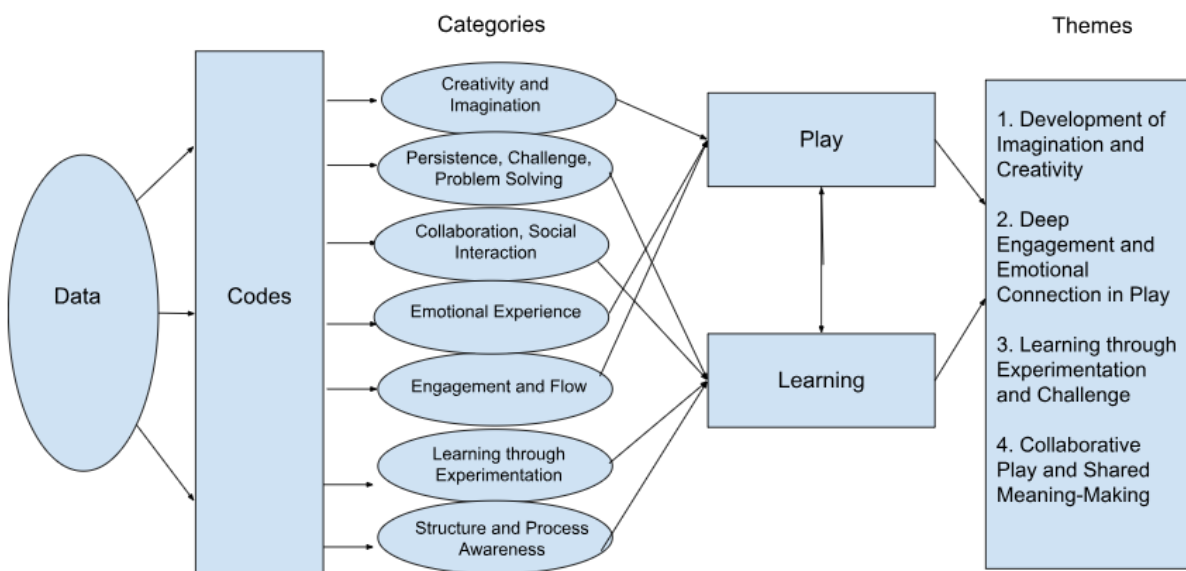
Figure 1

First Word Cloud

was employed to reassemble dominant themes and redefine the relationship of how children perceive and experience play and learning with LEGO (Saldaña, 2021). This led to four prevailing themes directly responding to the main research question of this study.

Figure 3

Thematic Framework Diagram of the Coding Process



Note. The data analysis process represented in this diagram.

Results

Throughout the play sessions, the participants mostly opted to free build with LEGOs. A total of 11 free-building sessions were observed, whereas there were two instances of the children recreating a structure from a model card. None of them decided to build something from the booklets, but two participants did look through it on a few separate occasions.

Seven overarching categories were identified from the data: creativity and imagination; persistence, challenge, and problem solving; collaboration and social interaction; emotional experience; engagement and flow; learning through experimentation; and structure and process awareness. These were still too broad and required further analysis to correspond more closely

with this study's research question. To achieve this objective, the categories were connected to either play or learning, depending on how children seemed to perceive each concept. From previous research, it is evident that playing and learning are interrelated for young children, however from the children's own perspectives, playing and learning can differ. For example, from this study and the participants' viewpoints, creativity and imagination as well as emotional experiences and engagement were more closely related to play as they would often discuss these interactions within a play framework. Yet, experimentation, challenges, and collaboration were observed and discussed more in terms of what and how the participants are learning. After the seven categories were associated to play or learning, I merged certain topics together to make more cohesive and structured themes, corresponding to how they were represented in the data. To illustrate, the second theme—deep engagement and emotional connection in play—emerged from observations showing that when children were highly engaged in building their structures, they also become emotionally invested in the task. In these moments, emotional investment and engagement appeared as concurrent and mutually reinforcing experiences. As well, experimentation, challenges, and persistence were frequently intertwined, forming the basis of the third theme.

Development of Imagination and Creativity (Theme 1)

One of LEGO's distinctive qualities is the way it encourages children to develop their imagination and creativity while constructing (LEGO, n.d.). Evidently, this was a theme that arose throughout the entire data collection process as participants had autonomy on what to build. This theme highlighted certain skills that the children were able to develop; sometimes they were asked to share a story about their LEGO structure, or to provide details about what they were building and where their ideas came from. Ethan stated, "I don't build anything

without having an idea of what it's going to be" (Play Session 3). In a subsequent session, one conversation focused on whether children had engaged with LEGO or constructed a set over the weekend. In response, Ethan expressed that he had made a castle that "was built off of a retired LEGO set" (Drawing Session). Along with the skills of descriptive storytelling and idea generation, children also learn to repurpose, rebuild, and reimagine something new from previous constructions while exploring with LEGO.

Organically, while free building with LEGO, the creative process gradually unfolds. This process is one that transcends the standard stimulus-response model and results in the enrichment of human experience (Kestenbaum, 1985). As children become immersed in their play, they remain in a creative state which encourages them to seek out new experiences and explore ideas. While engaging in this experience, some participants demonstrated resourcefulness when offered non-LEGO materials to play with. In the final play session, Adam constructed a house with an elevator designed to bounce up and down, secured in place with an elastic band. Figure 4 shows the child's drawn representation of this structure, and his response to being asked what his favorite part was is as follows: "My favorite part is the elastics on the elevator. How I got it to work like that [bouncing up and down]" (Drawing Session).

Figure 4*Child's Drawing*

Note. Adam's drawing of his elevator house with floating LEGO as decoration.

Another moment where resourcefulness was demonstrated occurred while discussing how we could have entered a secret hideout that Talia and Jonah built into their flower garden. Ethan mentioned “[...] When I don’t have a LEGO character, I use my fingers as the LEGO character” (Play Session 2). Talia added onto that idea by describing “[...] I just [...] paint my fingers” (Play Session 2). With the integration of body parts into LEGO play, children affirm that their creativity and imagination, alongside other skills, are being developed.

Deep Engagement and Emotional Connection in Play (Theme 2)

Engagement

Generally, participants were persistently engaging with their LEGO structures by adding additional bricks or improving structural components until it was time to wrap up the session. When prompted about the expected completion of his structure, Adam said: “[...] I just get a lot of ideas and when all my ideas are finished, I say ‘I’m done’” (Play Session 2). Often, the completed product was not finished by the end of the session, and children would continue

working on it the next time we met. Their sustained involvement revealed that free building with LEGO is a continuous process, if provided with enough time. During each play session, the children were asked to take photos of their completed structures. Towards the end of the third play session, Ethan was probed a few times on whether he was ready to do so, and with five minutes left, he exclaimed: “I changed it again, and now I’m ready. I’ve added this and this [referring to two pieces at the bottom of his structure]” (Play Session 3). This demonstrated the child’s ongoing engagement with his structure, and his desire to improve it until the session ended.

Figure 5

Child’s LEGO Structure



Note. Ethan’s floating house after adding two LEGO bricks to improve the structure.

Flow as part of Emotional Connection to Structures

LEGO free building was observed as encouraging the flow of ideas and innovations among children, thus reinforcing the theory of flow put forth by Csikszentmihalyi (2014). Described as an immersive and pleasurable experience, participants appeared emotionally connected to their structures and to playing with LEGO. Wong and Liem (2021) propose that

flow should be viewed as a significant form of student engagement as it embraces affective and cognitive experiences while learning. When discussing the purpose of LEGO bricks, the children described building, rebuilding, and having fun as the main objectives. Talia shared “I always have fun when I’m playing LEGO” (Play Session 2), and later in another play session exclaimed “[...] LEGO is my thing that I love” (Play Session 4). She was not alone in feeling happiness, amusement, and a sense of accomplishment while building. When prompted about constructing something they were pleased with, Adam answered “Yeah, yeah...at home I'm building a LEGO, and I'm halfway done it and it's a very big LEGO so I'm proud of myself” (Play Session 1). However, sometimes an emotional connection to a process can also lead to unpleasant feelings. During the final play session, when all structures needed to be taken apart, Talia stated, “it’s sad breaking this down” (Play Session 4). Alternatively, Ethan chimed in by mentioning “I only get upset about my LEGO being broken when I didn’t know it would happen” (Play Session 4). Throughout the play sessions, some participants built stronger emotional connections to their structures than others, although all of them easily accepted the fact that they would need to break apart their creations at the end of the fourth session.

Before beginning our drawing session, as we were looking at all the photos taken, I asked the children if their LEGO always looks like their intended creation. Adam was eager to respond, and the following conversation took place:

Adam

Sometimes, sometimes I build something, sometimes I build the LEGO set and I try to follow as much as I can, but it doesn't really turn out as it started to look like...So sometimes [...] I make a few mistakes and then I end up [...] having to restart like half of it.

Researcher

How does that make you feel?

Adam

I would maybe lose a piece, so I get mad and stuff.

Jonah

Why do you get mad and not happy that you still have something to do?

Adam

Because I just felt like, [...] I, let's say I spent like two weeks doing that LEGO after you start half of it. I mean...

Jonah

Yeah, but yeah, but don't you be happy that you still have something to do?

Adam

Yeah, but I'm also going to be mad at the same time because I have to restart my whole half. Get it.

Jonah

I would be happy about that (Drawing Session).

The angry reaction was influenced by the meaningful attachment and active involvement he developed while working on this LEGO set over an extended period. Jonah's involvement in the conversation shed light on the concept of gratefulness regarding having play materials and opportunities to build.

Ultimately, a central theme in this study is self-directed play. When exploring the reciprocal relationship between emotional connection and engagement, the child's own initiation

and intrinsic motivation emerge as key drivers, fostering deeper emotional investment and greater commitment to the structures they build (Seja & Russ, 1999).

Learning through Experimentation and Challenge (Theme 3)

Among the children in the group, the idea of rebuilding as a constant property of LEGO was seen as a positive opportunity to experiment. Adam exclaimed “[...] I find it more fun if you build something and then you make a mistake, instead of getting mad and taking it apart, you could just take it apart and fix your mistake” (Play Session 3). Jonah built onto this by mentioning “[...] I could always rebuild something more improved” (Drawing Session) when discussing the upcoming task of breaking apart the LEGO structures that were built. Rather than reinforcing the concepts of winning and losing, building with LEGO offers children the ability to play with ideas and prototypes, as this toy encourages experimentation. Participants also demonstrated persistence, not only when searching for the exact LEGO piece among hundreds of others, but also when faced with structural issues that required fixing. During our third session, Adam was building a tall house but was struggling to make the base strong enough to hold up the structure. After adjusting some elements, he said “Hey guys, I made my house more sturdy!” (Play Session 3). Concurrently, after declaring that his floating house was completed, Ethan decided “I need to upgrade the staircase, I made a mistake” (Play Session 3). These instances tie into the feelings of pride that are derived from achieving a self-initiated challenge, but also highlight how the concept of problem-solving through repeated trials is widely recognized among LEGO builders.

Figure 6*Child's LEGO Structure*

Note. Adam's tall house with a studier base.

Figure 7*Child's LEGO Structure*

Note. Ethan's improved staircase.

After multiple discussions, participants appeared to perceive free building as inherently more challenging than constructing LEGO sets. There were no sets involved in our sessions; however, the topic came up in conversation. As Ethan clearly stated “[...] I'm kind of challenging myself by free building cause I don't know what I'm going to build” (Play Session 2). This element of uncertainty regarding the end product, paired with self-directed structural expectations allows children to scaffold their learning and development independently. Throughout this process, they are also refining their analytic abilities in order to recreate the idea they imagined. In Jonah's words “if you never try, you're never going to know [if it's going to work]” (Play Session 1).

Although building LEGO sets at home is an enjoyable activity for the participants, they do not foster the same level of creativity and imagination as the experimental process children

engage in while free building. Since these two are considerably different approaches to playing with LEGO, the model cards were intended to serve as a transitional tool between the structured guidance of sets and the open-ended exploration of free building. Children had the opportunity to choose how they wanted to play during all four sessions. Talia was the only child keen on trying to recreate a model card because she preferred this idea over coming up with her own. Upon starting, she experienced some difficulties with making the base and exclaimed “this is so strange. This is actually so strange” (Play Session 1). After having offered some instructions, and Jonah pausing his play to help, she was able to move forward with her structure and complete it.

Figure 8

Child's LEGO Structure



Note. Talia's LEGO structure from a chosen model card.

Overall, experimenting with LEGO by improving, redoing, and changing elements was positively viewed between the participants. By the third play session, persistence, challenges, and problem-solving became regular instances in the building process, with children supporting each other's efforts while deeply immersed in their own experiences.

Collaborative Play and Shared Meaning-Making (Theme 4)

Collaboration and Social Interaction

The children collaborating, either by building structures together, offering advice to each other, or sharing resources became a consistent theme over the course of our play sessions. Midway into the second session, Talia and Jonah decided to collaborate to build a flower garden together and kept making improvements until we reached the end of the last play session. When prompted about building with a friend who has a different idea, Talia shared her experience with Jonah: “[...] I want to do a garden but he wanted to do wheels, so we did a garden on wheels” (Play Session 4). Through idea blending, they were able to collaborate and create a unique and well-crafted structure. Here is an excerpt from one of their interactions:

Jonah

We are totally using that [LEGO baseplate]. Let’s put it right here.

Talia

This could be the back of the house.

Jonah

Yeah, then look, we can go here.

Talia

And then go here and there could be a pool. Wait this fell down.

Researcher

You're adding a pool?

Talia

Yeah, because you could go from here and then through the door there's going to be a pool here (Play Session 2).

Figure 9*Child's LEGO Structure*

Note. The flower garden after the second play session

Figure 10*Child's LEGO Structure*

Note. The flower garden after the fourth play session.

Figure 11*Child's Drawing*

Note. Jonah’s drawing of the flower garden, with a blue LEGO piece resembling the continuation of building using more bricks.

Process Awareness. Despite collaboration being common for most participants in the group, none of them drew other people in their pictures. This may be due to the prompt being too precise, or to the fact that they view the process of building LEGO as an individual activity. At times, participants expressed a preference to create independently; “[...] sometimes I just like building by myself because if I build with my friend, [...] I get too distracted, I’m stuck and I can’t focus on building” (Adam, Drawing Session). In an earlier session, Adam mentioned “I [...] take [...] random pieces and build something, and it calms me down that way” (Play Session 1). He demonstrated process awareness revolving around LEGO building in relation to his abilities and character. Further, children expressed their preferences for building LEGO on the ground right after Ethan’s structure fell and broke, he said “those are the reasons of why when I play LEGO at home, I build on the floor” (Play Session 4). Luckily, we had just taken a photo of his structure, which prompted Adam to say “the best part about LEGO is [...] if you break it, it doesn't really matter because you could rebuild it” (Play Session 4). This highlights the children’s perception of LEGO as a restorable and resilient toy when facing obstacles. On the flip side, losing LEGO pieces is “[...] the worst part about LEGO” (Play Session 3) especially when it comes to cleaning up after a busy LEGO play session!

During certain moments, the participants were willing to share insights they learned while playing with LEGO. One child shared about learning “how to play with friends” and another added onto that thought by saying “I learned how to ask for help” (Play Session 2). Seeking help was a widely accepted principle especially when it came to searching for a specific LEGO piece in the bins. Below is an excerpt from an interaction between Talia and I.

Talia

And when I usually build LEGO by myself, sometimes I need help. So [...] I ask my sister because she's really good at LEGO and she helps me figure it out.

Researcher

And... but is that when you're making a set or is that when you're free building?

Talia

Maybe free building because [...] in my brain I wanted to make [...] the same thing and I was like how I did this piece but because my brain has a different idea.

Researcher

So you're... in your brain, you have a picture of what you want to make, and if it's too hard for you, you ask for help?

Talia

Like if I can't always see it, I was like what did I make of that? And then I was like, oh, I just remembered but [...] I can't even see it in my brain. So [...] I asked my sister, she's like, how do I help you make [...] this and that?

Researcher

And you describe it to her...you tell her what you see in your brain?

Talia

Yeah (Play Session 3).

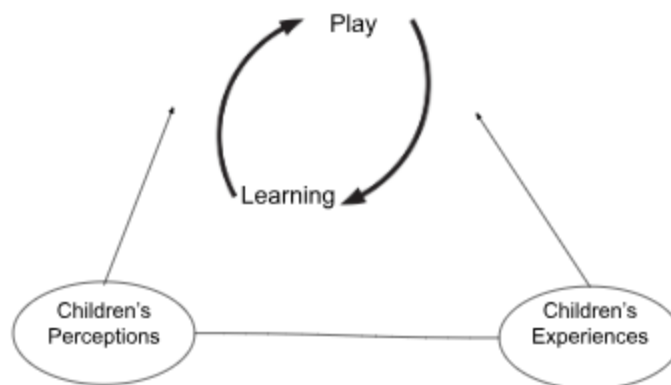
In addition to illustrating how she processes information and requests assistance, Talia shared that building LEGO encourages her to play with her sister. For some, sibling relationships provide powerful developmental contexts where children can explore, communicate, share, and play together in a familiar environment.

Discussion

This study's research question is as follows: How do six- and seven-year-old children perceive and experience play and learning when engaging with LEGO bricks? It consists of two processes that come together to help understand play and learning from a child's perspective, using LEGO bricks to facilitate a constructional play style (Bateson, 2005). Essentially, as children mature, the skills they develop through constructive play become more complex. Tian et al. (2020) highlight that block building generally develops in a systematic way, as young children create from basic manipulation, whereas older children's constructions demonstrate more balance and details. Additionally, Kobylak and Kalyn (2017) emphasize that integrating a cooperative play form, such as constructive play, as a pedagogical approach in a Grade 1 classroom encouraged social interactions and shared experiences among students. The results of this study suggest that six-and-seven-year-old children are perceptive to certain aspects of their play and learning through metacognition relating to the use of their imagination, creativity, focus, concentration and primary emotions. In contrast, their experiences of play and learning, largely shaped by skill development in cognitive, social, and motor domains, occur without deliberate awareness. Research solidifies that younger school-aged children learn better through play in an academic context as it encourages them to discover and pursue their curiosities, while adapting to their individual needs (Langton, 2023).

Figure 12

Deconstruction of the Research Question



Note. The way different research question components relate to each other.

Consequently, the four broad themes that were developed represent a wide variety of skills, some that the children are consciously aware of, and others that operate more implicitly during the play experience. The methodology of this study, largely based on open ended questions to participants, promoted metacognitive reflection from their past and current experiences. For example, children regularly expressed using their imagination and creativity to generate ideas and build structures. At times, they were also able to identify personal moments of concentration, focus, and emotion, both during play and while reflecting on past experiences. These moments indicate *metacognitive awareness*, which is the ability of consciously attending to, and reflecting on one's own mental activity. Interestingly, reflection is a concept that often comes up when revising and remodeling developmental standards in early childhood learning (Chen et al., 2022). It is also a key feature within the Froebelian principle that emphasizes autonomous learning. In general, there are two subcomponents in metacognition, which are knowledge and regulation of cognition (Chen et al., 2022). The knowledge of persons refers to children's understanding of themselves and others as thinkers, and by providing them with opportunities to express their thoughts and emotions, as Hyland (2000) suggests, participants' perceptions of how they play and learn with LEGO bricks have been revealed.

Co-development of cognitive and motor skills. Children's experiences of play and learning appear closely linked to skill development, as two of the themes derived positively impact a range of abilities. It should be noted that constructive play facilitates self-realization by allowing children to experiment, take risks, and reflect on their successes and challenges (Henricks, 2020) Aligned with this, children's cognitive and motor skills were cultivated through exploration, persistence, self-initiated challenges, and problem-solving while engaging with LEGO bricks. Evidence suggests that these domains are closely related, developing alongside one another (Davis, Pitchford, & Limback, 2011). In support of this, Stöckel and Hughes (2016) conducted a study that examined executive functions and motor skill performance in 40 Kindergarten children. Their results indicated a strong association between the two, reinforcing the view that motor and cognitive growth are interconnected in childhood (Stöckel & Hughes, 2016). Bateson (2005) highlighted that as children's skills strengthen through repetitive play, they experience greater joy, which in turn increases their motivation to continue. This process was identified for participants in this study.

Regarding the fourth theme, children's language and communication skills were fostered through collaborative play. Observing them building with LEGO throughout the data collection process, either individually or with peers, revealed that this is how children experience play and learning even if they are not necessarily aware that their social skills are being formed. For children, cooperative behaviors and opportunities for social interactions form the foundation of successful collaboration (Lin et al., 2024). Psychologist Dorothy Singer closely associated construction toys with children's development of cooperation, among other abilities (Lauwaert, 2009). In classrooms, a constructive play area, which often involves building blocks, acts as a social space which promotes an atmosphere conducive to social learning (Lin et al., 2024). In

their quasi-experimental study comparing a constructive play intervention to a control group, researchers found that children who participated in the play sessions demonstrated enhanced cooperation. This effectively transferred to other forms of play as collaboration and leadership skills (Lin et al., 2024). Similarly, participants from this study frequently displayed prosocial behaviours while building LEGO structures, indicating that children's play and learning experiences are closely linked to the development of their cognitive, social, and motor skills.

This study was conducted with the theoretical foundations of Froebel's work, highlighting the importance of early play experiences through self-directed activities, and their impact on healthy development over time (Hoskins & Smedley, 2018). One part of Froebel's approach centered on providing children with building blocks as a tool to experiment with, while adding onto their previous knowledge. By using LEGO bricks as a construction toy, this research mimicked one of Froebel's approaches to play. As well, two of his Froebelian principles were portrayed throughout the play and drawing sessions. Participants had the opportunity to be *autonomous learners* by choosing if they wanted to free-build a structure, or base it off of a model card, while selecting the amount of time they remained in their chosen play scenario (Froebel Trust, n.d.). They were also probed with open-ended and follow-up questions, facilitating reflection on current and past play experiences with LEGO. Through these conversations, children were able to demonstrate metacognitive abilities as they brought up their feelings and lived experiences, allowing them to build onto previous knowledge and skills. This holistic development in participants, which continues to support their learning, stems from the societal principle recognizing *the central importance of play* in childhood (Froebel Trust, n.d.).

Practical Implications

Overall, the integration of Froebel's theoretical insights with the results from this study emphasize the effectiveness of constructive play with LEGO bricks as a powerful learning tool for children and teachers alike. As children are quite perceptive to certain aspects of their learning, incorporating hands-on experiences and thoughtfully designed play activities, which encourage collaboration and reflection, are essential components in early years classrooms. To reinforce these experiences, providing ample opportunities for discussion and conversation, between both child-to-child and child-to-teacher, is fundamental. These implementations can strongly impact children's social, cognitive, and motor development equipping them for more complex future interactions and collaborative activities. This directly aligns with Pyle and Alaca's (2018) research stating that understanding children's perspectives can positively shape pedagogical experiences.

When children build with LEGO, collaborate with peers, and converse with adults, they display metacognitive awareness and strengthen their social, cognitive, and motor skills. This underscores the importance of allowing time for creativity, construction, and exploration, key ingredients for meaningful learning that may be lost when such opportunities are limited.

Future Direction

This study demonstrated how children in Grade 1 benefitted from the LEGO play and drawing sessions. These opportunities were implemented through this research study and were not related to the curriculum or daily routine of the classroom. Despite widespread awareness of the importance of play supported by abundant research, two unanswered questions remain: Why does a significant shift in teaching style occur when children enter first grade? While Henderson and Shipway (2024) note that play becomes less influential on development in early adolescence,

this raises a deeper question: why does play time become so restricted as early as first grade and beyond? To investigate, a future direction for this research approach can be centered around implementing a play-based curriculum for a specific subject and term, and then evaluating if children meet the same performance standards that would be expected of them had they learned the subject through a typical teaching approach.

Limitations

This research study had some limitations. Firstly, the sample size was small, consisting of four children from a private elementary school located in Montreal. All children had the same religious background and cultural similarities, making the sample quite homogenous. They had prior exposure to LEGO bricks and were familiar with the type of play the toy promotes; the results might have differed if participants with diverse cultural and educational backgrounds, including those with no prior LEGO experience, had been included. During the drawing session, following four play sessions, the prompt asking children to draw themselves playing with LEGO was limiting as it seemed to guide them to only draw themselves without considering peers or friends. As a researcher with limited LEGO play experience, my approach to building alongside the participants could have been more hands-on and involved, rather than leaning towards asking questions and encouraging conversations. These two aspects were not necessarily equally applied during the sessions, however had they been, children might have constructed more complex structures with compelling storylines. Lastly, despite reflexive practices being applied, removing my personal influence from the data collection and analysis processes is not completely possible. Therefore, my positionality constitutes a limitation in terms of objectivity and generalizability of the findings.

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Appendix A

Play Sessions Protocol

Researcher (participant-observer): Arielle Pimienta	Participants: four Grade 1 students (ages 6-7)
Dates: April 22, April 24, April 29, & May 2, 2025	4x Time: 45-minute sessions

Before beginning: “I just want to remind everyone that our play session is video recorded with the camera over here. We’re going to play with LEGO today and I might ask you some questions while we play. If you don’t feel like playing anymore or don’t want to answer a question, that’s totally okay. You can just say, ‘I want to stop,’ or ‘I don’t want to answer,’ and we’ll stop. It’s completely up to you!”

Introduction: “Although you’ve seen me before in your classroom, I just want to remind you that my name is Arielle! Today, we are going to spend some time playing together. I brought with me this LEGO Brick Box filled with tons of LEGO pieces to build with! I also brought model cards. This is how they look [show an example of a model card]. You can use them by recreating the structure you see on the card, in your LEGO play, or get inspired to build something different!”

“The goal of this play session is for you all to build creatively while using your imagination to make what you want with the LEGOs. It’s important that once you finish building something, you keep it on the side so we can chat about it later! At some points throughout the session, I’m going to be asking you to take some photos, with my phone, of what you’re playing and learning, and I’ll also be asking you some questions and would love it if you could give me your answers and thoughts! What’s most important while we play is that you all have fun!”

Questions to ask throughout the session:

- Tell me about the first time you played with LEGO.
- What do you like most about playing with LEGO?
- What are you building?
 - How do you feel about how it’s turning out? Why?
- How do you decide what to build?
- Can you tell me about a part of your building that was tricky or took more effort?
- What do you think you’ve learned while building with LEGO?
 - How does it feel when you figure something out while building?
- Can you show me something you’ve built that you’re really proud of?
 - What makes you feel proud about it?
- If you could change or add something to your creation, what would it be?
- What do you like about playing with LEGO by yourself or with others?
- Have you ever built something that surprised you? Can you tell me about it?
- What do you think makes LEGO fun to play with?
- Have you ever discovered something new while playing with LEGO? Can you tell me about it?

- If you could make up a new way to play with LEGO, what would it be?
- How do you feel when you finish a LEGO creation?
- If you were to teach someone else how to play with LEGO, what would you show them or tell them?
- Can you tell me a story about what's happening in your LEGO?
- If your LEGO creation came to life, what would it do and where would it go?
- Do you think you build differently now than when you first started playing with LEGO? If yes, how?
- What new ideas have you tried with LEGO lately?
- What happens when someone else has a different idea than you while playing together?

General Questions (to ask throughout or after the session):

- Did you enjoy this experience? What made it fun or not fun?
- How do you feel when you're playing with LEGO?
- What do you think you've learned from playing with LEGO?
- Have you ever used LEGO in a way that felt like learning? Can you tell me about it?
- If you've played with LEGO in different ways before, how was today's play session different?
- If you had more time, what else would you like to build or explore with LEGO?

Additional Probes

- | | |
|-----------------------------------|--------------------------------------|
| - Tell me more about... | - How come it makes you feel ___? |
| - Can you explain that some more? | - What else makes you ___? |
| - Why did you say ___? | - Could you give me another example? |

Appendix B

Drawing Session Protocol

Researcher (participant-observer): Arielle Pimienta	Participants: four Grade 1 students (ages 6-7)
Date: May 6, 2025	Time: 45-minute session

Before beginning: “I just want to remind everyone that our drawing session is video recorded with the camera over here. We’re going to draw today, and I might ask you some questions while drawing and once you finish. If you don’t feel like drawing anymore or don’t want to answer a question, that’s totally okay. You can just say, ‘I want to stop,’ or ‘I don’t want to answer,’ and we’ll stop. It’s completely up to you!”

Materials: White paper, markers or pencil crayons

Introduction: “As you remember, we completed some LEGO play sessions together in the past few weeks, and I’ve had so much fun being here with you all. For today, we have one final activity to do, and that is to draw! I’m going to give each of you a blank sheet of paper and we have some markers to share, and I want you to: draw a picture of you playing with LEGOs. Before we begin, I want us to look at some of the photos you have taken throughout our play sessions, to help us remember what you made or how you played! [Photos are shown].”

“To begin, remember: draw a picture of you playing with LEGOs. You can be creative, take your time, and use all the colours you would like. Once you finish, I would like you to share with the other students and I what you drew and why you drew it. I would also like to take a photo of all your drawings once they are finished. Let’s get started!”

After all the children have shared their drawings and explanations, I will thank them for participating and take photos of their drawings if they wish to keep them.

Questions for when students show their drawings:

- Tell me about what you drew.
- What are you doing in your drawing? Can you tell me more about it?
- Did you include anyone else in your picture? Why or why not?
- Why did you draw _ like this?
- What’s your favourite part of the drawing?
- How is this drawing similar or different from how you actually played with LEGO today?
- Did you draw this from your imagination or from a LEGO structure you built in the past?
- What does this represent or mean to you?
- If your drawing could come to life, what would happen next?
- How did you feel when you were making this drawing?
 - Why did you feel that way?
- Tell me why you drew the LEGO like this?
- Is there anything you would change or add to your drawing?
- What was the most fun part of your drawing to create?

- In your drawing, can you show me something that was fun and something that was a little more challenging to draw?

Additional Probes

- Tell me more about...
- Can you explain that some more?
- Why did you say ___?
- How come it makes you feel ___?
- What else makes you ___?
- Could you give me another example?

Appendix C**Letter of Approval**March 18th, 2025**Letter of Approval**

I, _____ am giving approval to Arielle Pimienta to
(name)
conduct her study titled Children's Perceptions of Play and Learning with
LEGO bricks at _____.
(name of school)

I, _____ acknowledge that the study will involve
(name)
voluntary participation from students in Grade 1 during the school day, and that
appropriate parental consent will be obtained.

This study has been reviewed and approved by Concordia University's Office of
Research (Approval number: 30021547).

Signature: _____

Date: _____

Position at school: _____

Researcher's Signature: _____

For any questions or inquiries, please contact: arielle.pimienta@concordia.ca

Appendix D

Information and Consent Form



INFORMATION AND CONSENT FORM

Study Title: Children's Perceptions of Play and Learning with LEGO bricks

Researcher: Arielle Pimienta

Researcher's Contact Information: arielle.pimienta@concordia.ca

Faculty Supervisor: Dr. Sandra Chang-Kredl

Faculty Supervisor's Contact Information: sandra.chang-kredl@concordia.ca

Source of funding for the study: N/A

Your child is being invited to participate in the research study mentioned above. This form provides information about what participating would mean. Please read it carefully before deciding if you want your child to participate or not. If there is anything you do not understand, or if you want more information, please ask the researcher.

A. PURPOSE

The purpose of the research is to gather information on how six-and-seven-year-old children perceive and experience play and learning with LEGO bricks. By discovering more about their perceptions on these topics, we may gain insights into children's agency in their own learning, which can inform pedagogical strategies and help teachers create more meaningful play-based learning experiences. Additionally, this is an area with limited existing research, therefore this study will contribute to new knowledge that can further play-based learning experiences while fostering positive self-perceptions in young learners and influencing curriculum design.

B. PROCEDURES

If you allow your child to participate, they will be invited to partake in five sessions. Four sessions will involve playing and building with LEGO bricks in small groups, while the fifth session will require them to draw a picture. These sessions will be video recorded, and solely photos of the LEGO creations and drawings will be taken by children themselves. The researcher is also a qualified teacher with the EMSB and has 8+ years of experience working with children of this age. During each session, she will ask the children open-ended questions about play, their feelings while building, what they have learned, and their overall experiences with LEGO bricks.

Each of the sessions (spread out over different days) will last a maximum of 45 minutes. The total participation time in this study should take no more than four hours over the span of at least two weeks.

C. RISKS AND BENEFITS

Although unlikely, your child might face certain risks by participating in this research. These risks include small injuries from handling LEGO pieces wrongly, fatigue or frustration if they find the task too difficult or dull, peer comparison or judgement, or the possibility of a dispute with another participant. However, to minimize these risks, the researcher will be present and supervising children for the duration of the sessions. The researcher will also help support the children and resolve any issues that may arise.

This research is not intended to benefit your child personally. However, the incentive to participate is the opportunity for your child to engage in enjoyable LEGO play sessions and one drawing session, which are intended to be fun and stimulating. The focus of this study is on discovering more about children's perceptions of play and learning, and their participation is based on the enjoyment and lessons they derive from these activities.

D. CONFIDENTIALITY

We will gather the following information as part of this research: basic demographic details (age and gender) to understand participant characteristics, observational data on children's interactions with LEGO, verbal responses to open-ended questions asked during sessions, video recordings of each session to capture responses, behaviours, engagement, and non-verbal behaviours for later analysis.

We will not allow anyone to access the information, except people directly involved in conducting the research. We will only use the information for the purposes of the research described in this form.

The information gathered will be confidential. This means that the research team will know the participants' real identity. However, participants' identities will not be disclosed in disseminated results.

The information will be protected by encrypting all stored files on a password-protected computer. The data will not be linked to any identifying information after anonymization, ensuring confidentiality. We will destroy the information five months after the end of the data collection.

E. CONDITIONS OF PARTICIPATION

You do not have to allow your child to participate in this research. It is purely your decision. If your child does participate, they can stop at any time, and they will be reminded of this before each session. You can also ask that the information your child provided not be used, and your choice will be respected. If you decide that you don't want us to use your information, you must tell the researcher before April 16th, 2025.

There are no negative consequences for not participating, stopping in the middle, or asking us not to use your information.

F. PARTICIPANT'S DECLARATION

I have read and understood this form. I have had the chance to ask questions, and any questions have been answered. I agree to allow my child to participate in this research under the conditions described.

NAME

(pleaseprint)

CHILD'S NAME

SIGNATURE

DATE

If you have questions about the scientific or scholarly aspects of this research, please contact the researcher. Their contact information is on page 1. You may also contact their faculty supervisor.

If you have concerns about ethical issues in this research, please contact the Manager, Research Ethics, Concordia University, 514.848.2424 ex. 7481 or oor.ethics@concordia.ca.

Appendix E

Child Assent Form



CHILDREN'S ASSENT FORM FOR PARTICIPATION IN RESEARCH

[Please note: After having received written consent from parents, I will read this form to each child individually and discuss any questions they may have. When four children have agreed to participate, we will begin with the play sessions.]

Study Title: Children's Perceptions of Play and Learning with LEGO bricks

Researcher: Arielle Pimienta

Researcher's Contact Information: arielle.pimienta@concordia.ca

Faculty Supervisor: Dr. Sandra Chang Kredl

Faculty Supervisor's Contact Information: sandra.chang-kredl@concordia.ca

I want to tell you about the research study I am doing, and I would also like to invite you to participate. A research study is a way to gather information and learn more about a subject or idea. For this study, I want to learn more about what children think when they play with LEGO bricks. I wonder what they think about, what they learn, and why they like or do not like to play this way. You are invited to participate because I am curious about the way children your age play and learn with LEGO.

If you agree to be part of my study, we will meet together 5 times, and there will be 3 other students joining us as well. You will get to use LEGO bricks to play, build, and create. I will also be talking with you and the other students and asking questions about what you are doing and thinking.

We will have four play sessions with LEGOs, and the fifth one will be you drawing a picture that includes LEGOs. Our sessions will not be too long, they should be about 45 minutes. Sometimes you might feel like not answering a question or not participating in the play sessions anymore and that is okay. You can just tell me whether you want to skip a question or want to stop playing and we will do just that. The goal is for me to learn more about you, and I could only do that if you feel comfortable during our play sessions.

You can choose to take part in the study or not and tell me what your decision is. Remember, if you want to stop at any point, you can. There is no problem if you do not want to be in the study or if you decide later on that you want to stop participating.

Your parents also know about this research study and have decided to let you be part of it, as long as you want too as well.

Do you have any questions for me? You can also always ask me during our play sessions.

If you have any questions or concerns about this study, you can contact us at:

Arielle Pimienta : (514) 679-3020, or arielle.pimienta@concordia.ca

Dr. Sandra Chang-Kredl: (514) 848-2424, ext. 8632, or sandra.chang-kredl@concordia.ca

Would you like to be in this research study?

_____ Yes, I will be in this research study _____ No, I don't want to participate

NAME OF CHILD (please print)

SIGNATURE OF CHILD

DATE

Appendix F

Transcription Sample Play Session 1

00:00 Participant A

[inaudible] cool piece. I think this might get changed [showing piece to other participants]

00:03 Participant T

What is this pink piece?

00:10 Participant T

I need a [inaudible] I'm making a BBQ, is there a one piece? [searching in the bins]

00:20 Participant J

I'm making a fire.

00:21 Participant A

This is sick [smiling]

00:23 Participant J

I know, it's so sick.

00:24 Participant T

What is this pink thing?

00:28 Researcher

You know what, let's just move this box over there because I want the video camera to be able to see what you're making.

00:35 Participant T

Do you have a one piece like this because I can't find it? [pointing to a piece from a model card]

00:42 Researcher

Well, did you look long enough?

00:43 Participant T

Yeah, I can't find it.

00:46 Researcher

There's a lot, a lot to look through.

00:48 Participant J

You don't have to use the exact same color.

00:50 Participant T

I know, I'm trying to look for the one [inaudible] [scratches her head]

Transcription Sample Play Session 2

03:49 Researcher

Yeah, And what do you prefer? You prefer a Lego set or do you prefer to free build?

Participant E

Free build.

Researcher

Why?

Participant E

Because I could make whatever I want.

03:56 Researcher

Yes, that's true. What about you guys? Do you prefer...

04:04 Participant A

I like a Lego set a little better.

Researcher

A little better.

04:09 Participant J

[chanting] Lego set, Lego set, Lego set!

04:10 Researcher

Tory, what about you?

04:11 Participant T

Maybe a Lego set better. I could like make it and then turn it into like what I want to.

Participant T

So it could show me how to touch stuff and like yeah. I like doing those stuff.

04:27 Researcher

Okay, that's good.

Participant J and Participant A

[continue to chant 'Lego set' together]

04:27 Researcher

So Eli, do you want more blocks? You can dig in [repositions the bin so it's closer to him]

04:36 Researcher

Aiden, what are you adding to your floating house?

04:49 Participant A

So, I'm adding a BBQ, a hot tub and wheels, that's all I've added.

Transcription Sample Play Session 3

02:33 Researcher

He's working on the Statue of Liberty?

Participant E

I don't think [inaudible]

Researcher

Tori what are you working on?

Participant T

My flower garden! [smiling]

Researcher

Your flower garden. What are you adding to it?

Participant J

We're gonna put more flowers. More flowers [while searching in the bin]

Participant T

I have no clue.

Researcher

More flowers.

02:48 Participant J

Oh, let's put a bridge and put flowers inside.

02:51 Researcher

Oh, that's so cool.

Participant A

Yeah!!

Researcher

You know what that reminded me of? Sometimes in a beautiful garden there's a pond.

02:58 Participant T

Oh yeah, let's make a pond! [smiling]

02:58 Researcher

Make a pond. You know we play fish.

Participant J

Look! That's exactly what I was going to do.

03:00 Participant T

You know with like fish, swimming inside?

Participant T

Ya that's what Jeremy's going to do with the bridge. [gestures a bridge with her arms]

Transcription Sample Play Session 4**14:37 Participant T**

That would be cute. [inaudible] That would be cute.

14:42 Researcher

Aiden, have you tried any new ideas with Lego?

Participant A

Not really, no [holding up his body on the desk while searching for a piece in the bin]

14:46 Researcher

Did you play Lego at your house this week?

14:48 Participant E

I always play Lego at my house.

Researcher

Yeah

Participant A

Umm no. No I didn't play Lego.

14:50 Participant T

I always, always, always, always, always, always, always, always play Lego.

14:56 Researcher

Yeah!

14:57 Participant E

A single day

14:59 Researcher

What Eli?

14:59 Participant E

I don't do like a single day that I don't play or build Lego at my house [continues building his structure without looking up].

15:06 Researcher

Really. Wow! So you play every single day!

Transcription Sample Drawing Session

02:42 **Participant A**

I think...

02:43 **Participant J**

Umm, I have something to say

02:44 **Participant A**

I think the flower garden was really creative.

02:47 **Researcher**

Yeah, Aiden come back. Go ahead, Jeremy.

Participant J

I have to say that.. I really, really like your imagination. I like the flower garden, how you imagined it like from the top [while looking at Participant T's drawing]

03:02 **Participant T**

Yeah [smiling].

03:05 **Researcher**

Tori, is there anything you would change or add to your drawing?

03:10 **Participant T**

If I had more time then I'll make properly [probably] like a castle filled with lego like maybe...[pointing to a white space on her drawing]

03:18 **Participant A**

Like a border line.

03:19 **Researcher**

Okay. And Aiden, what about you? Is there anything you would add or change?

03:24 **Participant A**

If I had more time I would try to build a bigger house, and make and make like two, and make it taller to have two elevators going up and down [while holding his drawing up and letting it droop up and down]

Appendix G

Sample Reflexive Journal Entries

Reflexive journal after first play session

April 22nd, 6:50pm

I just completed the first play session with the participants, and it went well overall. They seem to be very excited at the start when they saw the LEGO bins and knew they could build to their hearts desire. There are four children in the group, three of them seem extroverted and willing to chat and share ideas often, the fourth seems a little more introverted and focused on his play. I'm not sure how this will impact the group dynamic in the coming sessions, or what importance the overall dynamic holds in this study. Reflecting on how it went, in the next session I will try to facilitate more of a group discussion approach rather than a researcher to child approach, and observe what it yields, and how the children interact all together.

Reflexive journal after fourth play session

May 2nd, 1:10pm

I can't believe the four play sessions are finished already, it feels like yesterday that I met the children. They have really impressed me, in all aspects. From their stories, creativity, kindness, and willingness to participate in this whole study! As a researcher, I think I've improved my questioning and probing quite a bit. In the first sessions, sometimes participants would say something, and I wouldn't exactly know what to say back, or how to get them to expand on their idea, but now I think I'm able to scaffold certain discussions in a way that is much more geared to the research question and their lived experiences. I'm looking forward to the drawing session, to seeing what they will draw and how they will relate it to their Lego play and experience.

Appendix H

Coded Transcription Sample Play Session 1

<p>00:00 Participant A [inaudible] cool piece. I think this might get changed [showing piece to other participants]</p> <p>00:03 Participant T What is this pink piece?</p> <p>00:10 Participant T I need a [inaudible] I'm making a BBQ, is there a one piece? [searching in the bins]</p> <p>00:20 Participant J I'm making a fire.</p> <p>00:21 Participant A This is sick [smiling]</p> <p>00:23 Participant J I know, it's so sick.</p> <p>00:24 Participant T What is this pink thing?</p> <p>00:28 Researcher You know what, let's just move this box over there because I want the video camera to be able to see what you're making.</p> <p>00:35 Participant T Do you have a one piece like this because I can't find it? [pointing to a piece from a model card]</p> <p>00:42 Researcher Well, did you look long enough?</p> <p>00:43 Participant T Yeah, I can't find it.</p> <p>00:46 Researcher There's a lot, a lot to look through.</p> <p>00:48 Participant J You don't have to use the exact same color.</p> <p>00:50 Participant T I know, I'm trying to look for the one [inaudible] [scratches her head]</p>	<p>Legend: In-vivo - Yellow Descriptive- Orange Process- pink Emotion- blue</p> <p>1. "I'm making a fire"</p> <p>2. "This is sick."</p> <p>3. "I know, it's so sick"</p> <p>4. Interchanging the colors of bricks</p> <p>5. Searching for the right Lego piece.</p>
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Coded Transcription Sample Play Session 2

<p>03:49 Researcher Yeah, And what do you prefer? You prefer a Lego set, or do you prefer to free build?</p> <p>Participant E Free build.</p> <p>Researcher Why?</p> <p>Participant E Because I could make whatever I want.</p> <p>03:56 Researcher Yes, that's true. What about you guys? Do you prefer...</p> <p>04:04 Participant A I like a Lego set a little better.</p> <p>Researcher A little better.</p> <p>04:09 Participant J [chanting] Lego set, Lego set, Lego set!</p> <p>04:10 Researcher Tory, what about you?</p> <p>04:11 Participant T Maybe a Lego set better. I could like make it and then turn it into like what I want to.</p> <p>Participant T So it could show me how to touch stuff and like yeah. I like doing those stuff.</p> <p>04:27 Researcher Okay, that's good.</p> <p>Participant J and Participant A [continue to chant 'Lego set' together]</p> <p>04:27 Researcher So Eli, do you want more blocks? You can dig in [repositions the bin so it's closer to him]</p> <p>04:36 Researcher Aiden, what are you adding to your floating house?</p> <p>04:49 Participant A So I'm adding a BBQ, a hot tub and wheels, that's all I've added.</p>	<p>90. "[...] I could make whatever I want"</p> <p>91. Endless possibilities when free building</p> <p>92. Transformation is always possible with Lego bricks</p> <p>93. "[...] I could [...] make it [a Lego set] and then turn it into [...] what I want to."</p> <p>94. "[...] I'm adding a BBQ, a hot tub and wheels [...]"</p>
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Coded Transcription Sample Play Session 3

<p>02:33 Researcher He's working on the Statue of Liberty?</p> <p>Participant E I don't think [inaudible]</p> <p>Researcher Tori what are you working on?</p> <p>Participant T My flower garden! [smiling]</p> <p>Researcher Your flower garden. What are you adding to it?</p> <p>Participant J We're gonna put more flowers. More flowers [while searching in the bin]</p> <p>Participant T I have no clue.</p> <p>Researcher More flowers.</p> <p>02:48 Participant J Oh, let's put a bridge and put flowers inside.</p> <p>02:51 Researcher Oh, that's so cool.</p> <p>Participant A Yeah!!</p> <p>Researcher You know what that reminded me of? Sometimes in a beautiful garden there's a pond.</p> <p>02:58 Participant T Oh yeah, let's make a pond! [smiling]</p> <p>02:58 Researcher Make a pond. You know we play fish.</p> <p>Participant J Look! That's exactly what I was going to do.</p> <p>03:00 Participant T You know with like fish, swimming inside?</p> <p>Participant T Ya that's what Jeremy's going to do with the bridge. [gestures a bridge]</p>	<p>141. "We're gonna put more flowers. More flowers!"</p> <p>142. Time as opportunity to improve</p>
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Coded Transcription Sample Play Session 4

<p>14:37 Participant T That would be cute. [inaudible] That would be cute.</p> <p>14:42 Researcher Aiden, have you tried any new ideas with Lego?</p> <p>Participant A Not really, no [holding up his body on the desk while searching for a piece in the bin]</p> <p>14:46 Researcher Did you play Lego at your house this week?</p> <p>14:48 Participant E I always play Lego at my house.</p> <p>Researcher Yeah</p> <p>Participant A Umm no. No I didn't play Lego.</p> <p>14:50 Participant T I always, always, always, always, always, always, always, always play Lego.</p> <p>14:56 Researcher Yeah!</p> <p>14:57 Participant E A single day</p> <p>14:59 Researcher What Eli?</p> <p>14:59 Participant E I don't do like a single day that I don't play or build Lego at my house [continues building his structure without looking up].</p> <p>15:06 Researcher Really. Wow! So you play every single day!</p>	<p>184. "I always play Lego at my house."</p> <p>185. Lego as a constant in the household.</p> <p>186. Playing Lego every day</p>
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Coded Transcription Sample Drawing Session

<p>02:42 Participant A I think...</p> <p>02:43 Participant J Umm, I have something to say</p> <p>02:44 Participant A I think the flower garden was really creative.</p> <p>02:47 Researcher Yeah, Aiden come back. Go ahead, Jeremy.</p> <p>Participant J I have to say that.. I really, really like your imagination. I like the flower garden, how you imagined it like from the top [while looking at Participant T's drawing]</p> <p>03:02 Participant T Yeah [smiling].</p> <p>03:05 Researcher Tori, is there anything you would change or add to your drawing?</p> <p>03:10 Participant T If I had more time then I'll make properly [probably] like a castle filled with lego like maybe...[pointing to a white space on her drawing]</p> <p>03:18 Participant A Like a border line.</p> <p>03:19 Researcher Okay. And Aiden, what about you? Is there anything you would add or change?</p> <p>03:24 Participant A If I had more time I would try to build a bigger house, and make and make like two, and make it taller to have two elevators going up and down [while holding his drawing up and letting it droop up and down]</p>	<p>227. "I like the flower garden, how you imagined it [...] from the top."</p> <p>228. Drawings bring different perspectives on Lego structures.</p>
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Appendix I

Codes Categorized into Themes Sample

Creativity & Imagination

- 1. "I'm making a fire"
- 51. "I'm just doing whatever I want" [regarding building]
- 62. "[...] When I free build I find [...] like I make stuff up instead of copying [...]"
- 94. "[...] I'm adding a BBQ, a hot tub and wheels [...]"
- 119. "The flower garden is now a driving flower garden"
- 135. "[...] I used my imagination [...]"
- 155. "I don't build anything without having an idea of what it's going to be."
- 227. "I like the flower garden, how you imagined it [...] from the top."
- 8. Freedom of choice (freebuild or recreate a structure)
- 25. Flexibility to build and create
- 37. Lego structure uncertainty is part of the creative process
- 50. The creative process flows while free building
- 82. Endless possibilities for creation [lego catalogue]
- 106. Imagination to problem-solve
- 111. Lego building encourages flow of ideas
- 4. Interchanging the colors of bricks
- 7. Browsing the catalogue and exploring the possibilities to build.

Independence & Focus

- 12. "She doesn't really need my help"
- 57. "I like it because it keeps me busy"
- 59. " I [...] take [...] random pieces and build something, and it calms me down that way"
- 96. "[...] It's not bad either to be alone [...]"
- 120. "I feel like it [standing up] just gets me more concentrated on the legos"
- 149. "[...] When I do it by myself, I get more concentrated on it."
- 189. "When I was a much younger I didn't really know how to play with Lego, but now I really know how to play with Lego."
- 220. "[...] sometimes I just like building by myself because if I build with my friend,[...] I get too distracted, I'm stuck and I can't focus on building."
- 21. Time-consuming (in a good way)
- 97. Solitary play
- 219. Lego building as a solo activity
- 223. Staying focused on playing and building
- 79. Attaining personal objectives for Lego structure creations