Teacher Perspectives and Knowledge of Schema Play in Early Childhood Classrooms

by

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Abstract

This quantitative, cross-sectional study examined the relationship between early childhood teachers' knowledge of schema play and their reported responses to children's schematic behaviors. Data were collected using a single, researcher-developed vignette-based online survey that included demographic items, Likert-scale responses to classroom scenarios, measures of familiarity with and professional training related to schema play, and a multiple-choice assessment of schema knowledge. Descriptive and inferential analyses, including correlation and multiple regression, were used to examine associations between teachers' conceptual understanding and instructional decision-making.

Results indicated variability in teachers' knowledge of schema play and revealed a statistically significant relationship between conceptual understanding and reported pedagogical responses. While many teachers recognized schematic behaviors as developmentally meaningful, higher levels of schema knowledge were associated with a greater likelihood of intervening in or redirecting children's play. Teachers with lower levels of schema knowledge more frequently reported neutral or restrictive responses.

Overall, the findings highlight gaps in teachers' preparation related to schema theory and play-based pedagogy and suggest the need for greater attention to how teachers develop conceptual understandings of schema play and translate that knowledge into instructional decisions. This study contributes to the schema play literature by examining relationships between teachers' knowledge, interpretations of play-based scenarios, and self-reported instructional responses, emphasizing the role of teacher cognition in early childhood classroom contexts.

Artificial Intelligence (AI) Use Disclosure Statement

In the preparation of this dissertation, no Artificial Intelligence (AI) tools were used.

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List of Abbreviations

DAP	Developmentally Appropriate Practice
NAEYC	The National Association for the Education of Young Children
ECE	Early Childhood Education
CDC	Child Development Center
BDNF	Brain-Derived Neurotrophic Factor

CHAPTER ONE: INTRODUCTION

Background

The profession of early childhood education affirms that children develop at rapid rates cognitively, physically, emotionally, and socially during the first eight years of life (The Nature and Tasks of Early Development, 2023; NAEYC, 2020; Bredekamp, 1987; Reynolds & Temple, 2005; National Scientific Council on the Developing Child, 2018; NASEM, 2015). The experiences offered to young children during this critical time shape children's intellectual, behavioral, relational, and moral outcomes (Flores et al., 2007; Coelho et al., 2024; Skills for Social Progress, 2015; Suess & Sroufe, 2005; National Scientific Council on the Developing Child, 2007; Haywood & Tapp, 1966; National Commission on Social, Emotional, and Academic Development, 2019). The foundational outcomes listed above, critical developments, and new learnings ultimately influence identity formation, personal values, feelings of belonging, and life pursuits (NAEYC, 2020; Lea J. Boldt et al., 2020; Milica Jelic, 2014; Morrison & Bordere, 2001; Edmiston, 2010; A New Vision for High-Quality Preschool Curriculum, 2024; Shonkoff & Garner, 2012; NAESM, 2017). Although early childhood researchers and practitioners agree on the relationships between early experiences and development, many discrepancies exist between what the field affirms and what actually happens across early childhood education settings (Bredekamp, 1987; Cade et al., 2022; Stephen & Brown, 2004). For instance, despite the field broadly proclaiming the importance of integrating "children's developmental needs, interests, and capabilities into classroom practices as part of child-centered pedagogy," early childhood practitioners feel they must teach mastery of academic knowledge through standards-based curricula (Cade et al., 2022). Additionally, many classroom teachers value student-centered approaches that lend themselves to co-creating a classroom community,

developmentally appropriate learning outcomes, and opportunities to observe students' play through actions, behaviors, and interests, yet feel pressured to show academic results and the need to check academic mastery through prescribed curricula and standards created by outsiders (Cade et al., 2022; Stephen & Brown, 2004). These discrepancies unveil differences in what is known, accepted, and desired by the field at large and what is expected of practitioners in early childhood settings.

Diversity in Educational Models, Applications, and Resources

Moreover, differences in educational applications and offerings are pervasive in early childhood education, even when seminal ideals are agreed upon. These differences result from several factors, including diverse values and contexts, an abundance of program models, resource constraints, and evolving research and understandings (National Research Council, 2001; Clyde, 1990; NAEYC 2020). When educators agree on broad goals such as fostering development or nourishing the love of learning, their interpretations and approaches can vary based on their personal values and cultural backgrounds (Zhang, 2016; Reid et al., 2017; Twawick-Smith, 2019; Goodnow & Lawrence, 2015). These perspectives in early childhood education highlight that differences are not a problem to be solved but rather a strength to be embraced. By acknowledging and valuing these differences, engaging in ongoing dialogue, and continually reflecting on our own biases, we can create richer and more equitable learning experiences for all young children (Shore, 2012). Such reflective practices demonstrate how societal perspectives and needs shape early childhood practices, leading to diverse approaches even within a single nation, state, and community (Zhang, 2016).

The Role of Resources in Program Quality and Equity

Another factor that feeds discrepancies is the vast range of program models available for utilization and consumption. The field of early childhood education encompasses a broad spectrum of program models, each with its own philosophical underpinnings and practices (National Research Council, 2001). From Montessori to Reggio Emilia to Waldorf, these educational models and philosophies, while sharing some common ground, differ in their emphasis in many realms, including curriculum structure, teacher-directed vs. child-initiated learning, and assessment methods (Zhang, 2024; Lloyd, 1983). With all of the philosophical and theoretical differences woven throughout the field, it is apparent that there is a need for a shared vision across different practices that focus on the development of children while also acknowledging and valuing the existing variety of approaches.

Additionally, the availability of resources like funding, qualified teachers, and materials also significantly impacts program quality and the feasibility of implementing approaches and practices that are broadly accepted by the early childhood education field (Rojas et al., 2020; Duncan & Magnuson, 2013; Glassman, 1971). Educators face such challenges while accessing information and support, which can contribute to disparities in program quality and implementation. These inequities emphasize that the availability of adequate resources is not merely a logistical concern but a matter of effectiveness in early childhood education. Investing in qualified teachers, providing them with ongoing professional development, and ensuring access to high-quality materials are essential steps toward creating and enriching equitable learning environments where all young children can thrive (Hamre et al., 2017; Rojas et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2019; Organisation for Economic Cooperation and Development, 2018).

Bridging Theory and Practice in Early Childhood Education

Evolving research and conceptual understanding also influence the field of early childhood education and the practices employed across various settings. The constant fluidity of best practices and relevant research is dynamic, as new studies continually emerge that focus on child development, learning, and effective teaching practices. This evolving knowledge base can result in variations in how educators translate research into practice and the strategies they implement in early childhood classrooms (NAEYC, 2020; Farley et al., 2017; Trodd & Dickerson, 2018). Awareness of the ongoing changes in the field highlights the importance of understanding the organizational and social contexts of early childhood programs, as these factors influence how frequently and methods by which ideals are put into practice (Janko et al., 2017). This focus on bridging theory and practice becomes especially significant when considering key pedagogical elements, such as the role of play in early childhood education. The emphasis on play in the field serves as a clear example of how shared ideals and diverse applications intersect. Play, a universal and vital aspect of child development, not only aligns with developmental theories but also provides a dynamic context for educators to engage children in meaningful learning experiences (Resnick, 2017; Yogman et al., 2018; Zosh et al., 2018; Zosh et al., 2017).

The tension between shared ideals and diverse applications highlights complexities across the landscape of early childhood education. It underscores the need for ongoing dialogue, collaboration, and professional development in order to bridge the gap between theory and practice and to ensure high-quality experiences are prioritized, are responsive to, and are built upon child development (Shore, 2012). When these practices are paramount in educators' repertoires, commonalities and themes emerge between pedagogical and educational dialectics, ideals, and values (Reid et al., 2017; Schacter et al., 2019; Shore, 2012).

The Importance of Play in Early Childhood Education

One concept or activity lauded across the field of early childhood education is the value and benefits of children's play (Essame, 2020; Paley, 2009; Elkind, 2007; Brown, 2009; Khalil et al., 2022). Play is described as being fundamental for children, as it is through play that children learn and construct understandings of the world through exploration, experimentation, and social interaction (Hendricks, 2015; Essame, 2020; Paley, 2009; Elkind, 2007; Brown, 2009; Khalil et al., 2022; Piaget, 1951; Brunner, 1976; Vygotsky, 1967, Sutton-Smith, 2021). This fundamental aspect of life and inherent human desire also serves as a means for children to advance across all areas of development. (Schlesinger et al., 2020; Nicolopoulou, 1993; Gray, 2017), as actively inquiring during play requires active engagement in autonomous tasks and representations (Smith & Chao, 2018; Vygotsky, 1967). Participation in play also builds essential skills that aid in constructing knowledge (Piaget, 2013; Vygotsky, 1967; Mraz et al., 2016; Gronlund & Rendon, 2017; Elkind, 2007; Brown, 2009). Hence, new knowledge is constructed as children inquire, enter states of disequilibrium, repeat actions, and change their thoughts and actions (Piaget, 2013).

Schema Play: Foundations and Educational Implications

As educators increasingly recognize the importance of developmentally appropriate and holistic play experiences, schema play, a concept rooted in cognitive development theories, is emerging in educational contexts, particularly in early childhood education (Hedges et al., 2013; Hanline, 1999; Essame, 2020; Nicolopoulou, 1993; Schlesinger et al., 2020). Schema play yields an array of developmental learnings and constructions (Curtis & Jaboneta, 2019; Thomas, 2020; Beloglovsky & Daly, 2016; Nutbrown, 2011). At its core, schema play is influenced by Jean Piaget's constructivist theory of knowledge, emphasizing the active role of learners in

constructing their own understanding of the world (Curtis & Jaboneta, 2019; Atherton et al., 2013). Piaget highlighted the role of schemas, cognitive structures that organize knowledge and experiences, in shaping development (Meade & Cubey, 2008; Piaget, 2013; Levine & Munsch, 2011; Gray & MacBlain, 2012). In educational settings, schema play provides flexible opportunities for children to explore, experiment, and make sense of their surroundings (Lewis & Thomas, 2021; McDermott, 2020). Contemporary perspectives on schema play emphasize children's innate "delight [in] exploring the world" and advocate for increased opportunities for such exploration in early learning environments (Developmentally Appropriate Practice, 2020). Critically, schema play goes beyond rote memorization, fostering interactive and experiential learning (Curtis & Jaboneta, 2019). In doing so, schema play encourages students to engage in imaginative and hands-on activities that naturally align with their individual cognitive development stages (Nutbrown, 2011; Curtis & Jaboneta, 2019). Thus, children integrate new information into schemas through schema play, promoting creativity, problem-solving skills, and a deeper understanding of concepts (Gray, 2017; Athey, 2007; Vygotsky, 1967; Nicolopoulou, 1993).

Challenges and Equity in Play-Based Pedagogy

However, due to discrepancies and inequities plaguing the field, play opportunities afforded to young children look and sound intensely different (Cade et al., 2022; Hanline, 1999; Reid et al., 2019). These differences include a lack of resources, professional support, education on play-based learning pedagogy, and knowledge regarding child development (Arlene Harris, 2021; Kallitsoglou, 2020; Lewis, Fleer, & Hammer, 2019; Miller et al., 2022; Pyle et al., 2017; Taylor & Boyer, 2019). Simply put, for children to benefit from play opportunities, early childhood educators must have foundational pedagogical and child development knowledge and

continue to learn, assert, and advocate for the benefits of play while being intentional about their pedagogical approaches to implementation (Seo & Yuh, 2021).

Reflective Practice and Overcoming Negative Perceptions

Equivalently, the benefits of providing young children with schema play experiences are endless but also require adult intentionality, openness, and inquiry (Nutbrown, 2011; Curtis & Jaboneta, 2019). With this, practitioners must be aware of child development and schematic play for implementation to be successful and sustainable. As children explore the world around them and engage in schema play, their repetitive behaviors and actions may seem ambiguous, suspicious, or even problematic. However, such actions represent learning and development in a literal sense (Curtis & Jaboneta, 2019; Nutbrown, 2011; Thomas, 2020). Thus, when observing students at play or engaging with students during play, early childhood caregivers must ponder, reason, and reflect on their responsibilities to create effective opportunities that serve and advocate for children, ultimately guiding their learning and development (Sunday, 2020; King et al., 2016).

Additionally, reflective practitioners may encounter negative perceptions when implementing a pedagogical approach that includes schema play opportunities for children in their early childhood setting (Khalil, 2022). Uniform academic expectations imposed upon educators may also hinder the implementation of pedagogical practices that incorporate schema play (Bakar et al., 2015). With such hindrances in place, teachers may face challenges in understanding the role of schema play in learning, perceiving it as a distraction or infraction rather than a valuable educational tool. Addressing and disrupting these negative perceptions could become crucial for harnessing the full potential of schema play in educational settings.

The Future Potential of Schema Play in Early Childhood Education

Despite the challenges present in the evolving landscape of early childhood education, and where practitioners emphasize the development of the whole child beyond mere academic achievement, schema play could emerge as a dynamic and engaging approach. Its significance lies in providing a foundation for lifelong learning, cultivating critical thinking skills, and fostering a love for exploration and discovery (Curtis & Jaboneta, 2019; Atherton et al., 2013). As educators grapple with adapting teaching methodologies to meet the diverse needs of learners and requirements from administrators and other stakeholders, understanding and embracing the potential of schema play becomes paramount in creating enriching educational experiences for young minds. Fortunately, expanding analyses of schema play provide a frame through which we can deepen our understanding of the natural responses of young children to their environment and work with them to enhance cognitive, social, emotional, and physical development (Arnold, 2015).

Theoretical Framework

Schema Theory: Origins and Cognitive Foundations

Schema theory has its roots in cognitive psychology and was notably developed by the Swiss psychologist Jean Piaget (Thomas, 2021; Piaget, 1972). Piaget's work, spanning the mid-20th century, laid the foundation for understanding how individuals organize and interpret information (Piaget, 1953; Piaget, 1959; Piaget, 1970). The term "schema" refers to mental structures that individuals create to organize knowledge and experiences, enabling them to make sense of the world around them (Piaget, 2013; Athey, 2013). Piaget proposed that cognitive development occurs through a series of stages, and schemas are central to this process (Piaget, 1953; Piaget, 1959; Piaget, 1970). For example, during the sensorimotor stage (birth to age 2),

infants develop basic schemas by interacting with their environment (Kholiq, 2020; Curtis & Jaboneta, 2019). As individuals progress through childhood and adolescence, these schemas become more complex and abstract (Kan et al., 2020). With the knowledge that tending to students' schemata has advantageous implications, schema theory has been applied in educational contexts through many philosophies and strategies (Thorndyke & Hayes-Roth, 1979; Mavrogenes, 1983; Alvermann et al., 2019).

Schema Theory in Early Childhood Education

Schema theory gained prominence in early childhood education as educators sought to understand how students learn and retain information (Thorndyke & Hayes-Roth, 1979; Mavrogenes, 1983; Alvermann, et al., 2019). In education, schema theory aligns with constructivist principles, emphasizing that learners actively construct knowledge based on their experiences (Alanazi, 2016; Usher et al., 2015). In constructivist early childhood classrooms, educators create environments that encourage exploration, problem-solving, and the construction of meaningful schemas (Branscombe et al., 2014). If children are afforded opportunities to explore environments, materials, and provocations curated by educators in early childhood settings, play is bound to commence (King et al., 2016; Sunday, 2020).

Implications of Schema Theory for Practice

In summary, the historical development of schema theory, rooted in Jean Piaget's work, has significantly influenced educational practices (Thorndyke & Hayes-Roth, 1979). With this, early childhood practitioners must take notice of children's inquiries, interests, and development during play and design the environment, place materials, and craft provocations according to these interests. Applications of schema theory to early childhood settings underscore the

importance of creating learner-centered environments that support development, foster meaningful learning experiences, and address students' diverse needs.

Influence of Teacher Perceptions on Instructional Strategies

Teachers play a pivotal role in shaping students' educational experiences, as early childhood educators' perceptions significantly influence the acceptance, adoption, and implementation of instructional strategies, including schema play (Khalil et al., 2022; Gallego & Caingcoy, 2020). Teacher perceptions and knowledge are guided by many factors, including educational philosophy and beliefs, prior professional development and training, understanding of child development, and the value of institutionally adopted curricula and pedagogical practices (Zhang, 2016; Reid et al., 2017; Twawick-Smith, 2019; Shore, 2012). Many of these factors are lacking, diminished, or extrapolated from teachers' professional practices through many avoidances and hindrances (Khalil et al., 2022; Khalil & Elkhider, 2016; Farley et al., 2018).

Educational Philosophies and Beliefs Affecting Schema Play

Teachers' educational philosophies are the foundational values and principles guiding their instructional practices (Marpa, 2023). For instance, if a teacher's philosophy aligns with the importance of active, experiential learning and the construction of knowledge by students, they are more likely to recognize the value of schema play in supporting these principles (Bouley-Picard, 2005). Teacher beliefs about the role of play in learning must also profoundly impact teachers' perceptions of schema play (Bouley-Picard, 2005). If educators truly and sincerely believe that play is an integral part of the learning process, fostering creativity, problem-solving, and social skills, they are more likely to see schema play as a valuable tool for achieving these educational objectives (Baker et al., 2015). Accordingly, teachers' knowledge and perceptions of schema play are closely tied to their views on student-centered learning. If educators prioritize

student engagement, agency, and learners' active construction of knowledge, schema play aligns with these principles.

Classroom Environment and Its Role in Schema Play

The classroom environment greatly determines both teachers' and children's learning journeys (DeVries & Zahn, 2012; Martin, 2006; Wise & Wise, 1991). As such, environments curated by teachers are formed by teachers' values and perceptions. Thus, teachers' perceptions, particularly concerning the classroom culture and environment, play a crucial role in shaping the successful implementation of schema play (Khalil et al., 2022; Gallego & Caingcoy, 2020). For instance, teachers who perceive play as a valuable and integral part of the learning process are more likely to create a positive attitude toward schema play. This contagious attitude influences students, fostering an environment where play is seen as an enriching and purposeful activity. Schema play thrives in an environment that encourages autonomy, exploration, and creativity (Curtis & Jaboneta, 2019; Atherton et al., 2013). Teachers who value and support these aspects create a classroom culture where students feel empowered to engage in developmentally appropriate opportunities. This, in turn, enhances the effectiveness of schema play.

The Critical Role of Teacher Perceptions

In conclusion, teachers' perceptions play a crucial role in shaping the invitation and implementation of schema play in the classroom. Addressing and positively influencing these perceptions is essential for unlocking the full potential of schema play as a valuable tool for students' cognitive, social, and emotional development. This introduction sets the stage for exploring the rich and dynamic interplay between cognitive development and play, shedding light on how schema play contributes to the holistic development of young children immersed in early childhood settings (Lewis & Thomas, 2021). For instance, when children engage in schema

play, such as stacking, sorting, or building structures, they are not only strengthening their understanding of spatial relationships but also refining their problem-solving abilities and fine motor skills (Atherton et al., 2013). Additionally, as children repeatedly engage with patterns or objects in different contexts, like arranging toys in a specific order or pretending to drive a car, they begin to form deeper cognitive connections that support their understanding of cause and effect, symmetry, and categorization (Nutbrown, 2011; Atherton et al., 2013). This type of play is crucial for fostering creativity, language development, and emotional regulation as children negotiate roles, share ideas, and express themselves during these explorations (McDermott, 2020).

Statement of the Problem

Previous research on play in early childhood settings has not thoroughly extended to schema play or teachers' perceptions of such play. Although past research investigated teachers' knowledge and value of play-based and outdoor practices (Baker, 2014 & Isaacs et al., 2018; Prins et al, 2022; Rand & Morrow, 2021; Parker et al., 2022; Leung, 2023), additional exploration surrounding teachers' knowledge and perceptions associated with schema play is needed. The impact of studying teachers' experiences and perceptions surrounding schema play has the potential to 1.) elucidate teachers' reactions to student behaviors, 2.) identify critical gaps in pedagogical practices within the field of early childhood education, 3.) investigate teachers' knowledge and prior experiences with schema play, and 4.) explore teachers' perceptions of and reactions to schema play. Subsequent research can determine the relationship between teachers' perceptions and possible impacts on child development.

Purpose of Research

It is presumed that early childhood teachers' knowledge of schema play varies widely, influenced by factors such as educational background, pedagogical training, and professional context. While schema theory, originating from Piaget's cognitive developmental framework, offers a compelling lens for understanding how young children make sense of the world through repeated patterns of behavior (Athey, 2007), not all educators are equally familiar with or confident in recognizing and supporting these learning processes. Some early childhood professionals demonstrate a rigid or compartmentalized understanding of play and academic learning, often shaped by the demands of school readiness initiatives, accountability measures, or a lack of training in constructivist approaches to education (Pui-Wah, 2004; Wood, 2014).

Pui-Wah (2004) highlights how early childhood practitioners may articulate the value of play in principle but often struggle to integrate it meaningfully into classroom practice, particularly when academic outcomes are emphasized. As a result, educators may overlook or undervalue the deep cognitive functions inherent in schematic play, where children engage in repeated actions, such as transporting, rotating, enclosing, or enveloping, as part of their natural developmental trajectory (Broadhead, 2006). Additionally, Moss (2012) argues that contemporary policy pressures have narrowed the early learning agenda, further distancing teachers from child-centered, play-based pedagogies that honor schema play as a legitimate and essential learning process.

Others, however, recognize the potential for schema development in outdoor and experiential play settings, where children's physical engagement with the environment fosters exploration and meaning-making (Boulton, 2022). This awareness is often rooted in educators' pedagogical content knowledge and the complex interplay between theory and practice (Keung,

2020). Yet, there remains a significant need to further explore early childhood teachers' knowledge and perceptions of schematic play. Understanding teachers' reactions to children's schematic behaviors is crucial for unpacking how professional knowledge translates into practice—and, critically, how misunderstandings or negative reactions may impact children's developmental trajectories across various domains.

This study aims to measure early childhood teachers' knowledge of schema play and examine their behavioral reactions to children's engagement in schematic patterns. First, the study will assess general teacher knowledge of schema play, followed by an analysis of how that knowledge relates to classroom interactions, specifically whether they are supportive, neutral, or adverse. In doing so, this research aims to explore the relationship between discrepancies in knowledge and behavioral reactions, providing insights into how educators' understanding influences young children's experiences and development. The findings of this study will contribute to the limited yet growing body of literature on schema play, identifying how teacher perceptions and actions shape opportunities for meaningful, developmentally appropriate learning in early childhood settings.

Research Questions

The proposed study aims to answer the following:

1. What knowledge do early childhood teachers express regarding schema play?
2. What are early childhood teachers' reactions to children's manifestations of schema play?
3. Is there a relationship between early childhood teachers' knowledge and how they respond to students' engagement in schematic play?

Definition of Key Terms

1. *Toddler*- a child one to three years of age

2. *Play*- a dynamic and voluntary activity in which individuals, particularly children, engage in interactions and experiences primarily for enjoyment and intrinsic satisfaction. It encompasses a wide range of behaviors and serves as a critical vehicle for cognitive, social, emotional, and physical development
3. *Schema*- a knowledge structure that allows organisms to interpret and understand the world around them (Nickerson, 2024)
4. *Constructivism*- a learning theory that affirms that knowledge is best gained through a process of action, reflection, and construction (Mascolo & Fischer, 2005)

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter presents a historical review of schema and the emergence of applying schema play in childcare settings. Thus, this literature review offers an in-depth analysis of the existing body of research relevant to schema play and its application in early learning settings. The initial discussion begins by delving into the theoretical perspectives that support schema play. Subsequently, the chapter synthesizes recent literature on fostering schema exploration in early childhood education classrooms. Key topics include the characteristics and developmental significance of schema play, its impact on children's cognitive and socio-emotional growth, the influence of learning environments on schema engagement, teacher-child dynamics in schema-related activities, and the obstacles educators encounter when implementing schema-focused practices. The chapter concludes by addressing critical gaps in the literature, particularly regarding teacher practices and the scarcity of research that emphasizes schema play in early education.

Theoretical Framework

This section will explore the theoretical foundations of schema play, with a primary focus on constructivist and social cognitive constructivist perspectives. It will begin by examining Piaget's constructivist theory and then delve into social cognitive constructivism, highlighting the impact of social interaction and cultural context on learning (Huang, 2021). The concept of schemas will be discussed, followed by a thorough examination of schema play, emphasizing its role in cognitive development and learning. The interplay between these theoretical frameworks will be analyzed to provide context for schema play in toddler classrooms.

Constructivist Theory

Constructivism is an educational theory that asserts learners actively construct knowledge and understanding through their experiences and interactions with the world (Green & Gredler, 2002; Zajda, 2011). This approach emphasizes experiential engagement, inquiry-based learning, and the vital role of the learner in shaping comprehension (Sam, 2004; Adeyele, 2023). Its origins can be traced to several influential thinkers, each of whom contributed unique perspectives that informed its development (Quartz & Sejnowski, 1997; Green & Gredler, 2002).

Foundations in Pragmatism and Early Thought

John Dewey's pragmatist philosophy articulated foundational principles for constructivist methodologies (Renninger, 2024; Chambliss, 2009). He underscored the significance of experiential learning and the linkage between education and real-world contexts (Lebert & Vilarroya, 2024; Schunk, 2020). Dewey advocated for a student-centered and inquiry-based approach to education, promoting critical thinking and problem-solving skills (Vaghela & Parsana, 2024). Although Dewey's educational philosophy was not explicitly labeled as constructivist, it laid the groundwork for subsequent theoretical advancements (Alanazi, 2016).

Piaget's Contributions to Constructivism

Through his extensive research on cognitive development, Jean Piaget made substantial contributions to constructivist theory (Devi, 2019; Arsalidou & Pascual-Leone, 2016). He contended that children actively construct knowledge by engaging with their environment and forming mental representations or schemas, which facilitate the organization and interpretation of information (Smolucha & Smolucha, 2021; Taylor & Boyer, 2019). Piaget's stage theory of cognitive development emphasized the progressive nature of children's thinking and their pursuit of cognitive equilibrium (Taylor & Boyer, 2019; Gopnik & Wellman, 2012).

Vygotsky and Sociocultural Perspectives

Concurrently with Piaget's research, Lev Vygotsky accentuated the sociocultural dimensions of learning (Bernard, 2024; Devi, 2019; Vygotsky, 1978). His theory elucidated the critical roles of language, social interactions, and scaffolding in cognitive development, particularly as encapsulated in the concept of the Zone of Proximal Development (Kharroubi & ElMediouni, 2024; Tao & Chen, 2023; Alanazi, 2016). Vygotsky's explicit assertions have served as a foundational and seminal component of the formation of pedagogical practices in schools for many decades (Devi, 2019).

Influence on Contemporary Educational Practice

Constructivist principles have profoundly influenced modern educational practices, shaping contemporary teaching and learning paradigms (Renninger, 2024). While not always explicitly categorized as "constructivism," numerous contemporary pedagogical approaches embody its core principles, emphasizing the learner's active role in constructing knowledge and meaning (Tan, 2017). This transition from traditional, teacher-centered instruction to student-centered learning has transformed classroom dynamics, engendering more engaging and meaningful learning experiences (Arman, 2018; Mat & Jamaludin, 2024).

Student-Centered Learning and Experiential Engagement

One notable manifestation of constructivism in education is the emphasis on student-centered learning activities. Project-based learning, inquiry-based investigations, and collaborative group work empower students to assume ownership of their learning (Sam, 2024). By actively participating in these endeavors, students cultivate critical thinking, problem-solving skills, and a deeper understanding of the subject matter (Fernando & Marikar, 2017). This

approach recognizes that learning constitutes not a passive absorption of information but an active process of construction and meaning-making (Meyer et al., 2015; Coyle, 2015).

Experiential learning, a fundamental aspect of constructivism, emphasizes the significance of concrete experiences in shaping understanding (Coker et al., 2017; Jose et al., 2017). Schools are increasingly integrating hands-on learning opportunities, which encompass field trips, experiments, and real-world simulations (Schwichow et al., 2016; Daniel et al., 2019). These experiences provide students with relevant contexts to apply their knowledge and construct meaning. By associating learning with real-world situations, students attain a deeper understanding of the relevance and applicability of their knowledge (Zhang, 2019). Moreover, constructivism acknowledges the social and cultural influences on learning (Bada & Olusegun, 2015). Collaborative activities, such as group discussions, peer teaching, and cooperative projects, have become prevalent in classrooms (Baines et al., 2016). These interactions facilitate opportunities for students to share perspectives, negotiate meaning, and co-construct knowledge (Gordon, 2009).

In conclusion, constructivism continues to influence contemporary educational practices by advocating for active learning, critical thinking, and meaningful knowledge construction (O'Connor, 2022; Lombardi et al., 2021). The theoretical contributions of Dewey, Piaget, and Vygotsky offer a foundation for educational strategies that prioritize student engagement and inquiry-based learning (Mamun, 2018; Sam, 2024). These principles have transformed classroom environments from passive knowledge transfer to dynamic, hands-on experiences and collaborative problem-solving activities (Sam, 2024). Through experiential learning and authentic assessments, students are better equipped to apply their knowledge in real-world contexts, fostering a more profound understanding and developing lifelong learning skills

(Fernando & Marikar, 2017; Zhang, 2019; Efgivia et al., 2021). As education evolves, constructivist methodologies remain central to promoting a holistic and meaningful educational experience experiences (Bada & Olusegun, 2015).

Social Cognitive Constructivist Theory

Social cognitive constructivist theory is a cornerstone of contemporary educational psychology, providing a rich and nuanced perspective on how individuals learn and develop (Renninger, 2024; Kharroubi & ElMediouni, 2024). Although it is often associated with Lev Vygotsky, the theory embodies a convergence of ideas that have evolved over time, drawing from earlier philosophical and psychological traditions. John Dewey's pragmatism, emphasizing experiential learning and the social nature of knowledge construction, laid the foundation for understanding learning as a dynamic and interactive process rooted in specific cultural contexts (Null, 2004). Dewey's work challenged traditional views of education, which viewed it as the mere transmission of static information, advocating instead for learning experiences that actively engage learners in real-world problem-solving and collaborative inquiry (Swargiary, 2024).

Vygotsky's Sociocultural Contributions

Lev Vygotsky's sociocultural theory, which emerged in the early 20th century, provided a significant impetus for the development of social cognitive constructivism (Nicolopoulou, 1993). Vygotsky's work emphasized the crucial role of social interaction and language in mediating cognitive development (Topciu et al., 2015). He introduced key concepts, such as the Zone of Proximal Development, which defines the gap between what a learner can achieve independently and what they can accomplish with guidance from a more knowledgeable individual (Chaiklin, 2003; Silalahi, 2019). This concept also includes scaffolding, which refers to the temporary support provided to learners as they navigate this zone (Chaiklin, 2003; Silalahi, 2019).

Vygotsky's focus on social and cultural tools, including language, symbols, and artifacts, underscored the profound influence of cultural context in shaping cognitive processes (Bernard, 2024).

Jerome Bruner and Expanding Social Constructivism

Jerome Bruner's contributions significantly enriched social cognitive constructivist theory by building on Vygotsky's foundational ideas (Kratochwil, 2008). Bruner's work on knowledge construction and the role of representation expanded the scope of social cognitive constructivism, emphasizing the dynamic relationship between individual cognition and social interaction (Melenteva, 2018). He proposed three modes of representation: enactive (action-based), iconic (image-based), and symbolic (language-based), suggesting that learners progress through these modes as they develop (Zhou, 2020). Bruner's concept of scaffolding, which aligns with Vygotsky's idea of guided participation, became a central principle of social cognitive constructivism (Rannikmae, 2020). It highlights the necessity of providing learners with appropriate support and guidance as they construct new understandings (Belland, 2014).

Contemporary Perspectives and Educational Implications

Contemporary perspectives on social cognitive constructivism continue to evolve, integrating insights from diverse fields, including cognitive science, anthropology, and sociology (Palincsar, 1998). Current research explores the complex interplay between individual, social, and cultural factors in learning, emphasizing the importance of collaborative learning environments, authentic assessment practices, and culturally responsive teaching strategies (Snider, 2015; Hammond, 2014; Darling-Hammond, 2000; Herrington & Oliver, 2000). The historical trajectory of social cognitive constructivist theory reflects an ongoing dialogue between different perspectives, contributing to a richer and more nuanced understanding of

learning as a dynamic, socially situated, and culturally mediated process. This evolving understanding has profound implications for educational practice, informing the design of learning experiences that foster active engagement, collaboration, and meaningful knowledge construction.

Synthesis of Constructivist and Social Cognitive Theories

Integrating constructivism and social cognitive constructivist theory offers a comprehensive framework for understanding how learners actively construct knowledge through cognitive processes and social interactions. Constructivist approaches emphasize experiential learning, inquiry-based exploration, and problem-solving activities, fostering environments that enable students to develop a deeper understanding through meaningful engagement (Schunk, 2020). Social cognitive constructivist perspectives further highlight the critical role of social interactions in learning, as collaboration and cooperative discussions enable learners to challenge assumptions, negotiate meaning, and co-construct knowledge (Vygotsky, 1978; Palincsar, 1998).

This synthesis of cognitive and social elements highlights the dynamic nature of learners' mental frameworks, influencing how they process and organize information. By creating environments that support both independent exploration and collaborative learning, educators promote cognitive development and critical thinking skills, encouraging students to become active, self-directed participants in their educational journeys (Zhang, 2019).

Schema

The practical application of theoretical principles in early childhood education is essential for fostering a deep understanding of cognitive development (Bodrova & Leong, 2024; Bjorklund, 2022). One such concept is the idea of schemas, which provides a valuable framework for understanding how children build knowledge through their interactions with the

world (Deguara & Nutbrown, 2018; Geary & Berch, 2016). Based on Piaget's theory of cognitive development, schemas are mental structures that act as the fundamental building blocks of cognition (Rumelhart, 2017; Gilboa & Marlatte, 2017). These schemas, developed through repetitive actions and exploratory behaviors, offer insight into the underlying cognitive processes that drive children's learning and development (Curtis & Jaboneta, 2019; Brierley & Nutbrown, 2017; Bjorklund, 2022).

Piaget's theory posits that schemas are fundamental cognitive structures that enable children to comprehend their experiences and organize their knowledge (Bormanaki & Khoshhal, 2017; Meylani, 2024). As children engage in interactive and exploratory play, they continually create and refine these schemas (Boulton & Thomas, 2022). Through this process, they adapt and reorganize their understanding of the world, which is crucial for their cognitive development (Bjorklund, 2022).

Dynamic Nature of Schemas: Assimilation and Accommodation

The significance of schemas in early childhood education cannot be overstated. Schemas serve as mental frameworks through which children organize and interpret information, thereby facilitating the construction of knowledge (Kumar et al., 2018; Wood et al., 2018; Bhattacharjee, 2015). Piaget's work indicates that schemas are dynamic and undergo constant refinement through two primary processes: assimilation and accommodation (Meylani, 2024; Nickerson, 2023). Assimilation occurs when children incorporate new information into existing schemas (Paris, 2018). For instance, a child may initially label a cat as a "dog" because it shares specific characteristics, such as four legs and fur. In contrast, accommodation involves adjusting an existing schema to include new information that does not fit into the original framework

(Bormanaki & Khoshhal, 2017). In this case, the child may distinguish cats from dogs, forming a new schema for "cat."

Moreover, schemas are not static; they evolve as children encounter new experiences and information (Gilboa & Marlatte, 2017). This ongoing schema development process is essential for cognitive growth, enabling children to adapt to their environment and understand new situations (Bjorklund, 2022). Such a dynamic process allows children to construct knowledge increasingly sophisticatedly, promoting cognitive flexibility and critical thinking skills.

Implications for Educators and Curriculum Design

For educators, understanding schemas is essential for effective teaching and curriculum design (Anderson, 2018; Khalil & Elkhider, 2016). By observing children's play and interactions, educators can identify the underlying schemas that shape their behavior and thought processes (Curtis & Carter, 2022). This knowledge can then guide the development of learning experiences tailored to individual children's unique needs and interests (Curtis & Jaboneta, 2019). For instance, a child who shows a keen interest in patterns may benefit from opportunities to explore these patterns through various activities such as art, music, or movement (Grenier, 2014; Grenier et al., 2017). In this way, educators can foster a learning environment that promotes the development of schemas and supports children's overall development.

Moreover, recognizing the role of schemas can enhance children's problem-solving abilities (Bhagat et al., 2018). When faced with a problem, children draw upon their existing schemas to find solutions (Maine, 2015). Educators can support the development of problem-solving skills by providing opportunities for children to encounter and engage with challenges, allowing them to refine and expand their schemas in the process (Huang, 2021). By fostering an

environment that promotes schema development, educators empower children to become active learners capable of constructing their understanding of the world (Brierley & Nutbrown, 2017).

Building on this understanding of schemas, the next section of this paper will explore how schema play manifests these mental structures. This exploration will examine how children's active engagement with their environment dynamically expresses and refines their schemas.

Schema Play

Schema play, a concept deeply rooted in Jean Piaget's cognitive development theory, serves as an essential framework for understanding how children construct and refine their knowledge. According to Piaget (1952), children are not passive recipients of information; rather, they actively engage with their environment through schemas, which are mental structures that help organize and interpret their experiences. As children interact with the world, they continuously modify and adapt these schemas, a process central to development (Saracho, 2023; Bjorklund, 2022; Bhattacharjee, 2015). This dynamic interaction between a child and their environment forms the basis of schema play, where children test, refine, and expand their schemas through repetitive and exploratory behaviors (Yogman et al., 2018). The implications of schema play are profound, as it provides insight into how children construct their understanding of the world and how educators can support this process in meaningful ways.

Active Engagement and Cognitive Growth

At the core of schema play is the notion that children's development occurs through active engagement with their environment (Cooper, 2015; Goswami, 2019). Piaget’s theory of cognitive development emphasizes the importance of interaction in the construction of knowledge. For example, when children repeatedly engage in actions like stacking blocks, they

refine their understanding of spatial relationships and develop schemas related to balance, cause and effect, and problem-solving (Piaget, 1952). These repetitive actions, common in schema play, are not just random behaviors but purposeful strategies children use to test their existing cognitive structures and build new ones. By engaging in such activities, children internalize concepts and deepen their understanding of the world around them (Nutbrown, 2011; Atherton et al., 2013).

Educators' Role in Facilitating Schema Play

Supporting schema play in early childhood education promotes cognitive development (Blake, 2015). Educators who understand the significance of schemas can provide learning environments that encourage children to explore and experiment with their ideas (Curtis & Jaboneta, 2019). According to Vygotsky's (1978) sociocultural theory, social interaction and guided learning play a key role in children's development. However, Piaget (1952) emphasizes that children also need independent opportunities to explore and construct knowledge autonomously. Educators can facilitate schema play by offering open-ended materials, such as blocks, clay, or water, encouraging children to manipulate objects and engage in self-directed learning (Beloglovsky & Daly, 2016). These activities provide opportunities for children to test their current schemas and enable them to encounter new challenges that prompt them to modify their existing cognitive frameworks (Arnold, 2015).

Observing schema play provides valuable insights into children's cognitive development. Educators can identify the underlying schemas that drive their actions by carefully observing children's play behaviors (Curtis & Carter, 2022). For instance, a child who repeatedly sorts objects by color or shape is likely developing a schema related to categorization. Recognizing these repetitive behaviors allows educators to tailor their teaching strategies to the child's

developmental stage (Boulton & Thomas, 2022). As Grenier (2014) noted, when educators observe the types of schemas children are developing, they can create learning experiences that build upon and extend these existing frameworks. This approach ensures that the learning activities are relevant to the child's development and interests, making learning more meaningful and effective (Schlesinger et al., 2020).

Another key aspect of schema play is that it encourages children to explore concepts and ideas at their own pace. Open-ended play, characterized by a lack of predetermined outcomes, allows children the freedom to explore various possibilities and experiment with new ideas. According to Harkness and Super (2002), such environments foster intrinsic motivation as children become active participants in their own learning processes. In a setting that promotes schema play, children are not merely "absorbing" knowledge from external sources but constructing their understanding through direct interaction with materials and experiences (Bhagat et al., 2018). This process of exploration and experimentation helps children refine their schemas and solidify their knowledge of the concepts they are investigating (Atherton et al., 2016).

In conclusion, schema play is an essential component of early childhood education that supports cognitive growth by allowing children to actively construct and refine their knowledge through play (Lewis & Thomas, 2021; McDermott, 2020). As children engage with their environment, they continuously test and modify their schemas, leading to a deeper understanding of the world (Nutbrown, 2011; Thomas, 2020. By observing children's play behaviors, educators can identify the schemas at play and design learning experiences that support children's cognitive development (Arnold, 2015). Providing opportunities for open-ended play is vital, as it empowers children to become proactive learners, driving their own cognitive growth (Essame,

2020; Paley, 2009). Through schema play, children refine existing schemas and develop new ones, fostering critical thinking, problem-solving, and a deeper understanding of their world (Curtis & Jaboneta, 2019; Atherton et al., 2013).

Related Literature

Learning through play has long been recognized as a cornerstone of early childhood education, with its significance extending across various fields of study. It is increasingly acknowledged as a vital process for fostering the cognitive, social, emotional, and physical growth of young children (Allee-Herndon et al., 2022; Fisher et al., 2011; Lillard et al., 2013; Pellegrini, 2013; Walker et al., 2020). Through play, children engage in hands-on learning experiences that help them build foundational skills essential for later academic achievement and overall well-being (Nelson et al., 2016; White et al., 2021; Allee-Herndon et al., 2022). Play is not a mere recreational activity; instead, it serves as an active and dynamic tool for learning as children explore their surroundings, manipulate materials, and engage with their peers in ways that promote deep cognitive processing and skill acquisition (Alle-Herndon & Roberts, 2021; Alle- Herndon et al., 2022; Weisberg et al., 2013). Play is an innate mechanism that drives development in human beings and should not be reduced to being a teaching strategy or approach.

Neurobiological Foundations of Play

Play is an essential and multifaceted activity that significantly contributes to brain development, particularly in early childhood (Graham & Burghardt, 2010; Pellis & Pellis, 2009; Špinka et al., 2001; Vanderschuren & Trezza, 2014). Empirical research has established that play influences both direct and indirect neural architecture and cognitive function, shaping molecular, cellular, and behavioral processes (Zosh et al., 2017; Bell et al., 2010). At the molecular level,

engagement in play has been linked to epigenetic modifications that regulate gene expression, thereby contributing to neurodevelopmental plasticity (Zosh et al., 2017; Garner et al., 2012). On a cellular scale, play facilitates synaptic connectivity, enhancing neural circuit efficiency and optimizing the brain's capacity for information processing and integration (Garner et al., 2012). Behaviorally, play serves as a crucial mechanism for acquiring social and emotional competencies, as well as refining executive functions such as self-regulation, cognitive flexibility, and decision-making (Walker et al., 2011; Weisberg et al., 2016; Zelazo et al., 2017). Collectively, these neurobiological and behavioral effects underscore the critical role of play in fostering learning, adaptive responses to environmental stimuli, and the development of prosocial behaviors (Zosh et al., 2017).

Play's Influence on Brain-Derived Neurotrophic Factor (BDNF)

A key mechanism through which play influences neurodevelopment is its role in modulating the expression of brain-derived neurotrophic factor (BDNF), a vital neurotrophic agent responsible for neuronal survival, synaptic plasticity, and neurogenesis (Huber et al., 2007). BDNF is integral to cognitive functions such as memory consolidation, learning, and social cognition (Roth et al., 2009). Empirical evidence suggests that play-induced neural activity leads to an upregulation of BDNF, particularly within brain regions involved in emotional regulation, social processing, and memory retention, including the amygdala, hippocampus, and prefrontal cortex (Gordon et al., 2003; Huber et al., 2007; Burgdorf et al., 2010; Gordon et al., 2002) These structures are fundamental to executive functioning, self-regulation, and social comprehension (Gordon et al., 2003; Huber et al., 2007; Burgdorf et al., 2010; Gordon et al., 2002). Furthermore, research indicates that engagement in play elicits widespread alterations in gene expression, with the most pronounced effects observed in the

synthesis of BDNF, highlighting its critical role in facilitating neural development and cognitive adaptability (Roth et al., 2009).

Behavioral and Social Benefits of Play

In addition to its influence on neural architecture, play has significant implications for behavioral development (Einon et al., 1978). Regular engagement in play is associated with improved executive functioning, including cognitive flexibility, problem-solving abilities, and emotional self-regulation (Bodrova et al., 2013; Walker & Gopnick, 2013; Bell et al., 2010; Wolfgang et al., 2001; Fisher et al., 2013; Lewis et al., 2000). Through play, children develop adaptive behavioral responses, enabling them to navigate novel situations and adjust their actions in response to shifting social dynamics (Yogman et al., 2018; Zosh et al., 2017). Interactive play, particularly in peer-group settings, requires negotiation, collaborative problem-solving, and adherence to collectively established rules, thereby fostering communication skills and cooperative behaviors (Sutherland & Friedman, 2013; Burghardt, 2005; Pellis et al., 2011; Pellis & Pellis, 1998). These experiences are crucial for social-emotional maturation, equipping children with the necessary competencies to navigate interpersonal relationships effectively while promoting the development of empathy, perspective-taking, and prosocial behavior (Yogman et al., 2018).

Play as a Mechanism for Emotional Regulation and Resilience

Beyond its contributions to cognitive and social development, play serves a critical function in stress regulation and the promotion of emotional resilience (Yogman et al., 2018; Zosh et al., 2017). Empirical research suggests that engagement in play is associated with reduced cortisol levels, indicating its potential role as a natural mechanism for mitigating physiological stress responses (Hatfield & Williford, 2017; Corbett et al., 2010). Additionally,

play stimulates the release of norepinephrine, a neurotransmitter essential for modulating synaptic activity, facilitating learning, and enhancing neural plasticity (Siviy, 2008; Garner et al., 2012). When embedded within nurturing and emotionally supportive environments, play protects against the detrimental effects of stress and adversity, fostering psychological well-being and adaptive coping mechanisms (Yogman et al., 2018; Zosh et al., 2017). Studies further demonstrate that children who regularly engage in play, particularly in peer interactions or exploratory activities with toys, exhibit lower levels of anxiety and stress when compared to those participating in highly structured or less interactive experiences (Wenner, 2009; Barnett, 1984). These findings underscore the significance of play as a foundational process in emotional regulation and the development of resilience.

Integrating Play into Early Childhood Education

Play is fundamental in shaping neural development, cognitive processes, and emotional resilience (Yogman et al., 2018). Its influence on brain architecture, particularly through the upregulation of brain-derived neurotrophic factor (BDNF) and the reinforcement of synaptic connectivity, facilitates the acquisition of essential cognitive and social competencies (Gordon et al., 2003; Huber et al., 2007; Burgdorf et al., 2010; Gordon et al., 2002). Furthermore, the role of play in stress modulation underscores its significance in fostering emotional well-being and adaptive coping strategies (Zosh et al., 2017). By integrating play into early childhood experiences, caregivers and educators can support optimal brain maturation and equip children with the foundational skills necessary for success in both academic and interpersonal domains (Bonawitz et al., 2011; Bonawitz et al., 2010; Shulz & Bonawitz, 2007). Given its profound impact on multiple dimensions of development, play should be recognized as an essential

element of early education and a central component of comprehensive child development frameworks.

Early Experiences

Early experiences play a fundamental role in shaping a child's cognitive, emotional, and social development (Brown & Jernigan, 2012; National Scientific Council on the Developing Child, 2007). During the first few years of life, the brain undergoes rapid growth, forming neural connections at an unparalleled rate (Malave et al., 2022; Gilmore et al., 2018; Tierney & Nelson, 2009; Tooley et al., 2021). Research indicates that these early connections lay the foundation for later learning, behavior, and health outcomes (Center on the Developing Child, 2016; Bryant, 2014; Crosnoe & Elder, 2004). The quality and consistency of a child's early experiences, whether through caregiver interactions, environmental stimulation, or access to enriching activities, have a direct influence on brain architecture (Tierney & Nelson, 2009; Tooley et al., 2021). Positive experiences promote the formation of strong neural pathways, while adverse conditions, such as neglect or chronic stress, can hinder development and lead to long-term challenges (Tooley, 2021; Shonkoff et al., 2012).

Early Experiences and Language Development

Language acquisition is one area where early experiences have a particularly profound impact. Infants begin learning language from birth, and their ability to acquire and process linguistic input is significantly influenced by the interactions they have with caregivers (Kujala et al., 2023; Nallet & Gervain, 2021; Macrory, 2022; Masek et al., 2021). Studies show that children who experience frequent, meaningful conversations develop larger vocabularies and stronger communication skills compared to those who receive less verbal engagement (Hirsh-Pasek et al., 2015). Furthermore, exposure to a rich linguistic environment before the age of five

is associated with improved literacy outcomes and better academic achievement later in life (McLeod et al., 2019; Gibson et al., 2021; Rowe, 2012). These findings underscore the importance of early, responsive communication in promoting children's language development.

Early Experiences and Emotional-Social Development

Early experiences also shape a child's emotional regulation and social competence (Blandon et al., 2010; Hawes & Allen, 2023; Paley & Hajal, 2022). Secure attachment to caregivers, developed through consistent and nurturing interactions, forms the basis for healthy relationships throughout life (Xu et al., 2022; Ali et al., 2021; Garcia-Rodriguez et al., 2023). Children who receive sensitive and responsive caregiving are more likely to develop emotional resilience, empathy, and effective problem-solving skills (Bosmans et al., 2022; Thompson, 2016; Elicker et al., 2016). In contrast, children who experience neglect or instability may struggle with emotional regulation and exhibit higher rates of anxiety or behavioral difficulties (Lippard & Nemeroff, 2020; Dvir et al., 2014; National Scientific Council on the Developing Child, 2020). These early emotional patterns often persist into adolescence and adulthood, affecting interpersonal relationships and mental health (Weissman et al., 2019).

Executive Functioning and Early Experiences

Additionally, the early years are a critical period for the development of executive functioning skills, which include attention control, impulse regulation, and cognitive flexibility (Nigg, 2017; Blair, 2016; Center on the Developing Child at Harvard University, 2011). These skills are essential for academic success and overall well-being (Blair, 2016). Research has shown that early childhood programs that provide structured play, problem-solving, and self-regulation opportunities can enhance the development of executive function, leading to improved outcomes in school and life (Diamond & Lee, 2011). High-quality early education programs,

particularly those targeting children from disadvantaged backgrounds, have consistently demonstrated long-term benefits, including higher graduation rates, reduced involvement in criminal activity, and increased economic stability (Scorza et al., 2015).

In conclusion, the quality of early experiences plays a vital role in shaping a child's development across cognitive, social, and emotional domains (National Scientific Council on the Developing Child, 2007). A nurturing, stimulating, and supportive environment during these formative years is essential for building a strong foundation that influences lifelong learning and success (Tierney & Nelson, 2009; Tooley et al., 2021). When caregivers and educators prioritize enriching early experiences, they equip children with the skills and resilience needed for future achievement. Investing in high-quality early experiences is one of the most effective ways to foster well-rounded, capable individuals who can thrive throughout their lives (National Scientific Council on the Developing Child, 2020).

Play-Based Learning Benefits in Toddler and Early Pre-School Development

The Sensorimotor Stage: Foundation of Early Cognitive Development

During the toddler and early pre-school years, children are situated in the sensorimotor stage of cognitive development, as described by Jean Piaget (Ramesh, 2022; Roslan et al., 2022). This developmental stage, spanning from birth to approximately two years of age, is foundational in shaping the child's understanding of the world (Siregar & Lubis, 2023). In the sensorimotor stage, toddlers and early pre-school-aged children primarily learn through their sensory experiences and physical interactions with their environment (Artherton & Nutbrown, 2016). Their cognitive development is driven by exploration, which involves manipulating objects, observing the effects of their actions, and refining their ability to control their bodies (Blanco & Sloutsky, 2024). Play, during this stage, serves as an essential vessel for development,

providing opportunities for toddlers and early pre-school-aged children to use their senses and motor skills to explore, experiment, and learn (Lai et al., 2018). Through play, they engage actively with their surroundings, developing critical cognitive and physical abilities that form the foundation for future learning (NAEYC, 2020). Therefore, the sensorimotor stage is a critical period in human development, during which the mind is highly responsive to stimuli, with play serving as a fundamental means for children to construct knowledge (Athey, 2018).

Motor Skill Development and Environmental Exploration through Play

As toddlers and early pre-school-aged children progress through the sensorimotor stage, they engage in various forms of play that involve actively exploring their environment (Garner, 2021; Casby, 2003). This period is characterized by the refinement of sensory and motor skills, as children learn about their surroundings through touch, sight, sound, and movement (Corbetta & Snapp-Childs, 2009). Engaging in actions such as grasping objects, manipulating toys, stacking blocks, and throwing or retrieving balls enables young children to develop fine and gross motor skills while fostering coordination, balance, and physical strength (Nutbrown, 2011). Simultaneously, these activities enhance spatial awareness and provide a foundational understanding of physical properties such as weight, size, and texture (Atherton & Nutbrown, 2016a). Through these interactive experiences, toddlers and early preschool-aged children not only refine their physical abilities but also strengthen their cognitive capacity for problem-solving, illustrating the interconnected nature of motor development and early learning (Corbetta & Snapp-Childs, 2009). For instance, when a child attempts to fit a block into a shape sorter or stacks a tower of blocks, they are practicing early problem-solving skills and gaining a deeper understanding of cause and effect. These foundational experiences are integral to their growing ability to navigate and make sense of the world around them (Siregar & Lubis, 2023).

Play as a Critical Mechanism for Cognitive and Physical Growth

The sensorimotor stage of development is a critical period for toddlers and early pre-school-aged children, as it lays the groundwork for cognitive and physical growth (Roslan et al., 2022). Play, in its various forms, is a powerful innate mechanism for facilitating this developmental process (NAEYC, 2020). It enables young children to refine their sensory experiences, enhance motor skills, and develop cognitive abilities (Yogman et al., 2018). By engaging with the environment through play, toddlers and early pre-school-aged children gain essential knowledge about how the world works, both physically and conceptually (Li, 2022). This period of intense exploration and discovery, facilitated by play, forms the foundation for all future learning, making it a crucial stage in the broader trajectory of child development (Yogman et al., 2018). Thus, the role of play in the sensorimotor stage cannot be overstated—it is not only a form of entertainment but also an essential avenue for cognitive and physical development, equipping toddlers and early pre-school-aged children with the skills they need to thrive in future stages of growth. This foundational role of play extends beyond mere exploration, as it encompasses structured patterns of behavior that support cognitive development and learning.

Schema Play Research

The concept of schema play offers a more targeted framework for analyzing young children's play behaviors. Schemas, repeated patterns of thought or behavior, manifest in observable actions such as rotation, trajectory, enveloping, and transportation (Arnold, 2015; Atherton & Nutbrown, 2016b). Research in this area explores how children's engagement in schemas reflects underlying cognitive development and how educators can respond to such behaviors through responsive pedagogy (

Thomas, 2020). The SchemaPlay model developed by Siraj-Blatchford and Brock (2019) offers a structured approach for practitioners to recognize, interpret, and support schema-based learning. Schema play research is notable for its potential to bridge theory and practice, combining Piagetian and Vygotskian principles with real-time instructional strategies.

However, schema play research is not without limitations. Observations of schemas are inherently interpretive and may vary depending on the observer's knowledge and perspective. Misinterpretation can lead to overgeneralization or the pathologizing of typical behaviors (Thomas, 2020). Furthermore, schema-informed teaching requires specialized professional development, which is often lacking in early childhood education programs. Despite these challenges, schema play research remains a valuable avenue for promoting individualized instruction and understanding the complex ways in which young children learn through self-directed exploration.

Critical Analyses and Alternative Perspectives

While the literature generally supports play-based learning, several studies offer critical perspectives that question its implementation, cultural relevance, and pedagogical effectiveness. These critiques highlight tensions between developmental theory and educational practice, particularly in contexts that prioritize academic readiness, accountability, and standardized assessment (Ilgaz et al., 2017). Cultural studies have emphasized that play is not a universal phenomenon but is shaped by cultural norms, expectations, and values, suggesting that the implementation of play-based approaches must be culturally responsive. Although such critiques are necessary to advance the field, they sometimes underplay the documented developmental benefits of play and may lack empirical grounding in actual classroom practice.

Comparative Analysis of Research Approaches

Across the literature, several key contrasts emerge. Theoretical and applied research differ in scope, with the former offering foundational insights and the latter focusing on outcomes in specific contexts. Schema play research serves as a bridge between these domains, applying theoretical insights to everyday classroom practice. Another distinction lies in methodological approaches: schema play studies typically employ qualitative methods to capture the richness of children's play behavior, while intervention studies often use quantitative methods to assess effectiveness. Each approach contributes unique insights, but they vary in rigor, scope, and generalizability.

There are also philosophical differences in how play is conceptualized. Piagetian views emphasize autonomous learning, while Vygotskian perspectives stress social mediation. Schema play research frequently integrates both, recognizing that children's individual patterns of behavior can be supported and extended through adult facilitation. Despite the value of these perspectives, there is a notable lack of research examining how teacher knowledge and pedagogical beliefs about schema play influence their responses to children's play.

Future Research

The existing literature on play and schema play reveals several promising yet underexplored areas that warrant further investigation. While the developmental benefits of schema play are acknowledged in both theoretical and empirical work, there remains a limited understanding of how early childhood educators perceive and respond to such play in real-time classroom contexts. Notably, few studies have focused on the relationship between teachers' conceptual knowledge of schema play and their behavioral responses to children's schematic manifestations.

Much of the current schema play research centers on observing children's behaviors or presenting pedagogical models without sufficiently investigating the educator's role in identifying, interpreting, and supporting these behaviors. Additionally, although the SchemaPlay model (Siraj-Blatchford & Brock, 2019) provides a practical guide, there is a lack of empirical research measuring how well teachers understand and apply the model in everyday teaching. This gap highlights the need to investigate not only what early childhood educators know about schema play but also how this knowledge is applied in practice.

Schema play is a fundamental aspect of early childhood development, deeply rooted in established cognitive theories, and plays a crucial role in fostering problem-solving abilities and executive functioning. Through repetitive and exploratory behaviors, children refine their ability to plan, predict outcomes, and adjust their actions based on feedback, thereby facilitating cognitive flexibility and self-regulation. This iterative process not only supports immediate learning but also lays the foundation for future academic success and adaptive life skills. By recognizing and intentionally nurturing schema play, educators and caregivers can implement scaffolding strategies that enhance cognitive, social, and emotional development. Integrating schema play into educational and caregiving practices strengthens pedagogical approaches, ensuring that children are provided with meaningful opportunities to explore, construct knowledge, and develop essential lifelong competencies.

Play Schemes

Several play schemas commonly emerge during toddlerhood and the preschool years, reflecting children’s cognitive processes as they explore and make sense of their environment. These schemas, which are fundamental to early childhood development, are observable as repetitive patterns of behavior that indicate a child’s developing understanding of physical

properties, spatial relationships, and cause-and-effect principles. Rooted in Piaget's theory of cognitive development (1952), play schemas demonstrate how children actively construct knowledge through hands-on experiences. By engaging in these behaviors, children refine their motor skills, enhance problem-solving abilities, and develop foundational cognitive structures that support later learning (Athey, 2007). Recognizing and supporting these play schemas in early childhood settings can enrich learning experiences and foster deeper cognitive engagement.

Trajectory Schema: Exploring Movement, Direction, and Force

One of the most frequently observed play schemas is the trajectory schema, in which children exhibit an interest in movement, direction, and force. This schema is evident when children repeatedly drop objects from a height, push cars across the floor, or run back and forth in a straight line. Through such actions, they explore concepts related to motion, gravity, and speed, gradually refining their understanding of how objects and their own bodies interact with the environment (Gopnik, Meltzoff, & Kuhl, 1999). Providing opportunities such as throwing balls, engaging with water play, or climbing structures allows children to deepen their understanding of trajectory and motion while refining their gross and fine motor skills.

Transporting Schema: Moving and Organizing Objects

Another prominent schema is the transporting schema, where children show a fascination with moving objects from one place to another. This can be seen when toddlers fill bags with toys and carry them across the room or when preschoolers gather items into containers and transfer them elsewhere. This schema plays a crucial role in the development of spatial awareness and organizational skills, helping children understand concepts of collection, distribution, and categorization (Arnold, 2010). Educators and caregivers can support this

interest by offering wheeled carts, baskets, and opportunities for constructive role-play scenarios, such as pretending to be delivery workers or grocery shoppers.

Enclosure and Containment Schema: Defining and Using Boundaries

The enclosure and containment schema is another key pattern of play, where children display an interest in placing objects inside other objects, surrounding spaces with barriers, or even enclosing themselves within confined spaces. This schema is often observed when children build enclosures with blocks, hide small toys inside boxes, or seek out spaces such as tunnels or tents to sit inside. The enclosure schema supports spatial reasoning, problem-solving, and an emerging understanding of boundary concepts (Nutbrown, 2011). Activities such as using nesting materials, constructing dens, or playing with sensory bins can encourage exploration within this schema while promoting cognitive development.

Rotation Schema: Fascination with Circular Movement

Similarly, the rotation schema involves a fascination with circular movement and spinning objects. Children engaged in this schema may be drawn to turning wheels, rolling balls, or spinning themselves around repeatedly. This repetitive motion allows them to develop an understanding of rotation, balance, and directional movement, which are foundational for later mathematical and scientific reasoning (Athey, 2007). Providing opportunities such as engaging with spinning tops, using wind-up toys, or incorporating dance movements that involve twirling can enhance a child's learning within this schema.

Connecting and Disconnecting Schema: Constructing and Deconstructing

The connecting and disconnecting schema emerges when children display an interest in joining objects together and taking them apart. This schema is evident in activities such as constructing with building blocks, linking train tracks, or using Velcro-based materials. It fosters

an early understanding of structure, stability, and cause-and-effect relationships, which are essential for problem-solving and engineering-related thinking (Whitebread, Basilio, Kuvalja, & Verma, 2012). To support this schema, educators and caregivers can provide materials such as magnetic tiles, snap-together blocks, and threading activities that allow children to experiment with different ways of assembling and disassembling objects.

Positioning Schema: Arranging and Ordering Objects

The positioning schema is another commonly observed play pattern, where children display a strong inclination toward arranging objects in specific orders, aligning items symmetrically, or placing them in defined patterns. This behavior may manifest as children meticulously lining up toys, sorting objects by color or shape, or carefully organizing materials into rows or grids. The positioning schema plays a crucial role in early mathematical and spatial reasoning, as it helps children develop an understanding of classification, order, and sequencing (Gura, 2015). To support this schema, educators and caregivers can provide activities such as arranging loose parts, pattern-making with blocks, and games that encourage sorting by attributes, all of which foster problem-solving and organizational skills.

Transformation Schema: Experimenting with Change

The transformation schema involves a fascination with changing the state, form, or appearance of materials. Children engaging in this schema may enjoy mixing substances, such as water and sand, or experimenting with paint, playdough, or other malleable materials. This type of play fosters early scientific inquiry, encouraging children to explore cause-and-effect relationships and develop an understanding of material properties (Cremin, Glauert, Craft, Compton, & Stylianidou, 2015). Activities such as cooking, sensory play with various textures,

and exploring natural elements like mud or ice can enhance a child's learning experience within the transformation schema, providing opportunities for discovery and hands-on experimentation.

Orientation Schema: Exploring Perspectives and Spatial Awareness

Another fundamental schema is the orientation schema, which is characterized by children's interest in viewing the world from different perspectives. This schema is evident when children turn objects upside down, look at their surroundings from unusual angles, or experiment with their own body positions by hanging upside down or peering through gaps. The orientation schema supports spatial awareness, balance, and proprioception, which are essential for motor development and bodily coordination (Broadhead, Howard, & Wood, 2010). Encouraging activities such as climbing, using mirrors, exploring periscopes, or engaging in yoga can provide children with opportunities to refine their spatial perception and enhance their understanding of different viewpoints.

Supporting Play Schemas to Foster Early Learning

In conclusion, play schemas represent essential cognitive processes that guide children's early learning experiences. Each schema reflects a child's developing understanding of the physical and social world, laying the foundation for more complex thinking and problem-solving skills. Caregivers and educators can provide meaningful learning opportunities that enhance cognitive, motor, and social development by recognizing and intentionally supporting these schemas in early childhood education. Integrating materials and activities that align with children’s natural interests can maximize engagement and foster a lifelong curiosity for exploration and discovery.

Adult and Child Interactions

Adult-child interactions in early childhood education play a crucial role in shaping children's cognitive, social, and emotional development. These interactions influence language acquisition, problem-solving abilities, and emotional regulation, serving as the foundation for future academic success and well-being (Pianta et al., 2016). Research suggests that high-quality interactions between educators and young children, characterized by responsiveness, warmth, and engagement, significantly enhance learning outcomes and social competence (Hamre et al., 2014). When adults provide a supportive and stimulating environment, children develop the confidence to explore their surroundings, ask questions, and engage in meaningful learning experiences.

Responsive Communication: Building Language and Connection

One of the most critical aspects of adult-child interactions is the use of responsive communication. Effective early childhood educators actively listen to children's verbal and nonverbal cues, validating their thoughts and encouraging further expression (Cabell et al., 2015). This responsive approach fosters secure attachments, which are essential for emotional well-being and social development (Ainsworth & Bowlby, 1991). Moreover, the use of open-ended questions, active engagement in conversations, and scaffolding techniques help children expand their vocabulary, develop reasoning skills, and build foundational literacy competencies (Dickinson et al., 2019). Research indicates that children who engage in frequent, high-quality conversations with adults demonstrate stronger language skills and higher academic achievement in later years (Wasik & Hindman, 2020).

Emotional Regulation and Social Learning Through Adult Support

In addition to language development, adult-child interactions influence children's ability to regulate emotions and navigate social relationships. Secure and nurturing relationships with caregivers and educators provide a model for empathy, cooperation, and conflict resolution (Thompson, 2016). When adults acknowledge children's emotions and guide them through challenges with patience and support, children learn to manage frustration, express feelings appropriately, and develop resilience (Denham et al., 2017). Additionally, positive adult interactions foster self-regulation skills, which are essential for academic success and social adaptation (Blair & Raver, 2015). By setting clear expectations, providing consistent guidance, and offering encouragement, educators help children develop the executive functioning skills necessary for goal-directed behavior and problem-solving.

Enhancing Learning Through Intentional Play-Based Engagement

Furthermore, intentional adult engagement during play-based learning experiences enhances children's cognitive and social development. While independent exploration is valuable, research suggests that when educators participate in play, they can extend learning by introducing new concepts, modeling problem-solving strategies, and encouraging deeper thinking (Weisberg et al., 2016). Guided play, in which adults structure interactions to support learning while allowing children autonomy, has been shown to be highly effective in promoting conceptual understanding and critical thinking (Hassinger-Das et al., 2017). Educators who engage in meaningful play interactions help children make connections between their experiences and academic concepts, fostering a deeper understanding of the world around them.

Nurturing Potential Through Meaningful Relationships

In conclusion, the quality of adult-child interactions in early childhood education significantly impacts children's development across multiple domains. Responsive communication, emotional support, and intentional engagement in play-based learning contribute to children's cognitive growth, language acquisition, emotional regulation, and social competence. By fostering warm, enriching relationships and providing meaningful learning experiences, educators and caregivers can create an environment that nurtures young children's potential and prepares them for lifelong success.

Adult Perceptions of Challenging Behavior

Adult perceptions of challenging behavior in early childhood education significantly influence how educators and caregivers respond to and manage such behaviors. Challenging behaviors, including aggression, defiance, tantrums, and inattention, are common in young children as they develop self-regulation and social skills (Gouweleeuw et al., 2020). However, interpretations of these behaviors vary widely based on individual beliefs, professional training, and cultural background (Stevenson et al., 2021). Educators who view challenging behavior as a normal developmental phase are more likely to employ supportive strategies, while those who perceive such behaviors as disruptive or problematic may rely on punitive measures that can hinder social-emotional growth (Meek & Gilliam, 2016).

The Impact of Developmental Knowledge on Interpretation and Response

One factor influencing adult perceptions is their understanding of child development and behavior regulation. Research suggests that educators with training in early childhood development are more likely to recognize the underlying causes of challenging behaviors, such as unmet emotional needs, sensory sensitivities, or difficulties with communication (Carter et al.,

2022). These educators tend to use proactive strategies, such as modeling appropriate behavior, implementing structured routines, and fostering emotional regulation through co-regulation techniques (Murray et al., 2019). Conversely, adults with limited knowledge of child development may misinterpret challenging behaviors as intentional defiance or disrespect, leading to punitive discipline practices that exacerbate behavioral issues (Garro et al., 2021).

Cultural Influences on Behavior Interpretation

Cultural beliefs and societal expectations also shape how adults perceive and respond to challenging behaviors. In some cultures, compliance and obedience are highly valued, leading educators to view assertive or independent behaviors as problematic rather than developmentally appropriate (Tobin et al., 2019). Alternatively, cultures that emphasize autonomy and self-expression may encourage children to question authority, leading educators from different backgrounds to perceive these behaviors as oppositional rather than a reflection of cultural norms (Rodriguez et al., 2021). This cultural lens influences disciplinary practices, expectations for classroom behavior, and the strategies employed to support children's social-emotional development.

Stress and Burnout: Compounding Misinterpretations

Furthermore, educator stress and burnout can contribute to negative perceptions of challenging behavior. High-stress environments, such as overcrowded classrooms, limited resources, and unsupportive work conditions, increase the likelihood that educators will interpret behaviors as intentionally disruptive rather than as signals of unmet needs (Jeon et al., 2019). Research indicates that teachers experiencing burnout are more likely to rely on reactive discipline strategies, such as time-outs and verbal reprimands, rather than employing evidence-based, proactive approaches like social-emotional coaching and positive reinforcement (Chang,

2020). When educators receive adequate professional support, including mental health resources and professional development on behavior management, they are better equipped to handle challenging behaviors with patience and understanding (Sandilos et al., 2018).

Promoting Constructive Perceptions Through Support and Training

To foster positive adult perceptions of challenging behavior, early childhood education programs must prioritize professional development, cultural competence, and emotional support for educators. Training in trauma-informed care, social-emotional learning, and behavior management techniques can help educators reframe their understanding of challenging behaviors and adopt constructive intervention strategies (Zinsser et al., 2021). Additionally, creating supportive environments that promote educator well-being can enhance patience, empathy, and effective classroom management (Schonert-Reichl, 2017). By shifting perceptions from punitive responses to developmental understanding, educators can create more inclusive, nurturing learning environments that support all children in their emotional and behavioral growth.

Teachers' Understanding of Child Development as a Component of Developmentally Appropriate Practice

Teachers' understanding of child development is a fundamental component of developmentally appropriate practice (DAP) in early childhood education. According to the National Association for the Education of Young Children (NAEYC), developmentally appropriate practices promote optimal learning and development for children by considering their developmental stages, individual needs, and cultural backgrounds (NAEYC, 2020). Knowledge of child development enables educators to create and implement teaching strategies that are not only effective but also responsive to the diverse abilities, interests, and learning styles of young children (Berk, 2013). Without a solid understanding of developmental

milestones and processes, teachers may struggle to provide an environment that fosters children's growth across cognitive, emotional, social, and physical domains (Copple & Bredekamp, 2019).

Applying Developmental Theories to Classroom Practice

A key aspect of developmentally appropriate practice is recognizing that children develop at different rates but follow predictable patterns of growth. Educators who possess a deep understanding of these patterns are able to tailor their teaching approaches to the specific needs of individual children. For instance, knowledge of the sensorimotor stage in Piaget's theory allows teachers to offer activities that promote exploration and hands-on learning for toddlers (Piaget, 1952). Likewise, understanding socio-emotional development enables teachers to provide supportive environments where children can learn to regulate their emotions, develop empathy, and navigate social interactions (Denham et al., 2012). Teachers who are informed by developmental theories can better interpret children's behavior, recognize potential delays or challenges, and employ interventions that support both typical and atypical development (Bodrova & Leong, 2015).

Promoting Active Learning Through Developmentally Informed Practice

Furthermore, a teacher's understanding of child development is integral to fostering a classroom environment that promotes active, engaged learning. By being attuned to the developmental needs of children, teachers are able to structure activities and interactions that encourage children's curiosity and problem-solving abilities. For example, during the early childhood years, children are naturally inclined to engage in symbolic play, which fosters cognitive and language development (Berk, 2013). Educators who understand this developmental tendency can provide the necessary materials and opportunities for children to engage in pretend

play, thereby supporting their intellectual, social, and emotional growth. Teachers who utilize developmentally appropriate practices also understand the importance of balancing structured learning experiences with opportunities for free play, as play is a crucial vehicle for learning during early childhood (Pellegrini & Smith, 1998).

Supporting Inclusivity and Diversity Through Developmental Awareness

Moreover, teachers' understanding of child development plays a vital role in ensuring that learning experiences are inclusive and equitable for all children. An awareness of individual differences, such as cultural and language variations, is essential in supporting diverse learners in early childhood settings. Research indicates that teachers who are culturally competent are more effective in designing inclusive classrooms that honor the unique backgrounds and experiences of each child, thus promoting positive developmental outcomes (Gilliam et al., 2016). By grounding their practice in a comprehensive understanding of child development, teachers are better equipped to address the needs of children with disabilities, English language learners, and children from diverse socioeconomic backgrounds (Siegler et al., 2017).

The Necessity of Developmental Expertise in Developmentally Appropriate Practice

In conclusion, a thorough understanding of child development is integral to the implementation of developmentally appropriate practice in early childhood education. Educators who are knowledgeable about developmental milestones, stages, and variations can create learning environments that foster optimal growth across all domains. Furthermore, this understanding enables teachers to design interventions tailored to children's individual needs, ensuring that all students have access to high-quality, inclusive education. Through continued professional development and reflection on developmental theories and research, teachers can

refine their practice, thereby enhancing the educational experiences and developmental outcomes for young children.

Practice Meets Pedagogy: Real-World Implications for Early Childhood Educators

The gap between pedagogy and practice is a significant issue within early childhood education, where educators often encounter challenges in translating theoretical knowledge into effective, everyday classroom practices. This gap can manifest in various ways, such as a disconnect between what is taught in teacher preparation programs and how teachers implement these strategies in real-world settings (Summerlin, 2015). While research and pedagogy emphasize child-centered, play-based learning and the importance of understanding developmental stages, many educators struggle to integrate these principles into their practice fully. This disjunction between theory and practice can be influenced by various factors, including insufficient professional development, limited resources, and systemic constraints in educational settings (Bae, 2017; Taggart et al., 2019).

Barriers to Implementing Developmentally Appropriate Practices

A key element contributing to the pedagogy-practice gap is the discrepancy between the idealized pedagogical approaches taught in teacher education programs and the realities of classroom environments. Some teacher preparation programs emphasize the importance of developmentally appropriate practices (DAP), which prioritize individualized instruction, fostering emotional and social development, and engaging in active learning through play (National Association for the Education of Young Children, 2020). However, many early childhood educators report difficulties implementing these practices due to large class sizes, insufficient time, and inadequate materials (Gibson & Eddowes, 2017). These constraints limit

educators' ability to provide the individualized attention and learning opportunities that the pedagogy suggests are essential for children's development.

Tensions Between Developmental Theory and Practical Realities

Moreover, research has indicated that many early childhood educators find it difficult to align their practices with current theories of child development, particularly in areas such as play-based learning, inclusive practices, and promoting executive function skills. While teachers recognize the theoretical importance of these approaches, they often feel inadequately supported in applying them within their classrooms (McMullen et al., 2020). One study by Taggart et al. (2019) found that early childhood educators frequently rely on traditional, teacher-directed methods due to their perceived effectiveness in managing classroom behavior and ensuring academic outcomes. These approaches, however, are often at odds with the contemporary understanding of child development, which advocates for a more interactive, child-initiated form of learning.

The Role of Professional Development in Narrowing the Gap

Teacher professional development plays a crucial role in bridging the pedagogy-practice gap. Yet, studies indicate that many professional development opportunities are either too brief or not sufficiently aligned with the specific needs and contexts of early childhood educators (Bae, 2017). Effective professional development programs should offer sustained, contextually relevant support that enables educators to apply new pedagogical insights practically. For instance, ongoing training that fosters reflective practice, implementing developmentally appropriate strategies, and using observational techniques to assess children's needs can help teachers integrate pedagogical theories into their teaching practices (Darling-Hammond et al., 2017). Additionally, collaborative learning opportunities, such as communities of practice, can

encourage peer support and help educators share strategies for overcoming common challenges in the classroom (McMullen et al., 2020).

Structural Challenges and the Need for Systemic Support

To address the pedagogy-practice gap, it is also critical to involve systemic changes that support educators in implementing effective, research-based practices. Structural issues, such as unfair or inequitable compensation, high turnover rates, and a lack of planning time, can hinder teachers' ability to focus on the pedagogical methods they are trained to use (Gibson & Eddowes, 2017). Policymakers and educational leaders must prioritize the creation of environments where educators are not only equipped with the knowledge and tools to implement best practices but also given the support and time needed to do so effectively.

Advancing Toward Aligned Practice

In conclusion, the gap between pedagogy and practice in early childhood education poses significant challenges to implementing developmentally appropriate and research-supported teaching methods. While theoretical foundations and pedagogical models continue to emphasize child-centered learning, teachers often face obstacles that prevent them from fully realizing these classroom practices. Addressing the gap requires a comprehensive approach, including robust teacher preparation programs, ongoing professional development, and systemic support for educators. By closing the pedagogy-practice gap, early childhood education can better support young children's cognitive, emotional, and social development, ensuring that they receive the best possible start in life.

Teacher Development and Education

Teacher development and education in early childhood education play a pivotal role in ensuring high-quality learning environments for young children. Effective teacher preparation

programs and ongoing professional development are essential to equip educators with the knowledge, skills, and dispositions necessary to support children's growth across cognitive, emotional, and social domains. Research consistently underscores the significance of quality early childhood education in shaping children's development, with teacher quality identified as a key determinant of educational outcomes (McCormick et al., 2017). To enhance teacher effectiveness, it is crucial that teacher education programs provide a robust foundation in child development, pedagogical practices, and reflective teaching, while also addressing the complex and diverse needs of children and families in contemporary classrooms.

Integrating Theoretical Knowledge with Play-Based Practice

Teacher education programs should integrate both theoretical knowledge and practical application. Early childhood educators must possess a deep understanding of developmental theories, such as those proposed by Piaget (1952), Vygotsky (1978), and Erikson (1963), to effectively support children's developmental milestones. This theoretical grounding enables educators to make informed decisions about curriculum design, instructional strategies, and assessment practices. In particular, an emphasis on play is central to high-quality early childhood education. Research has consistently demonstrated the role of play in promoting cognitive, language, and social development (Berk, 2013). Therefore, teacher preparation should emphasize the value of play and encourage the design of environments that support children's natural inclinations toward exploration, creativity, and problem-solving.

Reflective Practice and Teacher Dispositions

In addition to foundational knowledge, teacher development must cultivate critical dispositions and reflective practices. Educators must be prepared to respond with emotional intelligence to the diverse needs of young children, including those with developmental delays,

disabilities, and those from culturally and linguistically diverse backgrounds (Garcia & Weiss, 2015). Reflection is a key component of professional growth, enabling educators to critically evaluate their practices and make data-informed adjustments to improve outcomes for children. Teachers who engage in ongoing reflection and collaborative inquiry are more likely to implement effective strategies that support developmental progress (Loughran, 2019).

Sustained Professional Development and Communities of Practice

The dynamic nature of the early childhood education landscape necessitates a sustained commitment to professional development. As new research findings, policy changes, and societal shifts reshape the field, educators must remain adaptable and informed. High-quality professional development should therefore address the evolving roles of early childhood educators and be sustained over time to foster deep, meaningful improvements in teaching practice (National Association for the Education of Young Children [NAEYC], 2020). In this context, collaborative learning communities and peer coaching are especially beneficial. Communities of practice enhance collective expertise, encourage shared responsibility for student success, and promote the exchange of innovative strategies (Murray & Nall, 2018).

Challenges and Innovations in Childcare-Based Professional Development

Despite growing awareness of the need for teacher development in early childhood settings, toddler and preschool teachers working in childcare centers often face barriers to accessing such opportunities. Research indicates that infant and toddler teachers frequently lack access to sustained professional development compared to their pre-kindergarten counterparts (Whitebook et al., 2018). However, promising models have emerged. For instance, the "Click, Coach, Connect" initiative demonstrated the effectiveness of peer coaching in enhancing teacher-child interactions (Zero to Three, 2023). Similarly, Norway's "Thrive by Three" program—a

multicomponent model incorporating supervision and structured feedback—significantly improved caregiver responsiveness and interaction quality in toddler classrooms (Drugli et al., 2021). Online and hybrid professional development formats are also showing promise. The McCormick Center for Early Childhood Leadership (2022) emphasized that accessible, interactive online programs can enhance instructional quality when they incorporate reflective and practice-based components. These findings align with broader studies demonstrating the efficacy of virtual learning communities and self-paced professional development modules in increasing teacher knowledge and confidence (Phillips et al., 2021).

Survey Research on Early Childhood Educators: Insights and Gaps

Surveys have been widely utilized to examine early childhood educators' beliefs, instructional practices, and professional development needs, including among those who work with toddlers and pre-kindergarten children. One prominent area of focus is teacher perceptions of play-based learning. For example, Pyle and Danniels (2017) found that pre-kindergarten and kindergarten teachers often struggle to reconcile academic expectations with developmentally appropriate play-based approaches. Surveys have also been employed to assess educators' understanding and implementation of developmentally appropriate practices (DAP). The Teacher Beliefs and Practices Survey, originally developed by Charlesworth et al. (1993), has been used and adapted in subsequent research (e.g., Kim, 2011) to evaluate DAP use across early childhood settings, including those serving very young children.

In addition to pedagogy, large-scale surveys such as the National Survey of Early Care and Education (NSECE Project Team, 2013) have gathered critical data on the workforce itself, including teacher qualifications, compensation, access to training, and working conditions. These data help contextualize the professional experiences of educators in toddler and pre-K

classrooms and point to systemic barriers that hinder the application of best practices. Furthermore, observational tools like the Classroom Assessment Scoring System (CLASS) and the Infant/Toddler Environment Rating Scale (ITERS) have occasionally been used alongside surveys to triangulate data on classroom quality and teacher interactions (Mashburn et al., 2008).

Despite the utility of these tools, there remains a notable gap in survey-based research specifically focused on schema play. While educators may observe schematic behaviors such as trajectory or rotation in children's play, little is known about their theoretical understanding of schema or how it shapes instructional decisions. This gap presents an opportunity for new research aimed at capturing early childhood teachers' awareness of schema theory and their ability to translate this knowledge into practice.

The Professional Development Gap: Schema Play

A critical area of underrepresentation in teacher development is schema play. While schema theory, rooted in Piaget's cognitive developmental framework and expanded by Athey (2007), is widely discussed in early childhood literature, it is inconsistently integrated into teacher education and professional learning. Educators' perceptions of play remain mixed; some view it as essential for learning, while others consider it less aligned with academic instruction (Pui-Wah, 2004). Keung (2020) suggests that pedagogical content knowledge significantly affects how teachers understand and enact play-based learning, underscoring the need for targeted schema-focused training.

Childcare Centers as Contexts for Schema Play Research

Childcare centers serving toddlers and preschool-aged children offer a vital context for understanding how educators perceive and respond to schematic behaviors. Given the diversity in training and professional development across the early childhood workforce, research is

needed to examine how well teachers in these settings can identify and scaffold schema play. Thomas (2020) contends that understanding schema play allows teachers to better plan curriculum and implement developmentally responsive practices. Training educators to observe and interpret schematic behaviors can promote individualized learning and sustained engagement (Atherton & Nutbrown, 2016; Siraj-Blatchford & Brock, 2019).

Research-Based Models to Inform Study Design

Although few quantitative studies focus specifically on schema play, several existing professional development models offer useful frameworks. Programs like "Tools for Teachers" (Sandall et al., 2020), which emphasize embedded instruction, and "REACH" (Conners-Burrow et al., 2019), which targets social-emotional teaching strategies, provide strong examples of how to structure training that connects theory with practical classroom implementation. These models emphasize reflection, coaching, and the integration of evidence-based strategies into everyday practice.

Advancing Professional Development Through Schema Play Research

Teacher development and professional education in early childhood settings must evolve to address persistent gaps in schema play knowledge and implementation. As early childhood educators navigate increasingly complex and diverse classrooms, research-informed teacher education and sustained professional development are essential. By centering childcare settings and focusing on educators' understanding of schema play, this dissertation seeks to contribute to the scholarly knowledge base and support the creation of responsive, research-based professional learning opportunities.

Summary

Extensive research supports the significance of schema play in early childhood education and its deep roots in constructivist and social cognitive constructivist theories, such as Piaget, Vygotsky, and Dewey. Schema play refers to the repetitive patterns of behavior children use to explore and understand their world. These behaviors, such as trajectory, transporting, and rotation, reflect active cognitive processes through which children build knowledge (Boulton & Thomas, 2022; Curtis & Jaboneta, 2019). Children modify their mental structures through assimilation and accommodation, refining their thinking and understanding of cause and effect (Piaget, 1952; Bjorklund, 2022). Educators who understand and observe these play patterns are better able to design developmentally appropriate environments that foster children's natural learning paths.

Neuroscience and developmental research affirm that play, particularly schema play, influences brain development, emotional regulation, and social behavior. It boosts brain-derived neurotrophic factor (BDNF), enhances synaptic connectivity, and supports the development of executive functioning (Zosh et al., 2017; Huber et al., 2007). Furthermore, responsive adult-child interactions during play, such as scaffolding and emotional support, significantly enhance language development and social competence (Weisberg et al., 2016; Dickinson et al., 2019). However, adult interpretations of children's play are influenced by personal beliefs, training, and cultural expectations, which may lead to mislabeling schematic behaviors as challenging (Meek & Gilliam, 2016; Stevenson et al., 2021).

While schema theory is foundational in early childhood literature, it is inconsistently integrated into teacher training and practice. Many educators lack formal knowledge or confidence in supporting schema play due to limited professional development and systemic

barriers in childcare settings (Siraj-Blatchford & Brock, 2019; Thomas, 2020). As a result, a gap exists between pedagogical theory and daily classroom implementation. The literature identifies a need for further study on how teacher knowledge of schema play impacts their classroom responses and instructional choices. Therefore, this study aims to explore early childhood educators' understanding of schema play and how this understanding influences their engagement with young children's schematic behaviors in real-world classroom settings.

CHAPTER THREE: RESEARCH METHOD

Overview

This chapter outlines the methodological framework for investigating early childhood teachers' knowledge of and reactions to schematic play behaviors exhibited by children ages 1 to 5. The study employed a quantitative, vignette-based survey approach to examine how teacher knowledge relates to their interpretations of children's actions that reflect play schemas. Vignettes are effective tools for simulating real-life classroom situations in survey-based research, especially when assessing judgment and decision-making (Barter & Renold, 2000; Finch, 1987; Hughes, 1998). The chapter includes the research questions and a hypothesis, the research design, participant selection procedures, data collection tools, data analysis strategies, and a discussion of trustworthiness and limitations.

Research Questions and Hypotheses

Research Questions (RQ)

Primary RQ: How do teachers of children 1 to 5 years old respond to typical schematic behaviors?

RQ 1: What knowledge do early childhood teachers express regarding schema play?

RQ 2: What are early childhood teachers' reactions to children's manifestations of schema play?

RQ 3: Is there a relationship between early childhood teachers' knowledge and how they respond to students' engagement in schematic play?

Hypothesis (HY)

HY1: Teachers unfamiliar with schema play display adverse reactions when children engage in schema play.

Research Design

This study employed a quantitative, cross-sectional survey design, grounded in descriptive, regression, and correlational methodologies. Quantitative survey methods enabled the collection of broad, generalizable data from diverse populations (Creswell & Creswell, 2018; Fraenkel, Wallen, & Hyun, 2019). The use of vignette-based surveys has been demonstrated to be particularly effective in early childhood education research for eliciting authentic judgments and interpretive responses from teachers (Schoon & Smith, 2000). The survey instrument included demographic questions, Likert-scale responses to schema-related vignettes, and schema knowledge assessments designed to measure conceptual understanding and pedagogical interpretation.

Participants

A criterion sampling strategy was utilized to purposefully select participants with direct experience with the phenomenon under investigation, specifically the implementation of play-based learning in early childhood classrooms (Creswell & Poth, 2018). Criterion sampling ensured that all participants possessed specific characteristics essential to the study, such as experience teaching young children in play-based environments.

Eligible participants will included early childhood educators with a current or former presence in various settings, such as in-home, faith-based, and center-based programs serving children aged 1 to 5 across the United States. Participants were recruited through professional organizations, direct email invitations, and in-person intercept surveys to ensure a diverse and representative sample of early childhood educators. Professional associations such as the National Association for the Education of Young Children (NAEYC) served as key recruitment avenues. These networks effectively connect with educators already engaged in professional

development and research opportunities (Bloor & Wood, 2006). Additionally, direct email invitations were sent to educators via publicly available directories or school websites to reach individuals who may not be active in professional organizations or online communities, as direct email recruitment has been shown to increase participation rates by targeting individuals with relevant expertise and professional experience (Fowler, 2014). Finally, intercept surveys and in-person recruitment were conducted at professional development workshops, conferences, early childhood events, and on-site at child development centers. Teachers were approached on-site, provided with a brief explanation of the study, and invited to complete the survey either digitally (via QR code) or through a paper-based option. Intercept surveys are particularly effective for capturing participants who may not otherwise respond to online invitations, while also allowing researchers to clarify eligibility criteria and study details in real time, ultimately improving informed consent and response quality (Groves et al., 2009). Intercept surveys were critical to this research because there is no known comprehensive database of early childhood educators, and participants were also able to recommend other eligible participants.

To enhance the representativeness of the sample, maximum variation sampling was employed within the criterion framework to ensure a diversity of perspectives (Patton, 2015). This sampling approach allows for the identification of common patterns across a broad range of participants. The target sample size ranged from 75 to 150 participants, a range sufficient for statistical power in survey research and to detect relationships using correlational analyses (Fink, 2013; Cohen, 1988).

Procedures

Permissions

A research proposal was submitted to the Auburn University Institutional Review Board (IRB) after all required procedures for ethical approval in human subjects' research were followed (American Educational Research Association [AERA], 2011). Once approval was granted, potential participants were recruited through email invitations and in-person intercept requests. Interested participants accessed the survey through a secure online link or QR code. Before beginning the survey, participants were presented with an informed consent statement that clearly explained the purpose of the study, the voluntary nature of participation, confidentiality protections, and the right to withdraw at any time (Creswell & Creswell, 2018). Consent was embedded directly in the online survey, and participants indicated agreement by selecting an option before proceeding (see Appendix A). Survey responses were collected and analyzed to identify patterns and emerging trends regarding early childhood teachers' knowledge of and reactions to schema play. The findings were used to address the research questions and contribute to a deeper understanding of how schema theory is perceived and applied in early childhood classrooms.

Data Collection

Participants completed a secure, web-based or paper survey (see Appendix B) that includes four key sections:

1. Demographics (7 questions that include age, gender, educational background, role, and experience)
2. Schema Play Vignettes (20 brief scenarios with Likert-scale statements assessing participant interpretation of schematic behaviors)

3. Training and Experience with Schema Play (4 items assessing familiarity with schema theory, prior professional development, and classroom integration)
4. Schema Knowledge Assessment (18 multiple-choice questions assessing conceptual understanding of play schemas and their identification)

The vignettes are based on established definitions and observations of schema types such as trajectory, rotation, enveloping, transporting, positioning, and others (Athey, 2007; Nutbrown, 2011). This approach allows for consistent presentation of realistic classroom scenarios that elicit teacher interpretations and judgments. To ensure content clarity, usability, and instrument validity, the survey was piloted with a small group of early childhood educators who were not part of the main study and who have expertise in schema play. Feedback from pilot participants informed revisions to item wording, formatting, and structure (Artino et al., 2014).

Data Analysis

Data from the survey were analyzed using a combination of descriptive and inferential statistical methods**,** suitable for a cross-sectional, non-experimental design (Creswell & Creswell, 2018).

1. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to summarize participant demographics, schema knowledge scores, and response patterns to vignette-based items.
2. Schema knowledge was scored by awarding points for each correct answer on a set of knowledge-based items. A total composite score was calculated for each participant. Based on these scores, participants were grouped into quartiles to reflect their level of knowledge:
    - Level 1 (lowest quartile): limited or no knowledge of schema play

- Level 2 (second quartile): emerging knowledge
- Level 3 (third quartile): moderate knowledge
- Level 4 (highest quartile): strong or advanced knowledge

These knowledge levels served as independent variables in group comparisons and predictive analyses.

3. Frequencies and percentages were calculated to examine trends in participants' responses to the class vignettes, each designed to elicit a behavioral interpretation of schema play.
4. Pearson's correlation coefficients were computed to explore potential relationships among key variables, including schema play knowledge, years of experience, educational level, and types of responses to the vignettes. Correlation analyses informed the appropriateness and structure of subsequent regression analyses.
5. Multiple regression analysis was used to determine whether schema play knowledge, and possibly other variables such as educational attainment or years of teaching experience, predict the type or quality of teacher reactions to schematic play responses. This analysis is aligned with the study's hypothesis that lower levels of schema play knowledge are associated with less developmentally appropriate reactions to children's schema play behaviors.

This approach is justified not only by the nature of the research questions but also by the theoretical framework that suggests a direct link between conceptual understanding and pedagogical response (Athey, 2007; Meade, 2020). When the correlation analysis revealed meaningful relationships, regression analysis was used to isolate the predictive power of schema knowledge relative to other participant characteristics.

Overall, this analytic strategy allowed for the examination of both group differences and predictive relationships, supporting a comprehensive interpretation of how knowledge of schema play relates to real-world decision-making in early childhood classrooms.

Assumptions, Limitations, and Delimitations

Assumption

1. Participants will answer survey items honestly and reflectively.
2. Teachers' self-reported responses are reasonable indicators of their classroom behavior (Podsakoff et al., 2003).
3. The vignettes accurately represent schematic behaviors as observed in early childhood settings (Athey, 2007; Arnold, 2010).

Limitations

1. The survey relies on self-report data, which may be subject to bias (Donaldson & Grant-Vallone, 2002).
2. Participants' interpretations of vignettes may differ from actual practice.
3. Generalizability may be limited to similar early childhood education settings in the U.S.
4. The survey does not capture teachers' rationales for redirecting schematic behaviors.
5. Purposive sampling is non-representative, and findings may not be generalized to the broader population.

Delimitations

1. The study is restricted to teachers of children aged 1 to 5.

2. Only those educators who can complete the survey in English will be included.
3. This research focuses specifically on schema play, rather than broader forms of play-based learning.

Summary

This chapter detailed the methodology used to examine how early childhood teachers interpret and respond to schematic play. By integrating both perception and knowledge data through a vignette-based survey design, this study illuminated the extent to which professional knowledge influences teacher reactions and practices related to play schemas.

CHAPTER FOUR: RESULTS

Overview

The purpose of this quantitative, cross-sectional study was to examine the relationship between early childhood teachers' knowledge of schema play and their reactions to children's manifestations of schematic behaviors in classroom settings. While existing research demonstrates that schema play is a central component of young children's cognitive development (Athey, 2007; Nutbrown, 2011), few studies have examined teachers' schema knowledge or whether conceptual understanding influences pedagogical responses. This study addresses this gap by analyzing how early childhood educators interpret schematic actions through vignette-based scenarios and how their levels of schema knowledge predict classroom reactions.

Data were collected using a web-based or paper survey consisting of four components: (a) demographic and professional characteristics, (b) twenty schematic play vignettes with Likert-scale responses, (c) items assessing familiarity and training experiences related to schema theory, and (d) a multiple-choice schema knowledge assessment. Teachers rated vignette statements on a five-point Likert scale from "Strongly Disagree" to "Strongly Agree," and knowledge scores were determined by the number of correct responses to schema-identification items. All participants provided electronic consent prior to completing the survey.

This chapter presents descriptive and inferential findings from the survey data. First, demographic profiles and descriptive summaries of knowledge scores and vignette responses are provided. Next, correlational and regression results are reported to examine patterns between schema knowledge and teacher practice. Finally, the chapter concludes with a summary of the major findings in relation to the study's research questions.

Research Questions

Research Questions (RQ)

RQ1: What knowledge do early childhood teachers express regarding schema play?

RQ2: What are early childhood teachers' reactions to children's manifestations of schema play?

RQ3: Is there a relationship between early childhood teachers' knowledge and their responses to students' engagement in schematic play?

Results

Participant Characteristics

A total of 236 survey responses were initially received. Of these, 72 responses were excluded from analysis because participants did not progress beyond the demographic section or failed to provide sufficient data on the primary study measures, including the schema knowledge assessment and vignette-based response items. These incomplete responses were not retained because they did not include sufficient, analyzable information to address the study's research questions. The remaining 164 responses were deemed of sufficient quality for inclusion in the final analyses.

Participants included 164 early childhood educators who were currently or formerly working with children ages 1 to 5 across a range of early learning settings. Respondents represented diverse professional roles, including lead teachers, auxiliary or floating teachers, center directors, college students preparing for early childhood careers, and instructional support staff. Participants were employed in public, private, Head Start, faith-based, university laboratory, and home-based early childhood programs. Levels of educational attainment ranged

from a high school diploma or GED to advanced graduate degrees, reflecting a wide spectrum of professional preparation and experience. Detailed demographic characteristics of the final analytic sample are presented in Table 1.

All included participants met the established inclusion criteria and reported direct experience working in play-based early childhood learning environments, consistent with the criterion sampling procedures outlined in Chapter Three. This diversity supported the study's goal of capturing a broad range of perspectives regarding schema play across early childhood contexts.

Table 1

Demographic Characteristics of Participants (N = 236)

Variable	n	%
Gender		
Female	201	84.8
Male	9	3.8
Missing	27	11.4
Highest Level of Education		
High school diploma or GED	41	17.3
Associate's degree	83	35.0
Bachelor's degree	57	24.1
Master's degree	24	10.1
Doctoral degree	3	1.3
Missing	27	11.4
Professional Role		
Childcare or Preschool Lead Teacher	76	32.1
Childcare or Preschool Auxiliary Teacher ("Floater")	43	18.1
College Student	55	23.2
Center Director	22	9.3
Collegiate Instructor or Professor	7	3.0
Missing	33	13.9
Early Childhood Setting		
Public	105	44.3
Private or Independent	39	16.5
Head Start	36	15.2
Faith-based	12	5.1
University or College Lab School	9	3.8

In-home	8	3.4
Missing	27	11.4

Research Question 1: Knowledge About Schema Play

Research Question 1 examined early childhood teachers' knowledge of schema play, as measured by performance on an objective schema knowledge assessment and self-reported familiarity with schema theory. Objective knowledge was operationalized as a composite score representing the percentage of correctly identified schema manifestations across vignette-based items. Of the 236 total survey responses received, 72 were excluded from analysis because respondents did not proceed beyond the demographic section or provided incomplete responses insufficient for meaningful analysis. The final analytic sample included 164 participants, of whom 149 provided complete data for the schema knowledge assessment.

Participants' mean knowledge score was 65.96% (SD = 19.59; see Table 1), indicating a generally low level of conceptual understanding of schematic behaviors when evaluated against expectations typical of teacher preparation coursework. Scores ranged from 11.11% to 100.00%, reflecting substantial variability in teachers' schema knowledge. The median score was 66.67%, suggesting that half of the sample correctly identified approximately two-thirds of schema manifestations. Visual inspection of the distribution (Figure 1) suggests that schema knowledge scores were widely dispersed, with approximately one-quarter of participants scoring below the mid-50% range, indicating limited ability to accurately identify schematic behaviors.

To further examine variability in knowledge, schema knowledge scores were divided into quartiles, consistent with the analytic plan outlined in Chapter Three. Teachers scoring in the lowest quartile were classified as demonstrating low schema knowledge. Using this criterion, a substantial proportion of participants demonstrated limited conceptual understanding of schema

play, reinforcing the uneven distribution of knowledge observed across the sample and highlighting meaningful gaps in teachers' ability to accurately recognize schematic behaviors.

Self-reported familiarity with schema play was measured using a composite of three reverse-coded Likert items assessing teachers' familiarity with schema theory. Among valid respondents (N = 150), the mean familiarity score was 3.22 (SD = 0.80) on a 5-point scale, reflecting moderate perceived familiarity. It is important to note that self-reported familiarity reflects teachers' perceptions of exposure to or awareness of schema play terminology and concepts, and does not indicate demonstrated understanding or accurate application. As such, familiarity should be interpreted as perceived knowledge rather than verified conceptual competence. The distribution of schema knowledge scores is presented in Figure 1.

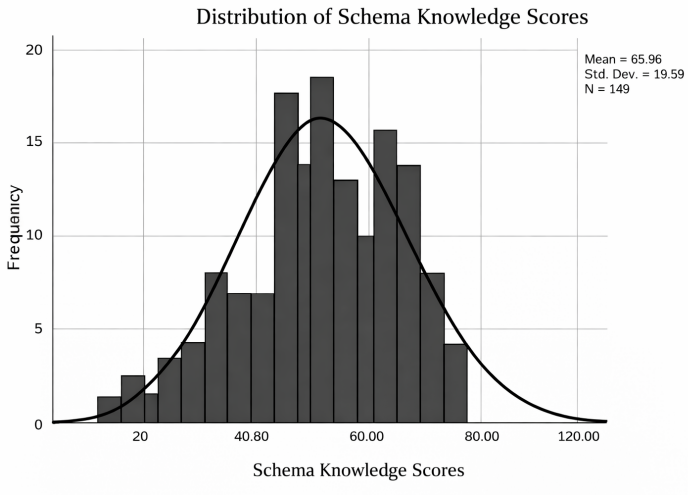
Table 2

Descriptive Statistics for Knowledge and Familiarity

Variable	N	Mean	SD	Minimum	Maximum
Knowledge Test Score (%)	149	65.96	19.59	11.11	100.00
Familiarity Composite (1–5)	150	3.22	0.80	1.00	5.00

Figure 1

Distribution of Schema Knowledge Scores



Knowledge Level Groupings and Frequency Patterns

In accordance with the analytic plan outlined in Chapter Three, participants' schema knowledge scores were also examined using quartile groupings to reflect varying levels of conceptual understanding. Knowledge scores were divided into four quartiles representing limited, emerging, moderate, and strong knowledge of schema play. Participants in the lowest quartile demonstrated limited ability to accurately identify schematic behaviors, while those in the highest quartile demonstrated strong conceptual understanding. Frequency analyses indicated that the largest proportion of participants fell within the middle two quartiles, reflecting knowledge levels ranging from emerging to moderate. A smaller proportion of participants demonstrated either very limited or advanced knowledge. These findings further illustrate the variability in teachers' understanding of schema play and support the descriptive results indicating uneven levels of conceptual mastery across the sample.

Relationship Between Familiarity and Objective Knowledge

To examine the association between teachers' perceived and demonstrated knowledge, both Pearson and Spearman correlations were conducted between the familiarity composite score and the knowledge assessment score. A significant positive relationship was found using Pearson's correlation, $r(138) = .27$, $p = .001$, 95% CI [.11, .42], indicating that higher self-reported familiarity was associated with higher objective knowledge scores. This relationship was also confirmed using Spearman's rho ($\rho = .29$, $p < .001$, 95% CI [.13, .44]), supporting the robustness of the association given the ordinal nature of the familiarity measure. These findings suggest that teachers who perceived themselves as more familiar with schema play concepts tended to demonstrate greater accuracy in identifying schematic behaviors.

Table 3

Correlations Between Familiarity and Knowledge

Measure	Coefficient	p-value	95% CI
Pearson r	.27	.001	[.11, .42]
Spearman ρ	.29	< .001	[.13, .44]

Differences in Knowledge by Professional Role

A one-way analysis of variance (ANOVA) was conducted to examine whether knowledge scores differed across participants' current professional roles. Prior to analysis, Levene's test indicated that the assumption of homogeneity of variance was met ($p = .895$). The ANOVA revealed a significant main effect of professional role on knowledge scores, $F(3, 139) = 3.60$, $p = .015$, $\eta^2_p = .07$, indicating that approximately 7% of the variance in schema knowledge scores was attributable to participants' professional roles. Descriptive statistics indicated that participants in Role Group 1- Lead Teacher (M = 70.86, SD = 17.67) and Role Group 3- Center Director (M = 70.24, SD = 22.29) demonstrated higher knowledge scores than participants in Role Group 2- Auxiliary Teacher or "Floater" (M = 61.92, SD = 19.00) and Role Group 4- College Student (M = 59.06, SD = 20.15). Post hoc analyses using Bonferroni correction revealed a statistically significant difference between Group 1- Lead Teacher and Group 4- College Student ($p = .023$), with Group 1- Lead Teacher scoring significantly higher on schema knowledge. No other pairwise comparisons reached statistical significance. Differences in schema knowledge by educational attainment are illustrated in Figure 2.

Table 4

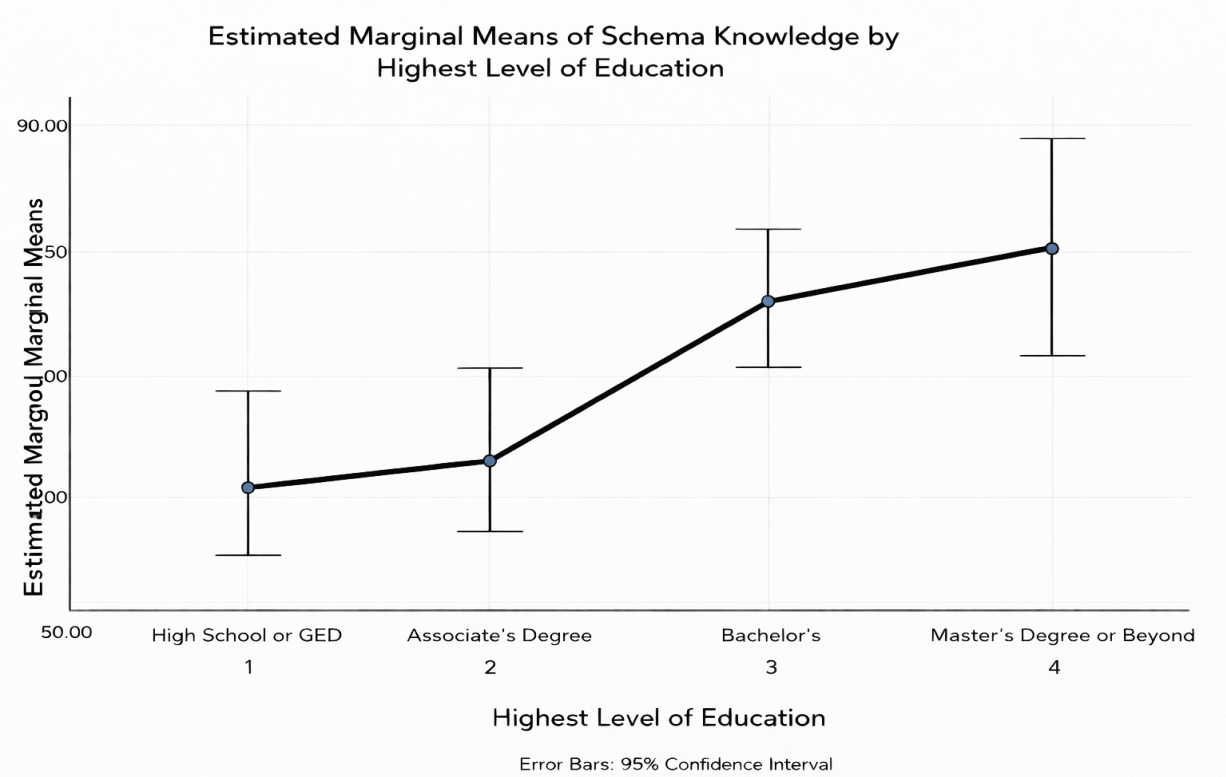
Knowledge Scores by Professional Role

Role Group	N	Mean	SD
Group 1- Lead Teacher	57	70.86	17.67
Group 2- Auxiliary Teacher or "Floater"	34	61.93	19.01

Group 3- Center Director	14	70.24	22.29
Group 4- College Student	38	59.06	20.15

Figure 2

Schema Knowledge by Education Level



Interpretation

Findings for Research Question 1 indicate that early childhood teachers demonstrated moderate but uneven knowledge of schema play. Although many participants correctly identified most schematic behaviors, considerable variability was observed across the sample. The significant positive correlation between self-reported familiarity and objective knowledge suggests that teachers' perceptions of their understanding generally aligned with their demonstrated competence. However, the moderate strength of this relationship indicates that perceived familiarity does not fully capture actual knowledge.

Additionally, the professional role was significantly associated with schema knowledge, with certain groups demonstrating a stronger understanding than others. This finding suggests that differences in training, responsibilities, or professional preparation may influence teachers' exposure to and mastery of schema play concepts. Collectively, these results highlight the need for more consistent and systematic professional development focused on schema play to promote accurate recognition and interpretation of schematic behaviors across early childhood contexts.

Research Question 2: Teachers' Reactions to Schematic Behavior

Research Question 2 examined early childhood teachers' reactions to children's schematic behaviors, as measured by their tendencies to recognize behaviors as positive and to redirect children during schematic play. Prior to conducting substantive analyses, the internal consistency of the reaction scale was evaluated. The 20-item scale measuring teachers' identification of positive schematic behaviors (Q74–Q93) was analyzed using Cronbach's alpha. Items Q76 and Q82 were reverse-coded prior to analysis to prevent participants from clicking through.

Results indicated excellent internal consistency, with a Cronbach's alpha of .93, suggesting that the items reliably measured a single construct of teachers' reactions to schematic behaviors. In comparison, reliability prior to reverse coding was lower ($\alpha = .84$), suggesting that reverse coding improved the scale's coherence. These findings support the use of a composite reaction score in subsequent analyses.

Descriptive Statistics

Teachers' reactions to schematic behaviors were assessed using two composite measures, a Redirection Composite Score and a Positive Behavior Composite Score. The mean Redirection Composite Score, viewable in Table 4, was 2.82 (SD = 0.52, N = 152), indicating that

participants, on average, reported moderate tendencies to redirect children's schematic behaviors. The mean Positive Behavior Composite Score was 3.06 (SD = 0.86, N = 154), suggesting that participants generally perceived schematic behaviors as moderately positive. Together, these results indicate that teachers tended to view schematic behaviors somewhat favorably, while still demonstrating moderate inclinations toward redirection. This is shown in Figure 3.

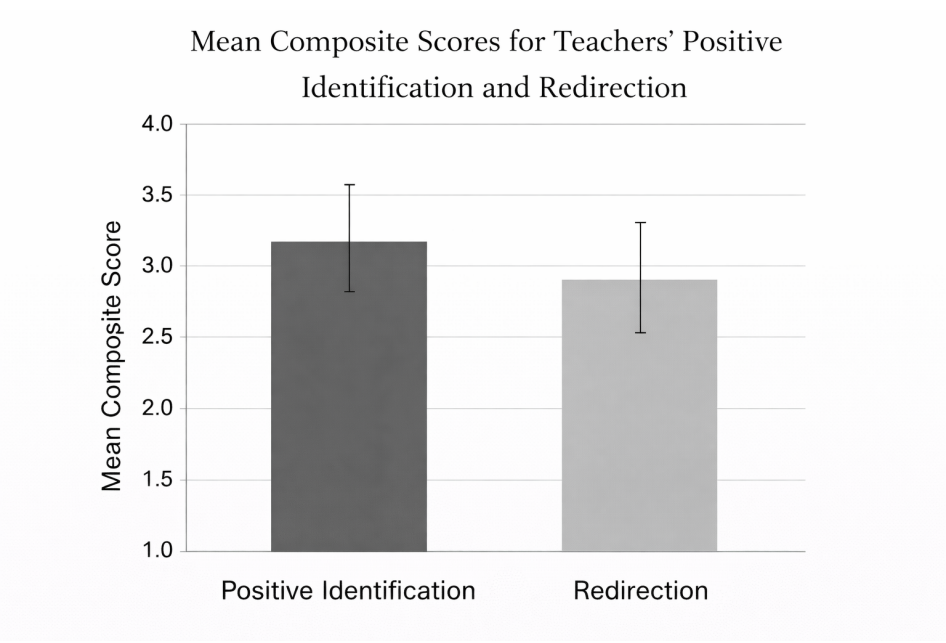
Table 5

Descriptive Statistics for Reaction Measures

Variable	N	Mean	SD
Redirection Score	152	2.82	0.52
Positive Behavior Score	154	3.06	0.86

Figure 3

Mean Composite Scores for Teachers' Positive Identification and Redirection



Relationship Between Redirection and Positive Behavior Identification

A Pearson correlation was conducted to examine the association between teachers' tendencies to redirect and their ability to identify schematic behaviors as positive. Results indicated a statistically significant positive relationship between the Redirection Composite Score and the Positive Behavior Composite Score, $r(149) = .53$, $p < .001$. This finding suggests that teachers who were more likely to recognize schematic behaviors as positive were also more likely to redirect schematic behaviors. The moderate-to-strong magnitude of this correlation indicates that teachers' perceptions and behavioral reactions to schematic play are closely linked.

Differences in Reactions by Professional Role

To examine whether teachers' reactions differed by professional role, a one-way analysis of variance (ANOVA) was conducted with participants' current role as the grouping variable. Levene's test indicated that the assumption of homogeneity of variance was met ($p = .895$). The ANOVA revealed a significant main effect of professional role on teachers' reaction patterns, $F(3, 139) = 3.60$, $p = .015$, $\eta^2_p = .07$, indicating that approximately 7% of the variance in reaction scores was attributable to professional role. Post hoc comparisons using Bonferroni correction indicated a statistically significant difference between Group 1- Lead Teacher and Group 4- College Student ($p = .023$), with Group 1- Lead Teacher demonstrating more reaction patterns toward schematic behaviors. No other group differences reached statistical significance.

Relationship Between Knowledge and Teachers' Reactions

To examine the association between teachers' knowledge of schema play and their reactions to schematic behaviors, a Pearson correlation was conducted between knowledge scores and reaction measures. Results indicated a statistically significant positive relationship,

$r(151) = .53$, $p < .001$, demonstrating that teachers with higher schema knowledge scores were more likely to redirect schematic behaviors. This finding suggests that greater conceptual understanding of schema play is associated with redirection even when the behavior is viewed as developmentally appropriate.

Interpretation

Findings for Research Question 2 indicate that teachers demonstrated generally moderate and consistent patterns to schematic behaviors. The high internal reliability of the reaction scale supports the validity of the composite scores used in analysis. Teachers tended to recognize schematic behaviors as moderately positive while maintaining moderate levels of redirection. Importantly, teachers' perceptions of schematic behaviors were strongly related to their classroom reactions, indicating that even positive behaviors are often redirected.

Professional role emerged as a significant factor influencing reaction patterns, suggesting that training, experience, and professional context may shape how teachers respond to schematic play. Additionally, the strong positive association between knowledge and reactions highlights the central role of schema-related understanding in promoting developmentally appropriate teaching practices. These findings support the importance of targeted professional development focused on schema play to improve classroom developmentally appropriate responsiveness.

Research Question 3: Relationship Between Knowledge and Teachers' Reactions

Research Question 3 examined whether early childhood teachers' knowledge of schema play predicted their instructional responses to children's schematic behaviors after accounting for relevant professional background variables. Teachers' reactions were operationalized using vignette-based survey items that asked participants to indicate how they would react to children's repeated, exploratory actions commonly associated with schema play. These reactions included

tendencies to identify behaviors as developmentally positive as well as tendencies to intervene or redirect children's actions. Redirection items specifically reflected instructional decisions to stop, modify, or steer children's play toward alternative activities, even when the behavior itself was not overtly problematic.

To examine relationships among these constructs, Pearson correlations were conducted between teachers' objective schema knowledge scores, self-reported familiarity with schema play, professional development experience related to play or child development, years of teaching experience, and the redirection composite score derived from vignette responses. Results indicated that redirection was strongly and positively associated with objective schema knowledge, $r(151) = .68$, $p < .001$. Moderate positive correlations were also observed between redirection and self-reported familiarity, $r(149) = .17$, $p = .024$, professional development experience, $r(149) = .22$, $p = .004$, and years of teaching experience, $r(149) = .43$, $p < .001$. These findings suggest that teachers with greater conceptual knowledge, perceived familiarity, professional preparation, and experience were more likely to intervene or redirect children's schematic behaviors, even when those behaviors were recognized as part of children's exploratory play. Correlations among all study variables are presented in Table 5.

Table 6

Correlation Matrix for RQ3 Variables (N = 139)

Variable	1	2	3	4	5
1. Redirection	—	.68	.17	.22	.43
2. Knowledge		—	.21	.26	.51
3. Familiarity			—	.38	.33
4. PD Experience				—	.48
5. Years Teaching					—

Note. Values represent Pearson correlation coefficients. The professional development variable was reverse-coded, with higher values indicating greater perceived preparation.

Multiple Linear Regression Predicting Redirection

To examine whether knowledge uniquely predicted teachers' reactions after controlling for background variables, a multiple linear regression analysis was conducted. The dependent variable was the Redirection Composite Score. Predictor variables included objective knowledge score, self-reported familiarity, professional development experience, and years of teaching. This is shown in Table 6. The overall regression model was statistically significant, $F(4, 134) = 30.25$, $p < .001$, and explained 47.5% of the variance in redirection scores ($R^2 = .475$, adjusted $R^2 = .459$), indicating a strong model fit. Before interpreting the regression model, the normality assumptions were examined. A normal probability plot of standardized residuals was inspected to evaluate whether residuals approximated a normal distribution.

Table 7

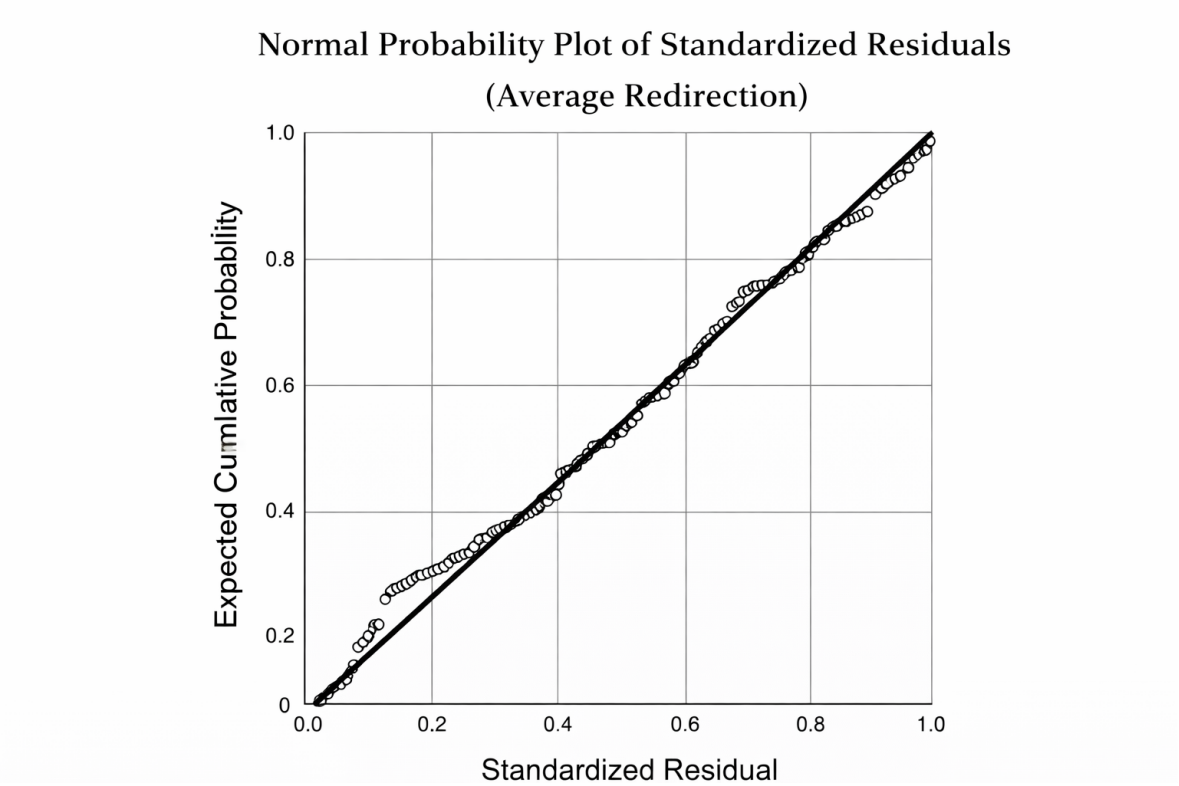
Multiple Regression Predicting Redirection

Predictor	B	SE	β	t	p
Constant	1.776	.142	—	12.51	< .001
Knowledge Score	.307	.036	.623	8.56	< .001
Familiarity	.000	.037	.000	.001	.999
PD Experience	.002	.024	.007	.088	.930
Years Teaching	.042	.030	.112	1.39	.167

Before interpreting the regression model, the normality assumptions were examined. A normal probability plot of standardized residuals was inspected to evaluate whether residuals approximated a normal distribution. As shown in Figure 4, observed values were closely aligned with the expected normal distribution, indicating that the assumption of normality was met.

Figure 4

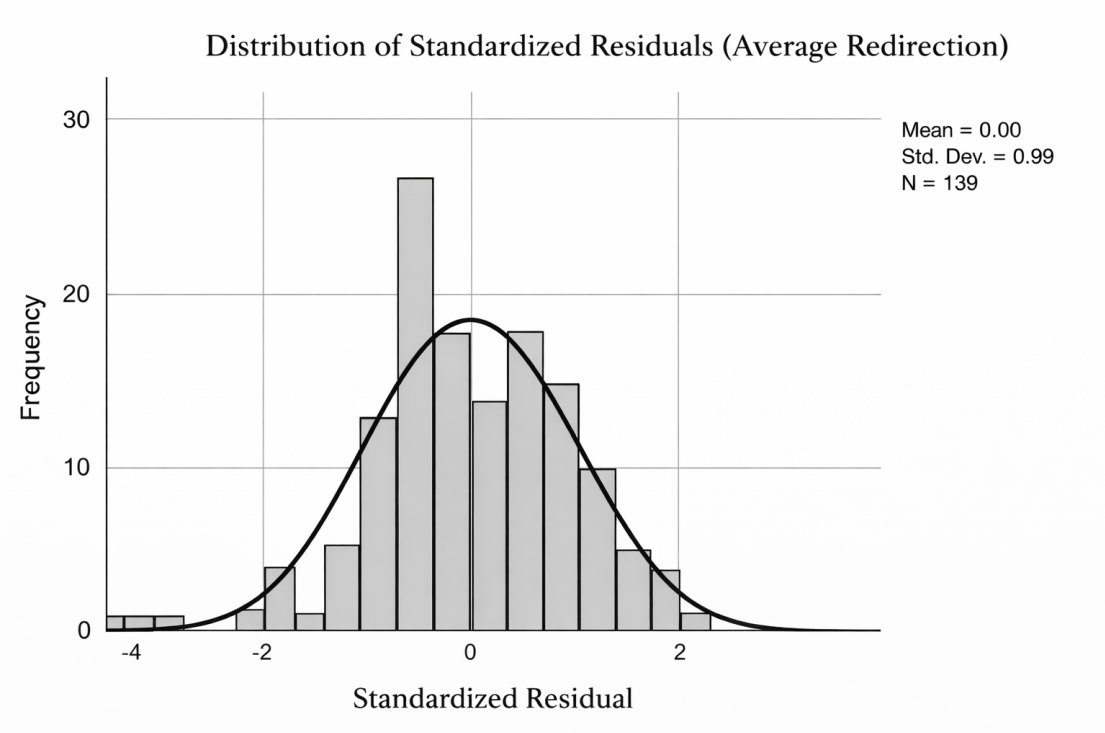
Normal Probability Plot of Standardized Residuals for Average Redirection



As shown in Figure 4, the distribution of standardized residuals closely approximated normality, supporting the assumption of normality required for linear regression. When predictors were examined simultaneously, objective schema knowledge emerged as the only statistically significant unique predictor of redirection ($\beta = .62$, $t = 8.56$, $p < .001$). Familiarity ($\beta = .00$, $p = .999$), professional development experience ($\beta = .01$, $p = .930$), and years of teaching ($\beta = .11$, $p = .167$) were not significant predictors in the full model. These results indicate that while several background variables were related to response patterns at the bivariate level, objective knowledge was the primary driver of teachers' redirection behaviors when controlling for other factors.

Figure 5

Distribution of Standardized Residuals for Regression Predicting Teachers' Redirection Responses



Interpretation

Findings for Research Question 3 indicate that teachers' objective knowledge of schema play plays a central role in shaping their classroom responses. Although familiarity, professional development, and experience were associated with response tendencies, these variables did not uniquely predict redirection when knowledge was taken into account. This pattern suggests that demonstrated understanding of schematic behaviors is more influential than perceived knowledge or general experience in guiding teachers' instructional decisions.

Collectively, the findings from Research Questions 1 through 3 provide a comprehensive view of early childhood teachers' understanding of schema play and how that understanding is reflected in classroom practice. Results from RQ1 demonstrated moderate but variable

knowledge, influenced by familiarity and professional role. RQ2 revealed consistent reactions patterns closely aligned with teachers' perceptions of schematic behaviors. RQ3 integrated these findings by demonstrating that objective knowledge was the strongest predictor of instructional responses. Together, these results suggest that conceptual understanding of schema play serves as a critical foundation for developmentally appropriate teaching practice and highlight the importance of targeted professional learning.

Study Findings

The purpose of this study was to examine early childhood teachers' knowledge of schema play, their reactions to children's schematic behaviors, and the extent to which knowledge predicted instructional responses. Across the three research questions, several key findings emerged that illuminate the relationship between conceptual understanding and classroom practice.

First, findings from Research Question 1 indicated that teachers demonstrated moderate but variable knowledge of schema play. Although many participants correctly identified most schematic behaviors, substantial variability was observed across the sample. Self-reported familiarity was positively related to objective knowledge; however, the moderate strength of this association suggests that perceived understanding did not consistently reflect demonstrated competence. Additionally, differences in knowledge across professional roles indicated that teachers' preparation and professional contexts influenced their exposure to and mastery of schema-related concepts.

Second, findings from Research Question 2 revealed that teachers generally demonstrated moderate and consistent reaction patterns to schematic behaviors. Participants tended to view schematic actions as moderately positive while deploying moderate levels of redirection. The

reaction scale demonstrated strong internal reliability, supporting the validity of the composite measures. A strong positive relationship between positive behavior identification and redirection suggested that teachers' perceptions and responses were closely aligned. Furthermore, the professional role was significantly associated with reaction patterns, indicating that professional responsibilities and experiences may shape how teachers interpret and manage schematic play.

Third, findings from Research Question 3 demonstrated that objective schema knowledge was the strongest predictor of teachers' reaction patterns. While familiarity, professional development experience, and years of teaching were correlated with redirection at the bivariate level, these variables did not uniquely predict reactions when knowledge was included in the regression model. This finding highlights the central role of demonstrated conceptual understanding in shaping instructional decision-making related to schematic behaviors.

Taken together, the results indicate that teachers' knowledge of schema play is not only associated with how they perceive children's behavior but also a critical determinant of how they respond in classroom settings. Teachers with stronger schema knowledge were more likely to redirect children's behavior, even when it was perceived as positive.

Summary

This chapter presented the results of a quantitative, cross-sectional study examining early childhood teachers' knowledge of schema play, their reactions to children's schematic behaviors, and the relationship between knowledge and instructional responses. Data were collected through a vignette-based survey that included demographic items, familiarity and training measures, and an objective knowledge assessment.

Findings related to Research Question 1 indicated that teachers possessed moderate but uneven knowledge of schema play, with significant variability across participants. Self-reported

familiarity was positively associated with objective knowledge, and professional role was related to differences in knowledge levels.

Findings related to Research Question 2 demonstrated that teachers generally recognized schematic behaviors as moderately positive and engaged in moderate levels of redirection. Reaction measures were highly reliable, and teachers' perceptions of schematic behaviors were strongly associated with their reaction patterns. Professional role also influenced teachers' reactions.

Findings related to Research Question 3 revealed that objective schema knowledge was the most influential factor in predicting teachers' reactions. Although familiarity, professional development, and experience were associated with response tendencies, these variables did not uniquely predict classroom responses when knowledge was taken into account.

Overall, the results suggest that teachers' conceptual understanding of schema play serves as a foundational element in shaping how they respond to children's schematic behaviors. Variability in knowledge and reaction patterns underscores the need for more systematic, targeted professional development focused on schema theory and its practical application in early childhood classrooms.

The following chapter discusses these findings in relation to existing literature and theoretical frameworks and explores implications for teacher education, professional development, and future research.

CHAPTER FIVE: DISCUSSION

Overview

The purpose of this study was to examine early childhood teachers' knowledge of schema play, their reactions to children's schematic behaviors, and the extent to which knowledge predicted instructional responses in classroom settings. Using a quantitative, cross-sectional design and a vignette-based survey instrument, this study sought to address gaps in the literature related to teachers' understanding of schema theory and its practical application in early childhood education (Nutbrown, 2011; Siraj-Blatchford & Brock, 2019; Khalil, 2022). This chapter discusses the study's major findings in relation to existing research and theoretical frameworks. Implications for teacher preparation and professional development are explored, followed by the study's limitations and recommendations for future research (Piaget, 1952; Vygotsky, 1978; Athey, 2007).

Discussion of Major Findings

Teachers' Knowledge of Schema Play

Findings related to Research Question 1 indicated that early childhood teachers demonstrated moderate but variable knowledge of schema play. While many participants correctly identified most schematic behaviors, substantial variability was evident across the sample. These results suggest that schema theory is not consistently integrated into teacher preparation programs or professional development initiatives (Nutbrown, 2011; Siraj-Blatchford & Brock, 2015).

The positive relationship between self-reported familiarity and objective knowledge indicates that teachers' perceptions of their understanding were generally aligned with demonstrated competence. However, the moderate strength of this relationship suggests that

perceived familiarity alone is not a reliable indicator of actual knowledge (Podsakoff et al., 2003; Donaldson & Grant-Vallone, 2002). Some teachers who reported confidence in their understanding may have lacked accurate conceptual knowledge, while others with stronger knowledge may have underestimated their competence.

Differences in knowledge across professional roles further suggest that teachers' access to schema-related training and professional learning opportunities varies by context. These findings align with previous research indicating that early childhood educators often receive uneven preparation in developmental theory and play-based pedagogy (Nutbrown, 2011; Siraj-Blatchford & Brock, 2015).

From a theoretical perspective, these results support constructivist views of teacher learning, which emphasize that conceptual understanding develops through meaningful engagement with theory and practice (Piaget, 1952). Prior research has similarly demonstrated that teachers' beliefs and theoretical knowledge do not always align with enacted classroom practices (Charlesworth et al., 1993; Kim, 2011). Without systematic exposure to schema theory, teachers may struggle to accurately interpret children's play behaviors and redirect schema behaviors, even though they are positive and developmentally appropriate.

Teachers' Reactions to Schematic Behavior

Findings related to Research Question 2 indicated that teachers generally demonstrated moderate and consistent reaction patterns to schematic behaviors. Participants often identified children's schematic actions as developmentally appropriate, yet simultaneously engaged in moderate levels of redirection. The strong internal reliability of the reaction scale suggests that teachers' responses were measured consistently across vignette scenarios. The significant positive association between identifying behaviors as developmentally appropriate and

redirecting those behaviors indicates a critical tension in practice: even when teachers recognize schematic play as aligned with children's developmental needs, they frequently intervene in ways that may disrupt children's ongoing construction of knowledge.

From a Developmentally Appropriate Practice (DAP) perspective, schematic behaviors represent purposeful, self-directed learning through repetition, exploration, and pattern refinement (NAEYC, 2020; Athey, 2007). Redirection of such behaviors, particularly when not driven by safety or ethical concerns, may inadvertently interrupt children's cognitive processes and limit opportunities for sustained meaning-making. These findings suggest that recognizing a behavior as developmentally appropriate does not necessarily translate into pedagogical restraint or facilitative support. Instead, teachers may continue to intervene out of habit, environmental pressures, or uncertainty about how to support learning without directing it.

One interpretation of these findings is that classroom environments may not consistently support sustained schematic play for children in this age group. Structural constraints such as rigid schedules, limited space, curricular pacing demands, or behavioral expectations may reduce teachers' capacity to allow extended exploration, even when they acknowledge its developmental value. In these contexts, redirection may reflect environmental limitations rather than a rejection of play-based learning (Nicolopoulou, 2010; Pyle & Danniels, 2017).

Alternatively, teachers' reactions may reflect deeply embedded instructional norms that prioritize adult regulation over child-initiated inquiry (Charlesworth et al., 1993; Kim, 2011). Rather than pausing to observe, interpret, and inquire about the meaning of children's schematic actions, teachers may default to familiar response patterns that emphasize control, organization, or task completion. As a result, schematic behaviors, despite being viewed as developmentally

appropriate, may be treated as behaviors requiring adult management rather than opportunities for assessment, documentation, and responsive scaffolding.

Teachers who identified schematic behaviors as developmentally appropriate were, paradoxically, more likely to redirect those behaviors. This pattern reflects concerns raised in prior research regarding the risk of "hijacking" children's play through excessive adult intervention (Pyle & Danniels, 2017). Within a DAP framework, such intervention may shift learning from child-constructed to adult-controlled, thereby narrowing opportunities for autonomy, experimentation, and cognitive flexibility. These findings underscore ongoing tensions in early childhood education between developmentally appropriate, play-based approaches and more directive instructional models shaped by accountability pressures.

Differences in reaction patterns across professional roles further suggest that institutional expectations, curriculum mandates, and administrative priorities may influence how teachers enact developmentally appropriate practice. Teachers working in academically driven or compliance-oriented environments may feel compelled to redirect schematic play toward perceived academic outcomes, even when they recognize the play as developmentally appropriate. These findings align with research demonstrating that teachers' practices are shaped not only by knowledge, but also by contextual and systemic constraints (Dalli et al., 2011).

Relationship Between Knowledge and Instructional Responses

Findings related to Research Question 3 demonstrated that objective schema knowledge was the strongest predictor of teachers' reaction patterns. Although familiarity, professional development experience, and years of teaching were correlated with redirection at the bivariate level, these variables did not uniquely predict reactions when knowledge was included in the regression model. Notably, higher levels of demonstrated schema knowledge were associated

with a greater likelihood of redirecting children's schematic behaviors. This finding suggests that teachers with stronger conceptual understanding may be more inclined to intervene in children's play, potentially limiting opportunities for sustained exploration and the natural construction of schemas.

This pattern indicates that conceptual knowledge alone does not necessarily translate into facilitative, child-centered practice. Instead, teachers who accurately recognized schematic behaviors may have been more likely to reinterpret these behaviors through instructional or managerial lenses, leading to increased redirection. Such reactions, while often well-intentioned, may inadvertently impede children's autonomous meaning-making and schema construction. Research has demonstrated that explicit adult instruction can constrain children's exploratory behaviors and reduce independent discovery, even when instructional intentions are supportive (Bonawitz et al., 2011).

These results are consistent with Piagetian and constructivist theories, which emphasize that teachers' interpretations of children's actions shape instructional interactions. When teachers possess strong conceptual frameworks for understanding play, they are positioned to scaffold learning and extend exploration; however, without a parallel emphasis on restraint and responsiveness, this knowledge may also lead to over-structuring of children's experiences. These findings also align with research suggesting that professional development is most effective when it integrates conceptual understanding with reflective practice and pedagogical application, rather than emphasizing theory in isolation (Desimone, 2009).

Clarifying the Concept of Redirection in Early Childhood Practice

An important takeaway from these findings is the need for greater conceptual clarity regarding what it means to "redirect" a child in early childhood settings (Curtis & Jaboneta,

2019; Khalil et al., 2022; Pyle & Danniels, 2017; Athey, 2007). In this study, redirection was operationalized as teachers' reported tendencies to intervene, modify, or shift children's schematic behaviors in response to classroom scenarios. However, the findings suggest that redirection may encompass a wide range of practices, from subtle guidance and environmental adjustments to more explicit instructional or behavioral control. Without a shared definition, redirection may be interpreted by teachers as inherently supportive, even when it disrupts children's ongoing schematic exploration.

The consistent association between higher schema knowledge and increased redirection highlights the importance of distinguishing between facilitative redirection that extends children's thinking and directive redirection that interrupts children's self-initiated meaning-making. For some teachers, redirection may function as an instructional reflex, an automatic response shaped by training, accountability pressures, or classroom norms, rather than a deliberate pedagogical choice grounded in observation and inquiry (Donalson & Grant-Vallone, 2002). These findings suggest that teachers may benefit from explicit guidance in discerning when redirection supports learning and when restraint may better preserve children's opportunities for schema construction (Athey, 2007; Siraj-Blatchford & Brock, 2019). Clarifying this distinction is essential for aligning schema theory with developmentally responsive, play-based practice.

Integration with Theoretical Framework

This study was grounded in constructivist and developmental theories of learning, particularly those advanced by Piaget, Vygotsky, and schema theorists, which emphasize that children construct knowledge through active exploration and repeated patterns of action (Piaget, 1952; Vygotsky, 1978). These theoretical perspectives highlight the importance of sustained

engagement with materials, environments, and social partners as children refine and extend their schemas. Findings from this study support these frameworks by demonstrating that teachers' understanding of schematic behaviors influences how they interpret and respond to children's play. However, rather than consistently facilitating open-ended exploration, stronger conceptual knowledge was associated with increased redirection of schematic behaviors.

This pattern suggests that teachers with greater awareness of schema theory may be more likely to interpret children's actions through instructional or regulatory lenses, leading to more frequent intervention. While such reactions are often motivated by intentions to support learning, they may inadvertently constrain opportunities for autonomous exploration and schema construction. From a constructivist perspective, excessive adult direction can limit children's ability to engage in self-initiated problem-solving and meaning-making (Piaget, 1952). Thus, conceptual knowledge alone may be insufficient to promote developmentally responsive practice without a parallel emphasis on pedagogical restraint and responsiveness (Athey, 2007; Curtis & Jaboneta, 2019).

Similarly, the strong relationship between knowledge and reaction patterns reflects Vygotskian notions of guided participation, in which adult mediation plays a central role in learning. Teachers who understand schema theory may be well positioned to scaffold children's learning within guided play frameworks that balance autonomy and instructional support (Fisher et al., 2013; Weisberg et al., 2016); however, when scaffolding becomes overly directive, it may shift from supportive guidance to instructional control. These findings suggest that effective application of schema theory requires not only conceptual understanding but also reflective judgment regarding when to intervene and when to allow children's play to unfold independently.

Implications for Teacher Education and Professional Development

Pre-Service Teacher Preparation

Findings from this study highlight the need for more systematic integration of schema theory into teacher preparation programs, with particular attention to how knowledge is translated into practice (Darling-Hammond et al., 2017; Nutbrown, 2011). Coursework in child development, curriculum design, and assessment should explicitly address not only identifying schematic behaviors but also the pedagogical implications of responding to them. Pre-service teachers should be provided with opportunities to observe, analyze, and reflect on schematic behaviors in authentic classroom settings, with guided discussion focused on balancing instructional support and child autonomy (Darling-Hammon et al., 2017; Nutbrown, 2011). Vignette-based learning activities, video analysis, and structured field experiences may help future educators develop both conceptual understanding and pedagogical discernment.

In-Service Professional Development

Results indicate that professional development focused solely on general instructional strategies or theoretical content may be insufficient to support effective reactions to schematic behaviors. Instead, targeted training in schema theory and play-based pedagogy should emphasize integrating knowledge with reflective practice. Effective professional development programs should provide explicit instruction on schema types and their manifestations, engage teachers in analyzing authentic classroom scenarios, and offer structured opportunities to examine their own reaction patterns (Desimone, 2009; Darling-Hammond, 2017). In addition, ongoing coaching and mentoring focused on play-based learning can support teachers in applying theoretical knowledge in ways that preserve children's opportunities for sustained

exploration. Collectively, these approaches may help teachers develop more nuanced, responsive, and developmentally appropriate practices.

Program and Policy Implications

At the program level, administrators and policymakers should consider how accountability systems, curriculum mandates, and instructional expectations influence teachers' reactions to play (Cade et al., 2022). Emphasis on academic outcomes and behavioral regulation may inadvertently increase the redirection of schematic behaviors. Creating supportive environments that value play-based learning and recognize the developmental significance of schema construction may enhance teachers' ability to apply schema theory in practice. National policy reports emphasize the importance of preserving play-based learning environments while supporting intentional teaching practices (National Academies of Sciences, Engineering, and Medicine, 2024).

Limitations of the Study

Several limitations should be considered when interpreting the findings of this study. First, the use of self-report measures and vignette-based scenarios may not fully capture teachers' actual classroom behaviors. Although vignettes provide valuable insight into teachers' decision-making processes, they represent hypothetical situations rather than real-time instructional interactions. Observational data may yield a more comprehensive understanding of how teachers respond to schematic behaviors as they unfold within authentic classroom contexts.

Second, teachers were not given the opportunity to explain the reasoning behind their redirection decisions. While the vignette responses revealed consistent patterns of intervention, the survey design did not allow participants to articulate their instructional intentions, environmental constraints, or beliefs that may have influenced those responses. As a result,

interpretations of redirection behaviors are based on reported tendencies rather than teachers' expressed rationales, limiting insight into whether redirection reflected intentional scaffolding, classroom management strategies, or contextual pressures.

Third, the cross-sectional design limits causal inference. Although schema knowledge significantly predicted reaction patterns, longitudinal research is needed to examine how teachers' knowledge and instructional responses develop over time and in relation to professional learning experiences. Fourth, the sample was limited to teachers who voluntarily participated in the study, potentially introducing self-selection bias. Participants may have been more interested in professional development or reflective practice than non-participants.

Finally, demographic and contextual variables not examined in this study, such as organizational culture, leadership practices, classroom constraints, and curriculum models, may also influence teachers' reactions to schematic play. Future research should consider these contextual factors to better understand how institutional environments shape teachers' responses to children's schematic behaviors.

Recommendations for Future Research

Based on the findings and limitations of this study, several directions for future research are recommended. Future studies should examine how teachers' knowledge of schema play and their reaction patterns evolve over time, particularly in relation to participation in professional development, through longitudinal research designs. Classroom-based observational studies may provide deeper insight into how teachers respond to schematic behaviors in authentic instructional contexts, allowing researchers to compare reported practices with observed behaviors (Pyle & Danniels, 2017).

In addition, experimental and quasi-experimental intervention studies evaluating the effectiveness of schema-focused professional development programs would strengthen causal conclusions regarding the impact of targeted training. Future research may also benefit from mixed-methods approaches that combine quantitative data with qualitative interviews, reflections, and case studies to provide a more comprehensive understanding of teachers' beliefs, instructional reasoning, and professional challenges (Creswell & Creswell, 2018). Studies conducted across diverse educational settings, program models, and cultural contexts may further enhance the generalizability of findings and contribute to a broader understanding of schema play in early childhood education.

Conclusion

This study examined early childhood teachers' knowledge of schema play and its relationship to instructional reactions to children's schematic behaviors. Findings indicated that teachers demonstrated moderate but variable knowledge, that reaction patterns were consistent and reliable, and that objective schema knowledge was the strongest predictor of classroom reactions. Notably, higher levels of conceptual knowledge were associated with increased redirection, suggesting that knowledge alone does not guarantee facilitative, child-centered practice.

These results underscore the importance of integrating conceptual understanding with reflective pedagogy and professional judgment. While teachers who possess strong knowledge of schema theory are better equipped to recognize patterns in children's play, they may also be more inclined to intervene in ways that constrain autonomous exploration. Supporting children's cognitive development, therefore, requires not only knowledge of developmental theory but also the capacity to apply that knowledge with pedagogical autonomy and intentional restraint.

By highlighting the complex relationship between knowledge and practice, this study contributes to the growing body of research on play-based learning and teacher preparation (Khalil et al., 2022; Saraj-Blatchford & Brock, 2019). The findings suggest that strengthening teachers' understanding of schematic development, while simultaneously emphasizing reflective, responsive practice, may enhance the quality of early childhood instruction and promote more authentic, child-centered learning environments.

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APPENDICES

Appendix 1

Paper Survey Instrument

Teacher Perspectives and Knowledge of Schema Play in Early Childhood Classrooms

My name is Travis Morgan, and I am conducting research as part of my doctoral degree at Auburn University. This research explores early childhood educators' knowledge of schema play and examines how they respond to children's schematic behaviors in early learning environments. The results will help in better understanding how to identify areas of alignment or disconnect between developmental theory and professional practice and inform recommendations for teacher preparation and professional development.

By completing and returning the survey you are indicating your informed consent to participate in the research.

Section 1 is for statistical purposes ONLY. Rest assured that the answers you provide are ANONYMOUS, and they will not be associated with you or your household.

-What year were you born? _____

-Gender:
○ Male ○ Female ○ Not Listed

-What is your predominant race as defined by the U.S. Census Bureau?

A. American Indian
B. Alaska Native
C. Asian
D. Black or African American
E. Native Hawaiian or Pacific Islander
F. White

-What is your highest level of education completed?

A. Less than high school diploma
B. High school diploma or GED
C. Associate's degree
D. Bachelor's degree
E. Master's degree
F. Education Specialist's degree
G. Doctoral degree

-In what year did you complete this education? _____

-What is your current role?

A. Preschool Lead Teacher
B. Preschool Auxiliary Teacher OR "Floater"
C. Center Director
D. College Student
E. High School Student
F. Collegiate Instructor OR Professor

- As of June 1st of this year (2025), how long have you been working with children (Ages 1 to 5) as a professional?

_____

-What type of early childhood education setting were you or are you employed?

A. Public
B. Faith-based
C. Private or Independent
D. University or College Lab School
E. In-home

Section 2 of the survey will examine your perceptions of various scenarios. Instructions: Read each vignette and indicate the extent to which you agree or disagree with the statement that follows.

Scale:

- ***Agree***
- ***Somewhat Agree***
- ***Neither Agree Nor Disagree***
- ***Somewhat Disagree***
- ***Disagree***

1. **Miles lines up toy cars in a long row across the classroom floor, blocking a walkway. He watches them as he moves each forward in sequence.**

   Statement: Miles' behavior in the vignette represents positive classroom behavior.

   A. Agree
   B. Somewhat Agree
   C. Neither Agree Nor Disagree
   D. Somewhat Disagree
   E. Disagree

   Statement: I would redirect Mile's behavior.

   A. Agree
   B. Somewhat Agree
   C. Neither Agree Nor Disagree
   D. Somewhat Disagree
   E. Disagree

2. **Talia builds a wall of blocks around herself and refuses to let peers enter her space.**

   Statement: Talia's behavior in the vignette represents positive classroom behavior.

   A. Agree
   B. Somewhat Agree
   C. Neither Agree Nor Disagree
   D. Somewhat Disagree
   E. Disagree

   Statement: I would redirect Talia's behavior.

   A. Agree
   B. Somewhat Agree
   C. Neither Agree Nor Disagree
   D. Somewhat Disagree
   E. Disagree

3. **Jordan repeatedly throws soft toys across the room, watching how they fly and land. A peer is hit.**

   Statement: Jordan's behavior in the vignette represents positive classroom behavior.

   A. Agree

B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Jordan's behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

4. **Isla spins the wheels of a toy truck over and over.**
Statement: Isla's behavior in the vignette represents positive classroom behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Isla's behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

5. **Noah carries blocks back and forth between shelves and a corner of the room for more than 15 minutes. He did not pause during this time to build a structure.**
Statement: Noah's behavior in the vignette represents positive classroom behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Noah's behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

6. **Ava spends her center time linking and unlinking interlocking toys and ignores group activities.**
Statement: Ava's behavior in the vignette represents positive classroom behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Ava's behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

7. **Leo arranges crayons in a straight line by color but becomes upset when someone moves one out of order.**
Statement: Leo's behavior in the vignette represents positive classroom behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Leo's behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

8. **Mia wraps dolls in paper, fabric, and tape until they're completely hidden, then unwraps them and starts again.**
Statement: Mia's behavior in the vignette represents positive classroom behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Mia's behavior.
A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

9. **Ezra crawls under tables, through tunnels, and in and out of boxes all morning, ignoring toys and group time.**

   Statement: Ezra's behavior in the vignette represents positive classroom behavior.

   A. Agree
   B. Somewhat Agree
   C. Neither Agree Nor Disagree
   D. Somewhat Disagree
   E. Disagree

   Statement: I would redirect Ezra's behavior.

   A. Agree
   B. Somewhat Agree
   C. Neither Agree Nor Disagree
   D. Somewhat Disagree
   E. Disagree

10. **Aria places small toys into cups, buckets, and bins, carefully filling each to the top.**

    Statement: Ezra's behavior in the vignette represents positive classroom behavior.

    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

    Statement: I would redirect Aria's behavior.

    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

11. **Max drops different objects from the top of the sensory table, watching how each one falls and lands.**

    Statement: Max's behavior in the vignette represents positive classroom behavior.

    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

    Statement: I would redirect Max's behavior.

    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

12. Sophia spins herself in circles during transition times and often falls to the floor laughing.

Statement: Sophia's behavior in the vignette represents positive classroom behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Sophia's behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

13. Liam spins herself in circles during transition times and often falls to the floor laughing.

Statement: Liam's behavior in the vignette represents positive classroom behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Liam's behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

14. Olivia spins herself in circles during transition times and often falls to the floor laughing.

Statement: Olivia's behavior in the vignette represents positive classroom behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Olivia's behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

15. **Elijah directs peers where to sit or stand during clean-up, arranging people like puzzle pieces in a line.** Statement: Elijah's behavior in the vignette represents positive classroom behavior.
    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

    Statement: I would redirect Elijah's behavior.
    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

16. **Zoe hides under blankets and scarves, wrapping herself tightly and refusing to come out during circle time.**
    Statement: Zoe's behavior in the vignette represents positive classroom behavior.
    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

    Statement: I would redirect Zoe's behavior.
    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

17. **Aiden builds fences around toy animals with blocks and becomes frustrated if someone removes them.**
    Statement: Aiden's behavior in the vignette represents positive classroom behavior.
    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree
    Statement: I would redirect Aiden's behavior.
    A. Agree
    B. Somewhat Agree
    C. Neither Agree Nor Disagree
    D. Somewhat Disagree
    E. Disagree

18. Nora slides books and puzzle pieces across tables and floors repeatedly during center time.

Statement: Nora's behavior in the vignette represents positive classroom behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Nora's behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

19. Shaw gathers acorns from the playground and carries them inside, distributing them into cubbies and bins.

Statement: Shaw's behavior in the vignette represents positive classroom behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Shaw's behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

20. Lily watches the classroom ceiling fan spin for long periods, not participating in other activities.

Statement: Lily's behavior in the vignette represents positive classroom behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Statement: I would redirect Lily's behavior.

A. Agree
B. Somewhat Agree
C. Neither Agree Nor Disagree
D. Somewhat Disagree
E. Disagree

Section 3 of the survey will examine your experience with schema play. Instructions: Read each question and choose the most accurate response.

1. How familiar are you with the concept of schematic play?

- How familiar are you with the concept of schematic play?
- Very familiar – I understand it well and could explain or apply it in practice.
- Familiar – I have a general understanding but would benefit from deeper knowledge.
- Somewhat familiar – I've encountered the term but don't fully understand it.
- Heard of it – I've heard the term, but I don't know what it means.
- Not familiar at all – This is my first time encountering the term.

2. Have you ever participated in professional development (PD) focused on play-based learning?

- I have participated in PD specifically focused on play-based learning.
- I have participated in PD that contained aspects of play-based learning.
- I have participated in PD that contained things that might have been play-based learning but that term was never used
- I have participated in PD but nothing about play-based learning
- I have never participated in PD.

3. Do you currently (or have you) incorporated schema play concepts into your classroom planning or child observations?

- Frequently
- Occasionally
- Rarely
- Never

4. Have you observed schema play behaviors (e.g., transporting, enclosing, trajectory) in children under your care?

- Regularly
- Occasionally
- Rarely
- Never
- Not applicable

Section 4 of the survey will examine your knowledge of schema play. Instructions: Read each question and choose the most accurate response.

1. A child repeatedly rolls balls down ramps and watches them crash into a wall.
Which of the following best describes this behavior?
A. The child is misbehaving and needs redirection.
B. The child is exploring a schematic pattern of behavior.

C. The child is engaging in risky play that should be stopped.
D. The child is trying to test classroom limits.

2. A child lines up five pencils in a perfectly straight line and refuses to let others move them.
Which of the following best describes this behavior?
A. The child is exhibiting obsessive behavior and needs redirection.
B. The child is demonstrating schematic play.
C. The child is not engaging in meaningful play.
D. The child is being oppositional.

3. A child spends most of center time looking at a book quietly, occasionally turning pages but not interacting with peers or materials.
What does this behavior most likely indicate?
A. The child is participating in schema-based play.
B. The child is disengaged and may need support.
C. The child is acting out a trajectory schema.
D. The child is modeling what they see adults do.

4. A child moves between centers collecting small items and placing them in a backpack throughout play.
This behavior is best viewed as:
A. Off-task and unfocused
B. Avoidant behavior due to stress
C. Poor understanding of center expectations
D. A typical example of schematic exploration

5. A child uses toy dinosaurs to reenact scenes from a recent movie, giving them voices and personalities.
How should the teacher interpret this behavior?
A. As schematic play
B. As imaginative role play
C. As solitary or parallel play
D. As unstructured, non-purposeful play

6. A child hides a toy inside a box, then places the box inside a cupboard and closes the door. The child repeats this several times.
This behavior most likely reflects:
A. A need for attention
B. Avoidance of social interaction
C. A schematic pattern of enveloping
D. Difficulty with object permanence

General Schema Recognition (Questions 1–6)
1. A child repeatedly rolls balls down ramps and watches them crash into a wall.
Which of the following best describes this behavior?
A. The child is misbehaving and needs redirection.

B. The child is engaged in a science experiment.
C. The child is exploring a schematic pattern of behavior.
D. The child is trying to get attention from the teacher.

2. During free play, a child gathers small blocks in a bucket and carries them around the room without using them to build.
What does this behavior most likely indicate?
A. The child is hoarding and needs to be monitored.
B. The child is imitating shopping behavior.
C. The child is engaged in a play schema.
D. The child is unengaged and needs a task.

3. A child continuously wraps dolls in blankets, then unwraps and rewraps them.
What does this repeated behavior suggest?
A. The child is overly focused and should be encouraged to try other activities.
B. The child is practicing self-regulation skills.
C. The child is showing signs of separation anxiety.
D. The child is demonstrating schematic play.

4. A child creates long trails by linking paper clips, string, and tape across the floor.
Which explanation best aligns with this behavior?
A. The child is being messy and wasting materials.
B. The child is working through a developmental play schema.
C. The child is modeling a science experiment.
D. The child is copying an adult's actions.

5. A child stacks, knocks down, and restacks blocks repeatedly during center time.
How should the teacher interpret this behavior?
A. As a lack of creativity that needs teacher direction
B. As disruptive and needing redirection
C. As a sign of developmental delay
D. As purposeful, schema-driven learning

6. A child moves between centers collecting small items and placing them in a backpack throughout play.
This behavior is best viewed as:
A. Off-task and unfocused
B. A typical example of schematic exploration
C. Avoidant behavior due to stress
D. Poor understanding of center expectations

Specific Schema Identification (Questions 7–12)

7. A child stacks plastic cups into tall towers, then tips them over to start again.
Which schema is being explored?
A. Enveloping
B. Orientation

C. Positioning
D. Rotation

8. A child hides a stuffed animal inside a box, covers the box with a cloth, and then takes it out and repeats.
This play reflects which type of schema?
A. Transporting
B. Enveloping
C. Connecting
D. Positioning

9. A child spins in circles, turns toys over repeatedly, and becomes fascinated by a spinning chair.
What kind of schema is evident here?
A. Rotation
B. Trajectory
C. Connection
D. Enclosur

10. A child creates walls with blocks around a group of animal figures and says, "They live here now."
What schema is most aligned with this behavior?
A. Enclosure
B. Transporting
C. Rotation
D. Enveloping

11. A child lines up toy food on the table from smallest to largest.
What schema is being demonstrated?
A. Orientation
B. Enclosure
C. Positioning
D. Connecting

12. A child tapes markers together to form long chains and connects them to hang from a shelf.
What schema is this behavior most likely demonstrating?
A. Rotation
B. Connection
C. Enveloping
D. Trajectory

Appendix 2

Exempt Determination

AUBURN UNIVERSITY
Institutional Review Board

EXEMPT DETERMINATION

October 31, 2025

Richard Durham
3348444434
rsd0007@auburn.edu

Dear Richard Durham:

On 10/31/2025, the IRB reviewed the following submission:

Protocol Information	Submission Details
Type of Review:	Initial Study
Title:	Teacher Knowledge and Perceptions of Schema Play in Early Childhood Education
Investigator:	Richard Durham
IRB ID:	STUDY00000724
Funding:	None
Grant Title:	N/A
Grant ID:	None
IND, IDE or HDE:	None
Documents Reviewed:	• HRP- 581 Information Letter Updated.pdf, Category: Consent Form; • IRB Exemption HRP-503a Update.pdf, Category: IRB Protocol; • QUESTIONNAIRE Schema Play.pdf, Category: Survey/Questionnaire;

The IRB determined that this protocol meets the criteria for exemption from IRB review. This determination is valid through 10/31/2028. The IRB has implemented a three-year determination period for Exempt submissions to better manage the active research portfolio.

In conducting this protocol you are required to follow the requirements listed in HRP-103 - INVESTIGATOR MANUAL.

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit a modification in the Endeavor system.

Sincerely,
IRB Administration
540 Devall Drive
Auburn, AL 36849
irbadmin@auburn.edu
(334) 844-5966

Appendix 3

Informed Consent Document

INFORMED CONSENT DOCUMENT

(NOTE: DO NOT SIGN THIS DOCUMENT UNLESS AN IRB APPROVAL STAMP WITH CURRENT DATES HAS BEEN APPLIED TO THIS DOCUMENT.)

Title of research study[i]: Teacher Knowledge and Perspectives of Schema Play in Early Childhood Classrooms

Investigator: Travis Morgan and Sean Durham

KEY INFORMATION

The following table is a short summary of this study to help you decide whether or not you would like to participate in this research study. More detailed information is listed later on in this form.

General Information	You are being asked to take part in a research study about early childhood educators' knowledge of and responses to schema play. This research is being conducted by Travis Lane Morgan, a doctoral candidate in Early Childhood Education at Auburn University. Participation in this study is completely voluntary. You may choose not to take part, or to stop participating at any time, without penalty or loss of any benefits to which you are otherwise entitled. This consent form explains the purpose of the study, what you will be asked to do, any potential risks or benefits, and how your information will be protected. Please take time to read it carefully and ask any questions you may have before deciding whether or not to participate.
Purpose	The purpose of the study is to explore early childhood educators' knowledge of schema play and examine how they respond to children's schematic behaviors in early learning environments. This research aims to identify connections between what teachers know about schema play and how they act in response to children's play behaviors, with the goal of informing teacher training and supporting developmentally appropriate practices in early childhood education.
Duration & Visits	There will be a total of one (1) study session, which consists of completing a single online or paper survey. This session will last approximately 20–25 minutes. Your total time commitment for the entire study will be no more than 25 minutes.
Overview of Procedures	You will be asked to complete a one-time survey about your knowledge of schema play and how you respond to children's play behaviors in early childhood settings. This involves answering questions about your background in education, your understanding of schema play, and how you would respond to short descriptions (called vignettes) of children engaged in play. You may complete the survey online through a secure platform (Qualtrics) or by filling out a paper version. The survey will take approximately 20–25 minutes. You may skip any question you do not wish to answer.
Risks	The risks associated with this research are minimal. You may experience mild discomfort when reflecting on your knowledge or classroom practices. You may also skip any questions you do not wish to answer. There is a small risk of loss of confidentiality; however, no

	identifying information will be collected, and all data will be stored securely to protect your privacy.
Benefits	There are no direct benefits to you for participating in this study. The benefit to researchers is to gain a better understanding of early childhood educators' knowledge of schema play and how that knowledge influences their responses to children's play behaviors. This information may help improve teacher training, professional development, and classroom practices that support developmentally appropriate, play-based learning.
Alternatives	The alternative is not to participate in this study. Participation is completely voluntary, and you may choose not to take part or to stop at any time without penalty.
Right to Withdraw from the Study	Your decision to be in this study is voluntary. If you decide to be in this study and then change your mind, you can leave the study at any time without penalty.

DETAILED INFORMATION

The following is more detailed information about this study.

Why am I being invited to take part in a research study?

You are invited to participate in a research study to explore early childhood educators' knowledge of schema play and examine how they respond to children's schematic behaviors in early learning settings. The study is being conducted by Travis Lane Morgan, Doctoral Candidate, under the direction of Sean Durham, Associate Professor, in the Auburn University Department of Curriculum and Teaching. You were selected as a possible participant because you are currently or were formerly employed in a professional early childhood education role and have experience working with children between the ages of 1 and 5.

How many people will be studied?

We expect about 100 people locally will be in this research study, out of 150 people in the entire study nationally.

What should I know about a research study?

- Someone will explain this research study to you.
- Whether or not you take part in the research study is up to you. You may wish to talk to your family and friends about participating in the study.
- You can choose not to take part in the study.
- You can agree to take part in the study and later change your mind.
- Your decision will not be held against you.
- You can ask all the questions you want before you decide whether you would like to take part in the study or not.

Why is this research being done?

This research aims to gain a deeper understanding of what early childhood educators know about schema play, a form of repeated, patterned play behavior linked to child development, and how their knowledge influences their responses to children in classroom settings.

Although schema play is rooted in widely accepted developmental theories, it is often misunderstood or overlooked in early childhood practice. This study seeks to identify gaps between theory and practice, which may inform future teacher training, curriculum development,

and the promotion of developmentally appropriate, play-based learning environments for young children.

What will be involved if I participate?

If you decide to participate in this research study, you will be asked to complete a one-time survey about your background in early childhood education, your understanding of schema play, and how you would respond to various classroom play scenarios involving young children.

Specifically, as a research participant, you will be asked to:

- Read and agree to an informed consent form before beginning the survey.
- Answer a short set of demographic questions (such as your job role, years of experience, and age group of children you work or have worked with).
- Complete multiple-choice and Likert-scale questions about your knowledge of schema play.
- Review brief play-based classroom vignettes (short scenarios involving children's behavior during play) and indicate how you would most likely respond in your professional role.
- Choose to complete the survey either online through Qualtrics (a secure, university-approved platform) or using a paper version if offered in person at a professional event or educational setting.

Time Commitment:

The survey will take approximately 20–25 minutes to complete. There are no additional visits, procedures, follow-ups, or interactions required.

Location:

You may complete the survey at your convenience—online from any private location with internet access, or in person if completing a paper version. No in-person meetings or phone calls are required.

No drugs, medical procedures, devices, or biological samples will be used in this study.

There will be no follow-up contact, and your participation will conclude once the survey is submitted.

This research does not involve experimental treatments, medical care, or genetic testing, and there are no plans to contact you for future research.

How long will the research last and what will I need to do?

We expect that you will be in this research study for approximately 20–25 minutes, which is the time it will take to complete a one-time survey.

You will not be asked to return for any follow-up or additional activities. Your participation will be complete once you submit the survey, either online or on paper.

Is there any way being in this study could be bad for me?

This study involves minimal risk, meaning the likelihood and severity of harm are no greater than those encountered in everyday life or typical professional reflection. However, a few potential risks should be considered. ***The risks associated with participating in this study are:***

- There are no physical risks involved, as the study does not require any medical procedures, physical activity, or in-person interaction.
- There may be minor psychological discomfort as you reflect on your professional knowledge or consider how you have responded to children's behaviors in past classroom situations. This

discomfort is expected to be mild and temporary. You may skip any question or exit the survey at any time without penalty.

- There is a small risk to your privacy, particularly if you are completing the survey in a shared or public setting. To minimize this risk, the survey is anonymous, and no identifying information is collected. Online responses are submitted through a secure, encrypted platform (Qualtrics), and paper responses will be stored in a locked location before being entered anonymously into the dataset.
- There are no legal, social, or economic risks associated with participating in this study. Your participation or responses will not be shared with your employer or affect your job, income, or standing in any way.

Will being in this study help me in any way?

There are no benefits to you from your taking part in this research. We cannot promise any benefits to others from your taking part in this research. However, possible benefits to others include contributing to a better understanding of how early childhood educators recognize and respond to schema play, which may inform future teacher preparation programs, professional development efforts, and support for developmentally appropriate, play-based learning in early childhood settings.

Will I receive compensation for participating?

Your participation is completely voluntary, and there are no monetary incentives, gift cards, extra credit, or other forms of compensation being offered in exchange for your time.

What happens if I do not want to be in this research?

Participation in research is completely voluntary. You can decide to participate, not participate, or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. Your decision not to participate or to stop participating will not jeopardize your future relations with Auburn University.

Your alternative to participating in this research study is to not participate.

What happens if I say yes, but I change my mind later?

You can leave the research at any time; it will not be held against you. If you choose to withdraw, your data can be withdrawn as long as it is identifiable.

What happens to the information collected for the research?

Your privacy will be protected. Any information obtained in connection with this study will remain anonymous. Information obtained through your participation may be used in a doctoral dissertation, submitted for publication in a professional journal, or presented at educational conferences or academic events. All findings will be reported in summary form, and no individual participant will be identifiable.

Although we will take every reasonable step to protect your privacy, we cannot guarantee complete confidentiality. Organizations that may review the study for compliance and ethical oversight include the Auburn University Institutional Review Board (IRB) and, if applicable, the academic committee supervising the dissertation.

There are no legal limitations to confidentiality in this study, as we are not collecting any personal or sensitive information that would require reporting (such as evidence of abuse or threats of harm).

All electronic data will be stored in AU Box, a secure, encrypted, password-protected platform approved by Auburn University. Any paper surveys will be stored in a locked cabinet until they

are manually entered into the secure digital system and then destroyed after a three-year period.
Because this study is anonymous and not NIH-funded, it is not covered by a Certificate of Confidentiality.

FUTURE USE OF DATA

The data collected will consist solely of anonymous survey respons**es**. Because no identifying information is collected, the data cannot be linked back to you in any way. The survey may be completed online (via Qualtrics) or on paper. All data—whether collected digitally or entered manually from a paper copy—will be stored securely on Auburn University's encrypted AU Box platform, which is password-protected and accessible only to the Principal Investigator (Travis Lane Morgan) and the Faculty Advisor.
All study data will be retained for a minimum of three (3) years after the conclusion of the study, in compliance with federal regulations and Auburn University policy. After that time, the data will be permanently deleted or destroyed.
Because this study does not collect identifiable private information or specimens, your responses will not be used or distributed for future research studies, even in de-identified form.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at ***(334)790-3684.*** This research has been reviewed and approved by the Auburn University Institutional Review Board (IRB). You may contact the Auburn University IRB at (334) 844-5966 or IRBadmin@auburn.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

The Auburn University Institutional Review Board has approved this document for use from _____ to _____. Protocol #_____.

Having read the information provided, you must decide whether or not you wish to participate in this research study. Your signature documents your permission to take part in this research. A copy of this document will be given to you to keep.

Signature of subject	Date
Printed name of subject	Date
Signature of person obtaining consent	Date
Printed name of person obtaining consent	

[i] This template satisfies AAHRPP elements I.1.G, I.4.A, I-9, II.3.C-II.3.C.1, II.3.E, II.3.F, II.4.B, III.1.F, III.1.G