

OBSERVING FOUR AND FIVE YEAR OLDS' COGNITIVE PROBLEM-  
SOLVING: A QUALITATIVE STUDY USING A VARIATION OF  
VYGOTSKY'S DOUBLE STIMULATION METHOD

A DISSERTATION

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY  
IN THE GRADUATE SCHOOL OF THE  
TEXAS WOMAN'S UNIVERSITY

COLLEGE OF PROFESSIONAL EDUCATION

BY

TAMARA BANKS B.A., M.Ed.

DENTON, TEXAS

December 2018

Copyright © 2018 by Tamara Banks

## DEDICATION

All praise and honor is given to my Lord and Savior, Jesus Christ. Thank you because with You all things are possible. To my incredible momma, Henrietta Powell-Hines, my amazing grandmother, Rae Powell, and all my family thanks to each of you. To my loving and always supportive children, Jordan and Jayla, thank you for being there through the innumerable ups and downs. I send many thanks to my friends and I appreciate my caring angels, Molly, Mrs. May, Gwen, Naomi, Jayla, and Norvon for your support, during my defense. Heartfelt thanks to my irreplaceable New Testament Bible Church family, my Denison ISD family, and DISD's top-notch Special Education Department. I could not have done this without your constant support and encouragement. Last but not least, thank you, thank you, thank you to my patient, understanding advisor, Dr. Karen Petty. You did not give up on me even through ALL my bumps in the road.

## ACKNOWLEDGMENTS

Reaching the end of this journey is surreal. The obstacles faced throughout make this accomplishment even more rewarding. I must first acknowledge that I know it is by the grace of God that I have reached this point. He was so gracious to place me at Texas Woman's University and provide me with faculty and peers who were with me every step up the way. Dr. Karen Petty, Dr. Joyce Armstrong, and Dr. Katherine Rose all remained in my corner and were an amazing committee. I sincerely acknowledge and thank Dr. Karen Petty, my committee chair for being consistently positive, yet firm, meeting me where I was at each encounter, and for her extensive knowledge and inspiration. I am grateful for the families, teachers, and administrators who allowed the precious preschoolers to participate in the study. Additional key acknowledgments go to those who assisted me in arriving at this point. These persons were not on campus, but they were with me at home, work, and church. I was constantly surrounded by encouraging family and friends. They kept me rooted in the plan God had laid out for me, despite the days and months when I could not write a single word. There was always someone reassuring me that I could push through to the end and accomplish my goal. My heart is full and I am truly thankful.

## ABSTRACT

TAMARA BANKS

### OBSERVING FOUR AND FIVE YEAR OLDS' COGNITIVE PROBLEM-SOLVING: A QUALITATIVE STUDY USING A VARIATION OF VYGOTSKY'S DOUBLE STIMULATION METHOD

DECEMBER 2018

Problem-solving is a skill that is a part of everyday existence. It is displayed among adults and children. The purpose of the qualitative study was to observe preschoolers engage in problem-solving and as a result gain insight to the strategies they incorporated in the process.

A total of 12 preschoolers ages four and five participated in the study. The children were paired with a peer and props/tools were arranged for the activity. The children met with the researcher two at a time and were presented a problem-solving activity. The study set out to observe the children during the activity that incorporated Vygotsky's (1978) double stimulation method while they solved the problem facilitated by the researcher.

Findings of this qualitative study revealed the various strategies the children utilized within the study. The most prevalent strategies included taking initiative when problem-solving, interpersonal problem-solving, verbal problem-solving, and nonverbal problem-solving with physical responses. Each of these strategies surfaced across dyads and aligned with previous, relevant research.

## TABLE OF CONTENTS

	Page
DEDICATION .....	ii
ACKNOWLEDGMENTS .....	iii
ABSTRACT .....	iv
LIST OF TABLES .....	viii
LIST OF FIGURES .....	ix
Chapter	
I. INTRODUCTION .....	1
Statement of Problem .....	2
Statement of Purpose .....	3
Research Question .....	4
Theoretical Framework .....	4
Definition of Terms .....	6
Delimitations .....	7
Summary .....	8
II. REVIEW OF LITERATURE.....	9
Introduction .....	9
Research Question .....	10
Theoretical Framework .....	10
Mediators .....	12
Problem-Solving .....	13
How Children Problem-Solve Independently .....	14
How Children Problem-Solve with Guidance from an Adult .....	18
How Children Problem-Solve During Peer Collaboration .....	22
How Children Problem-Solve With Tools .....	25
Summary .....	33

III. METHODOLOGY .....	35
Introduction .....	35
Research Question .....	35
Researcher’s Perspective .....	35
Protecting Human Research Participants .....	37
Consent .....	38
Recruitment .....	39
Participants .....	39
Data Collection .....	39
Procedures .....	40
Methodological Rigor .....	44
Plan of Analysis .....	45
Procedures .....	45
Summary .....	49
IV. DATA ANALYSIS AND RESULTS .....	50
Introduction .....	50
Research Question .....	51
Description of Three Schools .....	52
Exterior-School I .....	52
Interior-Classroom I .....	54
Exterior-School II .....	55
Interior-Classroom II .....	57
Exterior-School III .....	58
Interior-Classroom III .....	59
Verbal Portraits of Participants .....	60
Participants .....	61
Data Collection Procedures .....	69
Triangulation .....	69
Analysis of Data .....	72
Video and Audio Recordings Analysis .....	72
Observational Field Notes Analysis .....	73
Analytic Memos Analysis .....	73
Coding .....	74
First Cycle Coding .....	75
Second Cycle Coding .....	84
Findings .....	86
Presentation of Strategies .....	87

Strategy 1: Took the Initiative when Problem-Solving .....	88
Strategy 2: Interpersonal Problem-Solving .....	89
Strategy 3: Verbal Problem-Solving .....	91
Strategy 4: Nonverbal Problem-Solving with Physical Responses .....	92
Summary .....	94
<b>V. DISCUSSION AND IMPLICATIONS .....</b>	<b>96</b>
Introduction .....	96
Summary of the Study .....	97
Discussion of the Strategies .....	99
Strategy 1: Took the Initiative when Problem-Solving .....	99
Strategy 2: Interpersonal Problem-Solving .....	100
Strategy 3: Verbal Problem-Solving .....	101
Strategy 4: Nonverbal Problem-Solving with Physical Responses .....	102
Connecting Findings to Literature and Theory .....	102
Implications for Educators .....	103
Directions for Future Research .....	106
Summary of Chapter .....	108
Limitations .....	109
Conclusion .....	110
<b>REFERENCES .....</b>	<b>112</b>
<b>APPENDIXES</b>	
A. Recruitment Flyer .....	119
B. Recruitment Script .....	121
C. Consent to Participate in Research .....	123
D. Problem-Solving Activity Scenarios.....	126
E. Counseling Services for Children and Families .....	128

## LIST OF TABLES

Table	Page
1. Sample of <i>a priori</i> Coding .....	78
2. Sample of Descriptive Coding .....	80
3. Sample of Process Coding .....	82
4. Sample of In Vivo Coding .....	83
5. Sample of Pattern Coding .....	85
6. Sample of Strategies .....	93

## LIST OF FIGURES

Figure	Page
1. Problem-Solving Scene.....	41
2. Example of Stimulus-Response and Double Stimulation Methods.....	51

## CHAPTER I

### INTRODUCTION

Vygotsky (1978) defined problem-solving as incorporating higher mental functions to find a means to an end. This is accomplished using of activity, tools, speech, and social interactions (Ahmed, 2014; Bozhovich, 2004; Vygotsky, 1978). Early childhood years are an essential time for brain development. When young children learn to problem-solve, they incorporate the use of creative thinking skills, forethought, and deductive reasoning (Havertape & Kass, 1978; Voutsina, 2012). These are all important cognitive processes that have an impact on a child's learning and define problem-solving.

Problem-solving is vital due to the nature of the way in which children develop mental capacities, emotions, speech, cognitive abilities, and acquire social skills. Voutsina (2012) explained that exploring the various strategies employed in the problem-solving process gives insight into cognitive development. When a child problem-solves, they apply skills and strategies learned in various situations (Havertape & Kass, 1978; Sakharov, 1928). These skills are necessary for a child to develop, especially within young children, because it establishes growth in the areas of socialization, academics, and critical thinking (Cluver, Heyman, & Carver, 2013). The authors posited that in order to obtain growth and tap into problem-solving, one must access different regions of the

brain. The more one accesses the areas of the brain that incorporate problem-solving, the more they enhance their cognitive problem-solving skills.

Kisamore, Carr, and LeBlanc (2011) wrote, prompts (which are tools) are avenues that enable participants to move forward during the problem-solving process. The prompt serves as a stimulus and triggers a deeper level of thinking. A study by Cluver, Heyman, and Carver (2013) indicated that understanding cognitive development is associated with children's socialization. Children learn from others and incorporate social referencing in their cognitive development. Furthermore, Vygotsky's double stimulation method is an approach that makes use of prompts and other external means to solve a problem and has been linked to higher level thinking during activities (1967).

### **Statement of the Problem**

When children are able to find solutions on their own, (i.e., problem-solve), their learning becomes more self-directed (Vygotsky, 1978). This requires the use of developing cognitive abilities when they problem-solve (Bodrova & Leong, 2006). In an exploration of related literature regarding problem-solving, it was evident that many studies consisted of interaction between participants and others when problem-solving transpired. The various methods that surfaced in the literature included: how children problem-solve independently (Castillo & Kloos 2013; Chen, Siegler, & Daehler 2000), how children problem-solve with adult guidance (Kisamore, Carr, & LeBlanc 2011; Portes, Smith, Zady, & Castillo, 1997;), how children problem-solve during peer

collaboration (Clark, 2012; Cluver, Heyman, & Carver 2013; Lundy & Fyfe, 2016), and how children problem-solve with tools (Kudryavtsev, 2011; Obukhova, 2012; Vygotsky, 1978). Knowing how critical problem-solving is to the development of creative thinking, deductive reasoning, and judgment it is vital to determine an effective means of problem-solving for children (Cluver, Heyman, & Carver, 2013; Havertape & Kass, 1978; Vygotsky, 1978). After seeking various means, Vygotsky (1978), determined that the double stimulation method was a technique that incorporated aspects that allowed the researcher to examine cognitive processes as they unfolded in children (Vygotsky, 1978). Much of the seminal research focuses on problem solving with assistance from an adult, while some of the more recent research integrates problem solving with the use of tools. There is limited research linking preschoolers to problem solving, explicitly using the double stimulation method (Kudryavtsev, 2011; Wood & Middleton, 1975).

### **Statement of Purpose**

The purpose of this study was to observe preschoolers' cognitive problem-solving strategies during a variation of L. S. Vygotsky's (1978) double stimulation method. Based upon a lack of research regarding the use of preschoolers as participants and utilizing the double stimulation method, this study brought about the exploration of this topic. This study not only incorporated the use of tools and assistance from an adult, but also peer collaboration and an opportunity for preschoolers to problem-solve individually. This was worth exploring with preschoolers because according to Havertape

and Kass (1978), children begin to develop extensive social relationships at a young age. This opened the door to broaden the participants' problem-solving skills and gave the researcher another problem-solving tool to examine (Mills, Danovitch, Grant, & Elashi, 2012; Portes, Smith, & Cuentas, 1993; Vygotsky, 1978; Winsler & Naglieri, 2003). Overall, the information in this study was of importance to persons who work with preschoolers and who are interested in their cognitive problem solving, discussed in Chapter Five.

### **Research Question**

The following research question was developed as a means of discovering ways preschoolers incorporate while problem-solving. In order to examine this experience of young children, the following question guided the research:

Using a variation of L.S. Vygotsky's double stimulation method, what cognitive problem-solving strategies of preschoolers were observed by the researcher?

### **Theoretical Framework**

The theoretical framework of a study is connected to current, relevant research and is the theoretical lens or perspective from which the study was viewed (Green, 2014). The current study was examined through the lens of cultural historical activity theory (CHAT) (Vygotsky, 1978) and CHAT is a theory rooted in examining the mind. In addition, activity is a major component of CHAT and is embedded into cultural-historical

psychological development (Ahmed, 2014; Bozhovich, 2004; Jonassen & Rohrer-Murphy, 1999). The theoretical assumption of this theory was used to investigate the juncture in which human activity and consciousness occurred (Bozhovich, 2004; Jonassen & Rohrer-Murphy, 1999). When the psychological development of children is observed, activity is a significant element (Bozhovich, 2004). Vygotsky (1967) linked creativity and imagination to behaviors during an activity and noted there were two types of activities. First, is activity that reproduced action that is related to memory of previous interactions. Such actions are based on previous experiences and do not create anything new. The second type of activity is combination or creative activity. Through this activity, a person reproduces action from past memories and experiences in conjunction with creative choice. Hence, old information combined with new thoughts generates imagination or fantasy, combinational or creative activity occurs (Vygotsky, 1967). Actions related to memory as well as combination action are concepts that are present in an activity system. These concepts emphasize social context and interest within CHAT. Viewing learning from action related memory allowed the researcher to examine cognitive development as well as the social, historical, and cultural connections among the subjects and objects in the research (Silo, 2013). These various components made CHAT an ideal theory to shape the current study.

## **Definition of Terms**

The current study applied various terms from related literature to expound on problem-solving. The key terms below related directly to children and their problem-solving strategies. The terms were as follows:

*Double stimulation:* This experimental design is used to observe someone completing a task and uses two stimuli to find a means to an end in problem solving. The first stimulus is a verbal prompt or cue and the second stimulus is a neutral object or tool. The premise of this method is to examine the cognitive functioning of the participant (Vygotsky, 1978).

*Externalization:* The creation or influence one has on artifacts or tools (Engestrom, 1999; Postholm, 2015; Vygotsky, 1978).

*Internalization:* This means to represent cultural forms of behavior and reconstruct an external action (Engestrom, 1999; Postholm, 2015; Vygotsky, 1978).

*Interpsychological category:* This incorporates problem-solving between people (Vygotsky, 1978; Wertsch, McNamee, McLane, & Budwig, 1980).

*Intrapsychological category:* This incorporates problem-solving individually (Vygotsky, 1978; Wertsch et al., 1980).

*Mediation:* An intervention that is provided while helping a child through a task (Vygotsky, 1978).

*Object:* The motive or goal that is sought during an activity (Ahmed, 2014; Obukhova, 2012; Wilson, 2014). The product during the activity is physical or mental (Jonassen & Rohrer-Murphy, 1999). The current study used the term tool or props to represent objects.

*Private (inner or internal) Speech:* A problem-solving tool children use during an activity where they mentally use language skills (Vygotsky, 1978).

*Problem-solving:* In this study a task was presented to two participants at a time during a planned activity with toy props for the participants to find a solution.

*Stimulus-response method (S-R):* An experimental design in which a participant is given a stimulus situation and their varied responses are recorded (Vygotsky, 1978).

*Strategies:* These are themes that surfaced after coding the data collected in the current study.

*Subject:* Refers to persons or a group to whom the focus of change is aimed toward in an activity (Ahmed, 2014; Obukhova, 2012; Wilson, 2014).

### **Delimitations**

Delimitations in the study included events for which the researcher had control, such age of the children and the location of the study. The participants in the study were preschoolers who were four-or five-years-old and who attended the same public local school district within a southwestern rural city in the United States of about 25,000 people.

## Summary

There were various means of exploring problem-solving; however, the double stimulation method was the method chosen for the current study in order to fill the literary gap in observing preschoolers who problem-solved collaboratively and with the use of tools. The study sought to explore, when using Vygotsky's double stimulation method, how preschoolers problem-solved during researcher facilitated planned activities in a peer dyad. This method provided an approach to grasp a deeper understanding of the cognitive functions of preschoolers.

Activity is a key component in the lives of children. The two different types of activities presented in this chapter included what were learned as well as what additional knowledge people (the children) chose to add to previous information. This was known as action related memory and combination action (Vygotsky, 1978). Creativity and problem-solving also played a key part in a child's development and learning process. Children used creativity and took skills they had learned and experienced and in turn discovered new abilities, which shifted them into the process of problem-solving (Vygotsky, 1967). The preschool age, where language and self-talk were developed, provided a prime age group for observing problem-solving. To incorporate a more in-depth understanding of this study CHAT was used as the theoretical framework for the study. Through the CHAT lens, concepts such as language and socialization were observed in relation to preschoolers' problem-solving abilities.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

#### **Introduction**

L.S. Vygotsky (1978) is considered to be a pioneer in the area of developmental psychology. His work is a significant part of child development and an essential part of examining higher psychological processes (Vygotsky, 1967, 1978; Valsiner, 1988). Vygotsky explored problem-solving and discovered that when children problem-solve, it occurs in a social, as well as a psychological, context. As a result, significant problem-solving for children occurs when they receive assistance from an outside source with greater knowledge or information (Lundy & Fyfe, 2016; Vygotsky, 1978; Wood & Middleton, 1975). Furthermore, Vygotsky suggested that learning not only takes place when children receive guidance from an adult, but there is also a level of learning that takes place individually and with peers. Hence, each of these standpoints are examined, and provide insight into how children problem-solve. The current study did this by pairing preschoolers to problem-solve during a planned activity facilitated by the researcher. Kimhi and Bauminger-Zviely (2012) suggested that problem-solving collaboratively requires cognitive and socio-cognitive abilities. The authors explained that when children work together it increases their cognitive abilities as well as their social growth. This review of related literature discusses topics related to cognitive

problem-solving abilities of preschoolers. This chapter is comprised of the research question that drove the current study, the theoretical perspective that frames the study, an overview of problem-solving, as well as various related literature that reflects preschoolers' strategies when they problem solve individually, with the assistance of an adult, collaboratively with a peer, and when tools are used.

### **Research Question**

The research question for the study was developed to expand the body of literature related to problem-solving:

Using a variation of L.S. Vygotsky's double stimulation method, what cognitive problem-solving strategies of preschoolers were observed by the researcher?

### **Theoretical Framework**

Examining the current study from a CHAT perspective provided insight into the socio-historical aspects of the study (Obukhova, 2012). The premise of CHAT is that humans interact with the environment from a cultural historical perspective. With activity theory being the main focus in a cultural setting, it is vital to note that where the activity takes place, the "subject" and "object" interact with one another and bring about change (Ahmed, 2014). The subjects are the persons or group to whom the focus of change is aimed, and objects are the motive or goal of the activity (Ahmed, 2014; Obukhova, 2012; Wilson, 2014). The interaction of the subject and object is differentiated in various ways through physical instruments, conceptual schemes, as well as language tools. Examples

of physical instruments include computer hardware or the use of a tool such as a box to stand on in order to reach an object. Conceptual schemes or instruments include: mind mapping, work plans, or strategies for children. Language tools are devices such as text, language, or mnemonics. Tools alter outcomes as they are the mediators that lead to enhanced cognitive development (Jonassen & Rohrer-Murphy, 1999). In addition, the use of tools or mediators ties the interaction between the subjects and objects together. An example of this is, if a child tried to reach something they can use a ladder or a stick to pull the object down. The various subjects and objects are direct mediation and are typically culturally based (Ahmed, 2014).

Language is an integral part of culture. Both language and culture combine to form mind and action. During problem-solving, children talk through situations and use what is known as private or inner speech (Bodrova, Leong, & Akhutina, 2011; Vygotsky, 1978; Winsler & Naglieri, 2003). CHAT focuses on the analysis of talk and how talk created cultural conditions. When looking at the activity of children during a problem-solving activity it provides a deeper understanding of the concept when the cultural historical aspect is tied to an activity. The distinction between mind and culture set CHAT apart from other theories. Thinking and action are both tied into culture and for that reason they are both essential in the use and development of CHAT (Edwards, 2011). Luria (2002) posited that, “A child’s mental development is not a simple maturing of natural instincts, but that it occurs in the process of objective activity and communication

with adults” (p. 21). CHAT does this by incorporating an integration of nature and nurture (Bodrova et al., 2011). Nature and nurture both play a major role in the design of CHAT and work together to develop the natural, as well as the cultural aspects of the development of the human mind. For children, mental abilities do not fully develop naturally, but their development is based on activity and communication with adults (Bodrova et al., 2011).

### **Mediators**

In CHAT, the activity is comprised of actions. These actions are mediated, developed, and learned in social settings (Postholm, 2015). The social setting is a key in activity theory. It is within the community or social setting that the activity will be mediated by the way the tools are used in various contexts. Over time, activity within a culture develops using mediators. Mediators are things such as signs, procedures, languages, instruments, or tools. A common tool that is utilized today is the computer (Jonassen & Rohrer-Murphy, 1999; Jurdak, 2006). In order to understand the activity of mediating the various things it is important to know the role of the artifacts. These tools can mediate and influence mental development (Jonassen & Rohrer-Murphy, 1999). Artifacts, which include language, signs, and tools, are an essential aspect of the theory (Postholm, 2015; Vygotsky, 1978). Within activity theory, the roles of the mediators are examined through internal and external processes. Internalization refers to assimilating cultural forms of behavior and reconstructing an external action. Externalization is the

creation or influence one has on artifacts or tools (Engestrom, 1999; Postholm, 2015; Vygotsky, 1978). For example, tools can be manipulated to fit the situation to solve a problem.

### **Problem-Solving**

According to Skinner (1953), when a person encounters a circumstance where they do not have an immediate answer or response it is viewed as a problem. Kisamore, Carr, and LeBlanc (2011) explained that in an effort to seek an answer to a problem, an individual gathers feedback from the environment, past experiences, and other stimuli. This problem-solving process is reinforced and expounded upon when new problems are presented. Vygotsky (1978) described the problem-solving process as occurring on an interpsychological or intrapsychological level. Problem-solving occurs on an interpsychological level, which describes the process between people. Whereas, on an intrapsychological level, problem-solving occurs within an individual. Therefore, with these two levels of problem-solving in mind the research presented examines both levels and children's cognitive functioning within each level. This is done by exploring how children problem-solve independently (Chen, Siegler, & Daehler, 2000), problem-solve with adult guidance (Portes, Smith, Zady, & Castillo, 1997), problem-solve during peer collaboration (Clark, 2012), and problem-solve with tools (Kudryavtsev, 2011; Obukhova, 2012; Vygotsky, 1978).

## **How Children Problem-Solve Independently**

In a study conducted by Havertape and Kass (1978), language was used to assist children when problem-solving independently. This is evident in children who utilize inner speech to self-direct through various tasks. Vygotsky (1978) wrote that language is a cultural tool integrated into development and helps build connections between early years and later years in childhood. For example, a child is able to understand what they are experiencing when they use speech. When children use speech during a task, they are able to move forward in the task and problem-solve on their own (Vygotsky, 1978).

A classic way to examine children and their problem-solving on their own is to observe them playing a game of tic-tac-toe. Crowley and Siegler (1999) observed 34 kindergartners, 40 first graders, and 40 second graders while they played this game. Kindergartners and first graders were less likely than older children to have prior knowledge and experience with strategies in the game. The study was designed to include a pre-test, and then the participants studied an example problem. Then they were given a generalization post-test, and finally, a recall post-test. During the beginning stages Crowley and Siegler (1999) established a pre-test that identified whether or not the children were able to play tic-tac-toe as well as whether or not the children knew what Crowley and Siegler (1999) called the fork method. Once this was established, the children were given a generalization post-test where they played a partial game of tic-tac-toe on the computer. After doing this, they participated in the recall post-test. This

portion of the test included the participants repeating moves they observed during the example game. The study revealed that having an explanation for a strategy, rather than just memorizing a strategy, helped with the learning process. The kindergartners and first graders had more difficulties than the second graders in learning good explanations for the strategies. In turn, the kindergartners and first graders did not generalize new problem-solving strategies to facilitate their abilities to perform during the task.

Kisamore, Carr, and LeBlanc (2011) conducted a study with preschoolers and explored training them to use visual imagining as a problem-solving strategy. There were four participants in the study who were between 4 and 5 years old. The study was a replication and extension of a study conducted by Sautter et al. (2011), which was rooted in the work of B. F. Skinner (1953). In the study by Kisamore et al. they extended their study by training preschoolers to use visual imagining as a strategy to problem-solve. The strategy was used on correct responses to categorize questions and for subcategories. Animals, furniture, kitchen items, and vehicles were used as categories of stimuli. The categories and subcategories included intraverbal training (IVT), multiple-tact training (MTT) or visual imaging training (VIT). An example of IVT included giving the participants pictures of particular items and then training them to say each item and the subcategory. The IVT training involved naming categories and the items that fell into that category. The MTT included pictures of categories and items. An example of MTT would include the participant saying “it’s a *cow*” and, “it’s a *land* animal”.

In addition, they would also be trained to say the subcategory which would include, it lives on *land* and it's an *animal*. The VIT portion of the training involved the participants watching the researcher model them using the skills from the previous phases. As a result of the various phases of the study, Kisamore et al. (2011) discovered that problem-solving strategies were an effective way to emit responses that were not directly related to a verbal stimulus. An additional conclusion was that in order for participants to visually imagine, other behaviors such as complex speech and listening skills would need to be in place for effective visual imaging. Further discovery was made in reference to rule governing. It was evident that the participants did not engage independently in the visual imaging strategy until after they were given a rule. Being given a rule evoked parameters from which the participant operated. Kisamore et al. (2011) concluded that the number of prompts needed by the participants warrants further investigation.

In a similar manner, using a more complex task, Seed and Call (2014) conducted a mixed method study divided into four separate sessions. The ages of the children were 2 years to 6.5 years. In Study Session 1, the children were presented a trap box with a transparent front. The children attempted to use their fingers to retrieve the reward (a sticker inside a plastic ball) that was sitting on a shelf inside the box. There were exits on each side, but they did not line up directly with the shelf; however, there was a vertical exit where the ball could fall and from there exit through one of the two exits at the

bottom. The results showed that when the children were paired with others who were the same age, they were able to solve the transparent task. This provides understanding of how children problem-solve with the same age peer.

In Study Session 2, the same apparatus was used, except the researchers presented the task with and without tool assistance (Seed & Call, 2014). In addition, the task was presented with the obstacle of retrieving a ball that was on a shelf in a clear box, while the overall goal of the study was to use the trap box to investigate the development of physical reasoning in children. In an attempt to accomplish this task, the children needed to use their fingers to roll the ball away from a trap or barrier. Focal points of this task included the use of physical and spatial reasoning, and the influence the tool use had on the children's performance. Consequently, it was more difficult for the 2.5 year olds to maneuver the task with a tool than it was without a tool. Seed and Call demonstrated the tool use and this resulted in the children attempting to use the tools as they were demonstrated for them. This conclusion was related to how children problem-solve with assistance from an adult.

In study session 3, there were an equal number of boys and girls being tested on the covered task, 2.5-, 3.5-, 4.5-, 5.5-, and 6.5- year olds (Seed & Call, 2014). The task was the same as in study session 1, except the removable pieces were covered. Seed and Call discovered the covered task was more difficult for the younger children; however, the 5.5- and 6.5-year olds were able to accomplish the covered trap box task. In Study

Session 4, the older children completed tasks on both the transparent and covered trap box. There were eight 6.5-year olds participating in both tasks. They were able to solve both tasks, yet the performance on the covered task was lower than on the transparent task. The trap box tasks were presented to younger and older children. The main difference occurred when the part of the trap box was covered. The older children accomplished this task more often than the younger children. Subsequently, Seed and Call (2014) discovered that younger children incorporated spatial and physical information instead of only using spatial relationships between objects. In addition, although the older children performed better than the younger children on the covered task, within the older group the covered task performance was more difficult than the uncovered task.

### **How Children Problem-Solve with Guidance from an Adult**

Help seeking behavior in adult-child collaboration was a key during problem-solving (Thompson, Cothran, & McCall, 2012; Vygotsky, 1978). Adult-child collaboration revealed the influence social guidance from an adult might have on a child's cognitive abilities (Thompson et al, 2012). When a child's problem-solving ability was examined in relationship to having guidance from an adult, it shed light on the child's social processes. This was based on what Vygotsky (1978) saw as a child's social development on two different planes, interpsychological and intrapsychological. Rather than a child learning to first work alone, they sought guidance from an adult and their

learning was an integrated experience. A more traditional method that incorporated this integrated experience was the stimulus response (S-R) method. Valsiner (1988) wrote that developmental researchers such as Baldwin, Claparede, and Piaget used the stimulus response method to look at an individual's decision making during an experiment. Consequently, this method did not demonstrate how the participant's thoughts developed, but only revealed their response during the experiment. However, the current study incorporated the double stimulation method, which is designed to examine decision making during the problem-solving process. The studies to follow will expound upon how children problem-solving with guidance from an adult.

In a study of 12 dyads of children and their mothers, Wood and Middleton (1975) examined how a mother's assistance during problem-solving influenced a child's ability to complete a task. Wood and Middleton noticed that many times children might recognize the goal set before them, but had difficulty with the steps to reach the goal. As a result, the researchers included the mothers in the study to assist the children. The mothers were there to try to close the gap between recognizing the goal and figuring out the steps to solve the problem. Through observations, Wood and Middleton realized when the mother provided verbal cues during the task; the children were more successful than they were when the mother simply demonstrated the task. The cues during the task appeared to provide more assistance versus when the mother demonstrated the task and then asked the child to repeat what they observed. According to Wood and Middleton

(1975), children might have been able to identify a problem, yet were not as apt to produce a fitting, sequential solution without adult guidance. The research revealed that adult guidance was helpful, yet deciding when the appropriate time to intervene was a crucial part of assisting during problem-solving.

Thompson, Cothran, and McCall (2012) explored how help seeking behavior differed between girls and boys. This mixed, cross-sectional, and repeated measures design included 62 preschoolers. There were 28 girls and 34 boys, and their ages ranged from 2.91 years to 5.33 years. There were 15 girls and 17 boys who worked with a female researcher and 13 girls and 17 boys worked with a male researcher. The study revealed that girls' and boys' performances were similar at younger ages, yet the older girls performed above all the children. An additional finding in the study was that as the age of the girls increased, their problem solving time became faster and their help seeking became more prevalent. There were no significant differences among the boys in the study in relation to their ages, help seeking, or problem solving.

In a quantitative study devised by Lundy and Fyfe (2016), 72 parents (36 fathers and 36 mothers) and their four-year-old child participated. The researchers sought to analyze children's mind-related comments as they collaborated with their parents during problem-solving. The theory of mind (ToM) was explained as understanding the behaviors of others as well as one's self. These behaviors are guided by things such as beliefs, intentions, and emotions. The discourse between the parent and child were

examined to view if the questions or comments the parents presented to the child were interactional attunement, parental mind-related, autonomy-promoting, parental control comments, or child mind-related comments.

Lundy and Fyfe (2016) concluded there was a noticeable correlation between the parental discourse, the child's mind-related comments, and ToM. In relation to the parental autonomy-promoting questions, the children's use of private speech was significant. When asked questions, the child appeared to reflect on their thoughts and process what they interpreted. The next model revealed that parental comments generated a limited number of mind-related comments by the children. The more controlling the parental comments were, the fewer opportunities to reflect, thus minimal mental comprehension. When Lundy and Fyfe viewed the parental-minded comments and child-minded comments, there was a less significant use of mind-related comments by the child. When parents utilized mind-related comments, it did not seem to encourage the child to further their thought process. The study concluded that a child's mind-related comments do make a difference in predicting a child's ToM during problem-solving. In addition, parental mind-related comments have an impact on a parent and child's interactions, discourse, and behavioral cues in ways that can produce developmental outcomes.

### **How Children Problem Solve: During Peer Collaboration**

Schmitz and Winskel (2008) found when children collaborate with a peer who worked at a similar or higher level of thinking, the collaboration was more likely to result in positive results (Schmitz & Winskel, 2008). The studies below will present data on how children problem-solve during peer collaboration. Schmitz and Winskel (2008) conducted a mixed method study with 54 children ages 10 to 12 who were included a pre-test problem-solving task as well. Schmitz and Winskel also examined the discourse between participants and transcribed the recordings. There were 26 boys and 28 girls divided into 27 single sex dyads. They were partnered by ability level as a way to determine if ability would influence problem solving during the collaboration. The ability levels of the students were based on what the teacher reported based on classroom performance. In half of the dyads, the higher ability partner was asked to help the lower ability partner; however, the other half of the dyad sets were simply asked to work together with their partner. Their collaborative efforts were explored using a pre- and post-test. The quality of talk between the dyads as well as how well they were engaged in the collaborative task was explored by Schmitz and Winskel. What Schmitz and Winskel determined was that although the amount of progress might be noted by doing this, there was no evidence to show how the collaborative efforts between the peers helped enhance the results. On the other hand, Schmitz and Winskel used a method that monitored the discourse during the collaboration. Using this process there was a limited number of

participants because this method required much more effort and time of the participants. A key to this collaboration was the talk between the participants.

Warneken, Steinwender, Hamann, and Tomasello (2014) paired 12 dyads of 3 year olds and 12 dyads of 5 year olds together to solve a problem. Prior to the experiment the children were given a 10-15 minute warm-up period to encourage social interaction, as well as a period of time to become familiar with the selection boxes which included push tools and turn tools in them. The actual experiment included eight trials with four trials in each condition. The warm-up period and the actual experiment took 60-90 minutes to complete.

During the actual experiment, collaborative problem-solving was utilized. Collaborative problem-solving engages participants in simultaneous behavioral and social-cognitive skills (Warneken et al., 2014). They collaborated with their peers to coordinate their actions and did not receive assistance from an adult. The collaborative problem-solving task was for the children to obtain a reward from a box using two turn tools and two push tools. The tools looked and functioned differently. All of the children performed under two conditions, unidirectional and bidirectional. In the unidirectional condition each child had a box, but the child on the left would have access to their box first and have a choice of which tool they wanted to choose. The other child would then have available to them the opposite tool. In the bidirectional condition, both children have access to both tools. The children took turns during eight trials. There were four

trials on the unidirectional condition and four on the bidirectional condition. Warneken et al., (2014) discovered that three is an approximate age when children begin to be able to collaborate with a partner and take in account what their partner was doing and then make problem solving decisions based on that collaboration. Warneken et al. realized that it was possible that when looking at peers working in a collaborative relationship, the tasks as well as the participant's social-cognitive skills both were factors to consider.

Shieh and Chang (2014) conducted a study of 24, 7th grade students in a Taiwan junior high school who were members of the Innovative Club led by a science teacher. The study included 11 girls and 13 boys. Eight teams were formed: Team 1 had four members; Team 2 had two members; and Teams 3 had three members on each team. There was a room designed for the construction of a boat project. The teams met for 50 minutes for a total of 16 weeks. The project objective was to construct a boat that would operate on a course established by the researchers. The structure that crossed the finish line first would be the winner. Thus, how the boat functioned was what the structure would be judged on, and not the boat's visual appeal.

There was a warm-up contest in the 14th week and two weeks later a final contest. In addition to the project objective, the researchers also aimed to enhance student collaborative interaction using learning activities. The learning activities were designed to see if the students could extend their ability to connect theory to practice, enhance their problem solving abilities, develop their hands-on skills, and collaborate with others

through teamwork. The results revealed that in the study conducted by the first contest, only the Team 3 boat completed the race. The top team reported that they collaborated with their group members and these teams also had individuals from the team take the boat home or the team met during their lunch break to work on the boat.

Shieh and Chang organized the experiment into teams as a collaborative, hands-on, scientific project. The project encouraged collaboration and problem-solving. Based on feedback from the students, the authors concluded the students gained scientific knowledge and hands-on skills while working on the project. However, the authors discovered creativity surfaced as a focus for some teams, although it was not part of the criteria. A balance in structure and freedom during the project were challenges during the study. In addition, realizing the teacher's limited involvement in scaffolding and guidance during the study were keys to fostering the students' learning process.

### **How Children Problem Solve With Tools**

According to Kudryavtsev (2011), children generally rediscover things rather than invent them. The study involved children rediscovering concepts and strategies to help them problem-solve with the assistance of adults, peers, and tools (Kudryavtsev, 2011; Mills, Danovitch, Grant, & Elashi, 2012). The term tool was used to represent the use of an object to provide indirect assistance toward problem-solving during an activity. As has been stated in previous discussion, the tools included the use of language and signs as well as physical and mental elements (Jonassen & Rohrer-Murphy, 1999; Vygotsky,

1978). Children learned the relationship between words and objects and how the objects were culturally represented (Kudryavtsev, 2011). When tools were used in conjunction with speech development, children's actions had a tendency to become more organized (Vygotsky, 1978). Physical items included things such as a toy or a computer. Mental aspects included mnemonics, models, or heuristics (Jonassen & Rohrer-Murphy, 1999). In addition, in two studies by Mills, Danovitch, Grant, and Elashi (2012) and Mills, Legare, Bills, and Mejias (2010), children listened and then asked questions in the problem-solving process. They explained that children's questions can serve various purposes, but often they asked questions to seek assistance.

**Stimulus-response method.** Previous research was conducted on the stimulus response method where the researcher sought to find a participant's response to different stimuli (Valsiner, 1988; Vygotsky, 1978). Vygotsky explored adults during an experiment using the stimulus response (S-R) method but did not see it as a way to examine the higher cognitive problem solving process. During the experiment, Vygotsky observed the individual to see how he figured out the problem rather than looking at the end result of the experiment. Therefore, in order to expand S-R, Vygotsky introduced two kinds of stimuli. He introduced stimulus objects as well as stimulus means. A participant used the object as a means to an end during an experiment (Vygotsky, 1978).

**Double stimulation method.** L.S. Vygotsky (1978), in *Mind in Society*, described the double stimulation method as a way to observe problem-solving in children, which

was set in motion after his use of the stimulus response (S-R) method with adults. In his work with adults, Vygotsky studied their choice reaction during an experiment by gradually increasing the stimuli and responses. Even when a different variation of the task was presented to the adults they remembered the relationship of previous means and then they were able to accomplish the task. He then presented the task of multiple stimuli, and only provided limited instructions. When the task got to this level, the adults became frustrated and gave up on the task they considered to be too difficult. This led him to set up the task with children (Vygotsky, 1978).

To advance the concept further, Vygotsky moved from work with adults using the stimulus response (S-R) method and progressed to develop the double stimulation method that examined more in-depth cognitive development. Vygotsky sought to know and understand an individual's higher level of thinking (Valsiner, 1988; Vygotsky, 1978). Vygotsky explained that it was not enough to know when an individual acquires the right answer, but rather knowing how they solve a problem was worth researching further. He set out to see if the double stimulation method was a method that would reveal more about the cognitive level of an individual during an experiment (Valsiner, 1988).

Bodrova and Leong (2006) described double stimulation as clues or help given to a child during a learning process. The process revealed how the child learned. Although, the double stimulation method evolved and shed light on the process of children's cognitive abilities during problem-solving, research has been minimal in the past fifteen

years (Portes, Smith, Zady, & Castillo, 1997). The studies to follow present further information on how children problem-solve with tools.

Portes, Smith, and Cuentas (1993) conducted a quantitative study that used multivariate measures of 64 fourth to sixth grade child-parent dyads which explored the assistance needed by a child when using a variation of the double stimulation method. As a result of the data collected, Portes et al. discovered that the mothers' interactions with their children included the mother providing cues or directives, questions, and even at times the mothers took over the task and solved it. The child's use of cues and questions were seen in later responses to a task. When direct assistance provided by the mother was used, actions during the task were apparent. Consequently, when the child did not transfer the assistance and use it on the task, there seemed to be a mismatch in the child's zone of proximal development (ZPD) and the parents' directives. Portes et al. (1993) determined that the dyad interaction had limited influence on the development of the child in the study.

In an additional study, Portes, Smith, Zady, and Castillo (1997) explored the use of the double stimulation method in cultural-historical (CH) research design. The participants in the study were twenty dyads composed of fifth grade children and their mothers. The participants were made aware they could seek assistance from the director or teacher at any time during the process. The interactions of the mothers and children during problem-solving tasks were examined. The setting was in a laboratory area and the

interactions were videotaped, transcribed, and coded. The tasks were block design tasks and the children were given instructions to group the items based on as many common characteristics as they could. The participants were presented with three target areas.

One of the target areas was to examine patterns of interaction through the double stimulation method. Portes et al. (1997) did this by examining the parent-child interactions and how the child problem-solved with the assistance of the parent. Portes et al. also explored metacognitive concepts as a way to view how school-like tasks were solved by the participants. In addition, the study looked at the children's intellectual ability and the assistance they have available to them. The authors explored this area by looking at the parent's contribution to the child reaching a higher level of thinking during the tasks. With these three areas in mind, the theoretical view of the study is from a cultural historical (CH) perspective. This shaped the study by viewing the children's responses in relation to the stimuli as well as in relation to their environment and the influences the environment has on their learning. Portes et al. (1997) discussed throughout the study the importance of the zone of proximal development (ZPD) and how it supported the development of the learner. Portes et al. explain how the ZPD can lead to growth and development later in life. The authors also noted mediation in social interaction might vary. A reason for the variance was not all adults are equally capable in helping children problem-solve. Likewise, a capable peer might not be a competent

teacher. Therefore, external support might not always lead to better performance during the task.

The study viewed how the double stimulation method played a part in the children processing and working through new information and concepts. The double stimulation approach gave insight on how the children obtained knowledge and found a means to an end in the problem solving process. The findings of the study revealed that when the parent explained certain things to the child, many times the child would go back to that line of thinking to guide them through the next task. The study showed that some of the parent-child dyads had trouble moving forward in the tasks. Portes et al. (1997) attributed this to the problem solving tasks possibly being outside the ZPD of the parent. Therefore, when looking at the results, some of the dyads were lower achieving dyads because there was less of a strategic contribution by the parent. The study showed how double stimulation method can be used to move a child forward during a task with the help of a parent. In addition, the ZPD of a child can be influenced by the ZPD of the parent and therefore lead to the child having limited progress during a task. When viewing the overall study, Portes et al. (1997) concluded that the use of a longitudinal study might be a means to a more in-depth view of parent-child interactions during problem-solving tasks.

In a qualitative study conducted by Chen, Siegler, and Daehler (2000), the authors examined the gap between problem solving or thinking between toddlers versus older

children. The study incorporated the use of overlapping wave theory and microgenetic method which takes into account how a child's thought process works when challenges arise as well as componential analysis that looked at how children worked through challenges as they transpired. The participants included 86 children younger than 3 years, and concluded that they were less likely to use an object than older children and adults, unless they have been shown how to use the tool or object. Younger children did not intentionally plan their own actions related to tool use. They waited for direction from their older peer before they made a decision (Chen, Siegler & Daehler, 2000; Warneken, Steinwender, Hamann, & Tomasello, 2014).

However, Kudryavtsev (2011) noted that even when children did not use tools or objects, from birth they were solving tasks and making discoveries. There were two levels of cultural objects, the external level and internal level. The external level referred to the observable characteristics of an object and was visible and concrete so children could touch the object, such as a spoon. The internal level represented the features of the object that were hidden. These cultural levels were taught to children. There was a focus on the preschooler age group because of the frequency of adult assistance they often receive. In doing this, the authors were interested in exploring how preschoolers develop the ability to distinguish between words and objects and the ability to separate words from their meaning (Kudryavtsev, 2011). Chen, et al. discovered when concepts were presented to younger children versus older children it was important to take into account

how they worked independently, with guidance from adults, during peer collaboration, as well as how they used tools or objects to solve a problem. This research provided a connection between observing social and cognitive responses of children at an early age during a problem-solving activity and in turn sought to gain a deeper understanding of preschoolers' cognitive development. It was found that the children in the study used the problem-solving strategies, they learned at the beginning of the study, and even after they learned new strategies they tended to stick with what they learned early on in the study. In addition, when the children had been given verbal or modeling cues they seemed to directly transfer the information into their problem-solving efforts.

Jurdak (2006) conducted a study that included 31 students in a grade 12 science class. These students had attained top honors in their mathematics class and were chosen by their teachers. The students were given three tasks to choose from that included: car loan, cell phone, and body mass index (BMI). The three problems/tasks the students were given were either in school context or in the real world context. Jurdak determined that although the problems were set up to mirror situations related to using skills they might use in school as well as in the real world; however, there were limitations to providing an actual real world problem-solving task in the school. There was a limit to being able to bring an actual real life situation to the classroom because of curricular, logistic, and economic constraints. Despite the difficulty of presenting an actual task that was from the real world, the authors noted that it was still possible to require certain mathematical

skills to solve the problem related to the real world to given an idea of the student's decision making skills.

Kozulin (2011) developed a study that examined mental development in relation to teaching children and their learning processes. In this study he discussed the learning process and how crucial it is to present particular concepts at the appropriate age. It was found that the children were not able to master the use of the tool mediation if they did not understand the materialistic use of the item as well as the cultural meaning of the item. These behaviors are generally mastered in later preschool age. Consequently, these social tasks can usually be met with the assistance of an adult. The children were more successful at problem-solving when the task was age appropriate also when they received guidance from an adult.

### **Summary**

Recovered literature written by Vygotsky (1967; 1978) included background information about the development of the double stimulation method. Vygotsky first utilized the stimulus-response method which provided a limited view into problem-solving and subsequently developed the double stimulation method. This method offered a more in-depth look into problem-solving. The double stimulation method allowed Vygotsky to explore not just cognitive abilities, but also how abilities and skills were obtained during problem-solving.

More insight transpired when looking at problem-solving through the cultural historical activity theory (CHAT) lens. Incorporating CHAT into the current study gave a more in depth view of the social cultural aspects of how children solve problems and work together. With language being an integral part of culture, it was important to note how it was connected to children and problem-solving.

Problem-solving has long been a topic of research with in studies such as creativity and real-world situations with children of all ages. The review of literature spanned across ages and settings to represent the body of literature related to problem-solving. There was limited literature associated with preschoolers and even less literature related to preschoolers utilizing the double stimulation method. The current study sought to explore this through the use of the double stimulation method. The research explored how children problem-solve independently, with guidance from an adult, during peer collaboration, or with tools.

CHAPTER III  
METHODOLOGY

**Introduction**

The current study was conducted using qualitative research methods from an observational viewpoint and incorporated the observations of 4 and 5-year-olds participating in a planned activity with the researcher. The method that was utilized in this study was a variation of Vygotsky's double stimulation method (Vygotsky, 1978). Chapter Three focuses on the methods utilized to examine preschoolers' problem solving abilities, and includes the following topics: a single research question, the researcher's perspective, the current method of study, the protection of human participants, data collection including procedures and methodological rigor, and a plan of analysis.

**Research Question**

For this study, a single research question was posed in order to gain further understanding of how young children solve problems:

Using a variation of L.S. Vygotsky's double stimulation method, what cognitive problem-solving strategies of preschoolers were observed by the researcher?

**Researcher's Perspective**

Having worked with children all of my adult life, I constantly wondered what I could do to help them reach their learning potential. Children with whom I worked, had

the ability to excel in school, but unfortunately many of them did not realize the magnitude of all they were capable of learning.

My work with children went back to when I was a teenager. I volunteered at my church as a Sunday school teacher, and my first job was tutoring young children. Both of these experiences were stepping-stones to employment I later attained. When I was in college I had various jobs, but the one that made the biggest impact on my education and career choices was my work during summers at a child care facility. The time I spent in the toddler and 4-5 year old classrooms helped me recognize the great passion I had for working with this age group. Observations made while working with toddlers and 4-5 year olds caused me to want to learn more about the choices they made throughout the day, especially during activities with their peers and teachers. Seeing the different interactions led me to think about their decisions during activity time. My undergraduate degree was in Sociology, Psychology, and my educational background, along with what I observed during my work at the child care facility, kept me curious. I made a decision to earn a Master's degree in education with a focus in school counseling, and worked primarily counseling children in the public school setting.

Upon earning my degree, I went into the teaching field as a prerequisite to becoming a school counselor, but fell in love with being in the classroom and spending time teaching and building relationships with students. I began to try to answer some of those questions I saw years earlier while working in child care.

My work in the school system varied. Although my teaching certification is in Special Education, I worked with young children with and without special needs. Working in classrooms with children with varying cognitive capabilities helped expose me to the great need for teaching children to reach their full potential. The cognitive need for all children was different and it warranted exploring. Through experience working with young children I saw how every child worked at different rates and how their problem-solving varied. Some children problem-solved alone, some with peers, and others with adult assistance. As a result, I realized I really wanted to further pursue my educational focus in the area of child development. It was apparent after working at various levels in the education system, that early childhood was a crucial stage of development. After working at different levels in the education system there were learning gaps that seemed to be linked back to early learning. Therefore, when specific skills are focused on during preschool years, learning gaps seemed to be lessened. Consequently, my interest was largely focused on early childhood as a way to hone in on developmental issues that may begin at the preschool level.

### **Protecting Human Research Participants**

To protect the human rights' of the participants the research study met the requirements of the Protection of the Human Participants. The procedures and guidelines for Protecting Human Research Participants included completing an application for full review, consent procedures, along with appendices which were comprised of the

recruitment flyer (see Appendix A), recruitment script (see Appendix B), informed consent form (see Appendix C), problem-solving activity scenario (see Appendix D), and resources for families (see Appendix E).

### **Consent**

In order to gain consent from the school district in which the research took place, the office of administration was contacted and consent was obtained to conduct research within the district. Once approval was given, teachers and principals at the respective schools were contacted to discuss the expectations and process of the study. The researcher met with teachers and principals to (1) discuss details of the recruitment process, (2) location within the school to meet with the students, and (3) possible times for the sessions.

In order to protect the participant's identity, there were pseudonyms assigned to each student. Consent forms contained identifiable data that were signed and collected from the parents. When not in use, the identifiable data and materials were kept in a secure, locked filing cabinet and on a secured/password protected computer in the researcher's home office. The data were shredded and all computer files were deleted on the date specified with the Institutional Review Board (IRB). Copies of the consent forms were returned to the TWU IRB office at the conclusion of the study.

## **Recruitment**

The recruitment process began by leaving informational flyers to be distributed in the classrooms where the participants attended school. Upon receiving a flyer, interested parents indicated to the researcher agreement for their child to be a part of the study by returning the flyer. A meeting was scheduled with the researcher to review and sign the consent form. The recruitment script (Appendix B) was used when the researcher talked with the parent, and once this process was complete, the researcher arranged a time with teacher that was best to meet with the participant.

## **Participants**

The participants in the study were preschoolers who were 4 or 5 years old and attended public school in a small town of about 25,000 people, located in the southwestern part of the United States. There were no socioeconomic criteria or gender specific guidelines placed on the participant pool. The recruitment flyers were distributed to various classrooms with four and five year olds throughout the school district. As the parents returned the flyer, the researcher was notified. Twelve participants were grouped in 6 sets of dyads. Three of the twelve participants were boys and nine were girls. Each participant was assigned a pseudonym.

## **Data Collection**

According to Bernard and Ryan (2010), the data collection procedures are linked to the goal of the study. All data collection procedures for the current study were

performed with the research question in mind. Observing problem-solving strategies utilized by the participants was a goal in the study and when problem solving was observed in its natural environment, it assisted the researcher to better understand development (Valsiner, 1988). This qualitative research utilized collection methods that were crucial to the finding of themes/strategies within the study. The participants had access to a toy doll-house with props, in an effort to reveal how hands-on activities could contribute to preschoolers' problem solving strategies.

According to Patton (2002), triangulation of data is vital to a study because it strengthens a study. The use of triangulation of data increases the credibility of a study using various data collections such as video, audio, observational field notes, photographs, participant observer notes, different theories, or multiple methods (Patton, 2002). The various methods of collection reveal nuances within a study. The current study incorporated sources that included video recordings, audio discourse, and observation (field notes).

## **Procedures**

In order to provide systematic data that can be evaluated, this qualitative study required the researcher to pair the participants and present a planned activity facilitated by the researcher. The researcher took observational field notes while observing the participants during the activity as well as immediately following the session. The field notes included ideas, feelings and observations noted by the researcher. The field notes

were related to things that occurred prior to beginning the sessions, during the session as well as following the session to gather a holistic view of the study.

For the paired activity, the participants were escorted by the research from the classroom to a place that was familiar to the child within the participant's natural environment. Video- and audio- recordings were arranged to capture the pairs' engagement during the planned activity. When the session began, the researcher showed the participants the problem-solving scene in the doll-house (see Figure 1) and they were given time to explore the items.



*Figure 1.* Problem-solving scene

Then, the participants were asked to show or tell the researcher what they would do to solve the problem presented by the researcher. Prompts in the form of open-ended questions were provided (see Appendix D) and were given as needed in order to extend children's thinking as exhibited in Lev Vygotsky's double stimulation method (Valsiner, 1988). The researcher incorporated this method by presenting the prompt, "How can the Jordan, figurine boy get his bird inside the cage?" As the participants sought a solution to the problem, additional mediation was provided as needed in an effort to observe the children incorporate an additional stimulus. In the current study, the second stimulus was in the scene in the form of various tools/props. Some of the tools/props included: toy broom, miniature birdseed, a toy pail, and a toy wheelbarrow. The premise of this method was to examine the cognitive functioning of the participant through observation of strategies utilized while finding a solution to the problem (Vygotsky, 1978).

**Video recording.** Video recording was at the heart of this current qualitative research with young children, as its purpose was to allow the researcher to utilize the data collected in order to conduct a review and analysis (Miles, Huberman, & Saldana, 2014). Video recordings permitted the researcher to review the activity and provide an emic (insider) perspective which allowed for a more authentic voice by the researcher (Miles et al., 2014). Video recordings, in addition to field notes taken by the researcher, expanded the researcher's insight on this topic as well as provided the researcher an opportunity to view the recordings and provide feedback on analysis of data and findings.

**Audio recording.** A device that recorded audio was used for each session. Prior to using the device, the researcher conducted a trial recording to ensure the sound was able to be heard and when it was time to transcribe the recordings the settings were be accurate. The audio recording device was placed to get the best results for transcription. The audio recordings of the planned activity were collected in order to examine the discourse of the participants' individual problem-solving strategies as well as how they problem-solved with their peers, using tools, or with the assistance of an adult.

**Observational field notes.** The researcher observed 12 preschoolers in dyads during a planned activity that involved props and a script. Observing the participants in a natural environment and taking field notes provided comprehensive means of data collection, especially when it was collected in addition to audio recordings and participant observation notes of the problem-solving scene (Miles, Huberman, & Saldana, 2014). Furthermore, thoughts of the researcher that occurred while observing the participants was also noted and examined during the data analysis phase. Field notes were taken related to what the researcher observed while the participants problem-solved during the activity, prior to the activity, and afterwards. When the researcher recorded the field notes it was vital to include as much description as possible for later retrieval of information and accounts of what happened during the study. These notes were written in a timely manner to reduce the loss of information. Although field notes were a valuable part of data collection, they were not a sole means of data collection.

## **Methodological Rigor**

Tobin and Begley (2004) explained that rigor in research builds the integrity of the study. The current qualitative study was conducted to advance the body of research in child development and early childhood education. Tobin and Begley (2004) wrote that qualitative research became invaluable to the field of science and had a minimal contribution to the body of research without the presence of methodological rigor. If there was a lack of methodological rigor, trustworthiness and credibility, the scientific value in qualitative research did not exist. As a means to establish methodological rigor in the current study, creating trustworthiness and credibility were vital. Detailed means to increase credibility includes member checking, peer debriefing, saturation, external audits, thick description, reflexivity, and prolonged engagement (Henry, 2015). The current study incorporated thick description, prolonged engagement, and saturation. In addition to having a guiding research question, triangulation of data also contributed to the rigor of the overall study through the use of video, audio, and observation (field notes). Patton (2002) explains that observations include observing what is taking place in the setting as well as observing the actual setting. Therefore, taking timely and thorough field notes about observations strengthened the study. With this in mind, video and audio was a reliable source for data collection that was viewed multiple times, and examined for coding within the transcriptions which lead to themes.

## **Plan of Analysis**

In this qualitative study, the researcher observed things such as words, images, tools, and sounds. These things brought about themes and told a story about what had taken place during the session with the participants (Bernard & Ryan, 2010). The data were collected and analyzed through analytical memos and coding. The study was aimed towards looking at actions rather than behaviors. These actions took place in the participants' natural environment and revealed things about them in a social and historical context as participants in the study (Bernard & Ryan, 2010). As the data were collected, specific procedures were followed to protect the integrity of the study; these procedures were included in the consent form for the participants (see Appendix C). When analyzing the data from the paired, planned activities the researcher analyzed video, audio, and field notes.

## **Procedures**

Procedures related to data analysis occurred throughout the duration of the study. The procedures followed during the data collection were an essential part of the study and were thorough. Following the procedures as they were designed was a key in making sure the study was credible. The procedures included video analysis, audio analysis, field notes analysis, as well as coding and discourse analysis.

**Video analysis.** The videos were examined after the research had been conducted. The investigator looked at each video and noted responses and movements displayed by the

participant as well as the researcher during the individual planned activities. These responses and movements were compared to what was viewed in the videos of the other participants. The researcher noted similarities and differences among the data collected from each video. The researcher observed the participants' interactions with one another, how they interacted with the items, as well as how they attempted to solve the problem presented by the researcher.

**Audio analysis.** When examining audio recordings, Bernard and Ryan (2010) explain that listening to the recordings several times prior to transcribing is vital. The researcher played the recordings of the individual planned activities sessions to listen for nuances that might have occurred. This step was a significant way to hear information that was vital to the study just by listening. The researcher reviewed the audio recordings for codes and patterns that revealed themes/strategies within the discourse. It was imperative to transcribe the notes in a timely manner to keep the integrity of the data and to code while the data were still in the forefront for the researcher.

**Field notes analysis.** Field notes were taken during the paired, planned activity time as well as at the conclusion of those observations. The field notes were taken during the observation and included themes and environmental occurrences. Environmental occurrences could not be gathered through other means, so field notes about certain sights or sounds that might later be significant were recorded in field notes (Bernard & Ryan, 2010). The analysis of the field notes for the duration of the study occurred following the

transcription of the videos at the end of the respective week. A sample of the field notes can be found on page 73 in the upcoming chapter.

**Analytic memos.** According to Miles et al. (2014), analytical memos are means for the researcher to document their reflections related to the data. The memos were written in narrative form and are dated and referenced throughout the study. The memos in the current study were utilized to analyze information gathered during the planned activities. This information was critically written and dated to allow the researcher to go back and view what was written about a particular session. There were analytic memos taken following the activity, field note collection, and throughout the coding process to analyze the findings and how they related to things such as the research question and the theoretical perspective.

For this particular study, analytical memos were written in reference to each session to be viewed when analyzing the overall data. The memos were written in a journal and dated and kept with the other research information. The analytic memos were written with the research question, theory, and purpose of the study in mind. The researcher expanded possible answers to the research question.

**Coding.** This study utilized coding as a way for the researcher to note and categorize information collected from videos, audio, and field notes. Coding was used to summarize the data collected (Miles et al., 2014; Saldana, 2009). In order to make connections in the research, the coding was arranged in terms of First Cycle Coding

methods and Second Cycle Coding. Within the coding cycle, there were particular categories that were appropriate for the particular study. Saldana (2009) described seven subcategory methods within the First Cycle of coding that include: Grammatical, Elemental, Effective, Literary and Language, Exploratory, Procedure, and Themes. These coding methods are the foundation for future, more detailed coding. The current study employed the Elemental coding method that included Descriptive Coding, to explore the data sources collected throughout the study. In addition, *a priori* Coding, Process Coding, and In Vivo Coding were also used to examine the data. The various coding methods allowed the researcher to code data from the video, audio transcriptions, and field notes.

The Second Cycle of coding included Pattern Coding, which was derived from Descriptive Coding from the First Cycle. This coding method allowed the researcher to depict how all of the data fit together. Strategies or themes were comprised and analyzed. Patterns and then ultimately, strategies were a way to condense the data collected from the video, audio, and observation notes (Saldana, 2009). Exploring all these systems and condensing the data by looking for strategies across the areas strengthened the data collected throughout the study. Strategies were reoccurring concepts throughout the research. Examining the strategies in the study revealed patterns of behavior and made connections to things and occurrences within the study.

## Summary

This qualitative study was framed from an observational perspective. The researcher did this through observations of preschoolers during paired, planned activities. A variation of Vygotsky's double stimulation method was used in the study. A scene was presented to the participants and a problem was given for them to attempt to solve. The current study incorporated the use of field note observations, and video and audio recordings, to collect problem solving data. The human rights of the participants were protected by the researcher meeting the requirements of the Protecting Human Research Participants training.

Various means of exploring the information gathered were included in the data analysis process. The process encompassed video analysis, audio analysis, field note analysis, as well as analytic memo analysis. The use of various data collection and methods of analysis all contributed to triangulation of data, which increased the trustworthiness and credibility of the study. The data were analyzed using First Cycle Coding and Second Cycle Coding. The specific coding methods that were used were *a priori* Coding, Descriptive Coding, Process Coding, In Vivo Coding in the First Cycle. Pattern Coding was utilized in the Second Cycle in which strategies for the overall study surfaced. These methods were used to interpret the patterns and meanings within the study. All methods of data collection provided an in-depth analysis of the overall data (Bernard & Ryan, 2010; Patton, 2002).

CHAPTER IV  
DATA ANALYSIS AND RESULTS

**Introduction**

Bernard and Ryan (2010) explained that when conducting a qualitative study, an abundance of data is produced. Not only are observations during a qualitative research process taken into account, but also researchers begin the analysis process before observations take place and develop ideas of what will be studied. The current study involved observing preschoolers' problem-solving strategies while utilizing Vygotsky's double stimulation method. The researcher analyzed the data, assigned codes, and searched for patterns within the data collected. Data were collected through video recordings, audio discourse, and then coded in two distinct cycles, first and second. In First Cycle Coding, data were coded utilizing various types of coding. The coding included *a priori* Coding, Descriptive Coding, Process Coding, and In Vivo Coding (Saldana, 2009). Furthermore, Second Cycle Coding included Pattern Coding, which led to themes for the overall study that surfaced from the coding through the data collection process. The findings in this study were labeled strategies rather than themes to link to and answer the research question. This chapter includes the research question, a description of three school settings, a verbal portrait that consists of a description of the participants as a whole as well as an overview of the dyads, the data collection procedures, analysis of data, codes, and findings.

## Research Question

The data collections in the current study revealed that problem-solving strategies vary and were based on internalization as well as objects or tools which produced externalization (Engestrom, 1999; Postholm, 2015; Vygotsky, 1978). In this chapter the participants' problem-solving was observed and the codes and strategies that surfaced were examined. The research question is to follow along with a visual of the stimulus-response method compared to the double stimulation process.

Using a variation of L.S. Vygotsky's double stimulation method, what cognitive problem-solving strategies of preschoolers are observed by the researcher?

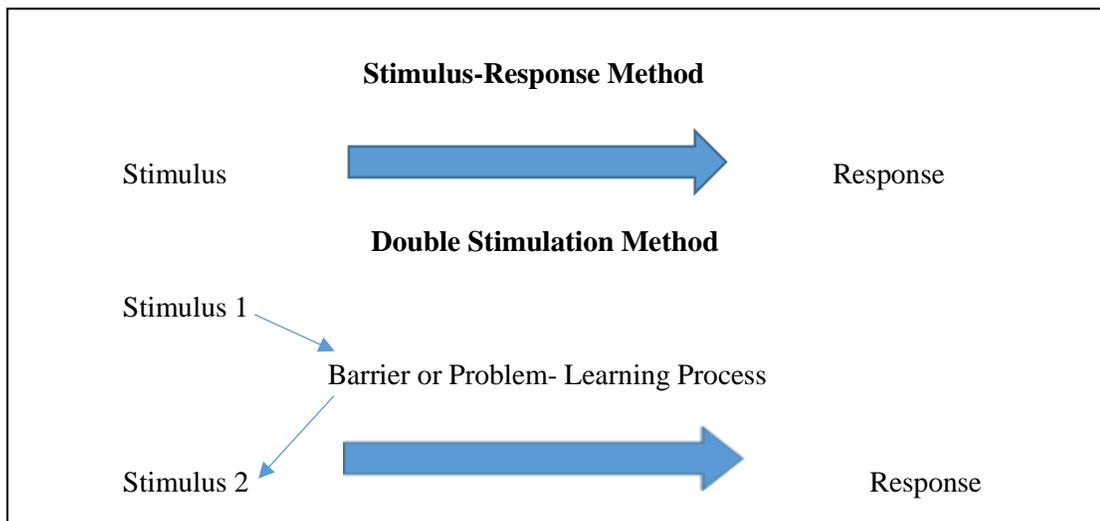


Figure 2. Example of stimulus-response and double stimulation methods

### **Description of Three Schools**

There were three different settings utilized in the study, Schools I, II, and III. Each setting is an elementary school within the same public school district in the southwest part of the United States. School I was the location for the problem-solving activity with Danny and Jen. The study conducted at School II included four of the six dyads that included, Kerri and Ken, Sara and Mary, Jasmyn and Jayla, along with Sadi and Phil. The final dyad, Naomi and Kendra, attended School III. The research was conducted at the children's respective schools, in order to incorporate situational problem-solving and keep the child in their natural setting that was safe and familiar for the children. The following are details describing the exterior of the schools as well as the interior of the classrooms where the study took place.

#### **Exterior-School I**

As I approached the area where this school is located, I saw established homes, two-story as well as single story. There was moderate car and walking traffic as well as an operational railroad near the school. Among the homes, there is a city park, a church, and a childcare center within a block of the school. The brown brick school building has signs of an addition once being added to the school. One of the additions is a detached, storage building and the other two are connected to the school on the back side. A retaining wall runs along the front of the property. A sidewalk runs along the front of the property and on both sides framing a brown, stone wall. There are three sets of stairs that

lead up to the grassy area of the property and rails for the stairs on the left and right re made of grey, metal. The stairway in the middle has about 10 steps and leads to a sidewalk that runs to the main entrance of the school. The property where the school sits has mature trees along the front of the property and several in the back provide natural shade for the single, fenced playground the children to run, jump, and climb. One of the larger trees in the front of the school has a built-in bench surrounding it where parents sit and wait for their children after school. A school sign, immediately to the right of the top of the stairs on the grassy area in front of the school, welcomes visitors and displays the name of the student of the week. Two sets of grey bike racks close to the building provide a place for children who ride their bikes to school a place to secure their bicycle. Parking surrounds the building, with open parking for staff and visitors.

Upon entering the front of the school there is a window and sign-in location for visitors where the main office is located. Throughout the building is flooring and wall accent colors that coordinate with the benches and sign outside as well as the older wood frame doors. There are signs hanging outside the doors that indicate to the children, staff, and visitors the type of classroom and grade level. Walking past the office and down the hallway to the left, the children can access a speech room and down a second hallway and a cafeteria is positioned at the bottom of a small set of stairs. The cafeteria serves a dual role as cafeteria and an auditorium for performances and school assemblies. Down the hall toward the gymnasium, children's artwork is displayed on the wall. The hallway to

the right of the gymnasium is where the study took place, across from the kindergarten classrooms and down the hallway from the pre-kindergarten classrooms. This close proximity made it a familiar setting for the children.

### **Interior-Classroom I**

The arrangement of the room is in line with its function as a class for the curriculum department to teach students in the Gifted and Talented Program as well as a space for Reading Intervention, and a place for teachers to help students in a small group. Walking into this multi-function classroom, the view of the entire room is separated by a three tiered shelf. The shelves have boxes of educational materials such as multi-level readers bagged in upright boxes grouped by reading level. Academic games and manipulatives for teaching are also on the shelf. Near the door are two sets of computers on individual student desks. There is a SMART Board (device used in replace of a dry erase board that is connected to the teacher computer) that is connected to the teacher computer and mounted on the wall to the right, which appears to be the front of the classroom. In the back of the classroom are tables and chairs that do not appear to be in use. They are stacked against the wall next to one another. The side of the room to the left of the shelves has a wall of windows. When the blinds are open, the sun shines brightly inside the classroom. At the front of the room is the teacher's main desk area that has his teaching materials, computer, telephone, document camera, and a rolling chair. On the wall in front of the desk is a bulletin board hanging next to the SMART Board. Behind

his main desk and chair is a horseshoe table with a rolling, teacher chair along with blue foldable chairs with multi-colored seat cushions around the table. To the left of the table is a dry erase board on a medium size easel where he can teach students in small groups while sitting at the table. To the right of the table there is a two-tier shelf with supplies for the students to access while working with him.

The horseshoe table is where the children participated in the study. There were a few challenges when putting the camera in place such as the sunlight shining into the room placing a glare on the camera. This effected the location of the camera as it needed to be located where the preschoolers, the doll-house, and props/tools were still in view for recording. Once everything was arranged, the researcher walked to the preschoolers' classrooms and escorted them across the hall to participate in the study.

## **Exterior-School II**

Tree-lined streets with old and new brick, two-story and single story homes make up the neighborhood near the second school. There is a church and corner store nearby and on the edge of the property is a school sign that posts announcements and displays the date and time. The property the school sits on is level and is wrapped with a fence on a third of the grounds. There is a playground on the side for the younger children that includes a bench, climbing and sliding play structure, and swing sets. One of the swings is a typical swing with chains holding it up and the other swing is a seated swing that resembles the size of an upright car seat. This type of swing is built for a student who

might be in a wheelchair or who is not able to balance sitting in a typical swing. Separated from the younger play area by a fence, is a play area for older students that curves around by the rear section of the school. This area has monkey bars, two larger play structures, a bench, and a covered patio near the cafeteria doors. There is a front and side parking lot designated for staff and parents. A sidewalk runs along the front of the school, up to one of the doors in the front of the building, as well as on the side where the other parking lot is located. The main part of the school has tan brick and there is a portion on the back side that is an addition, built taller than the main part of the building. It is where the gymnasium is located for the children's physical education classes and games. The property around the school does not have trees along the front, but there are a couple on the side near the side parking lot, and a forest of trees in back of the playground areas.

The entrance leading into the school contains an entrance with a buzzer for the office to check visitors into the school. There are three main hallways that lead to the classrooms. One of the hallways has a ramp in the place of stairs. Hanging from the ceiling outside each classroom is a banner that designates the teacher and class. The hallway on the far left of the office is where sounds of music and laughter can be heard where the pre-kindergarten, kindergarten, second grade, and computer classrooms are located. As the students and researcher pass the computer lab, there is silence coming from the library followed by echoes of bouncing balls and laughter as they walk past the

gymnasium and fourth grade classrooms. The research classroom is located on a hallway past fourth grade classrooms.

### **Interior-Classroom II**

The research classroom has the function of a resource classroom. When entering the class and glancing around the room it is apparent this class is a functioning classroom for several students, possibly with varying learning needs. A row of computers against the wall, are arranged by the entrance of the classroom. Current, seasonal decorations above the row of windows on the far wall include student created decorations that cover a few of the windows in its entirety. The middle of the classroom has individual student desks arranged in various seating patterns to create a shared space and others are alone to promote individual space. A horseshoe table is found in front of a row of windows with a chair where the teacher can teach up to three students. Next to the table is a pocket learning chart hanging on a cart and dry erase board on an easel for her to utilize while teaching a small group at the table. Toward the right, front of the class is the teacher's main desk and chair. To the left, side wall is a counter area with various supplies and manipulatives. On this side of the class is where the research study is arranged. The camera is placed on the counter facing an individual student desk with the props in place and two chairs for the preschoolers to sit if they elect to have a seat. After everything was in place, the researcher went to the children's classes on the other end of the long hallway, and walked the children back to the research class.

### **Exterior-School III**

Whether viewing the third and final school from the front, back, or the south side there is a view of grassy property with fenced play areas for students. The play area facing the front of the school is arranged for older students and in the rear and on the side of the property contains a play area for younger children. The school backs up to a main, fairly busy roadway. Homes around the school are encompassed in established neighborhoods. They are mainly single-story with a few two-story homes. A section near the front of the school contains newly built, single story homes. When driving onto the property there is a median that separates incoming and outgoing traffic. The school sign sits on the ground to the left of the entrance area that contains dates and events for the students and parents. A two-sided parking lot has spaces for parking on both sides for staff and visitors. Two driveways allow for buses and parents to drop off and pick up their student. A covered awning leads to the front door of the school. The main part of the school is made of red brick and a section of the school with light tan brick appears to be an addition to the school. The windows of the school have a colored tint and are multi-story, although the school is primarily single story. The upper windows allow additional light to shine through into the school's classrooms and hallways. For students who ride their bicycles to school, there is a bike rack on each side of the building, on one side near the bus pick up and on the side close to a neighborhood of houses. In the front of the

school there is a side walk that leads to the entrance with a set of benches outside near the parking lot for children to sit in the afternoon and wait for their parents during dismissal.

Upon entering the school, there is an entryway for visitors to wait to gain entrée. Outside the office there is a curved desk area where someone sits to greet visitors. There are two main hallways. One has a small set of stairs and a ramp that leads to it. The other is level with the office area. The hallway walls are painted with murals that reflect the school mascot and culture. Each academic classroom has a banner with the school colors, the name and grade of the teacher on it. Walking down the hallway toward the research class, the children pass the library that has a separate computer lab adjoined by a door. A cafeteria serves a dual role as cafeteria and auditorium for school functions and performances. Further down the hallway is the research classroom, it is next door to a kindergarten classrooms.

### **Interior-Classroom III**

The research room is located near the kindergarten classes and cafeteria in the east wing of the school. The interior of this class makes it obvious that this space is more of a work area for teachers than an actual classroom. Immediately in front of the door is a shelf with paper and supplies and on the other side is a teacher desk with a computer and rolling chair at the desk. A six foot long, 2 foot wide window is located in the corner near the teacher's desk. Next to the window is a floor to ceiling built-in cabinet with doors. Along the wall, underneath the windows is a counter with closed shelving underneath. A

fairly large table sits in the middle of the room along with a double sided shelf that holds buckets of bagged readers. In addition, there are academic games and manipulatives. A row of lockers are on the wall on the left side of the room, along with a row of large, double door file cabinets on the left wall. Next to the lockers is a horseshoe table, which was where the study was conducted with the preschoolers. A challenge with the arrangement of this room was where to place the camera and attain an optimal view of the preschoolers, the doll-house, and tools, or props. Once things were arranged, the researcher walked to where the children were located and walked them back to the research area.

### **Verbal Portraits of Participants**

The current study incorporated verbal portraits of the participants. The term verbal portrait was coined by Capps (2011) from the work of Eric Erikson where he used the term verbal sketches. This expression originated from Erikson's background as an artist and is what he used to describe human subjects. These sketches or portraits bring research to life. The current study included 12 preschoolers ages 4 and 5. The participants were paired into in 6 dyads. All attend school in a district located in the southern part of the United States. There were three different school settings throughout the study. The 12 participants were assigned pseudonyms to protect their identity. The pseudonyms derived from a list of names chosen by the researcher that did not resemble the participants'

actual name. Verbal portraits section includes a description of the participants as a whole as well as a description of the dyads.

### **Participants**

Participant demographics varied among the 12 preschoolers. Out of the 12 children, three were boys and nine are girls. The three boys were all in kindergarten, whereas two of the nine girls were in pre-kindergarten. The ages also vary, 10 of the participants were 5 years-old and two of them were 4 years-old. Within in the study two of the preschoolers were Hispanic, two were African American, and eight were White. This variation was a similar representation of the student population within the schools. The demographics of one of the schools were as follows: The first school had a population of 250 students, 10% Black, 16% Hispanic, 62% White, and 9%, two or more races. This same school had 67% of the student population were economically disadvantaged. The next school had a population of 411 students, 8% Black, 20% Hispanic, 70% White, and 11% two or more races. This school had 60% of their student population who were economically disadvantaged. Finally, the last school had a population of 314 students, 19% Black, 17% Hispanic, 55% White, 8% two or more races, and 82% of the student population were economically disadvantaged. The dyad details are to follow.

**Danny and Jen.** Prior to going to the preschoolers' classrooms, the setting was arranged. Positioning the camera was a challenge because the sun was shining on the

house and leaving a glare that made it difficult to see the scene. After positioning the seating and camera for the study, the researcher went to the respective classrooms to meet the children and then walked them to the study area. The first set of dyads was, Danny and Jen, a boy and girl who attended the same school. The research area was located across the hallway from the kindergarten classrooms and two doors away from the pre-kindergarten classroom. Both children entered the room and sat in chairs near the door, and then were directed to the other side of the room where the house and props or tools were sitting.

Danny was a 5 year-old and kindergartener. He had short, sandy blonde hair and was wearing a black sweatshirt that had a hood and a gold stripe on the side. Along with the sweatshirt, Danny was wearing gray sweat pants. He displayed a grin from time to time and shook his leg as he looked on as well as when responding at various times throughout the study.

Jen was a 4-year old pre-kindergarten student with dark brown hair in a single ponytail. She was wearing red matching sweat pants and sweatshirt and remained actively involved with the tools throughout the study as she sat crisscrossed on her knees in a chair. While interacting with the tools Jen utilized private speech that coordinated with her interactions with the tools.

**Kerri and Ken.** Ken attended School II. During the walk to the research classroom, these two kindergarteners talked to one another about what they were doing in

their individual classes. Ken commented that he was excited and looked forward to celebrating the holiday in his class. Upon entering the class for the study, both children waited to have a seat and for direction from the researcher before they engaged with the tools.

Kerri was a 5-year old with brown, wavy hair that she was wearing in a ponytail. She had a bright pink bow in her hair that matched her grey and pink striped shirt. When she spoke, it was difficult to hear her at times because of the low tone of her voice. Kerri inquired about words she read on the tools. She commented that the name on the house was the same name of her sister's teacher. She also commented that the wheelbarrow appeared to be from a Lego set, as she based this on the Lego-like area on the bottom of the toy wheelbarrow. Kerri also suggested a name for the cat, which was chosen associated with the cat's color. In addition, Kerri shared that was the same way her cat got its name.

Ken wore glasses that had dark blue and neon green trim. Throughout the study Ken adjusted his glasses frequently. Ken had short, blonde hair, trimmed in a low cut. Off and on, Ken giggled and looked at the researcher when he interacted with the tools.

**Sara and Mary.** It was a chilly winter day upon arriving at School II. After entering the school, the researcher proceeded to the designated classroom and arranged the seating and camera. Days prior, the previous dyad was in the same room, so the researcher knew how the seating and camera were to be positioned. This dyad was

kindergarten girls who were in the same class, Sara and Mary. The researcher went to their classroom and escorted them to the study classroom. During the walk both girls chatted with one another and with the researcher about their anticipated plans during the upcoming holiday break.

Sara was 5 years old and she had sandy blonde hair parted on top, one middle portion of her hair in a ponytail and the rest fell down across her shoulders. Sara was wearing a green coat that had a hood encircled in fur. She kept her coat zipped and buttoned, so her shirt was not visible. Along with the coat, Sara was wearing blue jeans. While they interacted with the tools, Sara stopped and looked around and commented about a clock near the table where she was sitting. Also, while playing, she turned and inquired about the grade level that was in the room. After receiving an answer, she immediately engaged in play with Mary again.

Mary was a 5-year old kindergartener. She had her hair in a ponytail at the top towards the middle and the side and back of her hair hung down her back. She wore a blue, graphics t-shirt with jeans. Mary interacted actively throughout the study with the tools and with Sara. She seemed to follow the lead of Sara, although she mentioned that she was slightly older than Sara.

**Jasmyn and Jayla.** The next dyad's session was on the same day and at the same school, so the study was already arranged. The girls were in the same class; therefore the researcher obtained both girls at the same time. Both girls in this dyad were 5-years old.

While walking to the study classroom, it was obvious the girls were familiar with one another. They talked about what they were engaged in together in their class and what they would do when they returned to class. The girls commented they were excited about being out of school soon for the holiday. When the girls arrived at the classroom, they both had a seat. While they waited for the researcher, both girls pointed and whispered about what they saw inside the doll-house. With big smiles, they looked at the researcher and listened for direction before they engaged in the activity. The girls were full of energy which was displayed in their giggles and laughs as well as their playful banter between each other and with the researcher.

Jasmyn had sandy blonde hair that was parted down the middle and was pulled in two ponytails that hung down to her shoulders, with red bows on top of each ponytail. She had on a red long sleeve shirt with holiday graphics and words on it paired with green holiday print tights. Jasmyn suggested helping Jayla at multiple times during the study to reach items because she was taller and another time she mentioned she could stand on the tips of her toes to reach the items. Also, in Jasmyn's conversation she suggested Jayla engage in various tasks with her. During the activity, Jasmyn paused what she was doing and inquired about the location of the class and commented that she liked the décor in the room. Jasmyn also explained that she named her cat a particular name, based on its color. Toward the latter portion of the study, Jasmyn shared with the researcher that her class was having a holiday party that day. Jasmyn reiterated what

Jayla said about excelling at reading. Jasmyn said, “She is kind of a first grader, second grader, fourth because she knows how to read.”

Jayla also had sandy blond hair that was pulled in a ponytail on her right side with a white bow. She had on a lime green oversized shirt with red and green polka dots, big red and white striped pockets on the sides, and a small bow on the front left side of her shirt. Jayla had on lime green tights with her top. Jayla was in agreement with Jasmyn when she commented about the décor in the classroom. In addition, during the course of the study Jayla mentioned she was allowed to get two books and excelled in reading, therefore she already had her owl on the “reading tree”.

**Sadi and Phil.** School II was the site for previous studies, so the researcher was familiar with arranging the seating and camera. After positioning everything, the researcher walked to the children’s classrooms. The next dyad consisted of a girl and boy who attended the same school. Their names were Sadi and Phil and they were in different classes, but their rooms were next to one another. The researcher went to each of their classrooms and escorted them to the research room. The children quietly walked to the study classroom with the researcher. When they entered the room, they walked over to the area where the house was sitting. Sadi immediately began engaging with the props. She moved the television and cat around while Phil stood next to the table and watched. Once the prompt was given, Sadi had a seat and Phil moved closer, but continued to

stand. Sadi continued to engage with the props and Phil looked on for a few seconds before he engaged also.

Sadi was a 4-year-old little girl in pre-kindergarten. She had brunette hair that had the top part pulled in a single ponytail and the rest was down in the back, with bangs along the front. Sadi had on a long sleeve pink shirt with a white shirt underneath that was hanging from the bottom. Sadi mentioned, “My mommy and daddy watched a movie and I watched that same movie before.” In addition, Sadi incorporated private speech throughout the study as she engaged with the tools. When Phil mentioned it was almost his birthday, Sadi mentioned her birthday was coming up. Sadi commented that she wished she had that big doll-house and that she had “the big dream house”.

Phil was a 5-year-old kindergartener with brunette hair. He had on a grey t-shirt that had a picture of a deer in the top left front part of his shirt. On the back there were graphics and words. Sadi called the toy nest a net multiple times and Phil corrected her by repeating that it was a nest. Phil stood and walked around for the duration of the study. While Sadi was telling the researcher about watching a movie with her parents, meanwhile Phil mentioned, “It’s almost like my real birthday.” Then he proceeded to problem-solving with the props, and he acknowledged there was a hole in the net and showed it to the researcher.

**Naomi and Kendra.** Arrangements to meet with the final dyad at the third and final school were made at the school of the older child because this final dyad was

comprised of two sisters who attended different schools. The room was arranged before the children arrived. They were walked into the school by their guardian and the researcher walked them to the room where the study took place. While on their way to the class, both girls asked the researcher about what they would be doing. Upon entering the room, both girls walked over to the doll-house and moved the toys/tools around while they listened to the researcher give directions.

Two sisters, Naomi and Kendra, comprised the final dyad. Naomi, was 4 years old and was in pre-kindergarten. She had on a long sleeve white shirt. Her black hair had multiple, small corn roll braids that come together at the top. Naomi was curious and walked around exploring the area. She tried to open the lockers and walk to the other side of the room away from the area of the study. Naomi was inquisitive, she asked the researcher and her sister questions throughout the study. She wanted to know what a particular item was; she asked if she could sit on the floor, she asked for help opening the toy bird cage, as well as she asked if she and her sister could sit in a chair.

The other sister, Kendra was 5 years old and was in kindergarten. She wore glasses and had on a long sleeve teal shirt and her black hair was braided back in several rows of small, corn roll braids. Kendra offered to help her younger sister open the bird cage and helped her get a chair to sit down. While active with the props, Kendra had self-talk or private speech and she explained what she was doing as she engaged with the props.

## **Data Collection Procedures**

According to Bernard and Ryan (2010), there are various categories of data collection. For the current study, data were collected through video recordings, audio recordings, and observational field notes. The procedures for the various means of data collection contributed to in-depth analysis throughout the study. The video recordings and audio transcriptions provided insight related to the verbal discourse and nonverbal interactions of the participants throughout the study. The observational field notes taken during and after the observations revealed details that related to the researcher's observations, thoughts, and feelings. The social environment was also an element that was examined through detailed descriptions in the data collection. The social environment was just as important as the physical environment, according to the theoretical framework of the study. Viewing how the participants interacted and positioned themselves during the study was taken into account during the data analysis process. The data triangulation increased the credibility of the study (Patton, 2002). The cross-data checks included transcribing the audio and video recordings as well as coding the data from the transcriptions. Each of these methods of data collection are discussed below.

### **Triangulation**

Patton (2002) explained that when implementing data triangulation, it does not rely on one process to address the entire need in a study. Utilizing various procedures

increases the likelihood the research results are consistent. All sources of triangulation do not have to render the same results. Rather, the point of triangulation is to strengthen a study (Patton, 2002). The current study incorporated triangulation within the data collection process as a means to provide trustworthiness within the study. This was done using video recordings, audio recordings, and observational field notes. Each of these methods are discussed below.

**Video and audio recordings.** The video and audio recordings were vital to the study. The recordings were a way for the researcher to recount what occurred during the problem-solving process. The collections of the video and audio recordings were conducted utilizing a camera that was arranged near the preschoolers as they problem-solved during the activity. In order to gather the accurate recordings, the placement of the camera was optimal in order to capture recordings that could be viewed and heard later for transcription and analysis.

**Observational field notes.** Field notes were taken during the observation as well as following the observation. According to Patton (2002), field notes are a vital part of qualitative research, and added to the credibility of the research. The notes included anything the researcher believed was worth remembering. They were necessary for recalling details related to things such as the environment, interaction between participants, and the researcher's thoughts and feelings. Patton cautions against relying on what one will remember later; rather, he encourages that notes be taken during the

research process or immediately following. The longer one waits, the less likely it is that the notes will contain substantial details from the study. There is not a designated means of procedures to follow when recording field notes, but Patton mentions that taking field notes are not optional. They are a must to add to the trustworthiness of a study. Below is an excerpt of the field notes taken during the session with Kerri and Ken during their problem-solving activity.

December 13, 2017

Both participants pulled out a chair to sit. Ken sat a few seconds, adjusted his glasses, and then stood up. Researcher wondered if Ken was nervous. Both participants sat quietly and waited for instructions. Sounds of children playing on the playground could be heard through the window. Kerri picked up the cat and Ken picked up the figurine boy. He straightened his legs and stood him up. Ken looked at researcher and picked up the bird and cage and placed bird in cage. They both explored the tools/props and engaged in solution seeking.

The above field notes were a reflection of the observations of how the preschoolers interacted nonverbally. The researcher made note of this and explored the codes to see if this was a trend throughout the study. The above field notes are taken while working with the second pair of preschoolers. The researcher's perspectives of the initial interaction with this dyad were recorded. Kerri engaged with the tools sooner than Ken. After he observed, Ken began to interact with the tools. Both preschoolers'

interactions were nonverbal at the time the field notes were taken. The researcher made note of their interaction. The following section expounded on the data collection and gave insight on data analysis.

### **Analysis of the Data**

Bernard and Ryan (2010) explained that qualitative data analysis tells the story as the researcher sees it. When analyzing data, various methods of coding contribute to a thorough examination of the data. According to Saldana (2009) the researcher implements First Cycle coding during the beginning stages of data examination and Second Cycle coding as a means to categorize and synthesize the data. The First Cycle coding methods that are utilized in this study were *a priori* Coding, Descriptive Coding, Process Coding, and In Vivo Coding. The Second Cycle coding that was incorporated in this study was Pattern Coding. The researcher inspected the codes and examined them for an emergence of themes, and in the current study these were labeled as strategies. This study incorporated strategies rather than themes as a link to address the research question. Each of the First Cycle coding, Second Cycle coding methods, as well as a discussion of strategies are detailed below.

### **Video and Audio Analysis**

The recordings were examined to document problem-solving and the use of the double stimulation method by the preschoolers. Details of what was observed and heard were transcribed and coded. It was necessary to play the recordings multiple times to

obtain details for the transcriptions. Audio transcriptions were verbatim accounts of the discourse between the participants that would later be coded. In addition to the audio transcriptions, the video recordings were inspected for nonverbal interactions between the peer partners, and coded for trends within the data. The combination of the video and audio recordings allowed the researcher to capture rich data for the integrity of the study.

### **Observational Field Notes Analysis**

The field notes were written per dyad during and immediately after the study. Each set of notes were timed and dated for later reference. Analyzing field notes assisted in making sense of the transcribed recordings. The researcher coded the notes for patterns and noted particular sights and sounds during the study. When coding the field notes, there was information noted that assisted in explaining observations from the recordings. The notes were vital when formulating codes and examining them for patterns and strategies.

### **Analytic Memo Analysis**

Analytic memos were generated throughout the study as references to the overall data collection process. The memos were related to various aspects of the study that included: how the data were related to the research question, patterns that emerged, data related literature and theory, and accounts of the data collection process. The memos tied the data collection process together as well as it was an avenue for the researcher to

reflect, sort, and synthesize the data collected. A sample analytic memo is included below.

January 19, 2018

#### PATTERN: RELATED LITERATURE

All the data was collected thus far with each dyad. The video and audio transcriptions compiled as of now depicted children problem-solve with assistance of an adult and tools. This was in line with the related literature on problem-solving. The researcher will continue to code the data to inspect for this continued pattern and examine for findings original to the current study.

#### **Coding**

According to Miles et al. (2014), codes are a method of condensing extensive data into more concise descriptions. Coding is a means of analyzing the data collected within a study. There are various methods utilized for coding. Bernard and Ryan (2010) explain there are two stages of coding, First Cycle coding and Second Cycle coding. First Cycle coding data is gathered and synthesized and following this cycle, a further advancement of data analysis takes place during the Second Cycle coding. From there, themes/strategies are formulated from codes that develop in a study. The strategies represent the overall findings gathered within the study.

## **First Cycle Coding**

Saldana (2009) First Cycle coding methods may be implemented in the beginning stages of coding. The codes are generally simple depictions of the data. There were various First Cycle coding methods utilized in this study. Miles et al. (2014) described First Cycle coding as a way to chunk the data. The use of various coding methods are often appropriate the analysis of data. The codes serve a particular purpose based on the data collected. The current study incorporated *a priori* Coding, Descriptive Coding, Process Coding, and In Vivo Coding in the First Cycle.

***A Priori coding.*** According to Saldana (2009) *a priori* goals or codes are linked to prior literature gathered and align with the theoretical framework of the study. The researcher examined the literature to determine which *a priori* codes aligned with the works published and were related to the research question. The *a priori* codes that were linked to the literature on problem-solving included: individualized problem-solving, collaborating with a peer while problem-solving, problem-solving with assistance from an adult, and problem-solving with the use of tools. The use of tools and assistance from adults are examples of mediation. Vygotsky (1978) explained that mediation is an intervention that assists a child through a task. Children externalize the use of tools when they incorporate tools in the problem-solving process.

In addition, Vygotsky (1978) explains problem-solving occurs on an interpsychological or intrapsychological level, which gives insight to cognitive problem-

solving. When viewing problem-solving on an interpsychological level, it refers to problem-solving between individuals. Whereas, problem-solving on an intrapsychological level, refers to problem-solving within an individual. Keeping this in mind was important when analyzing the data and relating it to the research question. In order to examine the cognitive problem-solving strategies, as stated in the research question, it was important to examine what the *a priori* codes revealed about interactions of the participants. Below are a discussion of each *a priori* code and Table 1 includes samples of how the codes surfaced within the study.

***A priori code 1: Problem-solving individually.*** During the planned activity the participants were given time to examine and explore the items that were brought in for the activity. Some of the pairs spent limited time exploring the items and they had more action and nonverbal interactions than verbal replies. When it was time to problem-solve following the planned activity prompt, some of the preschoolers did not consult their peer partner or the researcher. They explored the tools and found a solution on their own. The literature describes this as problem-solving individually, which Vygotsky referred to as interpsychological (Vygotsky, 1978)

***A priori code 2: Problem-solving with assistance from an adult.*** Problem-solving with assistance from an adult was exhibited throughout the study among each dyad. This type of assistance is an example of mediation. The researcher mediated, or provided support to the children as needed during the problem-solving process by

providing prompts. This was an example of how the double stimulation method was incorporated into the study. This method encompassed the use of prompts given by the researcher as the first stimulus and then the second or double stimulus was how the participants used the objects in the scene to find an answer to the problem or after they were presented with an additional prompt. Therefore, when examining adult assistance in addition to the initial prompt, the preschoolers relied on direct and indirect assistance from the researcher while solving the problem.

*A priori code 3: Problem-solving with a peer.* As in the previous example, the preschoolers were given the problem-solving activity; however, this time the pair collaborated to solve the problem. This code showed how children relied on one another even with limited discourse between one another. There was verbal as well as nonverbal interaction between the preschoolers as they participated in the study and found solutions with the assistance of a peer. Even when nonverbally interacting with one another, it was obvious that the preschoolers relied on one another during the problem-solving process.

*A priori code 4: Problem-solving with tools.* Problem-solving with tools varied. Tools include props/tools in the form of toy as well as questions asked by the children also represent the use of tools (Mills, Legare, & Mejias, 2010). The use of tools is also an example of Vygotsky's (1978) double stimulation method. The method was carried out when a participant was given a task and two levels of a means to an end were presented to use to solve the problem. In the current study, objects or tools were placed inside a

doll-house along with a figurine boy, cat, bird, wheelbarrow, broom, pale, birdseed, a net, and a nest. These were also arranged inside the house as a means for the children to access as they implemented the double stimulation method while problem-solving.

Table 1

Sample of *A Priori* Coding

RQ: Using a variation of L.S. Vygotsky’s double stimulation method, what cognitive problem-solving strategies of preschoolers are observed by the researcher?						
	Danny \$# Jen +#	Kerri \$@ Ken \$@	Sara \$@ Mary \$@	Jasmyn \$@ Jayla \$@	Sadi +@ Phil \$@	Naomi +% Kendra \$%
Sample of <i>A Priori</i> Codes	I,T	I,T	P,T	P,A	A,T	A,T
Key: + = 4 year-old \$ = 5 year old # = School 1 @ = School 2 % = School 3 I = Individual A = Adult P = Peer T = Tools						

*A priori* coding discussed above included how each pair of children incorporate problem-solving assistance. The table displays that the children primarily interacted with the use of adult and tool or prop assistance. Whereas, problem-solving individually and with peer assistance are minimal, the data collected revealed that Danny and Jen along with Kerri and Ken solved problems individually more often than the other children. Another caveat is that Danny and Kerri were two of the children who paused before offering an idea or interacting with the tools. Following their wait time, they proceeded to

offer solutions or ideas in reference to the problem. On the other hand, across dyads the utilization of tools and assistance from an adult were prevalent. Tool use was incorporated in 5 of the 6 dyads as a prominent means of assistance while problem-solving. Tool use varied from tools/props to questions; two of the children utilized their finger to solve the problem. Additionally, the assistance of an adult was present in three out of the six groups. The preschoolers integrated adult support through questioning and glancing at the researcher for what seemed to be approval or assistance. The next coding discussion is Descriptive Coding, discussion section and a table that displays the data collected are included.

**Descriptive coding.** Descriptive Coding is utilized to analyze various categories of data that include field notes, transcripts, journals, documents, video, and artifacts (Saldana, 2009). The current study implemented Descriptive Coding to analyze field notes and transcriptions from video and audio recordings. Data were also analyzed using Descriptive Coding to identify and categorize the data collected through the participant's problem-solving strategies. Through Descriptive Coding, words and phrases surfaced that gave meaning to the interactions between the preschoolers within their dyad. Sample Descriptive Codes are included in Table 2.

Table 2

*Sample of Descriptive Coding*

RQ: Using a variation of L.S. Vygotsky’s double stimulation method, what cognitive problem-solving strategies of preschoolers are observed by the researcher?						
	Danny \$# Jen +#	Kerri \$@ Ken \$@	Sara \$@ Mary \$@	Jasmyn \$@ Jayla \$@	Sadi +@ Phil \$@	Naomi +% Kendra \$%
Sample 1 of Descriptive Codes	Disagree	Asked Questions	Character roles	Working together	Disagree	Asked Questions
Sample 2 of Descriptive Codes	Nonverbal responses	Compare prior knowledge	Disagree	Compare prior knowledge	Character roles	Disagree
Key: + = 4 year-old \$ = 5 year old # = School 1 @ = School 2 % = School 3						

Descriptive Coding is summarized in the above table to show the primary codes as well as the secondary code that surfaced from each peer pair. It was obvious that codes across dyads are similar. Four out of the six dyads disagreed about solutions, but shared their ideas during the process. Danny took the opportunity to tell Jen that some of her ideas would not work. He did not immediately provide a solution himself. He took time to examine the scene and tools prior to making suggestions. Sara and Mary interacted well with one another; however, when ideas were presented, several times Sara voiced that she was not in agreement. Another dyad that displayed disagreements during the study was Sadi and Phil. They not only verbally disagreed with one another, but they also

took items out of the other person's hand. At one point, Phil took the bird from Sadi and walked away, then held it up out of her reach. Finally, Naomi and Kendra disagreed occasionally; however, their disagreements did not significantly affect the problem-solving process. Questioning, comparing prior information and character roles knowledge also surfaced as codes within two of the six dyads. Questioning involved the preschooler's peer partner and in some cases the researcher. Comparing prior knowledge and character roles were incorporated across the dyads, but not significant in all six. Comparing prior knowledge involved the child comparing ideas or situations they had encountered to what they were experiencing during the activity. Lastly, character role involved the children taking on the role of the figurine boy or one of the pets. They gave them a voice, names, and interacted with them. This was significant, but was not the most significant code that surfaced from four of the dyads. The next code discussed is Process Coding. A discussion section and a table that displays the data collected are included.

**Process coding.** According to Saldana (2009), Process Coding examines the action that takes place within the study. Saldana noted that Process Coding is not typically the sole means of coding, but it is used in conjunction with other methods. Furthermore, when data are coded using Process Coding, ongoing interaction and emotion is examined to determine how participants reach a goal and handle a problem. The preschoolers actively engaged throughout the activities and process codes were evident. By using this type of coding it allowed the researcher to determine the most

prevalent actions that took place by the participants while attaining a solution. Samples of the prominent Process Codes that surfaced are in Table 3.

Table 3

*Sample of Process Coding*

RQ: Using a variation of L.S. Vygotsky’s double stimulation method, what cognitive problem-solving strategies of preschoolers are observed by the researcher?						
	Danny \$# Jen +#	Kerri \$@ Ken \$@	Sara \$@ Mary \$@	Jasmyn \$@ Jayla \$@	Sadi +@ Phil \$@	Naomi +@ Kendra \$%
Sample 1 of Process Codes	Move tool or prop	Gazing at researcher	Pretending	Laughing	Gazing at researcher	Gazing at researcher
Sample 2 of Process Codes	Head nod	Move tool or prop	Hand gesture	Hand gesture	Move tool or prop	Head nod
Key: + = 4 year-old \$ = 5 year old # = School 1 @ = School 2 % = School 3						

Table 3 displays the process codes of the preschoolers. There were similar codes among the dyads from the data collected. Gazing at the researcher and moving a prop/tool were present in 3 out of the 6 dyads. When the children gazed at the researcher, it appeared to be either approval seeking or a need for assistance. The researcher waited to see how the child proceeded before engaging. The wait time seemed to move the child forward and provide them what they needed. Movements of the props/tools occurred across dyads, yet it was only significant in three of dyads. The preschoolers moved the

tools around and gave the objects life-like qualities as they problem-solved. The final First Cycle coding method includes In Vivo Coding. It is discussed and displayed below.

**In Vivo coding.** Miles et al. (2014) explain that In Vivo Coding incorporates words and phrases directly from the language the participants utilize during discourse. The discourse was collected and examined for the individual participants as well as between the participants and gave insight on the problem-solving strategies that took place. The use of this method of coding highlighted the participant’s voice and perspectives. A discussion section and Table 4 displays the data collected.

Table 4

*Sample of In Vivo Coding*

RQ: Using a variation of L.S. Vygotsky’s double stimulation method, what cognitive problem-solving strategies of preschoolers are observed by the researcher?						
	Danny \$# Jen +#	Kerri \$@ Ken \$@	Sara \$@ Mary \$@	Jasmyn \$@ Jayla \$@	Sadi +@ Phil \$@	Naomi +% Kendra \$%
Sample 1 of In Vivo Codes	Placed the bird next to pail	Placed bird in cage	Hmmm, put birdseed in there	It can hold our finger	The net	I just did
Sample 2 of In Vivo Codes	Head nod	What or who is this	No, let’s pretend	Let’s move the nest	He’s going to watch t.v.	Where is the boy
Key: + = 4 year-old \$ = 5 year old # = School 1 @ = School 2 % = School 3						

In Vivo Coding examples are in the table above to display related language utilized by the children. The codes varied among the preschoolers and exhibit the unique

language of each participant. Within each dyad there was a child who initiated the problem-solving process. Not all initial replies were verbal; some were physical responses. Even with that being the case, the responses were coded In Vivo because the actions whether verbal or nonverbal were the voice or the child's way of speaking and giving the researcher an answer to the problem. It was noted that once the original reply was given, the other child began to also interject ideas.

It was noticed during the activity that the preschoolers used inner speech, interpersonal engagement, as well as role-play and took on the identity of the props. This was predominant throughout the study, and surfaced as a code in three of the dyads. In Vivo Coding was the final method in the First Cycle coding process in this study. From the First Cycle coding surfaced the Second Cycle coding method, which is discussed next.

### **Second Cycle Coding**

Miles et al. (2014) described Second Cycle coding as a method to condense, group, and categorize data collected during First Cycle coding. The data are collected, chunked together, and then examined for similarities. Saldana (2009) explained that Second Cycle coding can incorporate Pattern Coding as the only method. The current study solely incorporates Pattern Coding in its Second Cycle.

**Pattern coding.** Pattern Codes are derived by condensing First Cycle coding data into more concise, meaningful units. Although, all of the First Cycle codes that surfaced

funneled into Pattern Codes, Saldana (2009) explained that Pattern Coding is directly linked to the codes from Descriptive Coding. By incorporating Pattern Coding, the data contributes to a greater understanding of the research investigated and consequently it increases the opportunity for research that follows to be more focused (Miles et al., 2014; Saldana, 2009). Table 5 displays the Second Cycle Pattern codes that surfaced after First Cycle coding.

Table 5

*Sample of Pattern Coding*

RQ: Using a variation of L.S. Vygotsky’s double stimulation method, what cognitive problem-solving strategies of preschoolers are observed by the researcher?						
	Danny \$# Jen +#	Kerri \$@ Ken \$@	Sara \$@ Mary \$@	Jasmyn \$@ Jayla \$@	Sadi +@ Phil \$@	Naomi +% Kendra \$%
Sample 1 of Pattern Codes	Differences	Exploration	Role-play	Exploration together	Differences	Exploration
Sample 2 of Pattern Codes	Physical Response	Exploration	Differences	Leadership	Differences	Differences
Key: + = 4 year-old \$ = 5 year old # = School 1 @ = School 2 % = School 3						

Pattern Coding was the only Second Cycle coding method within this study. The data above revealed the codes that derived from First Cycle coding in turn led to codes within the Second Cycle. Data that were collected from the coding methods developed

into themes or strategies in the study. These strategies are included in the findings section below. In addition to the discussion of findings below, a table follows that displays the prevalent strategies that surface in the study.

### **Findings**

The preschoolers were presented with a problem to solve during the planned activity. The activity involved a scene that was arranged with toy props and the preschoolers were asked how Jordan, the figurine boy, could get the bird inside the cage. In addition, they were prompted to complete the task without using their hands to place the bird in the cage. The preschoolers implemented the double stimulation method to solve the problem presented. The findings section includes details related to the strategies the preschoolers incorporate while implementing process. The strategies were linked directly to the research question. The research question explained that during the activity the researcher facilitated a problem and then observed strategies that surfaced and were used by the preschoolers. Patterns were noticed that related to the strategies that surfaced when the data were analyzed. Furthermore, the data revealed that the strategies were similar to the *a priori* codes from within the literature. These codes outlined how the participants problem-solved while interacting during the process. The coding from the First and Second Cycle led to themes or strategies that were revealed in the overall study. These strategies shed light on the relationship between the children as well as the degree

to which they problem-solved verbally and nonverbally. The strategies are presented below, displayed in Table 6, and they will be discussed in detail in the following chapter.

### **Presentation of Strategies**

Each of the themes, known as strategies in this study, gave insight to problem-solving during a planned activity. During the course of the planned activity, a problem was presented to the preschoolers, were various strategies utilized by the participants to find a solution. One of the salient strategies was interpersonal problem-solving by the preschoolers. Interpersonal interactions incorporated by the children was related to what Vygotsky (1978) described as interpsychological interactions. Interpersonal problem-solving was a means to finding a solution in conjunction with another person. Lundy and Fyfe (2016) analyzed preschoolers' collaborative problem-solving and concluded that social and interpersonal interactions were linked to higher cognitive abilities.

An additional strategy was verbal problem-solving with and without physical responses. When the preschoolers conveyed their responses to the problem with a verbal response, while utilizing physical responses they engaged with tools or displayed gestures. The final strategy was nonverbal problem-solving with physical responses. The nonverbal responses varied from head nods to gazing at the researcher. Physical responses such as whistling or movement of the tools or props by the preschoolers were some of the solutions related to the problem. The following are further details related to each problem-solving strategy.

### **Strategy 1: Took the Initiative when Problem-Solving**

When the problem, “How can Jordan, figurine boy, get the bird in the cage”, was presented to the preschoolers, there was a child within each dyad who initially relayed a solution to the researcher. This occurred through verbalization and at times while utilizing only physical response. Danny initiated a solution first by placing the toy bird next to the miniature pail. He displayed the solution then waited for feedback. In the next dyad, Ken also incorporated a nonverbal response without the use of an additional tool/prop; rather he placed the bird in the cage with his hand. The initiated response in the next dyad was presented by Mary. She suggested putting the birdseed in the cage, so the bird would fly into the cage. In response to the prompt, Jasmyn proposed the cat. She did not expound on her idea, and immediately after her response, her peer partner interjected another solution. In the following dyad, Sadi offered the solution of using the net to get the bird in the cage. She moved the tool/prop while she suggested the use of the net. Lastly, Kendra placed the bird in the cage, showed it to the researcher, and exclaimed that she had completed the task.

Although each child presented their initial response in various ways, it was a vital part of the activity. The strategy was significant in that taking initiative helped move the learning process further. The children who took lead in their group spurred the dyad towards higher level thinking and problem-solving by engaging in the solution seeking process.

## **Strategy 2: Interpersonal Problem-Solving**

The children displayed interpersonal interactions while working towards a solution to the problem getting the toy bird inside its cage throughout the study. This was represented with their peer partner as well as with the researcher. While seeking to find solutions during role-play, the children collaborated and played out instantaneous scenarios. Roles were immediately taken on and the children acted out roles as they collaborated and got the toy bird inside its cage. During the study, Sara had a great deal of role-play voices and roles for the props. She actively involved Mary by asking her to engage with particular props. Jasmyn moved around exploring and interacting with the props and with Jayla during the study. During the course of the study Jayla followed the lead of Jasmyn; she agreed with her and asked her to do things she was not able to do. She was actively involved with the props and took over the props several times. Within each group there were extensive amounts of positive discourse, yet there were moments of disagreement.

Responses within the collaboration varied from the preschoolers being in agreement to them telling one another that a particular strategy would not work. In 4 of the 6 dyads there were more disagreements during the planned activity than with the other groups. There were times Phil wanted to play with what Sadi was playing with and he attempted to take items out of her hand, with success from time to time. Of the 6 dyads, 4 of them were at odds in relation to the objects as well as in relation to strategies

chosen for getting the bird into the cage. Danny did not agree with Jen's ideas from occasionally and neither did Sara with Mary. Furthermore, Phil and Sadi wanted to use with the same tool multiple times. They walked over to the other person and took an object out of the other's hand. However, toward the end of their session, Phil asked Sadi for an object and rather than taking it, Sadi gave the object to him right away. It was interesting to note, the dyads with multiple disagreements, provided more solutions than the others.

In addition to collaboration with a peer, the preschoolers sought to obtain approval or confirmation from the researcher. This was represented in the form of them gazing at the researcher prior to making a decision or after they presented a solution they would gaze at the researcher. There was indirect assistance sought in relation to asking about an object or if certain things were permitted. Kisamore et al. (2011) mentioned that children want to know the rules or parameters when involved in an activity. This was displayed across dyads. The children asked the researcher questions directly or paused and waited for direction or redirection throughout the study.

**Sub Strategy: Intrapersonal problem-solving.** Some strategies were not as prevalent, yet were displayed enough by the dyads that data revealed multiple children incorporated them in solution finding. Intrapersonal problem-solving was utilized in the study and was a sub strategy to interpersonal problem-solving. Sometimes the preschoolers attempted to find a solution on their own, rather than seeking their peer or

the researcher. While problem-solving on their own, private speech was generally incorporated. This was apparent with the 4 year-olds in particular. Three of the twelve children were 4 years-old and it was interesting to note that all three of the 4 year-olds incorporated private speech while seeking a solution. While interacting with the tools, Jen gave feedback on her interactions with the tools through the use of private speech, while Danny looked on. In addition, Sadi and Naomi talked themselves through solutions and interactions with the tools/props.

### **Strategy 3: Verbal Problem-Solving**

The preschoolers' discourse was interactive and realistic as displayed through their talk, laughs, and tool/prop interactions. Various children incorporated different voices while solution seeking. Overall, when giving the researcher a direct solution, the preschoolers employed telling what they would do rather than showing what they would do. This occurred across dyads throughout the study.

As Danny, Kerri, Phil, and Kendra sought solutions, they appeared to process their thoughts and analyze the surroundings prior to giving input, asking questions, or interacting with the tools. It was noted that, while seeking a solution to the problem, there were times during the study that Danny looked on and before he interacted with the props his leg shook rapidly, then he would give a verbal response. It was difficult to know if this was uncertainty, anxiety, or a habit.

A few of the preschoolers' verbal problem-solving was displayed through laughter or giggles. One was how Jasmyn and Jayla talked and laughed as they engaged with the tools and presented solutions to the problem. It appeared the participants were thrilled to take part in the activity; however, it is possible the laughing was a sign of being anxious.

The children explored the items, declared what the names of the pets would be, and made the activity come alive with their interaction and play. The vast comments inference to the miniature props, was an example of how intrigued the preschoolers were by the tools/props; then kept them engaged in the task of solving the problem. Throughout their time while participating in the study, three out of the six groups were actively engaged in role-play while problem-solving. Of the six groups, five of them moved the furniture around and explored the entire house and incorporates their words and tools when finding solutions. All dyads except Danny and Jen moved the furniture and walked around to investigate different parts of the doll-house throughout the activity.

#### **Strategy 4: Nonverbal Problem-Solving With Physical Response**

The preschoolers' nonverbal solution seeking with physical responses surfaced as a strategy. This response method occurred across dyads. The participants chose to utilize the objects or gestures opposed to using verbalization during the study. To verify what the child was describing, because there was not any verbalization, the researcher would

sometimes repeat and rephrase for clarity the preschooler’s ideas on how to get the toy bird inside its cage.

The use of the birdseed as a double stimulation solution, was demonstrated by 4 of the preschoolers. This was demonstrated when one of the preschoolers pretended to pour birdseed in their hand to coax the bird into the cage. Another solution was displayed by the preschoolers included them using their hand by picking up the bird and placing it inside the cage. Additional methods included putting the bird in the nest, using the wheelbarrow, and using the net to get the bird into the cage. A final solution that was exhibited that incorporated nonverbal problem-solving with a physical response was the use the wheelbarrow in conjunction with the pail. This solution in which the preschooler demonstrated the use of the two objects as a solution for getting the bird into the cage was unique. Other than using the nest and birdseed together, there were not any other solutions provided that involved the use of more than one object.

Table 6

*Sample of Strategies*

RQ: Using a variation of L.S. Vygotsky’s double stimulation method, what cognitive problem-solving strategies of preschoolers are observed by the researcher?				
Overall Strategies Within the Study	1. Took Initiative when problem-solving	2. Interpersonal Problem-Solving	3. Verbal Problem-Solving	4. Nonverbal-Problem-Solving with Physical Response
Sub Strategies		Intrapersonal Problem-Solving		

The strategies discussed were salient aspects of the problem-solving process within the study. Vygotsky's double stimulation method was exhibited through the use of each strategy. The entire chapter is summarized below and a discussion of the strategies and implications for future research are points to come in the following chapter.

### **Summary**

This chapter included data collection and analysis of the current study. Following the introduction, a single research question and theoretical framework this chapter included detailed descriptions of the data collection procedures, the analysis of data, and a description of the themes or strategies. Vygotsky's double stimulation method was used in the problem-solving process and this chapter discussed how it was integrated into the study. In addition, it expanded on CHAT framed the study, and incorporated the social and activity aspect of the theory.

In reference to the data analysis, video- and audio- recordings, observational field notes, analytic memos, and codes were all analyzed. Codes across each process were compiled which included First and Second Coding methods. These methods helped to reveal the overall findings represented by strategies within the study. The dominant strategies the participants utilized to problem-solve were: taking initiative when problem-solving, interpersonal problem-solving, verbal problem-solving, and nonverbal problem-solving with physical responses. These findings and discourse excerpts were presented in

this chapter. However, the following chapter expands the findings and discusses implications for further research.

## CHAPTER V

### DISCUSSION AND IMPLICATIONS

#### **Introduction**

The purpose of this qualitative study was to observe the ways in which preschoolers problem-solve during a planned activity facilitated by a researcher. Vygotsky's double stimulation method was utilized in the problem-solving process and the researcher used mediation to assist the preschoolers in finding a means to an end after a second barrier was presented to a facilitated problem. This method was incorporated into the study using prompts and objects, known as tools and there were several objects or tools in the planned activity scene. Each tool had a practical function, but in an effort to employ the double stimulation method, it was important to see how the participants strategized using the objects/tools. The theoretical framework of the study was CHAT (Ahmed, 2014; Bozhovich, 2004). This theory allowed the researcher to view problem-solving from a social and activity viewpoint while mediating the process through the use of verbal prompts and tools/props. The children were in their natural school environment, internalized what the researcher presented, and in turn externalized their perspective of the situation. Vygotsky explained how this process ignites higher levels of thinking. It was important to view how the participants interacted with one another during the study as well as how they engaged with the researcher and the tools during the planned activity.

A single research question guided the study.

Using a variation of L. S. Vygotsky's double stimulation method, what cognitive problem-solving strategies of preschoolers were observed by the researcher?

Data were collected using observational field notes, as well as video and audio recordings. Each form of data collection attributed to revealing information about preschoolers' problem-solving strategies. This chapter includes a summary of the study, presentation of strategies, connecting findings to literature and theory, implications for educators, directions for future research, a summary of the chapter, limitations, and conclusions.

### **Summary of the Study**

This qualitative research study acquired a more in-depth look into cognitive strategies that preschoolers employed when problem-solving. The activity was established using a wooden doll-house, doll-house furniture, a figurine boy, a toy bird and cat, and props/tools. In order to become familiar with the items, the preschoolers interacted with them before the problem-solving activity was presented. Some of the preschoolers took a little longer than others, but once it was time for the planned activity, the dyads were talking, playing and interacting with the items. Throughout the study the preschoolers explored the props by moving them around and giving them life-like qualities. Many of the preschoolers gave the pets names and had voices they portrayed

for the figurine boy and the toy pets as they incorporated the double stimulation method in solving the problems. Through this exploration, the problem-solving process came to life.

After the children explored the toy props, the researcher presented a prompt in the form of a problem. The children were to figure out how the figurine boy, Jordan, could get the toy bird inside its cage before he went to school. Additional prompts were given as needed. Vygotsky's double stimulation method involved participants going beyond finding a basic means, but in addition, they utilized various tools/props to solve the problem. When the children solved the problems by utilizing tools it was a form of engaging in the double stimulation method. The tool/prop was the second stimulus employed after the problem or barrier was presented. Utilizing the double stimulation method was a means of advancing the preschoolers into a higher level of cognitive thinking because this method integrated the use of thinking beyond the initial means to an end and expanded the concept and presented additional avenues to the solution. The techniques in which the children incorporated to reach a solution revealed strategies preschoolers utilized while problem-solving. The strategies that unfolded during the study surfaced followed the data collection and coding process. The strategies influenced the overall findings of the study and will be discussed in the following section.

## **Discussion of Strategies**

Throughout the data collection process, there are opportunities to reflect on codes and patterns that are emerging. Saldana (2009) suggested it is vital to note the code and patterns because they become a part of a broader pattern or theme. Therefore, following both cycles of coding, strategies surfaced and was explored to gain a more in-depth understanding of the problem-solving strategies used by preschoolers. The strategies that surfaced included: (1) took initiative when problem-solving, (2) interpersonal problem-solving, (3) verbal problem-solving and (4) nonverbal problem-solving with physical response. The strategies were in line with Vygotsky's double stimulation method as well as the *a priori* codes derived from the literature. The problem-solving strategies that surfaced after coding revealed the dominant codes that were presented during the data collection process. The next section includes the strategies that surfaced within the study. The samples of discourse excerpts include pseudonyms used to protect their privacy.

### **Strategy 1: Took the Initiative during Problem-Solving**

Within each dyad, there was a child who took initiative and began the solution seeking process first. Their responses varied from verbal with and without physical responses to nonverbal with physical responses. This strategy was present across dyads and was displayed verbally as well as nonverbally by the preschoolers. The excerpts below are examples of initial responses from each dyad.

Danny: *Placed the bird next to pail*  
Ken: *Placed bird in cage*  
Mary: *Hmmm, put birdseed in there*  
Jasmyn: *The cat*  
Sadi: *The net*  
Kendra: *I just did*

## **Strategy 2: Interpersonal Problem-Solving**

The relationships between the children were apparent through their discourse. Each peer pair's level of engagement with one another varied when examining discourse. However, what was consistent with each dyad was the collaboration. Each peer pair talked to one another about solutions, they engaged in role-play, as well as the researcher was sought. This strategy revealed that the preschoolers sought to find a solution with assistance of a peer or the researcher. The preschoolers interacted on an interpersonal level. The excerpts below are examples of discourse between the dyads.

Sadi and Phil: *He could go in the bucket and drink*  
Sara and Mary: *We can have the birdseed in our hand like this; yes and I will trap the cat*  
Jasmyn and Jayla: *Let's use the birdseed, put some in your hand*

*Sub strategy: Intrapersonal problem-solving.* The codes revealed a sub strategy associated with the previous strategy. Intrapersonal problem-solving occurred when the preschoolers attempted to find solutions on their own. They did not seek assistance from the researcher or their peer partner. Below are excerpts from the discourse that includes how the preschoolers problem-solve individually.

Danny: *Put the bird in the net*  
Kerri: *I'll try using the net*  
Ken: *I'll hold the cage and he will fly on his own*

*Sub strategy: Assistance seeking from researcher while problem-solving.*

### **Strategy 3: Verbal Problem-Solving**

During the course of the study, the preschoolers verbally interacted with one another as well as with the researcher. A strategy that surfaced during these interactions was they verbally problem-solved without and with any physical response. This was displayed using questions and at times they told the researcher the plan to solve the problem without physically doing it. Questioning was a form of tool utilized to find a solution to a problem. The excerpts below are examples of discourse between the dyads.

Jasmyn, Jayla: *How do that thing close?*  
Kendra: *I put it in there.*  
Ken: *Let's see if this will work. I'll put it in the cage.*

The preschoolers actively engaged with the tools/props and used physical gestures to respond. In conjunction with this, some of them also responded verbally to the problem. The physical gestures included things such as showing how they would whistle for the bird or put their finger out for the bird to fly onto. The excerpts below are examples of discourse between the dyads.

Naomi and Kendra: *Put it in here like this.*  
Mary: *Let's do this. (singing it and moving items)*  
Jasmyn and Jayla: *Use your finger like this.*

#### **Strategy 4: Nonverbal Problem-Solving with Physical Response**

This strategy surfaced cross dyads. The preschoolers conveyed their solution by only using a physical response. It was displayed through a gaze at the researcher by several preschoolers or the movement of props/tools without speaking. The excerpts below are examples of discourse between the dyads.

Jen: *Has the boy move the wheelbarrow toward the bird*

Ken: *Shows the researcher the net*

Sadi: *Shows the net*

Phil: *Gazing at researcher*

#### **Connecting Findings to Literature and Theory**

The current study's findings were in line with the related literature found in Chapter 2 of this study. The *a priori* goals of the study were how children problem-solve individually, with assistance from an adult, while collaborating with a peer, or with a tools. The current strategies that surfaced included interpersonal problem-solving, verbal problem-solving, as well as nonverbal problem-solving with physical responses. The preschoolers were engaged socially, yet continued to work on finding a solution to the problem (Kimhi & Bauminger-Zviely, 2012). The process of being involved in the activity brought to the surface what Vygotsy (1978) described as action related memory and combination action. Several of the preschoolers recalled prior knowledge and related it to the current activity while seeking solutions.

It was interesting that through the role-playing and collaborating, the preschoolers' work towards problem-solving remained a priority by interactions with a

peer, looking to the researcher, or reflections on prior information. As explained by Obukhova (2012), social and historical aspects influence children's activity. The interpersonal strategy and comparing prior knowledge code that surfaced from the current study were in line with the prior literature and the theory that framed the study, CHAT. The majority of the current findings were not new discoveries, but they confirmed what the literature has reported regarding problem-solving. The strategy that was unexpected, was taking the initiative when problem-solving.

### **Implications for Educators**

Preschoolers solved problems using various strategies, as evidenced by the findings in the study. Providing educators, including teachers, administrators, librarians, and curriculum coordinators with insight into how preschoolers arrive at solutions is vital in the area of education. Within schools, children are expected to learn and find solutions to work to complete tasks throughout their day. The current study revealed that preschoolers attained solutions by initiating a solution, using words, with the assistance of others, and they utilized tools or props. Below are ideas of how teachers can integrate the findings from the study.

1. The research gave insight into the strategies preschoolers used when finding a solution to a problem. One of the significant strategies was problem-solving through the assistance of others. Lundy and Fyfe (2016) suggests that preschoolers problem-solve through the use of interpersonal skills and along

the same lines, Vygotsky (1978) suggested that children use interpsychological problem-solving. In addition, the current study revealed that this was a prominent strategy utilized. Knowing this, teachers can incorporate time in the classroom where children work together with a peer or with an adult mediator. Often, in classrooms teachers do this when there is a struggling student, but literature explains that all students can benefit from peer partners, with adult mediation.

2. Implications for use during in-service for teachers include explaining and demonstrating how preschoolers problem-solve with assistance from others as well as with the incorporation of physical responses or gestures. In addition, expanding on the importance of learning in a social context and recognizing when children work together, someone generally takes the lead. As in the current study, taking initiative to solve the problem was a strategy and is important in the solution seeking process for preschoolers. Keeping this in mind, in-service training on leadership in young children will be beneficial to educators.
3. Social implications derived from the current study were related to how children problem-solve with a peer will be of assistance in academic planning. According to Kimhi and Bauminger-Zviely (2012), problem-solving collaboratively incorporates cognitive and socio-cognitive abilities. In

addition, Vygotsky (1978) explained that interpsychological levels involved interactions between multiple persons. With this in mind, teachers and students as well as students and student interactions will be vital in increasing cognitive abilities of children.

4. The strategy to use words with or without physical responses can be utilized by integrating ways children can talk through their lessons with and without the use of physical responses, depending on the student's needs. Students utilizing whiteboards to write their answers will give all students a voice. Furthermore, some children need a combination of visual stimuli and verbal exploration in order to construct new ideas (Vygotsky, 1967). A child can add what they learned and use the new found information to take everyday objects and incorporate them in ways that further their activities or play. Teachers integrating talk time throughout a lesson as well as using manipulatives can be effective learning tools according to the current research.
5. Implications that surfaced for administrators include supporting teachers in creating a student-centered learning environment. Based on the findings in the study, a learning environment that incorporates social interactions in the learning process as well as hand-on opportunities will move children's learning forward. Therefore, teachers will need administrator's support in accessing materials and space to allow this type of teaching to take place.

6. Implications for librarians and curriculum departments include having books, materials, and training opportunities available for teachers to access.

Resources related to developmentally appropriate social needs of students combined with applicable use of tools/props in the learning environment will assist teachers in preparing academic environments for students.

7. The final implication for teachers is related to how preschoolers problem-solve without words, yet with the use of physical responses. The current study revealed that often there were times preschoolers knew the solution to a problem, but they did not verbalize their thoughts. Incorporating this type of learning style in the classroom will be beneficial for students. Also, it was noted that these preschoolers appeared to seek feedback from the researcher, possibly approval or correction. Knowing this, teachers can arrange ways children can respond during lessons with physical responses such as using physical cues or visual cards to represent their answer. In addition, students can be permitted to submit answer through an electronic means or have the means to maneuvering props related to a lesson could be of assistance to students.

### **Directions for Future Research**

In looking to the future, it is important to remember that problem-solving is key in the learning process (Voutsina, 2012). Presenting opportunities for problem-solving and

taking advantage of moments that arise to assist children in developing their problem-solving skills will increase their cognitive abilities. Unfortunately, there appears to be little significant research using the double stimulation method with preschoolers, making this and future studies all the more valuable.

The discoveries from the study implicate that when presented with a problem, preschoolers explored objects available to solve the problem or sought assistance from an adult (the researcher). Directions for future research are:

1. An additional problem-solving activity may be presented to gauge if varied strategies are utilized from one activity to another. Giving the participant multiple activities will allow for the researcher to compare and contrast the strategies used and the means to an end that take place in each study.
2. Developing a study that involves preschoolers problem-solving individually (rather than in dyads) with access to tools and an adult mediator is worth exploring. The influence of a peer is important according the literature, but exploring how preschoolers problem-solve on their own will provide insight on how children arrive at solutions by themselves.
3. The final implication for research is to explore observing preschoolers problem-solve within their natural setting while watching for the use of Vygotsky's double stimulation method. Literature indicates that collaboration among peers leads to the use of higher cognitive abilities. Likewise,

Vygotsky's double stimulation method does also. Therefore, observing preschoolers in their natural setting and exploring their strategies and the use of double stimulation will add great knowledge to the current and future research. Their natural settings would school as well as play and unstructured times. It would be important to encompass each of these aspects of the students' natural environment. Literature explains the importance of play as a major part of a preschooler's world and having realistic props that have natural problems for them to solve will add dimension to current research. Conducting a study that incorporates both play and academic aspects while incorporating the double stimulation method will add substantial evidence to the current literature in this area.

4. Another direction for researchers includes examining leadership roles of children while conducting a study in the children's natural environment, This is worth exploring as an extension of the current study where taking initiative was a strategy, to investigate whether initiative taking appears across various areas of the child's learning environment.

### **Summary of Chapter**

This chapter reflects on the findings that are revealed related to preschoolers' problem-solving strategies. The children incorporated various strategies to solve the problem, with the use of tools, mediation from the researcher, and collaboration with a

peer. Also, the strategies were expounded and insight was provided as to how the incorporation of the findings was in line with previous literature and the theory that framed the study. Further, implications were made that connected educators and future researchers to the current study. The findings and strategies that emerged will be accessible to the school district and can also be shared with parents and others with an interest in strategies preschoolers utilize to problem-solve.

### **Limitations**

There were several limitations within the study that were outside the researcher's control. Limitations included 1) challenges related to the recruitment process on various campuses, 2) the timing of school breaks, as well as 3) the research classroom on each campus.

The first limitation was in relation to the recruitment process and obtaining consent forms from parents at the campus the researcher originally anticipated conducting the study. The researcher had entrée in various schools, therefore anticipated that consent for participants could occur at one or two campuses. However, upon beginning the recruitment process, consent forms were not being returned in a timely manner. Consequently, the researcher expanded the distribution of the recruitment flyers to all elementary campuses within the district to obtain participants for the study.

The timing of when consent forms were received from parents conflicted with school breaks. At one time during the study there was an interruption when it was

summer break and the age group required for the study did not participate in summer school. Therefore, the researcher needed to wait until school was in session again. There was a similar impediment when it was time for the winter break. Fortunately, the researcher was able to conduct the study with a portion of the participants before the break and the remaining children following the break. It was important to be strategic in this planning because some students left early for the break with their families. Since there was a need for dyads, the researcher had to arrange days and times when pairs of children on each campus could be included.

An additional limitation was related to the restricted classroom options to conduct the study on the respective campuses. Each campus has designated classrooms as particular learning spaces, and there are not an abundance of unused space. Therefore, the available classrooms were only accessible on particular days. This influenced timelines and required extensive planning because of the breaks and the students' availability based on their daily schedules.

### **Conclusion**

The research that was conducted included observing preschoolers' problem-solving strategies while taking part in a planned activity that incorporated Vygotsky's double stimulation method. The findings contribute to related literature regarding preschoolers and problem-solving. Furthermore, the use of the double stimulation method allowed for another layer to be added to the current research. Consequently, research

directly related to preschoolers utilizing the double stimulation method is limited. Hence, the current study incorporated preschoolers and the double stimulation method in the problem-solving process. The study was framed by one research question that drove the data collected process. The data analysis revealed that there were various strategies that were utilized by the participants.

As a whole, the findings from the study were insightful and were in line with the literature. The current study had evidence that suggested preschoolers problem-solved with the help of an adult through avenues such as questioning and gazing at researcher throughout. The preschoolers also solved problems collaboratively with their peers which were exhibited through their discourse and role-play. In addition, the children sought the assistance of tools/props to arrive at a solution. The tools/props encompassed items such as a toy bird and birdcage, a figurine boy, a toy broom, miniature tables and chairs. In addition, questioning was a tool incorporated by the children when trying to get the toy bird in the cage. The literature posits that questioning is categorized as a tool. Each dyad interacted with the tools/props while employing their problem-solving strategies.

## REFERENCES

- Ahmed, T. (2014). Cultural historical activity theory framework for understanding challenges experienced by student teachers of science at secondary level of education in Bangladesh. *Education, 142*, 2-12.
- Bernard, H., & Ryan, G. (2010). *Analyzing qualitative data: Systematic approaches*. Thousand Oaks, CA: Sage Publications.
- Bodrova, E., & Leong, D. J. (2006). *Tools of the mind: Vygotskian approach to early childhood education*. Upper Sadle River, New Jersey: Pearson.
- Bodrova, E., Leong, D. J., & Akhutina, T. V. (2011). When everything new is well-forgotten old: Vygotsky/Luria insights in the development of executive functions. *New Directions for Child and Adolescent Development, 133*, 11-29.
- Bozhovich, L. I. (2004). L.S. Vygotsky's historical and cultural theory and its significance for contemporary studies of psychology of personality. *Journal of Russian and East European Psychology, 42*(4), 20-34.
- Capps, D. (2011). The verbal portrait: Erik H. Erikson's contribution to psychoanalytic discourse. *Journal of Religion and Health, 50*(4), 880-898.
- Castillo, R. D. & Kloos, H. (2013). Can a flow-network approach shed light on children's problem solving? *Ecological Psychology, 25*, 281-292.

- Chen, Z, Siegler, R. S., & Daehler, M.W. (2000). Across the great divide: Bridging the gap between understanding of toddlers' and older children's thinking. *Monographs of the Society for Research in Child Development*, 65(2), 1-107.
- Clark, J. C. (2012). Researching concept mapping using cultural historical activity theory: Collaboration and activity in the zone of proximal development. *Contemporary Approaches to Research in Mathematics, Science, Health and Environmental Science*, 1-15.
- Cluver, A., Heyman, G., & Carver, L.J. (2013). Young children selectively seek help when solving problems. *Journal of Experimental Child Psychology*, 115, 570-578.
- Crowley, K., & Siegler, R.S. (1999). Explanation and generalization in young children's strategy learning. *Child Development*, 70(2), 304-316.
- Edwards, A. (2011). Cultural historical activity theory (CHAT), British Educational Research Association. [www.bera.ac.uk](http://www.bera.ac.uk).
- Engestrom, Y. (1999). Expansive visibilization of work: An activity- theoretical perspective. *Computer Supported Cooperative Work*, 8, 63-93.
- Green, H. (2014). Use of theoretical and conceptual frameworks in qualitative research. *Nurse Researcher*, 21(6), 34-38.

- Havertape, J. F., & Kass, C. E. (1978). Examination of problem solving in learning disabled adolescents through verbalization self-instruction. *Learning Disability Quarterly, 1*(4), 94-100.
- Henry, P. (2015). Rigor in qualitative research: Promoting quality in social science research. *Research Journal of Recent Sciences, 4*, 25-28.
- Jonassen, D. H., & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments. *Educational Technology: Research and Development, 47*(1), 67-79.
- Jurdak, M. E. (2006). Contrasting perspectives and performance of high school students on problem solving in real world situated and school contexts. *Educational Studies in Mathematics, 63*(3), 283-301.
- Kimhi, Y., & Bauminger-Zviely. (2012). Collaborative problem-solving in young typical development and HFASD. *Journal of Autism and Developmental Disorders, 42*, 1984-1997.
- Kisamore, A. N., Carr, J. E., & LeBlanc, L. A. (2011). Training preschool children to use visual imagining as a problem-solving strategy for complex categorization tasks. *Journal of Applied Behavior Analysis, 44*, 255-278.
- Kozulin, A. (2011). The dynamics of the schoolchild's mental development in relation to teaching and learning. *Journal of Cognitive Education and Psychology, 10*, 198-212.

- Kudryavtsev, V. (2011). The phenomenon of child creativity. *International Journal of Early Years Education, 19*(1), 45-53.
- Lundy, B. L., & Fyfe, G. (2016). Preschoolers' mind-related comments during collaborative problem-solving: Parental contributions and developmental outcomes. *Social Development, 25*(4), 722-741.
- Luria, A. R. (2002). L.S. Vygotsky and the problem of functional localization. *Journal of Russian and East European Psychology, 40*(1), 17-25.
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook*. Thousand Oaks, CA: Sage Publications.
- Mills, C. M., Danovitch, J. H., Grant, M. G., & Elashi, F. B. (2012). Little pitchers use their big ears: Preschoolers solve problems by listening to others ask questions. *Child Development, 83*(2), 568-580.
- Mills, C. D., Legare, C. H., Bills, M., & Mejias, C. (2010). Preschoolers use questions as a tool to acquire knowledge from different sources. *Journal of Cognitive and Development, 11*(4), 533-560.
- Obukhova, L. F. (2012). Vygotsky and developmental psychology in his and our time. *Cultural-Historical Psychology, 1*, 51-59.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3<sup>rd</sup> ed.). Thousand Oaks, CA: Sage Publications.

- Portes, P.R., Smith, T., & Cuentas, T. E. (1993). Parent child interaction patterns in dyadic problem solving: An application of Vygotsky's double stimulation method. *American Education Research Association*, 1-26.
- Portes, P. R., Smith, T. L., Zady, M. F., & Castillo, K. D. (1997). Extending the double stimulation method in cultural-historical research: Parent-child interaction and cognitive change. *Mind, Culture, and Activity*, 4(2), 108-123.
- Postholm, M. B. (2015). Methodologies in cultural-historical activity theory: The example of school-based development. *Educational Research*, 57(1), 43-58.
- Sakharov, L. (1928). Methods for investigating concepts. *Soviet Psychology*, 3, 1-27.
- Saldana, J. (2009). *The coding manual for qualitative researchers*. Thousand Oaks, CA: Sage Publications.
- Sautter, R. A., LeBlanc, L. A., Jay, A. A., Goldsmith, T. R., Carr, J. E. (2011). The role of problem-solving in complex intraverbal repertoires. *Journal of Applied Behavior*, 44, 227-244.
- Schmitz, M. J., & Winskel, H. (2008). Towards effective partnerships in a collaborative problem-solving task. *The British Journal of Educational Psychological*, 78, 581-596.
- Seed, A. M. & Call, J. (2014). Space or Physics? Children use physical reasoning to solve the trap problem from 2.5 years of age. *Developmental Psychology*, 50(7), 1951-1962.

- Shieh, R. S., & Chang, W. (2014). Fostering student's creative and problem-solving skills through a hands-on activity. *Journal of Baltic Science Education, 13*(5), 650-661.
- Silo, N. (2013). Dialogue-missing in action competence: A cultural historical activity theory approach in a Botswana school. *The Journal of Environmental Education, 44*(3), 159-179.
- Skinner, B. F. (1953). *Science and human behavior*. New York: Macmillan.
- Thompson, R. B., Cothran, T., & McCall, D. (2012). Gender and age effects interact in preschoolers' help-seeking: Evidence for differential responses to changes in task difficulty. *Journal of Child Language, 39*, 1107-1120.
- Tobin, G. A., & Begley, C. M. (2004). Methodological rigor within a qualitative framework. *Methodological Issues in Nursing Research, 48*(4), 388-396.
- Valsiner, J. (1988). *Developmental psychology in the Soviet Union*. Bloomington, IN: Indiana University Press.
- Voutsina, C. (2012). A micro-developmental approach to studying young children's problem solving behavior in addition. *Journal of Mathematical Behavior, 31*, 366-381.
- Vygotsky, L. S. (1967). Imagination and creativity in childhood. *Journal of Russian and East European Psychology, 42*(1), 7-97.

- Vygotsky, L. S. (1978). *Mind in Society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Warneken, F., Steinwender, J., Hamann, K., & Tomasello, M. (2014). Young children's planning in a collaborative problem-solving task. *Cognitive Development, 31*, 48-58.
- Wertsch, J. V., McNamee, G.D., McLane, J.B., & Budwig. (1980). The adult-child dyad as a problem –solving system. *Child Development, 51*, 1215-1221.
- Wilson, V. (2014). Examining teacher education through cultural-historical activity theory. *Teacher Education Advancement Network Journal, 6*(1), 20-29.
- Winsler, A., & Naglieri, J. (2003). Overt and covert verbal problem-solving strategies: Developmental trend in use, awareness, and relations with task performance in children aged 5 to 17. *Wiley and Society for Research in Child Development, 74*(3), 659-678.
- Wood, D., & Middleton, D. (1975). A study of assisted problem-solving. *Britain Journal of Psychology, 66*(2), 181-191.

Appendix A  
Recruitment Flyer

## Recruitment Flyer

## *Observations of Four and Five Year Olds' Problem-Solving Strategies...*



### **Volunteers invited to participate in dissertation research**

Children are constantly utilizing the problem-solving process. In order to observe strategies they use, the researcher has a planned activity that involves the use of problem-solving questions as well as props which include: a doll house, small doll figures, furniture and pets.



Please be aware there is a potential risk of loss of confidentiality in all email, downloading, and internet transactions.

Tamara Banks, M.Ed.  
Doctoral Candidate  
(903)xxx-xxxx  
[tbanks5@twu.edu](mailto:tbanks5@twu.edu)

Karen Petty, Ph.D.  
Advisor  
Chair- Department of Family Sciences at  
Texas Woman's University  
(940)898-2698  
[kpetty@twu.edu](mailto:kpetty@twu.edu)

Appendix B  
Recruitment Script

**Introduction:**

Hello and thank you for your interest in allowing your child to participate in my study. I'm Tamara Banks, and I am a Ph.D. candidate at Texas Woman's University. I am glad you have chosen to contact me to find out how to sign your child up for my study. I work for Denison Independent School District as the District's Behavior Specialist.

**Research Procedural Information:**

The title of my research is "Observing four and five year olds' cognitive problem-solving: A qualitative study using a variation of Vygotsky's double stimulation method." Children problem-solve in different ways, and sometimes they need assistance. Therefore, during the study, I will observe children two at a time while they problem-solve during a planned activity. The term double stimulation refers to the researcher providing various levels of means to an end to help the child move through the problem-solving activity. I am interested in strategies children use to solve problems as well as how much help, if any, they need from others. The researcher will observe and prompt them as needed, while collecting a video and audio recording of the session.

I will protect the children's identities by providing a pseudonym for each child. I am the only one with access to that information. The video recordings will be stored in a locked filing cabinet in my home. My research advisor at Texas Woman's University might request to see a video, but she will not have the pseudonym for any child. After the recording, I will transcribe the audio recording, and I will analyze how each child problem-solved during the activity.

Once the study is complete and published, I will provide the school with information pertaining to the findings of the study.

**Consent:**

If you agree to allow your child to participate in the study, I have a consent form to sign, granting permission to include your child in the study. This study is completely voluntary, and you can choose to withdraw your child from the study at any time.

The consent form lists potential risks in the study. Please take a few minutes to read the form, and I will answer any questions you have.

**Questions:**

Do you have any questions?

Will you sign on the appropriate lines to allow your child to participate in my study?

Thank you for your time. My phone number and email are provided on the recruitment flyer if you have questions later.

**Confidentiality:**

There is a potential risk of loss of confidentiality in all email, downloading, electronic meetings, and internet transactions."

Appendix C

Consent to Participate in Research

**TEXAS WOMAN'S UNIVERSITY**  
**CONSENT TO PARTICIPATE IN RESEARCH**

**Title:** Observing four and five year olds' cognitive problem-solving: A qualitative study using a variation of Vygotsky's double stimulation method

**Investigator:** Tamara Banks, M.Ed. ....tbanks5@twu.edu 903/xxx-xxxx

**Advisor:** Karen Petty, PhD ..... kpetty@twu.edu 940/898-2685

**Explanation and Purpose of the Research**

Your child is being asked to participate in a research study for Tamara Banks' dissertation research at Texas Woman's University. The purpose of this research is to observe four and five year olds problem-solving abilities during planned activities using a variation of Vygotsky's double stimulation method. You have been asked to allow your four or five year old to participate in this study because they attend elementary school in Denison ISD, where the study will take place.

**Description of Procedures**

You will meet with the researcher to discuss the process and go over and sign the consent form. This will take about ten minutes. You will be notified of the week when the study will take place at the school. Each child will be assigned a number to correspond with their name for the study to protect the identity of each child. The researcher will be at the school to meet with the participants in pairs for 30 minutes to do a planned activity. The individual planned activity will take place in an empty classroom or office where there will not be any interruptions. The planned activity will involve the use of problem-solving questions as well as props which include: a doll house, small doll figures, furniture, and pets. The participant will be allowed to touch and look at the items. The researcher will use the double stimulation method; a technique that uses different items that help a child work through a situation and guide them through the problem-solving process. Throughout the paired planned activity, the researcher will video and audio record the children while they work through the task. Following the sessions, the researcher will take analytical memos and will transcribe the video and audio recordings in order to generate conversational and commentary transcripts.

**Potential Risks**

The following is a list of potential risks that may occur during the study:

**Loss of anonymity-** To protect the parent and children's identity, the consent forms and all discussions will occur between the researcher and the parent directly. The teachers-of-record and principal are aware of the children's participation; however, the identities of the children will remain unknown in relation to the data collected from the children in the study.

**Loss of confidentiality-** Confidentiality will be protected to the extent allowed by law. Participants will be informed that there is a potential risk of loss of confidentiality in all email, downloading, and internet transactions. Identifiable data will be kept in a locked file cabinet in the researcher's office. The researcher and the advisor will be the only people to have access to the identifiable data and access to view the audio and video recordings and transcriptions. Each participant will be assigned a number to correspond with their name, so their actual names are not on the transcription.

\_\_\_\_\_ Initials  
Page 1 of 2

**Fatigue or physical discomfort during the observation process-** Participants will have a choice as to when or if they would like to participate in the activity process and may discontinue at any time they are feeling discomfort or fatigue.

**Emotional Discomfort-** Participants who may experience emotional discomfort will be allowed to take breaks and/or to stop participating at any time. Also, their parents will be provided a referral list for mental health professionals should they feel the need.

**Risk of coercion-** Parents/guardians will be informed that participation in the study is completely voluntary, and if they consent to their children's participation, they may decline participation at any time during the study. Declining participation will not affect the child or parent in the classroom or in the center at any time.

**Participation and Benefits**

Your child's involvement in this study is completely voluntary, and they may withdraw from the study at any time. There are no direct benefits for participating in the study. Once the study is complete and published, the researcher will provide the school with information pertaining to the findings of the study. If requested, the researcher will schedule an appointment to explain the findings.

**Questions Regarding the Study**

You will be given a copy of this signed and dated consent form to keep. If you have any questions about the research study, you should ask the researcher; her phone number is at the top of this form. If you have questions about your child's rights as a participant in this research or the way this study has been conducted, you may contact the Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via e-mail at [IRB@twu.edu](mailto:IRB@twu.edu).

The researcher will try to prevent any problem that could happen because of this research. You should let the researcher know at once if there is a problem, and she will help you. However, TWU does not provide medical services or financial assistance for injuries that might happen because you are taking part in this research.

\_\_\_\_\_  
Child's Name

\_\_\_\_\_  
Signature of Parent(s)/Guardian

\_\_\_\_\_  
Date

\_\_\_\_\_  
Initials  
Page 2 of 2

Appendix D

Problem-Solving Activity Scenario

Hello, I brought an activity for us to do today.

**Problem-solving activity**

- I will put the problem-solving scene on the table
- I will pose the following problem-solving activity:  
Jordan needs to be ready for the school bus when it comes, but he cannot leave until his bird is in the cage. The bird does not like to be in the cage. Look at the things in the room. Is there anything he can use to get him into the cage?

**Possible Prompts:**

Can you think of another way?

How can you do it without touching him?

What can he do about that?

What can he do to keep him from flying out the window?

I think I hear the bus.

Bus sounds

**\*\*\* Items for the activity:**

There will be a scene in a living/dining room scene with open windows and curtains:

Little boy

Bird

Bird cage

Cat sitting on a sofa

Carpet

Sofa

Chair

Table

Small wheel barrow

Bucket

Bird's nest

Bird seed

Broom

Net

TV on stand

Appendix E

COUNSELING SERVICES FOR CHILDREN AND FAMILIES

<p><u>Abrantes &amp; Villines Counseling Services</u>  3401 N. Calais Drive  Sherman  *School age and up  *Accepts most insurances  *Sliding Fee Scale</p>	<p>903-815-0806 (cell)  903-891-1915 (office)</p>
<p><u>Brief Therapy Associates</u>  210 S. Rusk St.  Sherman  Bill Mory (Bilingual)  Brent O'Bannon  *Accepts most insurance</p>	<p>903-813-0723</p>
<p><u>The Center for Psychological Development</u>  Margo Smith LCDC, LPC  220 D North Sunset Blvd.  Sherman  *All ages  *Medicaid  *Some Insurance  *Prefers cash  *Speaks Spanish</p>	<p>903-868-2961</p>
<p><u>Child and Family Guidance Center</u>  804 E. Pecan Grove Road  Sherman  <a href="http://www.cfgcenter.org">www.cfgcenter.org</a>  *Accepts most insurance  *Sliding fee scale</p>	<p>903-893-7768</p>
<p><u>Dan McCaig</u>  402 W. Lamar Street  Sherman  *Accepts most insurance  *Sliding fee scale  *Accepts Medicare &amp; Medicaid</p>	<p>903-891-3831</p>

<u>Edward Furst</u> 115 S. Travis Sherman	903-870-0963
Elise Thompson Marriage and Family Therapist 3000 South Park Denison, TX 75020	972-679-2167
1514 North Greenville Avenue Suite 310 Allen, TX 75002	
Terry Madsen 1105 Memorial Drive Suite 202 Denison, TX 72020	P. (903) 337-0343
131 W. Main St. Wilburton, OK 74578	
<u>Grayson County Counseling Service</u> 2009 Texoma Parkway Ste 3 Sherman *Accepts most insurance	903-892-2874
<u>Dr. Charles Keenan</u> 1800 Teague Suite 508 Sherman	903-813-4787
<u>Lindsey Counseling Service</u> 1 Grand Centre Sherman, Tx * Medicare * Medicaid	903-893-8780
<u>Sherman Family Counseling Center</u> Tanya Brown-Davis, LPC 210 S. Rusk Street, Suite 3 Sherman *Accepts most insurance	903-893-4884

- \*Sliding fee scale
- \*Individual counseling
- \*Ages 10 and up

Star Family Connection 903-893-4717  
 P.O. Box 1625  
 Sherman  
 \*Free for 6 sessions  
 24-hour crisis hotline 1-800-568-7776

Stonebridge Family Counseling 903-893-6010  
 3400 East FM 691  
 Sherman  
 \*Accepts most insurances  
 \*Christian based counseling

Vicki Smith 903-892-6700  
 115 W. Lamberth Rd.  
 Sherman

Dr. David Falkstein, psychologist 903-893-1400  
 302 E. Brockett St.  
 Sherman

Dr. Mark Venable, psychologist 903-892-4466  
 1800 Teague Drive Suite 502  
 Sherman  
 \*Accepts most insurance

The Institute for Healthy Families of North Texas 972-569-8843- phone  
 5100 Eldorado Parkway, Suite 102 # 517 903-815-4779- cell  
 McKinney, Tx 75070 972-542-1919 - fax  
 \*Personal checks, MasterCard or Visa  
 \*Will file with your insurance policy.

Psychiatrists

Dr. Deepika Bhargava 903-892-0751  
 1800 Teague Suite 212  
 Sherman

2740 Virginia Pkwy  
McKinney  
\*Master card or Visa  
\*Ages 16 and up  
\*Most insurance accepted

Dr. Vicky Borck, psychiatrist 903-361-5066  
315 N. Travis suites B1-B2  
Sherman

Dr. Judy Cook, psychiatrist 903-892-6700  
115 W. Lamberth Rd. Suite A  
Sherman  
\*Visa, Master Card, Discover, American Express  
\*Ages 4 and up  
\*Most insurance accepted

Dr. Ronald P. Gleason, psychiatrist 903-891-7203  
140 W. Lamberth Suite A  
Sherman  
\*Visa, Master Card, Discover, American Express  
\*Ages 4 and up  
\*Most insurance accepted

Revised 10/02/13