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Exploring preschoolers' personal epistemologies using focus groups

Denise Lynne Winsor
University of Nevada, Las Vegas

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EXPLORING PRESCHOOLERS' PERSONAL EPISTEMOLOGIES

USING FOCUS GROUPS

by

Denise Lynne Winsor

Bachelor of Arts
Duquesne University
1985

Master of Arts
Edinboro University of Pennsylvania
1992

A dissertation submitted in partial fulfillment
of the requirements for the

Doctor of Philosophy Degree in Educational Psychology
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ABSTRACT

Exploring Preschoolers' Personal Epistemologies Using Focus Groups

by

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This is a qualitative study designed to use focus groups as a means of identifying the personal epistemologies of preschool children in an authentic learning environment. Personal epistemology is generally defined as the theory about the nature of knowledge and the process of knowing. Investigations of young children are scarce in this field, and little is known about the early onset of epistemological development. However, recent research suggests a possible connection between epistemic development and theory of mind.

This study explores very young children and how their cognitive ability and interactions with peers may reveal information regarding epistemological development. The aim of this study is two-fold: (1) to investigate three- to four-year-olds’ demonstration of personal epistemology, and (2) to integrate developmental levels and dimensions of knowledge into an epistemic matrix as a way to identify epistemological patterns.
Focus groups are rarely utilized with children; however, they provide a platform to capture the essence of the children's knowledge in their own words. For this study the focus groups were based on the weekly classroom theme, and the whole class instruction was used as a catalyst to formulate epistemological questioning. The six child-participants were divided into two groups of three and involved in a total of eight focus groups over a four week period. Each week the children participated in a pre-instructional and a post-instructional focus group to distinguish their prior knowledge and past experiences from their understanding of new information pertaining to the theme.

Constant comparative analysis was used during data collection in order to allow for follow-up questioning as a way to understand the children's epistemological thinking in more depth. Data was coded inductively and deductively using ATLAS-TI software. The twelve levels of analysis ultimately resulted in three sets of themes: individual epistemic profiles, group epistemic profiles, and overall preschooler's epistemic profiles.

These themes suggest that preschoolers can and do demonstrate epistemological development and that focus groups provide a unique and abundant source of epistemological insights. This study stands to promote theoretical, methodological, and educational advancements in the field of personal epistemology and with the research of young children.
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 CHAPTER ONE

INTRODUCTION

Epistemology has been the focus of philosophy for centuries and addresses questions regarding an individual’s beliefs about the nature of knowledge and the nature and process of knowing (Hofer & Pintrich, 1997). What are an individual’s beliefs about the nature of knowledge and the process of knowing? How do we know what we know? When we are in the process of constructing our knowledge, how do we make decisions about what we believe and whom we believe? These are just a few of the questions asked in personal epistemology research, which is deeply rooted in Piaget’s “genetic epistemology.” Piaget (1950) had an interest in developing a theory of knowledge, that is, how individuals come to know the world, and he approached it by researching children’s cognitive development. Vygotsky (1978) introduced a socio-cultural perspective to cognitive development. Both theories have important aspects in common and have been influential in personal epistemology theory and research.

Contemporary personal epistemology research was rejuvenated by Perry in the 1970’s. Since then it has been heavily researched in college students and more recently has focused on development in adolescents. Young children’s personal epistemology research continues to be absent; however, that may be shifting with the recent connection.
between young children's personal epistemology and theory of mind development (Burr & Hofer, 2002).

Most researchers in the field agree on a general trajectory of epistemological development that begins as a type of dualism, progressing into multiplism, and then finally into evaluativism. Chandler (2002) states that this is the same stage progression that appears in most research in personal epistemological development, regardless of who is studied and no matter what the conditions or measure. Over the past 35 years, personal epistemology has been conceptualized in a variety of frameworks. The current study will review various models that view personal epistemology in terms of development, belief systems, theories, cognitive resources, and integrative process.

Despite that personal epistemology research has neglected investigating children, many have hypothesized about the onset of personal epistemological development in young children. Other areas of cognitive development have flourished in their investigation of young children. Theory of mind refers to a developmental milestone in which children begin to recognize that other's perspectives differ from their own. This is an area that has dominated children's cognitive developmental research. Researching young children's personal epistemology may uncover important information about the current trajectory of personal epistemology development.

The purpose of this study is to investigate preschooler's developing epistemologies by exploring relationships among their peers in a classroom environment. Additionally, this study aims to develop an innovative methodology that is new to the research in personal epistemology and very young children. This study uses focus groups as one
component of the methodology as a means of identifying interactions among peers that could contribute to their developing epistemologies.

It is the goal of the study to contribute to personal epistemology research by meeting the future needs of the field, enhancing educational perspectives for young children, and impacting the larger spectrum of personal epistemology with insights about early childhood epistemological development.
CHAPTER TWO

REVIEW OF THE LITERATURE

Introduction

The range and variety of literature that exists in personal epistemology research is becoming increasingly more innovative and diverse at a variety of levels, including age, gender, culture, subject domains, and measurement instruments, just to scratch the surface. Even with the considerable amount of theoretical and empirical literature, there is little consideration given to researching children’s personal epistemology. Only until very recently have researchers been active in their investigations with children. The focus of this study involves young children’s personal epistemology in a preschool environment. It will also attempt to provide a more diverse lens for interpreting the trajectory of individuals’ personal epistemology. Within this perspective, using a dynamic systems view from Bronfenbrenner (1975) and Minuchin (1974), a framework will be developed to identify children’s emerging personal epistemology. The dynamic systems framework that is proposed focuses on the child and his personal epistemology. Other internal factors related to the child will be investigated including his theory of mind, affect, and language. In addition, the framework will include external factors in the child’s environment including the child’s parents, preschool teacher, and classroom peers. This framework will guide the entire study including the literature review, research questions, and design.
Initially in this chapter there will be a broad and historical introduction to the study of epistemology. The study of epistemology is derived and deeply rooted in the disciplines of philosophy, sociology, and anthropology. In order to integrate the complex framework that will be proposed, it is essential to understand the foundation of the diverse components of epistemology. Following the historical overview of the study of epistemology, a much more narrow focus on personal epistemology literature and how it has been interpreted and integrated into the field of educational psychology will begin. The theoretical frameworks of Piaget and Vygotsky are central factors to the field of educational psychology and personal epistemology. These two theoretical frameworks will be discussed in terms of how cognitive and social development are generally viewed within the field. The next section will review the various models of personal epistemology that are predominantly recognized in the field of educational psychology and will be discussed according to their relevance for interpreting childhood epistemology. The models generally represent what is known about an individual’s beliefs about the nature of knowledge and knowing (Hofer & Pintrich, 2002). The models will be reviewed according to their definitional differences, terminology, traits and characteristics, empirical support, strengths, and limitations. Narrowing the focus more closely to this study, the next section will involve young children’s personal epistemology. In this section the importance of investigating young children will be discussed, including developmental issues, research in children’s personal epistemology, methodological issues, theory of mind, and children’s personal epistemology and theory of mind.
Children’s theory of mind has been researched considerably over the past thirty years, and this chapter will review the theory of mind literature that is relevant for the purposes of the study. Once the overview of children’s theory of mind is presented, the discussion will turn to the integral components related to the proposed study and will begin with the connection between children’s personal epistemology and theory of mind.

Theoretical Frameworks

_Epistemology: The Historical Perspective_

Epistemology is a branch of philosophy that focuses on knowledge and is important to this study because it relates to a debate about subjective and objective truths. This debate has gone unresolved and continues to haunt educational psychology. Researching children may provide information regarding subjective and objective knowledge. For centuries this has been a controversial issue, but in spite of the confusion about many seemingly contradictory positions, a clear trend has emerged. Early trends in philosophy stressed knowledge as absolute and permanent (empiricism). Later theories placed more emphasis on the relativity of knowledge and suggested a dependence on experience or context (rationalism). These more recent theories of epistemology focus on the continuous development of knowledge and active inferences about one’s world in a subjective and objective manner. What is noticeable in the trend is that it has shifted from a passive and static view of knowledge towards a progressively more active and adaptive perspective of how we think of knowledge.

Early Greek philosophers, including Socrates, Plato, and Aristotle, viewed knowledge as simply absolute. Knowledge incorporated ideas that existed independent of
individual’s understanding of the ideas themselves. It was Aristotle who contributed to placing more emphasis on logical and empirical methods of obtaining knowledge but continued to support the position of universal principles (Reed & Johnson, 2000). Looking back, it was Plato’s *Republic* that focused on the impact of one’s emotional perspective. The study of personal epistemology embraces this perspective but repetitively falls short. Although Socrates had moral and political ambitions toward the nature of justice, it was Plato’s interpretation of Socratic conversations that extended to virtues of justice, wisdom, courage, and moderation as they exist within the individual and in society collectively. Plato spoke of this unity by utilizing emotions, primarily love in the *Phaedrus*. For Plato, education was a matter of leading the student from knowledge as a mere belief to knowledge as truth. Plato used the “Allegory of the Cave” to represent how uneducated individuals are restrained by their lack of knowledge and hold the mistaken belief that the shadows on the walls are real. When individuals become knowledgeable, they then can escape from the cave into the light. Plato claimed that it was this type of individual who would discover justice, knowledge, and objectivity.

Aristotle valued the idea of truth and had an appreciation for the value and contributions of observation and opinion in the pursuit of knowledge as truth. Aristotle’s contributions to philosophy are too numerable to comment on here, but some say Aristotle has been labeled “The Philosopher” because he was vastly prolific in his writing (Audi, 2001). One of Aristotle’s significant works that made a large impact on the study of epistemology is the *Nicomachean Ethics*, in which he contemplated the natural desire to achieve happiness, described functions of human volition, expanded Plato’s ideas of morals and virtue in a more neutral sense, discussed friendship, and stressed the
importance of knowledge. Aristotle suggests that because humans are rational, an educated individual unites morality and reason through wholesome actions. For Aristotle, the ultimate goal of education is to assist individuals in understanding the world and their role in it (Reed & Johnson, 2000). By doing this the individual acquires happiness, becomes a good and just representative for the community, and is able to function within the community as a rational member. The aspect of Aristotle’s philosophy that has been particularly important in the elaboration of epistemology is the idea of not only choosing and doing good and just actions but identifying that humans need to execute the actions in a good and just manner. This supports humans as possessing the ability to be intentional beings. That is, Aristotle believed that individuals do things or possess knowledge that they believe to be good and just. These perceptions which take place in the mind of the individual as images and are produced by the individual are linked to the social context and how we experience external objects.

Descartes is the most influential figure of the intellectual revolution which challenged and overthrew the theories of Aristotle. He was perplexed by the philosophical skepticisms, and therefore used his knowledge of mathematical applications to develop the scientific method which helped gain certainty about human knowledge. In the Discourse of Methods, Descartes realized that it is human nature for humans to be deceived and mistaken. He thought if such mistaken beliefs did not undergo inquiry and became foundational, then all knowledge built from the mistruth would be faulty. He proposed a program that all beliefs should be examined until a belief was arrived at that could not be doubted. He termed this “systematic doubt” (Reed & Johnson, 2000). Descartes concluded that an individual needs to reject all beliefs that can be doubted and
the core of an individual’s foundational knowledge begins when they reach the belief that cannot be doubted. Descartes’ theory is classically represented as, “Je pense, donc je suis,” as it was first published in French but is more commonly identifiable in Latin as “cogito sum ergo” which means “I think; therefore, I am.” Once individuals achieve this understanding, they can go forward to develop a secure system of knowledge. This is the core of all scientific method we use in research today.

Descartes established other significant components that researchers continue to grapple with. *Meditations* was unique for the time; it explored the discovery of doubt and the journey to certainty of one’s own existence. It also further elaborated on the turmoil associated with establishing the existence of God, incorporation of the external world, and the relationship between the mind and the body. Much later in his writings Descartes incorporated questions of psychology and ethics as they might relate to one’s epistemology in *The Passions of the Soul* (Audi, 2001).

In contemporary thinking we frequently refer to Descartes’ philosophy as the *Cartesian System*. Generally, there are three main points: (a) The essential unity of knowledge, in which all sciences are linked together; (b) knowledge that is achieved should be useful in the life of the individual; and (c) knowledge is constructed from the roots, and no knowledge should be considered absolute until it is compatible with one’s core beliefs. Descartes acknowledges that knowledge and humans are fallible; therefore, it must be common practice at least “once in a lifetime” to “demolish everything and start again, right from the foundations” (Meditations, 1641, cited in Kleiman & Lewis, 1990, p.29). Descartes stresses the human’s fallible nature by pointing out that our senses can be deceiving; therefore, an individual needs to be cautious to place judgment during such
doubtful times and defer to the reliable intellect of the mind that was God’s gift to man (Audi, 2001).

This idea that God is perfect and would not be deceitful by giving humans the ability to believe that many of our ideas come from external objects must be sound, and therefore the external world exists (Kleiman & Lewis, 1992). This is the facet of the theory that perpetuates indifferences towards the Cartesian system, known as the Cartesian circle. It is a rhetorical stance that Descartes establishes. If the answer is that we can prove God’s existence from the premise that we have the capacity of perception, then how is it that we can assume our perceptions are reliable? This is noteworthy in terms of the present study of epistemology because it relates to beliefs about the justification of knowledge and personal epistemological development in general.

Descartes believed that everything in the external world was quantifiable. He saw material things as possessing indefinite variations of shapes, sizes, and motions of simple, single, and homogenous matter (Foucault, 1994). The unconscious experience was the single phenomenon that Descartes could not explain mathematically; therefore, he proposed a dualistic theory. The theory suggests that there is a material substance and a thinking substance that are independent of one another. The mind is related to an individual’s soul and exists even if the body fails to exist. This is a controversial but noteworthy aspect of the Cartesian system because it has never been satisfactorily sorted out, and it is connected to a substantially significant portion of his attempt to construct a system of knowledge (Kleiman & Lewis, 1992). Descartes’ system of knowledge starts with the subjective awareness of the conscious self.
Spinoza’s philosophy built upon the works of Descartes with added reflection on his personal and social importance of epistemology. He veered away from the Christian and Jewish biblical interpretations; his thinking was detached from the anthropomorphic conceptions of god and he viewed these as both logical and theoretically unsound. Spinoza proposed a modern historical-critical method that was politically tolerant of all religions. He believed that all individuals could live peacefully together provided that they look beyond the theological and cultural controversies that divided them (Popper, 1992).

Spinoza proposed that individual truth comes from the knowledge that we have about ourselves and what facilitates our actions. This information we derive from within can then be connected with our unbiased attachment to reason. Spinoza realized the complexity of this type of thought and concluded “all noble things are as difficult as they are rare” (Ethics, 1677, cited in Pojman, 2003 p. 570). This continues to demonstrate the struggle researchers have had with subjective and objective truths and how beliefs about knowledge have evaded intellectuals for centuries.

John Locke’s philosophies are presented in An Essay Concerning Human Understanding (1690, cited in Kleiman & Lewis, 1990, p. 193). According to Locke, what we know is always properly understood as the relationship between ideas. He viewed ideas as simple or complex and were ultimately derived from experience. His thinking was empirical, and he thought that human knowledge was based solely on what was within realistic reach of the individual and certainty. Further, he believed that our knowledge is comprised of many pieces and uniquely exists in the manner that we represent them; therefore, our knowledge is individually constructed and can be traced to
the way that we access our mind through our innate abilities. Locke argued that knowledge alone was not adequate. He said that life requires the formation of beliefs on matters where knowledge is not available. Our beliefs, Locke believed, need to be supervised by an authority for the purposes of getting accurate information; it is a individuals’ moral obligation to do their best to get things right. He advocated for two types of knowledge: (a) Knowledge that could be empirically verified, and (b) knowledge related to religion and ethics that is culturally embedded. Locke adapted the scientific method to be utilized when knowledge, perception, insight, and awareness were not possible. This would include collecting evidence for and against the proposition in question, analyzing the evidence to determine the probability of the proposition, and weighing the evidence to determine one’s belief. This has a direct link to more advanced epistemological development.

It was a century later that David Hume maintained that moral obligation was a facet of affect rather than reason. Of philosophy, Hume said it, “cannot go beyond experience and any hypothesis that pretends to discover the ultimate original qualities of human nature, ought to be at first rejected as presumptuous and chimerical” (Hume 1740, cited in Pojman, 2003, p. 726). This view was Hume’s starting point, and at the time it narrowed the scope of human understanding by disconnecting the external world. He focused primarily on perceptions, and his work paralleled Locke but directly opposed Descartes’ attempts to prove the existence of the external. Hume distinguishes between two types of perceptions: impressions and ideas. He suggested that impressions come in two forms, sensations and reflections, and are stronger than ideas because they more frequently lead to beliefs. In this way, ideas are causally dependent on impressions.
Hume thought morality to be an entirely human affair founded on human nature and the circumstance of human life which we experience due to affective and social dispositions (Foucault, 1994). This can be linked closely to the sociocultural perspective of this study because it is aligned with many of Vygotsky's theories of development.

Immanuel Kant was among the ranks of the Idealism movement, otherwise known as Kantian Synthesis in his work *The Critique of Pure Reason* (1781, cited in Pojman, 2003, p. 819). In it he criticizes theories and makes claims beyond the realm of experience; he refutes Hume's attempts to dismiss physics as a possible science. He argued for *a priori* knowledge but limited principles in that everything is open for individual interpretation and therefore can be criticized. This test is that human reason must face the responsibility of determining the source, extent, and bounds of its own principles. This restricted theoretical knowledge in such a way as to make it possible for practical knowledge to reveal how pure rational faith has an absolute claim on an individual's knowledge.

Practical reason is defined as determining rules for dispositions such as desire and will, as opposed to thoughts and feelings. What this means is that by the time an individual experiences something it is already determined by *a priori* categories of intuition that he called space and time. This way of thinking was in direct opposition with traditional laws of metaphysics that were in place since Plato. Kant believed that understanding needs sensations to be applied to and sensations need to be categorized. According to Kant, there could not be "transcendence of sensible reality" (Kant 1781, cited in Pojman, 2003, p. 909). This would explain all of the problems with metaphysics that allow for human thinking to overstep boundaries. His justification for this belief was that metaphysics could not be possible as a science, but it was possible as a natural disposition due to the
systematic nature of reason itself. Ultimately, for Kant the question was, "how are synthetic a priori judgments possible?" He concluded that the human mind structures reality by applying universal categories; therefore, synthetic a priori knowledge is true for everyone since everyone has the same categories in mind. The subjective nature of Kant's philosophy has influenced post-modernism and the way we view language and mind (Audi, 2001). Constructivism is deeply rooted in Kantian philosophy and had a large impact on one of the more contemporary philosophers of our time, John Dewey.

John Dewey was a modern philosopher in the twentieth century; he placed experience at the heart of education. For Dewey obtaining knowledge was all about providing students with new and innovative experiences and offering environments they could draw meaning from. Dewey's resistance was toward the "teacher-expert" in which important information as they interpreted it was relayed to the "child-student," then the student task was to record the information and deliver it back on an exam (Dewey, 1991).

John Dewey was influenced by the idealism of Georg Wilhelm Friedrich Hegel, who extended the work of Kant in terms of transcendental idealism and searched for categories necessary for experience to be discriminated and evaluated. He also tried to develop a theory of the subject that could be responsible for Kant's categories in a non-empirical manner (Audi, 2001). The problem for Hegel (Pragmaticism) was the completeness, interrelation, and ontological status of such a structure. Dewey directed his focus toward Hegel's dilemma in his grand work Experience and Nature (1925, cited in Dewey, 1991) and based his philosophy on its observations. Primarily an empiricist, Dewey was concerned with separating his idea of experience from idealism and empiricism. Idealists focus on the cognitive aspects of experience whereas Dewey
highlighted the non-cognitive dimensions of one’s cognition. Dewey thought that the Idealists’ perspective was too subjective and alienating to the external world. The foundation of Dewey’s theory viewed experience as basic and used human action and emotion to demonstrate the irreducibility of experience. With this thinking as his backdrop, Dewey believed that an individual’s cognitive experiences derived from and was conditioned by our more basic experiences. In this way cognitive experience resulted from inquiry. Inquiry was then the mechanism that emotively develops within the individual and prompts concern or doubt. This constructed an initial experience, provoked conceptual elaboration toward possible scenarios of truth, and finally resulted in a reconstruction of our experience. This process of transforming experience for Dewey was a collaborative experience (McDermott, 1981).

Dewey argued against Plato and others in the modern period of philosophy, saying that their view of knowledge was a spectator theory, meaning that it was a passive collection of facts in the external world and derived from a connection with an individual’s beliefs. First, Dewey believed that knowing developed from doing; it is the activity that is constructed and conceptualized. It shapes and adapts past, present, and future interactions with our environment. Second, Dewey believed that the criterion for knowledge is “warranted assertability,” (McDermott, 1981, p. 129) which was a concept he used as a tool to destabilize truth because of its ambiguous connotations and the relationship to the metaphysical world. By doing this, individual cognition could be viewed as a dynamic process in which a present situation allows for an individual to contemplate a situation and conclude with a consummation. Dewey was inspired by the pragmatic thinking of his contemporaries, C. S. Peirce and William James.
Dewey’s idea of experience was tightly connected to the idea of nature but not as “the-world-as-it-would-be-independent-of-human-experience” (McDermott, 1981). Dewey believed that nature is a system of natural transactions that consisted of three parts. Human experience was one of these parts and was not reducible to any smaller form. Consequently, this notion opposed the more strict scientific representations of nature. Although Dewey embraced the scientific method of investigation as a way of thinking, he thought that the existing dualism between mind and body, fact and value, and individual and social, was inaccurate because it made it difficult to apply reason to human actions. Dewey proposed that a way to overcome dualistic thinking was to focus on what we want as an individual and what we ought to pursue. In this format using ‘we’ grounds our experience in our development and our social history. Extending the scientific method to accommodate practical judgments is similar to the process of collecting facts (Merriam, 2002). This is the fundamental thinking that led Dewey to the issues of Democracy and Education (1916). It was in the 20th century that Jean Piaget and John Dewey developed theories of childhood development and education that led to the evolution of constructivism and continue to heavily influence personal epistemology too.

The modern consideration of constructivism is rooted in classical philosophy. It was Socrates who asked his students questions that prompted them to realize the weaknesses of their knowledge. This Socratic dialogue continues to be an important tool in the way constructivism views student learning and understanding of knowledge and uses the environment to create new experiences for understanding knowledge. In constructivism the external world is not rejected; it is merely limited to reinforcing individuals’
availability for representing their experiences by reinforcing a scheme or rejecting it.
There are two basic principles: (a) Knowledge is not passively received through the
senses or by communication but is actively constructed by the thought and social
interactions of the individual with the environment, and (b) the function of the
individual’s cognitive processes is adaptive to the individuals’ experiences, not the
objective ontological reality (Carpendale & Muller, 2004, p. 113). Constructivism
declines to directly validate knowledge by comparing individual truths with the external
environment; the primary issue is how an individuals experience their world, organize
their thoughts, and determine their experience. It is important to distinguish
constructivism and social constructivism, also known as constructionism.

Social constructivism views knowledge solely as the product of social processes of
communication and mediation and is drawn from Kant’s idealism. Kant believed that our
interpretive categories used to construct the world were developed a priori, and
constructivists believe that these concepts and practices are different among groups and
historical periods. Because there is no standard for evaluating conceptual schemes, the
constructivist view seems relativistic and is present in Thomas Kuhn’s, The Structure of
Scientific Revolutions (1962). Kuhn argues that observations and methods in science are
deply theory-dependent and that different paradigms function in different realms. His
position is centered between scientific realism and empiricism. More recently, Neimeyer,
Brooks, & Baker (1996) stated that “as long as there were people asking each other
questions, there has been construction of knowing. Further, constructivism is the study of
learning and knowing and is how we all make sense of our world; and that really hasn’t
changed” (p. 102).
Hofer & Pintrich (1997) point out the connection between constructivism and personal epistemology research in the influences of Descartes, Piaget, and Dewey who were all concerned with the nature and justification of human knowledge. This is more specifically identified as how individuals come to know, the theories and beliefs they hold about knowing, and the manner in which such epistemological premises are a part of and an influence on the cognitive processes of thinking and reasoning (Hofer & Pintrich, 1997). In addition, we see the epistemic questions of justification of knowledge (King & Kitchener, 1994; Perry, 1970), doubt (Bendixen, 2002; Chandler, 2002), and epistemic change (Bendixen & Rule, 2004) in our work in epistemological research.

**Piaget's Theoretical Framework**

In the United States within the last half century, psychology as a discipline has made a major impact on the work of personal epistemology as we have experienced a paradigm shift from behaviorism to a cognitive perspective. In light of this paradigm shift, much of the focus in educational psychology has centered on Piaget's theory of development and constructivist instructional methods. Piaget has been one of the most influential researchers in the area of developmental psychology. He was primarily interested in the biological influences of how it is that we “come to know,” or what he referred to as “genetic epistemology” (Piaget & Inhelder, 1969, p. 81). Piaget separated humans from other living creatures because of our ability to do “abstract symbolic reasoning” (Smith, 1993, p. 8). Piaget (1971) focused on four developmental factors related to an individual’s cognitive functions: (a) biological factors, (b) equilibration factors, (c) social factors, and (d) education and cultural factors.
According to Piaget (1971), the process of development is carried out in a series of stages, each of which has a cognitive and logical form. He viewed developmental stages as being in a particular order because of the equilibration process (Kitchener, 1986). Piaget applied his stage theory and introduced four basic stages of cognitive development: (a) sensory motor, (b) pre-operational, (c) concrete operational, and (d) formal operational.

According to Piaget (1969), during the sensory motor stage, birth to age 2, intelligence takes the form of motor actions. Infants and toddlers use their senses to input information observed in the external world but are limited to motor reflexes to communicate and understand. However, as they build up their reflexes as a means of developing more sophisticated procedures, they learn to generalize their activities to a wider range of situations and coordinate them into a repertoire of behaviors.

In the pre-operational stage, between the ages of 3 and 7 according to Piaget, intelligence is seen as intuitive in nature. This is the stage of development in which children begin to acquire representational skills, and their thinking is more conceptual. This is also a time when language begins to develop rapidly. Piaget used the term egocentric to describe the self-oriented nature of their thought processes. He thought that children were limited to using their representational and language skills to view the external world only from their own perspective.

In the concrete operational stage, between the ages 8 and 11, cognitive structures are logical but depend on simple, unidimensional, concrete ideas. At this phase, children have the capability to consider another person’s point of view and consider more than one perspective simultaneously. In doing so their thought process becomes more logical,
flexible, and organized. Piaget argued that children at this stage have the capacity to understand concrete problems, but they are incapable of considering or solving abstract problems and have not become cognizant of the diverse consequences that exist as a result of their behavior. Children during this phase of development acquire the ability to understand principles of conservation, classification, sequencing, and spatial reasoning.

According to Piaget, the final stage, formal operations, takes place from the ages of 12 and 15. Thinking in this stage involves integrating complex, abstract, and multidimensional characteristics (Piaget & Inhelder, 1969). Children in this phase of development have the capability to think logically and reason deductively with regard to evidence and decision making. Piaget thought that this was the ultimate level of cognitive development. He believed that individuals would come to a crossroads as they moved into and through adulthood, in which they would have to revise knowledge their knowledge base; however, he supported his position that thinking at a formal operational stage is really the peak of cognitive processing and maintained that thinking does not get anymore powerful (Piaget, 1970).

While thinking in terms of the development of how children understand knowledge and the process of knowing, it is beneficial to distinguish the criteria that Piaget conceptualized as a stage. There are five criteria that reflect a stage according to Piaget (1971):

1. Sequential order of succession must be constant, although the age at which an individual reaches a particular stage may vary. It is not necessary to reach the highest stage, but no stage can be skipped, switched, or regressed. The last detail is not clear because Piaget has indicated that regression can occur in unusual
circumstances. There is some debate about clarity of the regression, specifically if it is a regression of a performance or competence nature (Kitchener, 1986).

2. Concepts at a lower level are necessary for building and advancing to the next stage. Even though the concept will be present in the advanced stage, it will be present in a different form.

3. Each stage is compartmentalized to represent one piece of the whole structure, and once a compartment is achieved, an individual can perform all functions outlined for that stage. Piaget sets this stage criterion to pertain solely to his cognitive theory of intelligence (Kitchener, 1986).

4. The view of preparation and completion at each stage is represented by Piaget through some disequilibrium:
   a.) Each stage begins with preparation of the goal and ends with completion of the goal at that stage (Piaget, 1967).
   b.) Stages overlap; each stage is the completion of the previous stage and the preparation for the next stage (Piaget, 1971).

5. Every stage produces some degree of equilibrium; however, individuals’ cognitive structures become balanced at each stage, again, substantiating the progressive nature of each piece as it contributes to the whole sequence (Piaget, 1971).

Piaget’s theoretical framework will be revisited in more detail as it pertains to each model of epistemological development. Many of the models are grounded in some form of Piaget’s conceptualizations of cognitive development.
Piaget outlined several principles for building cognitive structures throughout his stages of cognitive development. Based on a child’s experience and genetics, if an experience is familiar, they derive information and assimilate, whereby the information fits neatly into their existing cognitive map. However, if the information or the experience is unfamiliar or contradictory the child must accommodate their cognitive map, therefore adjusting their cognitive map to make the information correspond. The process of accommodation occurs, Piaget believed, because the cognitive structures lost equilibrium and required an equilibration process. For Piaget, this equilibration process is a constant attempt to adapt to the environment and construct stronger cognitive structures.

The goal of Piaget’s genetic epistemology was to expand the theories of knowledge about cognitive development in children. He thought that children’s logic and modes of thinking start out extremely different from adult cognitive processes. He viewed knowledge as a progressive construction, beginning with lower and less capable structures that develop into much stronger mechanisms as individuals progress through life (Flavell, 1999). Piaget assumed that there was a bond that existed between a child’s biology and their environment; he called this function interactionism (Piaget, 1969).

The problem that arises in Piaget’s stage theory is that children’s development is driven precisely by the stage that they presently in. This means, if a child is in one stage, he cannot successfully master tasks in another stage. There have been substantial criticisms of Piaget’s stage theory. There are questions that are raised about whether children really develop adhering to these criteria and also the argument that not all children reach formal operations (Driscoll, 1994). His work has been criticized for
underestimating the ability of very young children and being overly optimistic about the capabilities of older children (Slavin, 2006).

Regardless, Piaget has been incredibly influential in the search to tap into children’s cognitive understanding. In the 1960’s, researchers focused on Piaget’s ideas that children begin development with an egocentric subjectivity, meaning that they are incapable of understanding conceptual, perceptual, or affective perspectives (Flavell, 1999). In the 1970’s, researchers focused on many of children’s metacognitive abilities such as strategies, problem solving, and critical thinking (Flavell, 1999). It was in the 1980’s that researching children was dominated by the investigations regarding a child’s theory of mind. This thread of investigation remains strong in the research of children today. Theory of mind development investigates children’s knowledge about an individual’s most basic mental states, desires, perceptions, beliefs, knowledge, thoughts, intentions, and feelings (Flavell, 1999). The foundation of this research is based on Piaget’s cognitive developmental stages. Piaget explored the implications of his theory primarily in the areas of cognition, intelligence, and moral development. His theory has been applied to classroom teaching methods and curriculum design, primarily in elementary education. It has influenced and is similar to constructivist theories such as Vygotsky and Bruner.

\textit{Vygotsky’s Theoretical Framework}

Vygotsky’s (1978) framework has been widely overlooked in terms of young children’s personal epistemology within a classroom context. Researchers in the area of personal epistemology are beginning to notice the importance of social interaction. For example, Bendixen (2002) reported that as college students reflected about their
epistemic doubt and belief change they emphasized the role of social interactions in their perseverance over epistemic doubt. Bendixen & Rule (2004) elaborate on resolution strategies as a final component in their mechanism of epistemic change process and stress the importance of social interaction in overcoming epistemic doubt. Perhaps there is much to be gleaned from investigating what might be understood from young children’s social interactions and how this may impact their personal epistemologies.

It is often thought that Piaget and Vygotsky were in direct disagreement in terms of individuals’ cognitive development and how they construct knowledge (Smith, Dockrell, & Tomlinson, 2000). Between the two theories, many significant similarities are present with regard to intellectual development: (a) It occurs as a sequence of hierarchical levels or stages; (b) there is a significant social component involved; and (c) biological contributions play an important role (Smith et al., 2000).

The major theme of Vygotsky’s theoretical framework is that social interaction is fundamental in the development of cognitive development. Vygotsky (1978, p. 57) states; “Every function in a child’s cultural development appears twice: first, on the social level, and later, on the individual level.” Therefore, he suggests that interactions among individuals and with their environment first occur externally, as interpsychological experience, and then second, within the individual, which he referred to as intrapsychological. Vygotsky argued that all higher-order functions are actually internally manifested initially through external relationships between individuals. This is in direct contrast to the beliefs of Piaget’s philosophy of egocentrism and socialization.

Another primary difference between the Vygotskian and Piagetian theories is the role of language (Wink & Putney, 2002). Vygotsky considered language and nonlinguistic
behavior as the process that begins at birth with external exposure to the words and actions of others, which are then subsequently internalized by the child. It is only after repeated experiences and a gradual mapping of the language and actions of the outside world that a child gains the capacity to become egocentric or autonomous. Vygotsky (1978) viewed language with a cultural, historical, and social lens and believed that development is first facilitated by interaction and the use of language among individuals. Conceptually it is this process that allows learning to occur and precipitates the restructuring of an individual’s thought process, and, in a reciprocal fashion, the new thinking thereby impacts language (Wink & Putney, 2002). Vygotsky believed that initial developmental stages are derived externally through interactions with others and the higher levels of development are those in which the individual becomes more independent (Vygotsky, 1978).

One of the most important differences in terms of educational implications noted between Piaget and Vygotsky is that Piaget thought development comes first and learning follows, and Vygotsky saw this in reverse, that learning precedes development (Wink & Putney, 2002). A second aspect of contention between the two theories is that of perspective in a broad sense. Piaget viewed his work as epistemological, whereas Vygotsky chose the perspective of pedagogy, the study of the process of teaching and learning (Wertsch, 1985). He focused on components of human learning and development such as: (a) Learning with assistance is paramount to cognitive development; and (b) with the support and assistance of others, an individual’s seemingly limited capacity for learning or problem-solving can be expanded.
This pedagogical perspective allowed Vygotsky to look closely at certain assumptions of intellectual development including: (a) Intellectual development is driven from within an individual; and (b) the capacity for understanding is based on cognitive ability. Vygotsky, like Piaget, thought that children differed in their innate ability but viewed each child as having the potential to achieve higher cognitive understanding based on the circumstances of their learning and by the contributions of their environment. He focused on the child’s learning not solely as a reflection of inherent ability but also as a dimension of the effectiveness and communication of the teacher and the learner. Another assumption is that children learn best if they experience tasks that are within their cognitive level of development, so that tasks which are developmentally appropriate can be achieved independently or with mild to moderate assistance. Piaget’s argument is that when children are given tasks that require interventions or assistance from someone, they are prevented from constructing their own knowledge or self-discovery which then limits an individual’s understanding. Vygotsky’s view is quite different. He believed that children should be exposed to tasks that were developmentally advanced in order to strengthen intellectual capacity. Vygotsky (1978, p.53) stated that “Instruction is only good when it proceeds ahead of development.” A potential drawback to the Piagetian way of thinking is that when children are given free rein to construct knowledge independently, there is a greater chance of increasing the amount of misconceptions that they formulate which, in turn, increases their opposition to changing their misconceptions (Vygotsky, 1978).

It is Vygotsky’s theory that leaves more allowances for the influences of parents, teachers, and peers in terms of cognitive and epistemological development of children.
which are important aspects of the current study. It focuses on the construction of knowledge as a mutual reciprocation of learning through thought and language.

Although it was Vygotsky who introduced the influences of language, he failed to elaborate about how language was actually used in the process of teaching and learning. It was Jerome Bruner (1978) who followed Vygotsky’s vision and studied the language of teaching and learning, primarily through observing young children interacting with their mothers, using Vygotsky’s ideas about the Zone of Proximal Development. Language is initially used as a means of communication with a very small and deliberately chosen circle of individuals; but, once mastered, language becomes internalized and makes internal speech possible. Vygotsky’s work has been influential in Bandura’s theory of social learning and as a key component in Lave’s situated learning theory.

A second important aspect of Vygotsky’s theory is the concept of the Zone of Proximal Development (ZPD) in which higher levels of development are attained when children are engaged in social behaviors (Bruner, 1978). Within the ZPD, it is believed that a child can reach the highest level of understanding and skill within a range of development utilizing either adult guidance or peer collaboration, and this would far exceed what the child could attain independently. In this way Vygotsky’s approach is a demonstration of how intentionality and conscious awareness is produced by using socialization as a catalyst for the development of knowledge.

Piaget and Vygotsky are important in developing a framework for children’s personal epistemology because of their theoretical contributions to early childhood cognitive development, their support of constructivist instruction, and their profound influences on
adult personal epistemological research. Piaget's equilibration process and Vygotsky's zone of proximal development stray from the idea that knowledge is fixed and independent of the individual. Instead, they have opened the door to view knowledge as constructed by the individual based on beliefs and experience. Piaget has contributed to personal epistemology through his emphasis on individual cognitive development and meaningful construction (Moore, 2002). Vygotsky has contributed to our understanding of knowledge as being socially constructed, which involves merging experiences and interactions within one's cultural environment (Bendixen, 2002).

Theory and Research on Personal Epistemology

Epistemology is the study of the nature of knowledge and justification; more specifically it is the study of (a) the defining features of knowledge, (b) the substantive conditions or sources of knowledge, and (c) the limits of knowledge and justification (Audi, 2001). Views of epistemology do not come without controversy. From as far back as Socrates, rationalism, empiricism, and skepticism have debated about the nature of knowledge. Descartes' dualistic view of epistemology undoubtedly has raised more problems that it solved but remains deeply influential (Kuhn, 1962). The cluster of profound problems that he raised about the nature of the human mind and its relationship to the material world are still very far from being adequately resolved.

Educational and developmental psychology have produced a great deal of research pertaining to epistemological development in the past forty years, beginning with William Perry. This has resulted in a variety of perspectives about knowledge from definitional differences to the way knowledge is constructed and evaluated. The focus of
epistemological investigations in the field have revolved around students’ thinking and beliefs about the nature of knowledge and knowing (Hofer & Pintrich, 1997). There will be three sections that follow: (a) discussion and critique of the current models of personal epistemology development including: five developmental models, epistemological beliefs, personal epistemological theories, epistemological resources, and the integrated model of personal epistemology; (b) young children’s personal epistemology including: developmental issues, researching personal epistemology in young children, methodological issues, theory of mind, and connections between theory of mind and personal epistemology; and (c) a section that links all of the components together, introducing the purpose of the study and the research questions.

Review of Developmental Models

In the following section, five models of personal epistemology development will be reviewed including; (a) Perry’s Scheme of Intellectual and Ethical Development (Perry, 1970), (b) Women’s Ways of Knowing (Belenksy, Clinchy, Goldberger, & Tarule, 1986), (c) the Model of Epistemological Reflection (Baxter Magolda, 1992), (d) the Reflective Judgment Model (King & Kitchener, 1994), and (e) the Model of Epistemological Thinking (Kuhn, 1991). Each section includes a brief introduction that links contributions to personal epistemology that relate to this study. Sections on each model have a discussion of the model, empirical support, and a summary and critique section.

Perry’s Scheme of Intellectual and Ethical Development

In the 1950’s and 1960’s William Perry Jr., an educational psychologist, conducted two longitudinal studies. He began collecting information about his students’
interpretations of their learning experience using open-ended interview questions. Perry was not interested in the student’s academic achievements, but rather the open-ended questioning was a strategy used to capture the perceptions of the individual’s overall development.

Discussion of the model. Perry’s subjects were Harvard University undergraduates, predominantly white males from a high socioeconomic class. The students completed a survey, which Perry developed and called Checklist of Educational Values (CLEV). This came from research in the areas of personality and beliefs (Hofer & Pintrich, 1997). The CLEV was administered to a large sample, and using results from the CLEV, Perry would select a significantly smaller sample to participate in annual interviews at the end of each academic year. Contrary to Perry’s hypothesis, the patterns of development resulting from the interviews did not reflect changes in personality traits so much as the confirmation of many logically, coherent, cognitive developmental processes (Perry, 1999).

Perry and his colleagues compiled the interviews and worked out a Scheme of Intellectual and Ethical Development (Perry, 1970). The scheme was comprised of intellectual and ethical development and described a nine-position model and introduced terminology to explain how an individual progresses from one position to another. The scheme reflects mechanisms of change closely resembling Piaget’s model of cognitive development (Piaget, 1950). The team quickly set out to validate these initial findings, which they did successfully. Although continuing to collect more non-homogenous data, the second study had even less female representation, but Perry (1970) stated that women’s experiences would follow the same developmental scheme.
Perry’s scheme includes four main categories: (a) Simple Dualism, (b) Complex Dualism, (c) Relativism, and (d) Commitment in Relativism. The nine positions fall under these main headings.

**Position 1: Basic Duality.** This position represents the simplest set of assumptions about the nature of knowledge and values. The assumption of the dualistic structure in the world is taken for granted and unexamined. This position holds the belief of right versus wrong, good versus bad, and we versus other. Perry (1970, p.87) phrases the division as such: “the familiar world of Authority-right-we, as against the alien world of illegitimate-wrong-others.” It is authority that rules, and the scope of thought is that willpower and work will yield corresponding actions and rewards. Multiplicity is not viewed, and the position is self-defined by ability to follow in the right or desirable fashion of the tradition. The operational concept of knowledge is objective, definite, and organized as a body of facts that constitute the truth about a subject, to be distinguished from opinion, which is subjective and cannot be proven as true.

**Position 2: Multiplicity Pre-Legitimate.** In this position Multiplicity (M) is perceived but only as unreal or alien; both perspectives are represented as (M) because they are perceived but not as a signal of legitimate epistemological uncertainty. As unreal, (M) serves a vague appearance; opposition acknowledges authority not as wrong but rather failing to convey their position with adequate warrants. As alien, (M) assimilates easily to error and otherness. Perry (1999) uses this example; “others are wrong and confused (M).” Assimilated to authority, it leads to opposition: “I am right” translating the authority as being confused. Teachers are the seen as the source of Truth rather than resources. The operational concept of knowledge consists of facts, principles,
axioms, and other items that can be proven although it may be difficult to derive proof. Overcoming this difficulty is a challenge best left to the experts, and individuals hold the idea that there are levels or degrees of expertness.

**Position 3: Multiplicity Subordinate.** In this position, Multiplicity is perceived but with some limitations because authority may not have all of the answers. In the ideal perspective, authority is not threatened and is perceived to evaluate the individual on skill presentation. Students may fear that they are being judged inappropriately. The world view of Position 2 begins to break down in a number of different ways, perhaps most frequently through confrontation with several Authorities who are already established as good authorities and who just happen to disagree. This position is the first display of uncertainty in the world. There continues to be a right-box and a wrong-box, but in Position 3 a box is added for items that are unknown (Moore, Jarrold, Russell, Lumb, Sapp, & MacCallum, 1995). So, in other words, if two good authorities are disagreeing, it is probably because they are dealing with an area where all of the answers have not been found.

**Position 4: Multiplicity Correlate or Relativism Subordinate.** Within this position, there is considerable overlap. In the beginning level of the position, duality is restructured in more complex terms, such as right-wrong versus (M) absolutes that may be doubted or seen as unattainable within a reasonable amount of time. Therefore in (M) individuals have liberty to their own opinion, and there are no better interpretations; one is just as good as another.

Relativism Subordinate is a more advanced perspective that is attained just prior to advancing to the next position. Clearly there are more progressive interpretations on the
part of the individual happening, but there is still a sense that information or ways of thinking remain in the control of the authority. There is more realization that hard work is not sufficient in and of itself, and the individual achieves a stance that there is not an autocratic governing basis for determining what is right. Evaluation is frequently a fragile component as the individual begins to understand the idea of quality versus quantity and the application of information.

**Position 5: Relativism Correlate, Competing or Diffused.** In this position, Relativism is viewed as a way of perceiving, analyzing, and evaluating. Different authorities exist, such as authorities that hold the Truth in math and physics as opposed to authority for which relativism must be used, for instance, an English paper. The operational concept of knowledge lends itself to an individual’s awareness that thought and knowledge can be more intrinsic, that knowledge is always changing or has the potential to change. Knowledge can be shared but not measured, predicted, or counted on to remain the same.

It seems that the latter part of Position 4 and then Position 5 describe the individual’s most significant movement because it represents a transformation in one’s view of the world from essentially dualistic to essentially relativistic and context-bound. Along with this transition, individuals’ attitudes about their role as a student and the way they interpret knowledge and learning shift. The self becomes a viable source of knowledge alongside previous sources. The biggest distinction between the relativism of Position 4 versus 5 is the introduction of being self-consciously aware of the self as an active meaning maker (Hofer & Pintrich, 1997). An individual’s goal is finally understood here, that is to develop intellectually and ethically in order to make sense of and evaluate
knowledge as a means of generating judgments in a diverse and relativistic world (Moore, 2002).

**Position 6: Commitment Foreseen.** In this position, relativism is accepted for all moral or nonreligious purposes, including systematic judgments and actions. Commitment may be perceived as a logical necessity for action in a relativistic world. Interestingly, Perry (1970) includes emotions as a separate entity and emphasizes they can appear with or without any external observable validation of logic. The realization may provoke a variety of responses including: eagerness, ambivalence, dismay, sturdiness, turmoil, or simple acceptance (Perry, 1999). The concept of knowledge is that it is not something that is any longer external and definite, rather something that each individual constructs according to his/her own experience and background.

**Position 7: Initial Commitment.** This position is on the heels of Position 6 where the individual becomes aware of a need for commitment. This position includes the individual’s first commitment. Knowledge is perceived as what individuals have constructed themselves from learning and experience, along with the ethical implications of this view, synthesized into a consistent philosophy.

**Position 8: Orientation in Implications of Commitment.** In this position, individuals may encounter the realization of some of the implications of their commitments. They may experience tension between feelings of tentativeness and finality, expansion and narrowing, freedom and constraint, and action and reflection. This intellectual freedom makes for a dynamic interaction between the self and the environment, requiring stability and flexibility. There is more reflection and elaboration of identity commitments because the individual is coping with and synthesizing solutions for the consequences of their
commitments. The naïve assumption that making a commitment will take care of everything dissolves, and individuals discover the need for multiple commitments. They begin to realize that these multiple commitments, such as career, partner, friends, and lifestyle, are often conflicting.

**Position 9: Developing Commitments.** In this position, individuals assume new priorities and begin to reassess their commitments. Commitments can be either augmented or reconstructed, and balance is welcomed as the individual experiences less tension and more ease with knowledge and commitments. It remains a tentative level in that individuals come to terms with the complexity of the world and their position. They are now able to acknowledge a willingness to struggle through the process in a search for answers.

Perry’s scheme has been instrumental in the development of four other developmental models and continues to be the integral component of current investigations into the study of personal epistemology. He has designed a trajectory of development that progresses in a natural forward direction and assumes patterns in the reorganization of meaning that incur, both a structure and systematic momentum.

**Empirical support.** Kurfiss (1977) focused on validating three developmental constructs from Perry’s scheme: (a) sequentially, (b) hierarchical development, and (c) structural unity. She studied college students from two psychology classes who participated in three interviews. The first session was a two-hour interview in which the students used a Likert scale to verbally rate 40 short statements representing the concepts from eight of Perry’s positions. In the second session the students addressed the same 40 statements as in their first session, except this time they did so in writing. The third
session was identical to the second session. Because of the writing, it was necessary to add another hour so the students could get through all 40 statements. There were eight questions in each of five categories that related to Perry's positions: (a) making moral decisions, (b) role of advisor, (c) how essays should be graded, (d) responsibilities of teacher, and (e) the nature of academic knowledge.

In terms of sequences, Kurfiss (1977) concluded that Perry’s individual positions are sequential and are ordered by increasing cognitive complexities. The hierarchical development did support Perry, but it was not strong support, which was anticipated. The structural unity construct demonstrated that cognitive development proceeds unevenly across different areas, and, not surprisingly, the area where the individual is actively involved was found to advance first.

Clinchy, Lief, & Young (1977) used the Perry scheme to validate its generalizability to adolescent girls. Their major purpose was to examine the relationship between type of schooling and students’ ways of reasoning about moral and epistemological issues. Using Kohlberg’s (1969) scale of moral development and Perry’s scheme of epistemological development, they compared the performance of girls from a traditional and a progressive public high school. Clinchy et al. (1977) determined that previous methods of identifying positions on Perry’s scale (Kurfiss, 1975; Meyer, 1975; Widick, Knefelkamp, & Parker, 1975; Stephenson & Hunt, 1975; Slepitza & Knefelkamp, 1975) had yielded inconclusive results. They chose to adopt an interview format (Clinchy & Zimmerman, unpublished) because interviews seem to consistently provide data that was easy to score and allowed for the highest interrater reliability. They found that the traditional (teacher-centered) and the progressive (student-centered) school students
transitioned through identical positions (but at different rates) of epistemological development which confirmed Perry's scheme. They also, like Perry, failed to identify the actual characteristics of the scale's extremities.

Interestingly, where Perry found little relativistic thinking in college freshmen, Clinchy et al. (1977) found that over 40% of the progressive high school seniors exhibited relativistic reasoning, moving from position 3 to position 5. Considering their findings, the argument was that perhaps progressive schools facilitate development by providing more opportunities for cognitive conflict, perspective taking, and more active participation with one's environment. One of the most significant limitations of this study was the small sample that was used to draw the comparison to Perry. It was also argued by the authors that if the sample had been larger the differences between the schools may have been different. The important point is that using the interview method was a time consuming process and reduced the number of students they were able to evaluate.

Moore (1991) concluded that while interviews may provide a rich and valuable resource for evaluation of epistemological beliefs, they are inefficient to use in academic settings. He suggested two alternative approaches to unstructured interviews: (a) the Measurement of Intellectual Development (MID), a production-task measurement; and (b) the Learning Environment Preferences, a recognition-task measure. He suggested both measures were better than interviews because they eliminated individual's high degree of subjectivity in the individual's responses. Moore (2002) continues to acknowledge the value of in-depth qualitative methods; however, he continues to recommend that efforts be placed toward developing and refining assessments geared
toward individual’s performances set in real-world contexts, and he believes self-assessment data is especially insightful and should not be overlooked.

Mentkowski & Strait (1983) used the MID to validate Perry’s positions with high school students, using a cross-sectional analysis, and found that seniors scored significantly higher on two of the three essays than did the freshman. However, when compared to a longitudinal study looking at the same two essay questions, students had a significant increase over the four year span on the first question while the other question showed a small decrease. King & Kitchener (1990) point out the importance of the Mentkowski & Strait (1983) findings claiming that among college students such a gain typically reflects a qualitative shift from a style of reasoning based largely on personal beliefs to one that explicitly uses evidence in making judgments.

Using his MID and the Defining Issues Test (DIT) (Rest, 1979), Moore (1989) developed an alternative to the interview protocol for measuring epistemological beliefs, called the Learning Environment Preferences (LEP). His findings focused on the design and construct validity of the LEP, but they also offered evidence of Perry’s scheme of intellectual development. The LEP focuses primarily on the stages that Perry found to be most salient in college education (Knefelkamp & Cornfeld, 1978). This narrowed the focus to positions 2 thru 5, which is legitimate because Perry’s upper levels seemed to be most properly assessed by in-depth interviews, and the lowest level had been hypothesized from the onset and never truly measured. Ultimately, the LEP was comprised of five specific domains related to epistemology and approaches to learning: (a) view of knowledge and course content, (b) role of the instructor, (c) role of the student and peers in the classroom, (d) the classroom atmosphere, and (e) the role of evaluation.
Moore (1989) recruited students enrolled in a mixture of universities, state, community, and private colleges ranging from small to large with curriculums that varied among selective, comprehensive, and honors. Gender was equally split between males and females, and students were evenly distributed according to the year of attendance from freshman through senior years. Construct validity was measured on each item by (a) internal consistency of the position-keyed items across the five domains and according to Perry's four positions, and (b) an item factor analysis to determine whether and to what extent the LEP measures the underlying factor constructs corresponding to positions 2 thru 5 and to explore any empirical relationship that could link the items theoretically to the instrument scoring protocol (Moore, 1989).

It was reported that some items were poor because they did not obtain the empirical performance they had anticipated. Some of the items could be discarded without any threat to the internal consistency of the scale while others needed to be revised. There is such little distinction between Perry's position 4 and 5, which Moore refers to as "hybrid" (p. 511), that for clarification between the positions it would be beneficial to rework or replace some of the items in order to make it easier to draw distinctions between the two positions. Moore (1989) indicated that it was helpful for interpreting the LEP to have the scoring system reflect Perry's positions, but admittedly it may not be the most effective empirical reflection for identifying underlying cognitive processes. To get at such cognitive processes, the LEP's scoring system may need to relate more closely to its factor structure.

Zhang (1999) suggested that student's cultural background and experience as it relates to the learning environment may influence students' cognitive development. This
was a cross-cultural investigation for generalizability, comparing one group of students from the United States and two groups from the People’s Republic of China. The Zhang Cognitive Development Inventory (ZCDI) was constructed based on Perry’s intellectual development and was found to be valid and reliable. Her findings were problematic for incorporating Perry’s scheme to the Chinese culture. However, using the ZCDI the U.S. students matched Perry’s progression.

Zhang (1999) reported an interesting pattern in the Chinese college students. She found the patterns of cognitive development were not hierarchically consistent with Perry. One of the Chinese groups showed that the college freshman groups scored the highest in relativism and commitment in relativism but lowest in dualism. The dualism scores showed steadily more strength in the sophomores and still stronger in the juniors. The juniors actually had the lowest relativism scores, followed by the sophomores with the lowest. The seniors from the People’s Republic of China were minimally less dualistic and had slightly more relativism and commitment in relativism. The other Chinese group did show some cognitive development changes very similar to Perry’s scheme. One of the problems was that the two Chinese groups were investigated over two years apart. Although this study may imply that Perry’s model is not generalizable to diverse cultures in general and the Chinese culture specifically, it did show a systematic progression but in reverse. This finding could have significance in the proposed study or even provide support for varying theories with trajectories that differ from the traditional developmental models of personal epistemology.

Some researchers suggest that students’ understanding of knowledge is related to the types of epistemological assumptions they are exposed to, for example, the
epistemological assumptions of teachers (Hofer, 2004a; Schraw & Olafson, 2006). Based on Perry’s model of evolving epistemological development, Hofer (2004a) concluded that teachers can influence student’s understanding and epistemological development in multiple ways. Her study used classroom observation and interviews with the college students in two different courses. The observations aimed toward investigating how beliefs about knowledge and knowing are communicated in a college course and how they are situated within classroom interactions. This methodology veered slightly from Perry’s CLEV and interview process in that it incorporated classroom observations. One of the significant conclusions from the study came from the interviews: students’ evolving understanding of knowledge might also alter their sense of self. This is important in researching young children’s epistemological onset because it suggests that the impact of entering a classroom environment can influence beliefs and knowledge but might affect a children’s sense of identity and their relationship with others, for example, parents and peers.

Summary and critique. Perry’s work is ground-breaking and paved the way for nearly 35 years of investigation of epistemological understanding. However, Perry himself attributed several limitations to his research. First, his research sample was comprised largely of young, white, upper-class, male subjects who attended Harvard University in the 1950’s and 1960’s. Second, the subjects were strictly volunteers, and many of the members of the research team served a dual role, in that they were subjects and helped analyzed the data. This matter places the validation of the study in question. Third, the first and ninth positions were not actually identified in Perry’s study but rather extrapolated based on the other seven positions. Fourth, the beginning positions seem to
be more explicitly epistemological than the latter positions; therefore the scheme’s
description is less noticeably “spatial-cognitive restructuring” and more toward
“emotional and aesthetic assessments” (King & Kitchener, 1994; Perry, 1970, p. 205).

Perry and his colleagues appear to have loosely adopted the Piagetian framework for
two reasons: (a) They had expected to link their findings with personality characteristics,
but when they began seeing patterns of epistemological understanding between
individuals and over time they had to search for desirable alternatives; and (b) very
simply it was the best framework available that would portray a cohesiveness throughout
the progression and could withstand the coherence of the individual’s interpretations in
such a way that would allow them to implant position 1 and 9 based on inference.
Ultimately, Perry’s nine positions were reduced to four categories (Hofer, 2001; Moore,
2002): dualism, multiplicity, contextual relativism, and commitment to relativism.

Researchers in the field (Hofer & Pintrich, 1997; King & Kitchener; 1994) have
criticized Perry’s work because of concerns about whether the responses capture a true
structural, developmental trajectory or are more just artifacts of the socialization process
in values of a liberal arts education at that place and time. It is not clearly explained in
the Scheme about what occurs prior to and including Position 1 or is it hypothesized what
might happen to knowledge after Position 9. The progression from dualism to relativism
is not all that well-defined in terms of how knowledge is interpreted beyond the positions,
especially in the later positions where intellectual and ethical development, issues of
epistemology, and identity intersect during the affirmation of commitment (Perry, 1981).

The methods used by Perry (1970) are not particularly efficient at measuring change
and are functionally time-consuming. There is a question of validity in that the
developmental process of the individuals and their value systems could be easily misconstrued. Many researchers have taken on the task of modifying the Scheme with interviews and various written assessments (Baxter Magolda, 1992; King & Kitchener, 1994; Knefelkamp & Slepitz, 1978; Schraw, Bendixen, & Dunkle, 2002). Even with these theoretical and methodological contributions, epistemological development continues to have many unresolved issues, considerable virgin soil, and much speculation especially with younger children.

Perry’s work precipitated the movement of investigating college-age students’ epistemological beliefs (Baxter Magolda, 1992; Belenky Clinchy, Goldberger, & Tarule, 1986). However, many researchers who have followed a similar framework to Perry’s positions have gone on to suggest that this phenomenon can be detected at varying ages such as middle childhood (Carpendale & Chandler, 1996; Kuhn, Chaney, & Weinstock, 2000; Lalonde, 1996) and teenage years (Boyes, & Ball, 1990; Reich, Oser, & Valentin, 1994; Rosenberg, Hammer, & Phelan 2006).

Perry’s Scheme of Intellectual and Ethical Development has activated a wealth of research in the area of personal epistemology, primarily in college students. The pendulum appears to be shifting, and researchers are beginning to investigate how Perry’s scheme might apply to children and even very young children (Burr & Hofer, 2002).

Women’s Ways of Knowing

Belenky, Clinchy, Goldberger, & Tarule (1986) joined forces to investigate women’s issues concerning knowledge and learning. They adopted Perry’s Scheme and developed Women’s Ways of Knowing, a developmental model with five perspectives “from which women view reality and draw conclusions about truth, knowledge, and authority”
Belenky (1986, p. 3). Perry (1970) utilized an implicit visual metaphor, but, in contrast, the Belenky et al. (1986) model uses voice as their metaphor. They conducted their research with only women in the same fashion as Gilligan (1982) and, in direct opposition to Perry’s sample; they chose women from all walks of life, from college institutions to the Department of Public Welfare. Their goal was to explore whether there were certain conceptions of knowing that could be detected in the “voices of women” (Belenky, Bond, & Weinstock, 1997, p. 55). Hayes & Flannery (2000) explain that in women specifically but minority groups in general, voice can imply communication or connectedness with other people. Voice can be viewed in the same way in researching young children. Voice becomes a more sophisticated way for children to communicate, and while language may be an obstacle in learning what children know and understand, voice is always present (Dowling, 2005).

Discussion of the Model. Woman’s Ways of Knowing differs from Perry’s scheme structurally. Perry describes his stages in a systematic format much in the same way Piaget introduced his cognitive stages of development. Belenky et al. (1986) do not view their findings as developmental in nature but rather as traditions that can be contextual and non-linear (Belenky et al., 1997). It should be pointed out that the different ways of knowing are not intended to be fixed or universal stages of epistemological development, and that culture and social context would undoubtedly unfold as a significant factor; therefore, in most cases ways of knowing should not be expected to be generalizable.

Belenky et al. (1986) conducted 135 in-depth interviews, ranging from two to five hours. The approach was phenomenological, so it allowed the women to convey their own meaning making experience through the semi-structured interviews. The protocol
involved gender, relationships, education, and ways of knowing. They did not include culture, economic, or affective dispositions, but they did segregate the ways of knowing section from the educated women and the less educated women. The educated participants were asked to respond to one or more statements about the conception of knowledge and were then probed further about issues of expertise and truth. They were then quizzed on topics of intellectual judgment and justification. The less educated participants had a much less involved interview; they were asked five shorter questions involving the expertise of their own learning.

<table>
<thead>
<tr>
<th>PERSPECTIVES</th>
<th>METAPHOR</th>
<th>DEFINITION</th>
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<tbody>
<tr>
<td>1 SILENCE</td>
<td>Deaf &amp; Dumb</td>
<td>Voiceless, relies on external sources of knowledge</td>
</tr>
<tr>
<td>2 RECEIVED KNOWING</td>
<td>Listening to voices of others</td>
<td>Use of listening as a key to knowledge</td>
</tr>
<tr>
<td>3 SUBJECTIVE KNOWING</td>
<td>The inner voice &amp; the quest for self</td>
<td>Beginning trust of own knowledge</td>
</tr>
<tr>
<td>4 PROCEDURAL KNOWING</td>
<td>The voice of Reason</td>
<td>Separate and connected ways of knowing become systematic at finding solutions</td>
</tr>
<tr>
<td>5 CONSTRUCTED KNOWING</td>
<td>Integrating the voices</td>
<td>Knowledge is reliable &amp; comes from self &amp; others</td>
</tr>
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</table>

The interview questions Belenky et al. used were a collage from the theories of Perry (1970), Gilligan (1982), and Kohlberg (1969). For data analysis the questions were
separated by theorist and evaluated, and an attempt was made to fit the information into Perry’s Scheme. When the Women’s Ways of Knowing Model did not coincide with Perry’s scheme, they introduced five new classifications for epistemological perspectives that are represented by the metaphor of “voice and silence” (Belenky et al. 1986, p. 17) (See Table 1).

Silence. This was not a highly represented position in their sample but is a significant example of the extreme denial of self and the extreme dependence on external authority for direction. The women representing this level were among the most economically, socially, and educationally deprived. Other characteristics include the following: (a) a poor sense of self, with no internal voice; (b) thought processes linked to the immediate present and concrete experiences; (c) a short attention span; (d) a complete polarization of authority; (e) obedience to authority because of fear of punishment; and (f) difficulty forming bonds with others.

Interestingly, while considering the cultural implications of Women’s Ways of Knowing, Belenky & Stanton (2000) modified the Silence perspective to Silenced, a small but mighty shift when considering the different connotations of each term separately. Their intention was to help distinguish that perspective from contrasting observations made in non-Western cultures. Hurtado (1996), for example, found that African-American women use silence as an information-seeking strategy. An interesting question could be as follows: is there any relationship between the way in which minority women use their voice, and how young children develop their voice? The proposed study may be able to shed light on this question.
Received Knowing. In this stage, epistemological perspective is either/or thinking; all information and ideas are viewed as good or bad, and there can only be one right answer. The origin of knowledge is external, and the self has nothing to do with knowing; however, individuals are able to verbalize the external source of knowledge where the silenced women are paralyzed. The women who occupied this position do not view themselves as aligned with any authority. Although this position corresponds to Perry's dualism, the male counterparts in his research do view themselves as aligned with authority (Hofer & Pintrich, 1997).

In this position, individuals are open to what others say but do not speak with their own voice and do not view themselves as on an equal level. Some other outstanding characteristics are the following: (a) faith that others can provide valuable information and direction, (b) confidence in their ability to store information but a reluctance to do anything with the information, (c) dualistic thinking, (d) intolerance for any ambiguity, (e) dependence on authority, (f) desire for ways to adapt and conform (g) a tendency to leave challenging environments where they cannot adjust, (h) concern for others but not themselves, and (i) extreme difficulty with communication (Belenky et al. 1986).

Subjective Knowing. Women in this position continue to think somewhat dualistically but realize that the source of knowledge is within the self; therefore, it seems interchangeable with Perry's early multiplicity position. Hofer & Pintrich (1997) point out gender differences in the meaning making with the men in Perry's (1970) results. Men expressed the right to have their own opinions, whereas the women viewed truth as coming from personal experiences in an intuitive manner. The sense of self overcomes reliance on outside authority and replaces it with intuition. This type of knower will
often deflect influences of others and refer all decisions to a gut feeling. This epistemological perspective can be characterized by: (a) an understanding that individual interpretations are more valid than authority, (b) placing value on feelings over ideas and on intuition over reason, (c) skepticism toward rational thought and procedural approaches, (d) vast attention to personal experience, and (e) utilization of self-talk as a means of developing a voice.

*Procedural Knowledge.* This perspective is divided into two parts: separate and connected ways of knowing. Separate knowing is the abandonment of subjective knowing to assume a skeptical frame of reference, using procedures as a means for evaluating any situation or making decisions. Gaining use of procedures empowers the individual (now viewed as a learner) to go beyond subjectivism. This is aligned with Perry’s relativism. It is a type of critical thinking but more detached. Subjective thinking perceives it as possible for everyone to be correct, but separate knowing perceives that it is possible for others and themselves to be incorrect. Separate knowers can be identified by their: (a) preference for argument and emphasis on doubt; (b) need to be prepared and confident before speaking; (c) strategic approach to dealing with people and tasks; (d) acceptance of established standards; (e) emphasis on procedure, methodology, and objectivity; and (f) problem solving ability.

The second part of procedural knowing, connected knowing, maintains the subjective aspect of knowing but at the same time develops procedures for gaining access to others’ knowledge and interpretations. The impersonal knowledge becomes personal, and the learner transitions to a more empathetic and caring perspective as a means of understanding rather than judgment. The individual who experiences connecting
knowledge demonstrates characteristics such as: (a) putting forth effort to emphasize trust, (b) being able to adhere to multiple perspectives without necessarily being swayed to alternative points of view, (c) displaying a preference for being non-competitive and non-judgmental, and (d) showing no hesitation to accept assistance from others to negotiate and develop ideas.

**Constructed Knowing.** This perspective integrates received subjective and procedural ways of knowing in order to construct knowledge. This individual will use the following: (a) reflection to articulate understanding in an exploratory way; (b) self-awareness to complement sensitivity to others; (c) tolerance as a strategy for conflict, ambiguity, stress, and internal contradictions; (d) contextualization when needed for solving problems with little structure; and (e) environments that value diverse perspectives and ideas. The individual definitely views herself as a participant in the construction of knowledge, as one who can construct and reconstruct different frames of reference.

One conceptual difference that exists between Perry’s Scheme and *Women’s Ways of Knowing* is that Perry’s positions are descriptive about the nature of knowledge and truth, whereas Belenky et al. (1986) focus more toward the source of knowledge and truth. Their scope of questioning relied heavily on reflection of self in relation to knowledge. They reported that once the idea of self generalizes it strongly affects how women think about knowledge, truth, and expertise. They compare this process to Piaget’s horizontal decalage, which refers to the repetition that takes place within a single period of development as opposed to vertical decalage, which is repetition that occurs at different levels of functioning. In other words, the individual experiences changes about knowledge within themselves or self-knowledge prior to their understanding of self in
relation to knowledge and truth. *Women's Ways of Knowing* uses a sociocultural perspective (Vygotsky, 1978) in its use of diversity in culture and age. The combined Perry (1970) and Belenky et al. (1986) theories can demonstrate structural differences that are developed from different gender voices.

*Empirical support.* Measurement of personal epistemology has historically been an obstacle for researchers, including the tremendous time factor involved with interviews and the imposition it requires in educational settings. Buczynski (1993) attempted a paper-and-pencil questionnaire designed to measure the perspectives developed by Belenky et al. (1986); the measure is called the *Ways of Knowing Instrument* (WOKI). The sample investigated was comprised of 348 female undergraduates. The analysis supported a 5-factor model of intellectual development for women and appeared to support the five dimensions of Belenky et al. (1986); however, the instrument was not vastly adopted by the research community although it was found to be a reliable and valid measure.

Tennant & Poquson (1995) used *Women's Ways of Knowing* and found no differences in perspective between traditional and non-traditional students. This seems counterintuitive and in direct opposition to the findings of Belenky et al. (1986). This is an important finding because one of the emerging issues in personal epistemology is the possibility that there is a recursive nature to beliefs about knowledge. In addition, it contributes to the idea that personal epistemologies may be more context-dependent or context-specific. We have yet to scratch the surface of either issue, and the present study provides an opportunity to investigate both possibilities.
Luttrell (1989) studied working-class women and their ways of knowing and how it was affected by gender, race, and class. This study looked at two groups of women: (a) African-American working-class women who attended a basic education program serving maintenance and housekeeping employees at a Southeastern university, and (b) Caucasian working-class women who attended an urban northeastern community-based program. She intentionally targeted women in learning environments and women who were also working. Vast demographic information was collected on the women. Additionally they were observed in their respective classrooms, notes were taken, and grade equivalency testing was conducted. Fifteen women from each group were chosen to participate in in-depth interviews, and the final interview for each woman took place at their home and ranged from 2 hours to 4 hours in length. Within each group of women, there were identifiable similarities, which were expected, but there were minimal similarities between the groups of women. Surprisingly, the one area that both groups of women had in common was that they all had children and that was the biggest factor for all of them dropping out of school. Luttrell (1989) concluded her findings were similar to Belenky et al. (1986) when compared to Perry (1970) because of the underlying themes geared toward unconscious psychodynamic factors, cognitive development, and gender-role socialization. These women had developed inclinations toward their self and knowing that were less linear, separate, and hierarchical as compared to men in the Perry (1970) study. The findings also suggested a similar trajectory in that the women showed more of a continuous and connected sense of self-knowledge which was embedded in their social relationships and was related to their background knowledge and experiences. Through qualitative analysis it was summarized that although it was still difficult to
pinpoint precisely how the women internalized rationality and knowledge, it was clear that the outcome continues to falsely dichotomize emotion and thought; subjectivity and objectivity; and mind and body (Luttrell, 1998).

Brown and Gilligan (1992) did a study that directly links *Women's Ways of Knowing* to the current study because it investigates personal epistemological development in young girl’s over time. Brown & Gilligan (1992) is a ten-year longitudinal study with young girls entering adolescence and through their teens. What they found over the course of their discussions was that younger girls have strong voices and are unafraid of speaking the truth about their feelings, thoughts, and experiences. However, once on their way to becoming young women, these same girls who seemed at first open and uninhibited had experienced a significantly diminished voice and appeared to be disconnected from themselves. They concluded that the transition they had witnessed was that “developmental progress goes hand-in-hand with evidence of a loss of voice” (p. 6). They observed a struggle to authorize or take seriously their own experience, to listen to their voices in conversation, and to respond to their feelings and thoughts, increased confusion, and sometimes defensiveness.

In another study using the *Women's Ways of Knowing* framework, Llorens (1994) claimed that the voice that is missing in educational research is the voice of the teachers. Her goal was to find out why more teachers did not conduct more action research in their classrooms and what it might take to encourage teachers to find their voice. The study looks in-depth at 38 teachers from a variety of perspectives: educational background, teaching experience, instructional approach, goals, and classroom assessment. Data was collected from the experimental group over four months and included semi-structured
interviews, group brainstorming, a weekly reading meeting, and individual journal entries. The control group had a pre-interview and a post-interview discussing the same topics as the experimental group without the intervention. The findings were compatible with *Women's Ways of Knowing*. The teachers involved in the experimental group began to realize that the silencing they were experiencing was related to the female role models in their lives. Upon reflecting on their female students, the teachers were able to see patterns of what they had been exposed to and how they themselves might be impacting silence within their female students. Personal commitment and passion were also missing in the teachers in previous action research projects. This precipitated a disconnection from their work in the classroom. This is pivotal for successful action research because personal connection with the content and the students is the only way for a teacher to regain their voice (Zeichner, 1993). In Llorens (1994) it is the personal disconnect and lack of commitment that is consistent with Belenky et al. (1986).

Summary and critique. Like Perry (1970), Belenky et al. (1986) opened themselves up for criticism by intentionally investigating all women. They also generalized that their findings could be found in the male population but provided no means to assess the gender-related nature of their findings (Hofer & Pintrich, 1997). Their decision to expand the investigation to include less educated women had good possibilities to really see differences, but the decision to utilize two different protocols immediately infuses questions about the conclusions regarding the differences in the epistemological perspectives of the women. Perry's scheme included a position of Basic Dualism in which ideas are either right or wrong, but there is no inference of a power imbalance between the authority and the knower. Belenky et al. (1986) failed to include a
perspective representative of this type of thinking or knowing. They give validation to the Subjective Knower's voice, provided the voice can be interpreted as the only authority. Subjectivity does not prevail in *Women's Ways of Knowing*, however, except when knowledge is subjective to the knower.

Hofer & Pintrich (1997) raise the question about the order of the question sets: that there is a possibility that by asking the “relationship” set prior to the set on “ways of knowing” the women may have been primed. They raise the question because of the findings that women have a relational, connected approach to knowing. The division of procedural knowledge into separate and connected knowledge has had an impact on epistemological development as they appear to be gender related. Feminists have taken on work in this field, including the authors, and assert that power issues may drive many of the differences (Erwin, 1983). Belenky et al., (1986) lean toward empathy as another possible explanation. Baxter Magolda (1989) asserts that differences in ways of knowing may be related to feelings of confidence. These hypotheses eventually relate to affective dispositions and how they can affect an individual’s perspectives about the nature of knowledge and the process of knowing. This is pertinent to the proposed study because affect will be investigated in terms of how personal epistemologies may be constructed in young children.

Belenky et al. (1986) broach the issue of cultural diversity (which is a limitation of Perry’s scheme) and its importance to the ways women know, and they never claim universality. This resonates with personal epistemology research and how it tends to overlook sociocultural issues and their contributions to shaping individuals’ beliefs about knowledge. Goldberger (1996) calls for more research that uses a more diverse
sociocultural perspective, and the Zhang (1999) study with the Chinese students supports this request. Further, Zhang (1999) proposes that the different cultural and educational systems between China and the U. S. may create different patterns of cognitive development. She suggests that cultural background has a supreme impact on critical factors related to cognitive development such as decision making, instructional approaches, and personality formation.

Belenky et al.'s (1986) model does not use the concept of stages but rather perspectives. However, while there may be no explicit hierarchical claim, their work is full of developmental references. For example, when Belenky et al. (1986) discuss subjectivism, they state that “developmentalists in the past have noted that this kind of shift in orientation toward authority-from external source, which binds and directs our lives, to an adherence to authority within us-is one of the central tasks of adolescence” (p. 139). Belenky & Stanton (2000) refer to constructed knowing as the endpoint of development with regard to discussion about Women's Ways of Knowing. Weinstock (1989) has accepted the transitional and developmental nature of the model, breaking them down even further into specific developmental phases.

Exploring women's conceptions of knowing through their own voice is an important goal in the proposed study because in developing a framework for children's epistemology it will be critical to hear the voices of the child and the significant participants that scaffold the knowledge and understanding that the child finds meaningful. Women's Ways of Knowing is also particularly useful in the proposed study because of its focus on the influence of parents and teacher. The study calls for the
parents and the teacher to be very reflective of their own experiences and their observations of the child.

Epistemological Reflection Model

The Epistemological Reflection Model (Baxter Magolda, 1992) has been influential in the study of personal epistemology. The model builds on the work of Perry (1970) and Belenky et al. (1986) in a way that addresses one of the primary limitations of the previous works by targeting the potential gender-related differences in epistemological development. Baxter Magolda began her contributions somewhat differently. First there was the development and validation of a written instrument, the Measure of Epistemological Reflection (MER), as a way to quantify ways of thinking (Baxter Magolda, 1987). In contrast to Perry (1970) and Belenky et al. (1986), the MER is a short-essay production task that poses questions about the role of the learner, instructor, and peers; an evaluation of learning; the nature of knowledge; and educational decision-making. These domains were central to Perry’s theory and relied on Loevinger & Wessler’s (1970) data analysis and Gibb & Widaman’s (1982) domain coding procedure (Baxter Magolda, 2004). Initially, Baxter Magolda (1992) analyzed the data using the first five positions from Perry (1970) and the five perspectives from Belenky et al. (1986), also allowing for room to insert additional categories if needed. Later, she reanalyzed the data in a more qualitative form which resulted in the Epistemological Reflection Model (Baxter Magolda, 1992). Further studies to validate the MER resulted in a coding manual based on more than 1,000 MER responses (Baxter Magolda & Portfield, 1988).
Table 2: Summary of Epistemological Reflection Model
Baxter Magolda (1992)

<table>
<thead>
<tr>
<th>WAYs OF KNOWING</th>
<th>ABSOLUTE</th>
<th>TRANSITIONAL</th>
<th>INDEPENDENT</th>
<th>CONTEXTUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEMALE</td>
<td>Receiving Private listening Recording</td>
<td>Interpersonal Discussion Resolve uncertainty by personal judgment</td>
<td>Inter-individual</td>
<td>Inter-individual</td>
</tr>
<tr>
<td>MALE</td>
<td>Mastery Public demonstration Challenging</td>
<td>Impersonal Debate Resolve uncertainty by logic</td>
<td>Individual</td>
<td>Individual</td>
</tr>
<tr>
<td>Nature of Knowledge</td>
<td>Knowledge is certain or absolute.</td>
<td>Knowledge is certain and partially uncertain.</td>
<td>Knowledge is uncertain, and everyone has his own beliefs.</td>
<td>Knowledge is contextual &amp; judged on the basis of evidence within the context.</td>
</tr>
<tr>
<td>Role of Learner</td>
<td>To obtain knowledge from the instructor. They believe that authorities have all of the answers.</td>
<td>To achieve knowledge from the instructor and make meaning of that knowledge. Discovery that authorities are not all-knowing and begin to accept the uncertainty of knowledge.</td>
<td>To think for themselves &amp; share their views with others. They are able to question authority as the only source &amp; will begin to develop their own perspective &amp; hold their opinions as equally valid.</td>
<td>To have the ability to exchange &amp; compare perspectives. They are capable of constructing an individual perspective by judging evidence in context.</td>
</tr>
<tr>
<td>Role of Instructor</td>
<td>To communicate knowledge appropriately, they should ensure the student understands the knowledge.</td>
<td>To use methods that aim toward student understanding and to use methods that help apply the knowledge.</td>
<td>To be willing and able to promote independent thinking &amp; promote the open exchange of ideas.</td>
<td>To promote the application of knowledge in context &amp; promote evaluative discussions on perspectives.</td>
</tr>
<tr>
<td>Role of Peers</td>
<td>To share materials.</td>
<td>To get involved in active engagements.</td>
<td>To openly exchange ideas &amp; serve as a source of knowledge.</td>
<td>To be able to enhance learning through quality contributions.</td>
</tr>
<tr>
<td>Evaluation of Learning</td>
<td>Evaluation is a vehicle to show the instructor what the student has learned.</td>
<td>Evaluation is a means to measure students’ understanding of the material.</td>
<td>Evaluation rewards independent thinking.</td>
<td>Ultimately all students are responsible for their own judgments and constructed perspectives.</td>
</tr>
</tbody>
</table>
Discussion of the model. The Epistemological Reflection Model (Baxter Magolda, 1992) consists of four ways of knowing: (a) absolute, (b) transitional, (c) independent, and (d) contextual (See Table 2). It is important to note that three of the four categories contain a gender-related distinction; contextual ways of knowing is not based on evidence but rather hypothesized (See Table 2). Each category leads to a “particular expectation of the learner, peers, and instructor in learning settings, as well as to an understanding of how learning should be evaluated and how educational decisions are made” (Baxter Magolda, 1992, p. 29). There is less focus on knowledge alone, but rather the emphasis is on the nature of learning in the context of a college classroom. Baxter Magolda was particularly interested in gender-related issues of epistemological understanding, and her motivation to shift the conceptual frame slightly was due to the troublesome attempts to match student responses to Perry’s scheme and the apparent discrepancies between the men in Perry’s study compared to the women in Belenky et al.’s (1986) work.

Empirical support. Baxter Magolda’s (1992) framework is the result of a five-year longitudinal study of epistemological development and how epistemological assumptions affect individuals’ interpretation of their educational experiences. However, this was limited because the terms in which she defined epistemology for the study largely consisted of students’ perceptions of their learning experiences and involved only students at Miami University. The model is a representation of 70 graduate and undergraduate college students who completed annual open-ended interviews, and at each interview the students were given a MER to complete and return later. Year-one interviews addressed the original six issues involved in the development of epistemological understanding but was modified later to incorporate questions about the
nature of knowledge, out-of-class learning, and individual changes as a result of students' experiences with learning.

The Epistemological Reflection Model impacted the research in personal epistemology because it investigated gender-related patterns of epistemological development by researching both men and women. The conclusion was that there are in fact patterns in gender-related differences of knowing, which Belenky et al. (1986) speculated; however the patterns can be detected in both genders, so they are not gender-specific. The model encapsulated more middle-class socioeconomic groups of students, however, and sociocultural diversity was limited since the population was restricted to a Midwestern university whose enrollment was 97% Caucasian.

In a later study, Baxter Magolda (2003) illustrates how four practice samples using her constructivist approach to analyzing qualitative inquiry mimic findings of Baxter Magolda (1992) during a broader study investigating identity and learning. Her microgenetic study looks at four students and focuses on making identity central in learning to promote learning and self-authorship. There are four frameworks: multicultural education, community development, academic advising, and student affairs’ role in leading educational transformation. This brief study resonated with many of the findings from her longitudinal work, including how students encountered significant challenges during college. When challenged, students were most often offered external formulas for how to handle them instead of being engaged in real struggles to determine how these challenges shaped their beliefs about themselves in relation to their environment. She concludes that her proposed framework for promoting self-authorship could alleviate some of the difficulties students encounter in academic settings by making
the experience more real, allocating responsibility, exposure to tough issues, engaging in
decision-making and active argumentation and negotiation. These would be helpful
because they most closely relate to what happens in the world outside of academia. She
places the burden of authority-dependence on teachers and calls for higher education to
be more malleable for students to make the shift to higher levels of epistemological
development. Despite the repetition of finding the gradual progression, Baxter Magolda
(2003) reported that higher levels of sophistication seem to develop closer to age 30
rather than age 18, which in some cases has been marked as the beginning of more
complex epistemological thinking (Baxter Magolda, 2001; King & Kitchener, 1994).

More recent work from Baxter Magolda (2004) uses a constructivist lens discussed in
Guba & Lincoln (2000). The constructivist lens allows inquiry to view reality as
contextualized so that the knower mutually constructs knowledge through the interaction
between what is known and the knower or self. Her original work was aimed toward the
nature, limits, and certainty of knowledge and how epistemological assumptions evolve
during young adulthood. Her bottom line is that epistemological transformation is a
movement toward more sophisticated epistemological thinking and not the development
of specific learning strategies or skills.

Baxter Magolda (2004) portrays personal epistemology as socially constructed and
context bound. This paints a picture of individuals actively making meaning of their
experiences using short-essays to convey their reflections. Their interpretations are based
on what occurs internally and externally to them during the experience; they evaluate the
experience and derive a conclusion based on their current level of understanding. The
result or the meaning they construct depends on their present knowledge and
understanding that they hold regarding themselves and the world, the particular context of the experience, and conflicting assumptions or misconceptions they confront.

Baxter Magolda (2004) did not simply wake-up with this epiphany. Rather she explains that her own experience as a researcher has allowed her to construct her current views on epistemology. She explains that through attempting to make meaning and understand her experiences, it was the combination of her current interpretation of knowledge, the interaction with her participants' interpretation of knowledge, and what the possibilities of the two interpretations meant. This process helped guide her ability to ask fruitful questions, probe specific areas, or otherwise conduct a productive investigation of the students' personal epistemologies. This has been an insightful finding and is one that is particularly beneficial in qualitative analysis. Denzin & Lincoln (2000) encourage this type of researcher introspection and recommend the researcher detail their personal remarks in an epoche. An epoche is a technique that assists data analysis from incorporating subjective interpretations onto the interpretation of the participants. This approach will be used in the current study and will be discussed at more length in chapter three.

One of the more interesting aspects of Baxter Magolda's (2004) self-reflection study is her arrival at a new level of understanding in her thinking about personal epistemology, Phase Three. Phase Three includes exploring systems for managing uncertainty. Initially perplexed about how many seniors constructed the world from a transitional perspective, she found it more disturbing that others had shifted to an independent or contextual perspective but still used external formulas to approach life after college. This meant that the post-college environments had prompted movement toward independent and
contextual knowing faster than the college environment. The question here: how could that be the case? Baxter Magolda found an answer during the interview process; the students stressed the message that learning was not a meaningful framework for their post-college experiences and they preferred to talk about their experiences in more general terms (Baxter Magolda, 2004). This finding opened the door for the possibility that there were additional developmental dimensions such as identity and relationships that regulated the students' intellectual development. Baxter Magolda found Kegan (1994) helpful in identifying other systems that can contribute to epistemological development; for example, challenges and supports the individuals experienced at their job, advanced education, and social contexts; and the differences in the way the individuals reacted to the challenges and supports. Although the immediate frame for defining personal epistemology was not altered, the lens certainly broadened for identifying factors that contribute as an operating system associated with personal epistemology.

**Summary and critique.** Baxter Magolda’s refreshing constructive-developmental perspective and her methodological approach of inquiry and qualitatively analyzing data may invite research in more diverse populations with respect to age, gender, and race. Among the most significant contributions that Baxter Magolda has brought to the study of personal epistemology include the following: the perspective of multiple realities, contextualizing the individual’s experience, and socially constructed interactions. These components will be central to proposed study for developing a framework for researching children’s personal epistemology.
Baxter Magolda’s (1992) model is particularly useful beyond the gender-related issues because it approaches epistemological thought as it relates to the educational environment. It aims to grasp the students’ dispositional perspective about a host of educational factors that marks the beginning of interpreting the system that is related to the nature of knowledge and the process of knowing. Viewing personal epistemology from a broader system such as the individual’s environment and the connection to the development of personal epistemologies is of particular importance because the proposed study combines a personal epistemological framework with a systems framework to identify young children’s personal epistemologies within the context of the classroom environment.

**Reflective Judgment Model**

King and Kitchener (1994) developed the *Reflective Judgment Model* that is the result of fifteen years of studies and interviews with countless participants ranging in age from high school students to middle aged adults. The *Reflective Judgment Model* is derived from several theoretical bases including Dewey, Piaget, Kohlberg, and Perry (Kitchener, 1983). John Dewey first used the term reflective judgment in 1933 to discuss the process of thinking that must occur when no clear-cut solution can be identified (Dewey, 1933).

According to King & Kitchener (1994) reflective judgment can be thought of as “beginning with an awareness of uncertainty” (p. xvi). The Reflective Judgment Model (RJM) is based on reflective thinking which can be identifiable on its own because neither an individual’s current understanding nor logic will assist with finding the answer. The model focuses on epistemic cognition, which they define as “the ways that
people understand the process of knowing and the corresponding ways they justify their beliefs about ill-structured problems” (King & Kitchener, 1994, p. 13).

Discussion of the model. The most outstanding features of the RJM are the sophisticated quality of the theory and the gender-balancing as compared to the models reviewed thus far (Hofer & Pintrich, 1997). They also have succeeded in covering the largest age range (adolescence to late adulthood). King & Kitchener (1994) have linked their work closely to Kohlberg’s (1984) model of moral judgment. Some of King & Kitchener’s studies have indicated that the Reflective Judgment Interview (RJI) and Rest’s (1979) Defining Issues Test (the DIT is a pencil-and-paper assessment for moral judgment) correlate moderately; however, correlations are less when age and education are controlled (King & Kitchener, 1994). King & Kitchener (1994) have also connected their model of reflective judgment to Erikson’s psychosocial development for the stage of identity versus role confusion. Another moderate correlation was indicated to exist between an increase in reflective judgment and Marcia’s (1964) identity statuses: identity diffused, foreclosed identity, moratorium, and identity achieved (King & Kitchener, 1994).

Perry’s scheme of intellectual development has influenced most all of the research in epistemological beliefs over the past 35 years, but his contribution has been directly influential in the case of RJM (King & Kitchener, 1994). Perry was the first to observe that underlying assumptions about knowledge and learning can make a difference in reflective judgment (Knefelkamp, 1999). According to King & Kitchener (1994), the later stages of Perry’s model did not satisfactorily account for or articulate the nature of an individual’s reflective judgment. The RJM has pioneered most of the reflective
judgment research over the past twenty years (King & Kitchener, 2002). The Reflective Judgment Model elaborates on the structural and epistemological aspects of Perry’s higher positions. King & Kitchener (1994) identify the RJM as a developmental model because it is consistent with what Flavell (1971) lists as criteria for a stage model: (a) underlying organization, (b) units are qualitatively different, and (c) the whole forms a loosely or consistent sequence. Mechanisms of developmental change come from Piaget’s theoretical framework; that is, assumptions about knowledge develop through assimilation and accommodation of existing cognitive structures as individuals interact with their environment (Hofer & Pintrich, 1997). There is no assumption that an individual’s reasoning can be summed up by one stage at any one point in time.

King & Kitchener (1994) do, however, interpret their findings to indicate that individuals possess both an optimal and a functional level; this area between the two levels is considered the developmental range. This concept corresponds to Vygotsky’s (1962) zone of proximal development. According to Vygotsky, stage change may be marked by rapid bursts of growth, then a plateau that promotes generalizations across domains (Hofer & Pintrich, 1997). The idea of developmental range is in contrast to Piaget’s thinking; he thought development progressed abruptly and was discontinuous.

The RJM was developed after more than 1,700 individual interviews had been analyzed, and the participants ranged in age from 14 to 65. In the sample there were 150 high school students, 1,100 college undergraduates, 200 graduate students, and 150 non-students. These individuals were questioned about their epistemological assumptions and the ways in which they justified their beliefs when they were confronted with uncertainty. The individuals were presented with four ill-structured problems and asked to state and

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justify their perspective. The ill-structured problems had to do with things like the objectivity of news reporting or issues of evolution. In addition they had to respond to six probing follow-up questions designed to capture the essence of their assumptions about knowledge and how they perceive gaining knowledge.

Based on these interviews the **Reflective Judgment Model** was developed. It has three general levels and seven specific stages. Level (I): Pre-Reflective, (stages 1, 2, & 3), individuals are not likely to perceive that problems exist that have no correct or absolute answer; Level (II): Quasi-Reflective, (stages 4 & 5), reflection characterizes thinking; Level (III): Reflective, (stages 6 & 7), knowledge is actively constructed and must be understood within a context and judgments are susceptible to reevaluation. (See Table 3).

Each stage has a focus on both the individual’s conception of the nature of knowledge and the process of justification for the knowledge. Hofer & Pintrich (1997) point out some consistent parallels between the RJM and Perry’s scheme (for a detailed chart comparing all the developmental models see Hofer & Pintrich, 1997): (a) the Pre-Reflective thinking Stage 2 corresponds with Perry’s dualism, (b) Quasi-Reflective thinking, Stage 4, represents Perry’s Multiplicity position; and (c) Quasi-Reflective Stage 5 parallels Perry’s relativism. In addition, like Perry, King & Kitchener make no claims that an individual’s reasoning must be compatible with only one stage at a particular time.
Table 3: Summary of The Reflective Judgment Model
King and Kitchener (1994)

<table>
<thead>
<tr>
<th>PRE-REFLECTIVE THINKING</th>
<th>QUASI-REFLECTIVE THINKING</th>
<th>REFLECTIVE THINKING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge is assumed to be simple, concrete, absolute and exist exclusively. Beliefs need no justification because no alternatives are thought to exist. There is a direct connection between what is observed and truth. What an individual believes to know is the complete information and exists primarily in young children. <em>Not identified</em></td>
<td>Stage 4 Knowledge &amp; the justification of knowledge are perceived as abstractions but are poorly differentiated. Individuals believe differences of opinions exist b/c knowledge is uncertain. They believe that no one can know with absolute certainty, &amp; some knowledge will remain uncertain. All people are entitled to their opinion.</td>
<td>Stage 6 Knowledge is uncertain &amp; contextual. Conclusions are based on context. Able to link knowing &amp; justification. Answers can be more correct than others b/c of plausibility of arguments. Evidence may be tentative &amp; critically evaluated on the basis of justification.</td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge is absolute and limited to authority. Not everyone knows the truth. Individuals w/ authority know the truth &amp; all others who disagree must be wrong. Individuals function as filters. They are not able to explain information but know it to be right because of the source. They believe that knowledge is certain &amp; not everyone has access to it. When individuals are uncertain about the truth, they justify their beliefs by accepting the views of authority. Difficulty recognizing that there are legitimate dif. in opinion.</td>
<td>Stage 5 Knowledge is contextual &amp; relative &amp; filtered through the perceptions of the individual evaluating the evidence. What is ultimately known is limited to the individual's perceptions. It is possible to relate evidence &amp; arguments to knowledge, but reasoning is not possible because evidence is evaluated qualitatively &amp; some evidence is stronger than other evidence. Knowledge is no longer certain, and interpretation is inherent in all understanding. Individuals can recognize that choosing one alternative does not deny the legitimacy of others but cannot explain the relationships between the alternative perspectives.</td>
<td>Stage 7 Knowledge is constructed by using skills of critical inquiry and by combining evidence and opinion into cohesive and coherent explanations for beliefs about problems. Solutions are probabilistic and are reevaluated when relevant new evidence, perspectives, or tools of inquiry become available.</td>
</tr>
<tr>
<td><strong>Stage 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge is still considered to be absolute but only in some areas. Uncertainty is temporary. Authorities may not currently have the truth, but it is assumed that in the future the absolute correct answer will be known. Beliefs are justified by authorities. Opinions &amp; beliefs are viewed the same as factual evidence.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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King & Kitchener (1994) found that an individual’s assumptions toward what and how something can be known provide a particular lens that dictates how they tend to view a problem and how they justify their beliefs about the problem in the face of ambivalence. The foundation of the RJM stresses that reflective judgment is an ultimate outcome and developmental endpoint of reasoning and the ability to evaluate knowledge claims. This developmental transition presumably occurs within the context of an individual’s background, prior educational experience, and present life situation.

**Empirical support.** King & Kitchener (1994) indicate that over time higher-stage reasoning is more evident than lower-stage reasoning, and that educational achievement is strongly related to higher stages of reflective judgment. In general, comparing of the findings with the college students in terms of educational achievement, periods of development corresponded to the individual’s college attendance and a relationship exists between the individual’s age and stage. Interestingly, none of the college graduates are reported to be functioning any higher than low stage quasi-reflective thinking, and the traditional and non-traditional age participants were identical. Amazingly, there is only approximately a half a stage difference between the college freshmen and college seniors. The most significant gain in reflective thinking is among those individuals in the early portion of graduate training who are between stage 4 & 5. Stage 6 reasoning has appeared only in advanced doctoral students. Out of four testing episodes, the first two did not yield any gender-related differences in the ways of knowing; however, the last two studies showed results with gender-related differences. They found men to score at the higher stages and speculated that it might be due to educational achievement, mainly
because more of the men in the study had furthered their education beyond a baccalaureate program.

The task of validating the RJM consisted of a ten-year longitudinal study that is condensed nicely in King & Kitchener (2002). It consists of the collaborative efforts of King & Kitchener (1981), King, Kitchener, Davison, Parker, & Wood (1983), King, Kitchener, Wood, & Davison (1989), King & Kitchener (1990), and King & Kitchener (1994). Over the ten years, data on reflective judgment was collected in the years 1977, 1979, 1983, and 1987. King & Kitchener (2002) refer to two ways a proper validation study is conducted: (a) Cross-sectional data can identify developmental sequences that emerge over time, and (b) longitudinal data are needed to assess change in the individual's reasoning over time. The initial sample consisted of 40 21-year-old college juniors, 20 16-year-old high school students, and 20 third-year doctoral students whose average age was 28. Gender and academic achievement was matched between the two younger groups and the doctoral students. The results were reported after retest participation in 1979 (74%), 1983 (69%), and 1987 (66%) and was noted that most of the participants were still primarily active in their educational endeavors (King & Kitchener, 1981).

King, Kitchener, & Wood (1994) followed by reporting individual mean and modal scores for each participant at each of the testing times above. They reported a progressively upward pattern of change with 92% of the students demonstrating an increase in their RJI score from 1977 to 1987. They went on further to report that these changes corresponded to the general stage progression of the RJM but include movement...
between stages, and they identified waves of variability within each stage; however, the waves had different forms across the stages.

Brabeck & Wood (1990) was very similar to King et al. (1994) in participant confirmation but investigated well-structured versus ill-structured problems in a longitudinal and cross-sectional study. Wood (1995) is a secondary analysis of studies involving reflective judgment interviews. The most significant longitudinal research is a 10-year study with 80 students; 38 of these students were involved in four rounds of assessments using the RJI. The results indicated that the RJI increased with age and education; however, both variables were confounded, but that seems to be the case with reflective judgment research (King & Kitchener, 1996).

There have been studies that look at educational-level differences as a way to confirm whether epistemic cognition develops over time when measured by reflective judgment. Most of this work has been completed by King, Kitchener, & Wood (1994), but Dale (1995) assessed reflective judgment levels in 45 male students (freshmen through seniors), and 18 faculty at a conservative seminary. The results confirm the gradual progression of reflective judgment; the faculty scored highest, and the more advanced students scored higher on the RJI than did the younger students. The interesting finding in Dale (1995) was that the stronger the student’s belief in God, the lower their score on the RJI. Freshmen and sophomores tended to fall into stages 4 and 5 whereas the juniors and seniors leaned more toward stages 5 and 6. King and Kitchener (2002) add that many of their findings show that the highest RJI scores for early level graduate students are consistent with Dale (1995), falling in stages 4 and 5 and more advanced level
graduate students clustering around stages 5 and 6. They add that stage 6 has only been indicated in doctoral equivalent education and faculty of advanced education.

**Summary and critique.** Reflective judgment research has used multiple methods for assessment, most of which have been developed by King & Kitchener themselves; the most widely utilized is the *Reflective Judgment Interview* (RJI).

The Reflective Judgment Interview is limited to trained raters, placing it largely out of reach. The research using the instrument has been primarily white middle-class college students and needs to be used to evaluate other diverse populations. Although there is evidence of gender-related differences in knowing, the results from King & Kitchener (1994) and Baxter Magolda (1992) seem to be the tip of the iceberg and remain inconclusive. Classroom studies are needed view reflective judgment development in a broader scope, especially because the results have shown that there is very little reflective judgment development occurring in the first few years of college and that age may be linked to stage.

King & Kitchener view the *Reflective Judgment Model* to be within the broader realm of intellectual development and have been criticized for conceptually resembling critical thinking constructs (Hofer, 2001). King and Kitchener (1994) argue that the reflective judgment model is separate from critical thinking which may occur as a result of inductive or deductive logic. It is this type of reflective thinking that seems important in order for students to move from knowledge to applied practice of conceptions and to transfer those conceptions to similar situations. Dewey (1933) differentiated critical thinking and reflective thinking in this way; critical thinking is used to solve problems that have an absolute answer or well-structured problems but as for problems that exist in
the real-world, Dewey claimed these have no single absolute answer and are ill-structured problems. It is with ill-structured problems that reflective thinking can be most useful.

The problem is theoretical King & Kitchener (1994) say; epistemological assumptions are missing within the critical thinking research, and critical thinking is driven by solving well-defined problems.

The Reflective Judgment Model has made invaluable contributions to epistemological development in several areas: (a) their thoroughness of the developmental sequence; (b) the elaboration of Perry's higher positions; and (c) that through reasoning there is a better understanding of knowledge itself, which King & Kitchener refer to as epistemic cognition. However, little can be determined regarding the process which occurs during personal epistemological development. King and Kitchener have sheltered their methodology; therefore, much of the empirical support comes from them and places the reliability of the measurement in question. They have, however, been proactive in the research of adolescence and recommend research in this area be extended to younger children (King & Kitchener, 2002).

Argumentative Reasoning

Kuhn, Cheney, & Weinstock's (2000) model is an attempt to manage and resolve the difficulties of epistemological understanding by simplifying it in the hopes that it might attain more consistent theoretical and empirical analysis. Despite that all of the developmental models have varying numbers of stages with slightly different overlapping distinctions, they do, however, maintain similar developmental trajectories that are represented by a sequence from dualistic objective beliefs about knowledge, to subjective views which are more relativistic, and then finally advancement toward a contextual way
of knowing that is constructed by the individual. It is suggested by Kuhn & colleagues that there is a coordination of the subjective and objective dimensions of knowing that create the foundation for knowing, and this is the end goal of epistemological development.

The model is supported by research ranging from childhood to adulthood and is motivated by the question: “What is the developmental task to be achieved or the developmental goal toward which changes in epistemological understanding are directed?” (Kuhn & Weinstock, 2002, p. 123) It is claimed that the integration of subjective and objective knowing is where and how epistemological understanding is manifested. The result of this type of integration, according to Kuhn & Weinstock (2002), is a sequence of qualitatively distinct understandings of what it means to make a claim. The essence of epistemological development is defined in this model as the progression from claims as copies to claims as facts and opinions, then finally claims as judgments. Kuhn & Weinstock’s (2002) study includes children, which supports the proposed study, and this type of investigation with children is currently quite sparse.

Discussion of the model. Kuhn’s model of epistemological development is similar to Perry (1970) and includes three categories: (a) Absolutism, (b) Multiplism, and (c) Evaluativism. Absolutist individuals believe knowledge is certain and absolute; they emphasize expertise and facts as the foundation for knowing. These individuals convey their beliefs with a high degree of certainty. Multiplist individuals have a high degree of hesitation regarding expertise and do not accept the belief that there is expert certainty or that experts will ever reach certainty. They observe that experts are imperfect. Experts do not agree and are regularly inconsistent; therefore, they are plagued with “radical
subjectivity” (Hofer & Pintrich, 1997). Due to a lack of tolerance for expert certainty, this type of individual is driven by emotions. The emotional way of interpreting knowledge makes the individual’s belief personal in nature and is surmised to be legitimate, as well as equal to, an expert’s view. Finally, in the Evaluativistic perspective, individuals view knowledge with varying degrees of uncertainty. They have respect for expertise and view the expert to have less uncertainty while they have more uncertainty. They possess the ability to evaluate differing points-of-view before making a judgment. They realize the productivity of logic and argumentation and are accepting that knowledge can change.

Kuhn’s model is the first to relate epistemological understanding to argumentative reasoning, which requires cognitive skills such as reflection, evaluation, and judgment of other perspectives and evidence. Kuhn (1991) links these processes to individuals’ metacognitive ability to review their own thinking. There are claims that this metacognitive ability is not likely in young children (Inhelder & Piaget, 1958; Kuhn Amsel & O’Laughlin, 1988). Kuhn & Weinstock (2002) discuss what they perceive to be an important goal of understanding the development of personal epistemology and that is getting to the bottom of what is being measured in the most precise and meaningful way. They further add that this is done through similar subjective and objective dimensions of knowing and is present in children. The subjective dimensions of knowing are represented by knowledge that is constructed internally in the individual, and the objective dimensions of knowing are represented by knowledge that is constructed externally by the individual. This view is consistent with Vygotsky’s (1978) theory that objective (external) knowledge develops first and is a stronger influence that is needed.
prior the development of subjective (internal) nature of knowing. Ultimate achievement is accomplished, according to Kuhn & Weinstock (2002), when there is a balance between the subjective and objective ways of knowing and is represented through a developmental progression from realist to absolutist, absolutist to relativist, and relativist to evaluativist.

Empirical support. Kuhn et al. (2000) tap into informal reasoning through the use of ill-structured problems as a way to identify the impact of epistemological thinking as a process. This is similar to Baxter Magolda’s (1992) research; however, Kuhn’s ill-structured problems were placed within authentic world contexts.

One of Kuhn’s (1991) early studies was comprised of 160 participants broken into four groups of 40 individuals (teens, 20’s, 40’s, & 60’s), and each group was equally distributed according to gender and education. Two one-hour interviews were conducted with each participant. The interview protocol consisted of the participants generating causal explanations for three current urban social problems: (a) What causes prisoners to return to crime after they are released; (b) what causes children to fail in school; and (c) what causes unemployment. This line of questioning was expected to generate three areas of interest: (a) an explanation of how individuals came to have their point-of-view and justification with supporting evidence, (b) the individual’s perception of an opposing point-of-view including a rebuttal, and (c) epistemological reflection about their reasoning when asked explicitly. Embedded in the interview protocol were prompts for epistemological reasoning including proof, expertise, multiple viewpoints, origins of theory, and certainty. Even though they based their questions solely on expertise, they still identified multiple dimensions of personal epistemology.
The most surprising aspect of Kuhn’s (1991) study is the miniscule number of individuals who met evaluativist criteria, especially considering the educational diversity and age range of the participants. This is contrary to what is expected, considering half of the sample attended college, although half of the sample was over 40 years old. This raises the question about epistemological thinking in terms of education versus life experience and is consistent with King & Kitchener (1986) who found very small change within and between individuals after four years of college.

Kuhn, Katz, & Dean (2004) found that participants differed substantially as a function of education level. In the study 150 ninth graders in a college-bound, upper socioeconomic private school had higher levels of epistemological beliefs than ninth graders in a non-college-bound inner city parochial school. Kuhn (1991) asserted that the differences indicated represent the impact of home environment and background and that type of school does make a difference in epistemological thinking. Fifty percent of the students she interviewed were absolutist who viewed their knowledge with profound levels of certainty and viewed experts or authority figures as their primary source of knowledge. For example, to the question, “Do experts know what causes school failure?” one student responded, “I would have to say yes, because they have proven to me” (p. 171). In my old school we had guidance counselors and they know what was wrong with me” (p. 174). Multiplists acknowledged their view of knowledge from a combination of ideas and emotions but in a subjective manner and with subjective evidence. For example, one participant stated that “anyone can prove I am wrong, but I have my view and I am set in my view on the basis of my experience and information” (p. 182). Finally, evaluativists claimed that knowledge is open to argument and examined
alternative theories of their understanding of knowledge. For example, regarding the role of experts again, one student’s comment was, “I’m arguing from just a personal kind of perspective, but by the same token I would be reluctant to change my position unless a substantially varied, lucid, and documented argument was presented to me” (p. 191).

Kuhn, Cheney, & Weinstock (2000) pursued argumentative reasoning and described a systematic progression across several judgment domains: personal taste, aesthetics, values, and truth. In this study they used seven groups total; three groups were of fifth, eighth, and twelfth graders; a group of undergraduate students; a group of vocational students; and two groups of adults targeted for either high level of professional achievement or high degrees of life experience. All groups were mixed according to context, gender, achievement, ethnic background, and age. They used a 15-item questionnaire which they designed to tease apart the influences of age, intellectual ability, and life experience for epistemological understanding. The instrument contains contrasting statements regarding two individuals and the response varied from, “only one can be right” to “both could have some rightness.” Kuhn et al. (2000) concluded that all of the adult groups were capable of transitioning from absolutist thinking to multiplist ways of thinking. However, only one half of the adults from any background made the transition from multiplist to evaluativist where the discrimination between judgment and commitment to a particular position is critical. Experts and undergraduates showed the highest level in evaluativist thinking and understanding. This finding indicates that educational experience is a contributor to the development of epistemological understanding. This means that the data does not support age and educational level as sufficient variables that can promote the transition to evaluativist types of thinking. This
relates to the basis of their argument that it is a lack of reasoning while formulating an argument that maintains the objectivity in ways of knowing and epistemological understanding.

The work of Kuhn & Pearsall (2000) is significant to the proposed study because it is among the few in the area of personal epistemology that supports the investigation of young children and one of two works that investigates the possible link between personal epistemology and theory of mind. In young children, Kuhn & Pearsall (2000) state the ability to distinguish ways of thinking (scientifically) is defined as the consciously controlled coordination of theory and evidence. Although, their theory has not been empirically validated the research used to construct the theory is valid and recognized by researchers in the field (Kuhn, 1991; Kuhn, Shaw. & Felton, 1997). It is difficult to locate research that investigates young children’s personal epistemology, however, this theory provides a warrant for the purpose of the current study. Scientific thinking may be central to many forms of lower and higher levels of thinking and cannot be ruled out in children prior to being investigated (Kuhn, 1996; Olson & Astington, 1993). While investigating how individuals know, and what they know it may be beneficial to consider epistemological categories such as; fact, opinion, theory, and evidence.

Kuhn & Pearsall (2000) argue that children as young as ages four to six exhibit an “epistemological category mistake” regarding source of knowledge. This should catch the eye of epistemological belief researchers because this implies that very young children begin to think epistemologically, a concept that is not investigated with the tenacity in which this study is proposing. Kuhn & Pearsall (2000) present a theory of the development of scientific thinking in young children based on previous experimental
results in which Kuhn & Pearsall (1998) investigated 35 four-to-six-year-olds. They were shown a sequence of pictures in which, for example, two runners are competing in race and asked to tell why one will win. One runner has fancier running shoes or one has bigger legs so they will be stronger and faster. The final picture in the sequence shows the outcome of the race and the child is asked to state what the outcome is and tell why or justify how they know. The youngest children merged the two questions—How do you know and why is it so? This means that they could not always identify evidence about how they knew the runner had won (because he was holding the trophy) but rather with a theory of why it makes sense (because he has faster sneakers). This indicates important characteristics of preschool-aged thinking and some of the findings indicated that the four-year-olds were able to successfully answer questions about source and justification of knowledge separately.

Kuhn and Pearsall (2000) combined research from personal epistemology and theory of mind to make a case for how young children confuse a theory, making it plausible that an event occurred along with evidence that indicates the event. For the child, the source of their knowing is evidence that the event actually occurred; a construct that develops rapidly during this young age (Flavell, Miller, & Miller, 2002). The argument is that when children begin to make the distinction between themselves and others as a source of knowledge is the point in which a foundational platform for the development of scientific thinking occurs. Support for this type of hypothesis in older participants showing engagement in thinking about a topic enhances the quality of reasoning about that topic, and higher levels of reasoning using evidence-based arguments is an indicator for higher levels of epistemological understanding.
Summary and critique. Kuhn’s work and the complementary efforts of her colleagues have been used in the context of the real-world; this is in contrast with Baxter Magolda’s ill-structured problems. This allows for a much wider scope of educational implications (Hofer & Pintrich, 1997). However the model is significantly trimmed down from Perry’s original work which takes away from the true developmental progression and complexity of his developmental theory. Hofer and Pintrich (1997) criticize the three stage model, as compared to other models such as Perry’s scheme or Women’s Ways of Knowing (Belenky et al., 1986), because they provide much more detail in their developmental models. The criticism is that Kuhn (1991) does not allow for sufficient precision in the criteria at each level and does not offer adequate sublevels to identify a pattern of developmental progression in epistemological thinking.

Kuhn’s oversimplification of the epistemological phenomenon is perceived as problematic because it doesn’t provide the diversity or flexibility to reveal complex epistemological issues that an individual constructs. This could be viewed as a criticism because ill-structured problems require background knowledge and personal experience; therefore, they exclude the potential to validate the personal epistemology of the individual more. They are unable to adequately apply objectively situated arguments whereas other less emphatic topics may demonstrate the individual’s balance of objective and subjective balance. It is noticeable at this point that all of the developmental models reviewed use some derivative of an interview format to determine levels of epistemological understanding; however, all of the theories do not believe that the justification of knowledge claims is important for epistemological sophistication to develop. For King & Kitchener (1994) and Kuhn (1991) source and justification of
knowledge claims are central, but they recognize that the standards of rationality are fallible.

Kuhn's model of argumentative reasoning and scientific thinking has contributed support for research in personal epistemology to extend to investigating young children. Kuhn has provided support about the importance of scientific thinking and how it relates to both personal epistemology and theory of mind. Perhaps the progression of personal epistemology will make identifying evidence in young children theoretically and methodologically more approachable.

Summary of Developmental Models

The previous sections of this chapter have been a review of the developmental models that have been most commonly recognized by personal epistemology researchers in the field of educational psychology and developmental psychology. All of these models have empirical research that supports them, and all of these models discuss the same basic concept, which is, they describe how individuals' beliefs about the nature of knowledge and the process of knowing (King & Kitchener, 1994) develop and change over time. It is no coincidence that all of the models are derived from Piaget’s theory of cognitive development; however, each model consists of slightly modified dimensions, and they can be contrasted by the number of sequences and the defining characteristics of each level of development. It follows that despite the differences among the personal epistemological models there are also distinctive commonalities, such as, the same general trajectory from dualism-relativism-evaluativism (absolutist-multiplist-evaluativist). The purpose of this section is to discuss these similarities and differences.
Baxter Magolda (1992), Perry (1970), and Belenky et al. (1986) all suggest the existence of different levels and types of epistemological development and are qualitatively diverse (Buehl & Alexander, 2001). The developmental models convey the multiple dimensions of personal epistemology and are represented through a variety of perspectives. For example, Perry (1970) studied the nature of knowledge, but Kuhn (1991) and King & Kitchener (1994) studied the nature of knowing. These are two different dimensions of personal epistemology; therefore, each model contributes its own unique set of stage-like or less-stage-like progressions of development and its own definitional elements that range from what exactly is being studied to precisely how it is investigated. Describing the distinctions among each of the five models becomes more coherent when it is taken into account which dimension the model is investigating. This is not to indicate that each model actually measures what it claims to measure because this continues to be a controversial issue within the field of personal epistemology.

An additional issue is the definition of personal epistemology that has been adopted by each model, and this definition varies primarily with the way in which they identify the significance that learning has in the scope of personal epistemology. In addition, there are a range of limitations that exist in each model. The limitations attributed to each model pose two primary problems; they take away from the analytic ability of each model and diminish the strength of the educational implications.

It is clear in reviewing the developmental models that the obvious difference is their seemingly different titles. Recall the developmental models: Perry’s Scheme of Intellectual and Ethical Development (Perry, 1970), Women’s Ways of Knowing (Belenky et al. 1986), Epistemological Reflection Model (Baxter Magolda, 1992), The
Reflective Judgment Model (King & Kitchener, 1994), and Kuhn’s Skills of Argumentative Reasoning (and often referred to as Epistemological Understanding) (Kuhn, 1991). The point so far is that despite the obvious and underlying differences, the field of personal epistemology accepts that these models share a common goal of addressing beliefs about the nature of knowledge and knowing (Hofer & Pintrich, 1997). This typically includes four dimensions: (a) the certainty of knowledge, (b) the simplicity of knowledge, (c) the source of knowledge, and (d) the justification of knowing (Hofer & Pintrich, 1997).

Conceptually, the developmental models also have common interactionist and constructivist perspectives, and they follow the same basic developmental trajectories (Hofer & Pintrich, 1997). The general trend of personal epistemological development can be captured in three separate phases, all of which are represented in each of the developmental models. The first phase begins with the individual believing in an external objective (dualist) view of knowledge, in which knowledge is certain and typically known with authority. The second phase begins to embrace some amount of uncertainty about knowledge, and the individual takes on an overriding notion of subjectivity which represents a transition to a multiplistic perspective of knowledge. In the third phase of development, there is an integration of the objective and subjective views of knowledge; wherein the individual has the capacity to weigh evidence and apply the evidence to differing knowledge claims. Individuals construct their own knowledge, knowledge is perceived to be evolving and malleable, and the individuals balance the process of knowing with justification for knowing.
This pattern of development is captured in each of these models regardless of the number of stages, levels, or positions. The varying number of levels between the models has to do with how they are defined, which in turn has to do with what they are defining. Some models do it in three (King & Kitchener, 1994; Kuhn, 1991) levels and others take four (Baxter Magolda, 1992), five (Belenky et al., 1986), or nine levels (Perry, 1970) to get from dualism to evaluativism. Even though the general stage progression is similar, the levels themselves differ among the models. Interestingly, when the five models are overlapped, the degree to which certain levels map onto one another is curiously different. For example, the Reflective Judgment model splits Perry’s multiplism position and incorporates dualism and part of multiplism into their initial stage, Pre-Reflective judgment, and in the same sense splits the relativism position and accounts for multiplism and evaluativism in their second level, Quasi-Reflective thinking.

Similarly, Hofer & Pintrich (1997) state, “A review of the existing developmental models suggests that each of the primary models posit developmental trajectories that parallel one another. Regardless of the number of stages, positions, or perspectives, the sequence invariably suggests movement from a dualist, objective view of knowledge to a more subjective relativistic stance and ultimately to a contextual constructivist perspective of knowing” (p. 7). In reference to reviewing the RJM, Knefelkamp (2002) states that “Even after thirty years of extensive and varied scholarship, the Perry scheme continues to reflect the most critical dimensions to educators’ understanding of learning and students’ approaches to learning” (p. 238).

Another commonality in the area of personal epistemological development is that none of the models have successfully identified the earliest naïve stages of dualism. In
fact the first to even attempt it was Burr & Hofer (2002), but a single study is not empirically valid or reliable on its own. Conversely, the models in general are seldom consistently provided with detail of a profile for individual functioning at the highest epistemological level. Although the level has been identified, it is limited. No knowledge of what may come later is ever affirmed in the research. The developmental models are proficient when it comes to describing a sound trajectory for personal epistemological development and are considerably in-line with one another about the calibration of each level. However, they falter when it comes to adequately explaining what occurs on each end of the trajectory and how an individual transitions from one level to the next.

These five developmental models represent the foundation from which current work in personal epistemology is building and integrating new ideas. Many of the researchers who have developed these models continue to extend their work and expand their knowledge and contributions within personal epistemology and in other domains. Personal epistemology research in young children struggles to describe dimensions and trajectory of children's understanding of knowledge, in part to be adaptable to Piaget's stage theory of cognitive development and because it appears to be juxtaposed with Perry's scheme, which is not developmentally compatible nor does it account for experiences or memories of early childhood development (Mansfield & Clinchy, 2002). This presents dissonance for researchers of children's theory of mind and researchers of epistemology primarily because of conflicting views of to classify what children know and how they understand what they know. There are a variety of views about the role of environment, as far as implicit versus explicit influences on the development of cognitive structures and independent versus social dimensions. Chandler (2002) points out that
despite the age that is investigated, all of the sequences that unravel appear to be similar to Perry’s Scheme. Although Perry hypothesized about position 1, researchers of children have still concluded some corresponding notion of the individual’s personal epistemology. Moore (1994) suggests that Perry’s stages are not developmental in nature but rather products of the socialization process set in the values of the individual’s environment. Hallet, Chandler, & Krettenauer, (2002) counter that the age that children demonstrate some construction regarding the nature of knowledge differs depending on objects of knowledge or domains of understanding. Therefore, it is a possibility that epistemological beliefs are not a developmental trajectory, and some researchers argue for a general sense of recursion (Hallet, Chandler, & Krettenauer, 2002; Moore, 1994). Contrary to Perry’s developmental model there is a theory that epistemological progression is actually a recycling of earlier epistemic positions in different domains (Kitchener, 2002).

Kitchener (2002) addresses many of the discrepant claims of personal epistemology researchers, such as how to make sense of them and the data that supports the claims. In an attempt to explain conflicting notions of epistemological progression, according to Kitchener there are two levels: (a) the lower functional level, which refers to the cognitive processes that exist without contextual support or practice; and (b) the upper optimal level, that represents the high-order processes of an individual’s cognitive activity.

Age is a factor which remains controversial while investigating personal epistemology. According to their research, the National Center for Education Statistics in 2001 reported that the number of college students who are non-traditional college-age has
risen dramatically and, surprisingly, not much is known about the development of these older re-entry students.

*Other Theories of Epistemological Beliefs*

*Personal Epistemologies as Independent Dimensions*

Developmental models are one way of conceiving of personal epistemologies, but there are alternatives to these developmental models such as the work of Schommer (1990; 1993; Schommer, Crouse, & Rhodes, 1992) and colleagues. This view suggests that epistemological beliefs influence comprehension and academic performance. In this perspective, epistemological beliefs or dimensions are seen as “systems of more-or-less independent beliefs” (Duell & Schommer-Aikins, 2001, p. 440). According to Schommer, this perspective comes on the heels of previous research on developmental theory that conceptualizes personal epistemology as more unidimensional and focused on single dimensions of epistemology, for example, certainty of beliefs (Perry, 1970; Chandler, Boyes, & Ball, 1990) or the justification of knowledge (King & Kitchener, 1990). Schommer (1990) proposed measuring individual’s beliefs about knowledge and beliefs about learning which challenges more linear developmental models of personal epistemology.

*Schommer’s Epistemological Beliefs Model*

Schommer’s system of more-or-less independent dimensions refers to a conceptualization that beliefs are multidimensional and may not necessarily develop at the same rate. Therefore, Duell & Schommer-Aikins (2001) claimed it should not be assumed that an individual’s epistemological beliefs are more-or-less synchronized, and
this is particularly important during periods of development in which an individual has changing beliefs, much like the belief systems of young children.

Schommer (1990) constructed her model from the previous work of King & Kitchener (1981), who proposed the Reflective Judgment Model; Dweck & Bemchat (1983) who inquired about children’s beliefs about their ability to learn; and Schoenfeld (1983; 1985) who studied in the domain of math beliefs for omniscient authority and speed of learning. Interestingly, the integration of these works highlights the effects of the learner’s beliefs. Learners’ beliefs about learning in general and their beliefs about their abilities to learn have different impact on actual learning outcomes. For example, a student who has a lower ability could outperform a student with more superior ability because the lower ability student believes that intelligence can increase while the higher ability student holds the belief that intelligence is fixed (Schommer, 1992).

Table 4: Epistemological Beliefs As Independent Dimensions
Schommer (1990)

<table>
<thead>
<tr>
<th>LEVELS</th>
<th>NATURE OF KNOWLEDGE</th>
<th>DEFINITION OF KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Structure of Knowledge</td>
<td>Isolated bits of information to more integrated concepts.</td>
</tr>
<tr>
<td>2</td>
<td>Stability of Knowledge</td>
<td>Unchanging to continuously changing.</td>
</tr>
<tr>
<td>3</td>
<td>Source of Knowledge</td>
<td>Known by authority to derived from empirical evidence.</td>
</tr>
<tr>
<td>4</td>
<td>Speed of Learning</td>
<td>Quick all-or-none to gradual.</td>
</tr>
<tr>
<td>5</td>
<td>Ability to Learn</td>
<td>Fixed at birth to improvable over time &amp; experience.</td>
</tr>
</tbody>
</table>
Identifying distinct beliefs Schommer-Aikins (2004) says, “was a way to tease apart aspects of previous thick descriptions and allow for a more analytical inspection of individual’s personal epistemologies” (p. 21). More advanced or sophisticated thinking implies that the system is supported by higher-order thinking. According to Schommer (1994), to believe that knowledge is complex is a more sophisticated way of thinking compared to believing that knowledge is unchanging (more naïve). This idea of differing dimensions of personal epistemologies can still apply to a developmental stage progression if one considers that the two can develop at different rates, which could imply that the periods of inconsistencies represent periods of transition, growth, or change. It is also thought that the most naïve conceptions of knowledge and learning are the beliefs that knowledge is simple and certain, and learning is believed to be quick and fixed from birth.

Discussion of the model. Schommer’s model has been used to research middle school-aged children into adulthood. In addition, over the past fifteen years it has been well represented in the literature for making outstanding contributions in theoretical and methodological significance in researching epistemological beliefs (Hofer & Pintrich, 1997).

There are five dimensions comprising the model which are designed to be viewed on a continuum beginning with naïve perspectives on one end and more sophisticated beliefs on the other end. (See Table 4). For example, Schommer (1990) argues that it is possible for a high school student to believe that knowledge is intertwined, meaning that at one instance he can hold the naïve belief that knowledge is absolute or certain while at the
same time believe that the structure of knowledge is complex, showing his sophisticated concept of knowledge.

During the early period of Schommer’s research on personal epistemology as more-or-less independent structures, she worked on developing an instrument to measure her proposed dimensions (Schommer, 1990, 1991, 1993; Schommer, Crouse, & Rhodes, 1992). The Epistemological Questionnaire is a paper-and-pencil assessment used to measure general epistemological beliefs which pose positively and negatively stated questions about knowledge and learning. It is a 63-item, five-point self-report Likert scale. The measure ranges from (1) strongly agree to (5) strongly disagree. It was subsequently subdivided into 12 sets to measure Schommer’s (1990) five dimensions of personal epistemology listed in Table 4. Four factors from both exploratory and confirmatory factor analyses have been generated (Schommer, 1990, 1993; Schommer et al., 1992). Each of the four factors is represented on a continuum, beginning with naïve views on one end to more sophisticated perspectives on the other. The dimensions include the following: Beliefs in Fixed Ability (fixed versus incremental), Beliefs in Simple Knowledge (isolated and ambiguous pieces of knowledge versus highly interrelated concepts), Beliefs in Certain Knowledge (knowledge is absolute versus knowledge is tentative), and Beliefs in Quick Learning (learning is quick or not at all versus learning is gradual) (Schommer & Walker, 1995). The Source of Knowledge has not been empirically validated through Schommer’s efforts (Hofer & Pintrich, 1997).

Beliefs about learning came from Schoenfeld (1983, 1985) which qualitatively accounted for students solving geometry problems aloud. Three conclusions are transferred to the Embedded Systemic Model (Schommer-Aikins, 2004): (a) Only gifted
authority figures can truly understand math is a precursor for ability to learn; (b) solving math problems happens quickly or not at all is a precursor for speed of learning; and (c) omniscient authority bequeaths math proofs to less knowledgeable, which signifies the precursor for source of knowledge.

A more recent contribution made by Schommer-Aikins (2004) describes a basic paradigm of the epistemological belief system, and she proposes some new ideas for thinking about and studying personal epistemology through the lens of an embedded systemic model with coordinating team approaches to research. Schommer-Aikins (2004) claims her Embedded Systemic Model is notably different from previous models in the following ways: (a) It adds beliefs about learning; (b) it identifies distinct beliefs; (c) it acknowledges asynchronous progression; (d) it recognizes a need for balance; (e) it introduces the designation of beliefs; and (f) it utilizes quantitative methodology. She defines this Embedded Systemic Approach as multiple beliefs that are connected within an individual’s personal epistemology, and by being more-or-less independent the related beliefs could be or could not be developing along different continuums.

because beliefs can be linked to affect, have a close relationship to logic, challenges in
terms of change, and have strong importance on thinking.

Recently, Schommer-Aikins (2004) introduced the epistemological belief system
which suggests that future research needs to move a direction which incorporates
multiple interactions of an individual’s epistemological beliefs. This innovative method
is unique to the study of personal epistemology but not necessarily to research in other
areas such as clinical psychology (Minuchin, 1974) or human behavior (Bronfenbrenner,
1975).

**Empirical support.** Schommer’s (1990) factor structure (four factors) was replicated
with other college students in Schommer et al. (1992); high school students in Schommer
(1993); and non-academic adults in Schommer (1998). The *Epistemological
Questionnaire* has been adapted for high school students (Schommer, 1993) and middle
school students (Schommer-Aikins, Mau, Brookhart, & Hutter, 2000). The *Epistemological Questionnaire* has undoubtedly received substantial interest among
personal epistemological researchers because it is a more quantitative approach, and it
takes a more analytic approach to the dimensions of beliefs (Hofer & Pintrich, 1997).

According to Schommer (1995) moderate domain-independence was reported using
the correlations between epistemological factors across domains and suggests that
students may have beliefs about knowledge, in general, that are later adjusted depending
on the domain and context. The general findings are that different epistemological
beliefs exist in different domains and in different contexts because in specific contexts
students may reflect considerably different.
Research has supported some of the more developmental claims. Schommer, Crouse, & Rhodes (1992) investigated 424 students (157 men and 267 women) who were enrolled in an introductory psychology course. The students ranged in academic level; freshmen (67.7%), sophomores (21.5%), and the remaining 21% were evenly divided between undergraduate juniors and seniors and master-level students. The age range was 17 to 65, with the mean age being 22, and all were native English-speaking Americans. The purpose of the study was to replicate Schommer (1990) findings; therefore, the procedure and analysis were similar. In the first experiment all of the participants were given the EQ. In experiment 2, the purpose was to determine if simple knowledge predicts statistical text comprehension and metacomprehension, to test if task demands influence epistemological effects, and to investigate whether epistemological effects on learning are mediated by study strategies. Therefore, out of the original 424 students from experiment 1, 138 (39 men and 99 women) returned. Age ranged from 17 to 65 with the mean age being 25, still the majority was freshmen (66.6%), sophomores (18.8%), and the remaining 15% were juniors, seniors, and master-level students. In this study, the students were given two sets of instructions: one asked students to reflect on their understanding of the text, and the other asked students to prepare to teach the information in the text. Schommer, Crouse, & Rhodes (1992) concluded the following: belief in simple knowledge is negatively associated with comprehension and metacomprehension; the influences of simple knowledge on comprehension may be manipulated by study strategies; and the Epistemological Questionnaire provided the groundwork for the development of epistemological assessment.
Schommer (1993) studied secondary school students: 405 freshmen (180 boys and 225 girls), 312 sophomores (145 boys and 167 girls), 274 juniors (127 boys and 147 girls), and 191 seniors (89 boys and 102 girls). The sample was mainly Caucasian Americans (68%), with African Americans (21.5%), Asian Americans (5.5%), Hispanic Americans (3.4%) and Native Americans (1.5%). Initially the EQ was developed for college-level students and when piloted on 100 high school seniors, questions found confusing were altered to be age appropriate for high school students. For example, the word “theory” was changed to “idea” and “unambiguous” was changed to “clear-cut” (Schommer, 1993). Once the test was adapted for high school students, it was administered to all of the participants. The factor analysis yielded four factors: simple knowledge, certain knowledge, innate ability, and quick learning. These scores were correlated with Schommer (1992) which had a similar sample from a different state. Test-retest reliability was .74. The results indicated that there was some epistemological development occurring at the high school level. Simple knowledge, certain knowledge, and quick learning had the most significant incline from the freshmen to the seniors. However, one of the limitations was the cross-sectional design. It could be hypothesized that students with beliefs consistent with the freshmen drop out of school, particularly because there were considerably less seniors in the study than freshmen. The most interesting finding of this study is the relationship between quick learning and performance, even when general intelligence was controlled. Schommer (1993) concluded that belief in quick learning predicts performance based on the student GPA. There were also some similarities between junior college students and the high school student in this study in terms of their metacognitive abilities.
Schommer (1994, 1996) also included high school students and indicate the importance of balance in order to gain more sophisticated personal epistemological thinking and reasoning. Schommer (1993, 1994, 1996) compare high school students’ epistemological beliefs with their academic success. Schommer (1994) compared the epistemological beliefs of high school students using the EQ with identified gifted and non-gifted students in an urban high school. She found that gifted students’ beliefs for simplicity of knowledge decreased more than non-gifted students from freshman to senior year. However, the beliefs of certain knowledge between gifted and non-gifted showed no change during their high school years. The students in Schommer (1994) believed in the unchanging nature of knowledge. Therefore it was concluded that students in high school may not be exposed to content that reveals the evolving nature of knowledge.

In order to label balance as a significant proponent in personal epistemology Schommer-Aikins (2004) claims that epistemological beliefs need to be portrayed as frequency distributions rather than as continuums. Schommer-Aikins (2002) also supports how critical balance can be for epistemological sophistication. For example, Schommer-Aikins (2004) claims her findings, in terms of balance, are consistent with Perry’s (1970) idea that as students mature, their highest form of thinking is relativistic, but he found that dualistic thinkers were the exception. In a subsequent study Schommer and Dunnell (1997), 69 gifted students completed the EQ and answered two Dear Abby letters.

Conversely, the students who did not demonstrate beliefs in certain knowledge on the EQ, offered more frequent consolation for the students’ lack of success, offered ways to
change their academic outcome, and provided strategies to help the student succeed in school. They saw that younger students tended to blame others such as teachers and parents for the lack of academic success. Interestingly, they found no correlation between personal epistemological factors and the prison question.

Measuring personal epistemologies quantitatively was initiated by Schommer (1990) and has been widely recognized; however, many researchers have chosen to attempt slight modifications. Schraw, Bendixen, & Dunkle (2002) created the Epistemological Belief Inventory (EBI) as a way to resolve a debate regarding the validity of Schommer’s (1990) epistemological dimensions, specifically the dimensions that pertain to omniscient authority and innate ability (Schraw, Bendixen, & Dunkle, 2002). Further, Schraw et al. (2002) speculate additional difficulty with the omniscient authority because it did not factor load but yet Schommer (1990) proposes a relationship between epistemological beliefs and omniscient authority.

The EBI (Schraw et al., 2002) is a 28-item paper-and-pencil questionnaire linked to a five-point Likert scale. The goal was to construct an instrument that was significantly condensed by creating more homogeneous items that could prove to be more reliable than other instruments but still measured Schommer’s five dimensions. In a comparison study Schraw et al. (2002) use a sample similar to Schommer (1990), 160 undergraduates (n=104 female & n=56 males), ages 18-46 from an educational psychology course in a Midwestern university. The participants were given the EBI and the EQ plus a reading comprehension test, and 120 of the same participants completed the retest packet one month later. After two principal factor analyses, one was a oblique rotation, which means the factors were correlated, and the other was a varimax rotation, meaning that the
factors were uncorrelated; five different factors emerged as follows: (a) innate ability, (b) certain knowledge 1, (c) incremental learning, (d) certain knowledge 2, and (e) integrated thinking. Incremental learning and integrated thinking were in contrast to Schommer's (1990) analysis of quick learning and simple knowledge. Schraw et al. (2002) concluded that: (a) The number of factor loadings differed between the two instruments and the way in which they match theoretical predictions vary; (b) the proportion of sample variance that is explained by each instrument was different; (c) when correlated with the reading comprehension test, the EBI had better predictive validity; and (d) the EBI had better test-retest reliability. The final dimensions that corresponded with Schommer (1990) and were empirically supported were these five: (a) innate ability, (b) certain knowledge, (c) quick learning, (d) simple knowledge, and (e) omniscient authority. The Epistemological Belief Inventory has been pertinent in developing further insightfulness in the area of personal epistemology and epistemic beliefs and how they play a role in ill-structured problem solving (Schraw, Dunkle, & Bendixen, 1998), how they contribute to moral reasoning (Bendixen, Schraw, & Dunkle, 1998), and how they predict the disconnection in argumentation (Nussbaum & Bendixen, 2003).

Jehng, Johnson, & Anderson (1993) reduced the Epistemological Questionnaire into 34 items and proposed a belief about the orderly process of learning to take the place of the structure of knowledge and reported epistemological beliefs on five dimensions: (a) certainty of knowledge, (b) omniscient authority, (c) orderly process, (d) innate ability, and (e) quick learning. They studied 398 undergraduate and graduate students as a function of their educational level and field of study. They found that students in softer (psychology, sociology, education, and others related to liberal arts) classes had a
stronger tendency to believe that knowledge was uncertain and relied more heavily on their independent reasoning ability. They also had a stronger feeling that learning was not an orderly process. That was compared to more hard (liberal science courses, such as math, biology, physics, or chemistry) classes in which students believed that learning was more controlled and orderly. The epistemological beliefs of the graduate students differed from those of the undergraduate students; therefore, they concluded that epistemological beliefs are a product of the activity, the culture, and the context in which the individual’s beliefs were nurtured.

Kardash & Wood (2000) then combined Jehng et al. (1993) and the EQ and developed the Epistemological Beliefs Survey, an 80-item self-report, Likert-type instrument. Kardash & Wood (2002) analyzed individual items and concluded five factors: (a) speed of knowledge acquisition, (b) structure of knowledge, (c) knowledge construction and modification, (d) characteristics of successful students, and (e) attainability of truth. Kardash and Wood (2002) tested 793 undergraduate and graduate students. Some of the results were confusing because many of the factors that were hypothesized to be consistent with certainty of knowledge, actually were reported loading on the dimensions of speed of knowledge acquisition and attainability of truth. They also had items associated with quick learning load on dimensions in addition to speed of knowledge. Kardash & Wood (2002) does support Schommer’s (1990) claim that epistemological beliefs are multidimensional; however, there did not appear to an overlap with the dimensions reported by Schommer (1990) or Jehng et al. (1993). Kardash & Wood’s (2002) findings do support Schommer’s (1993) results that epistemological
beliefs are related to grade point average, and differences in the beliefs were identified based on sex, age, and educational level, similar to the findings of Schommer (1992).

Schommer-Aikins (2000) found that age predicted growth in beliefs about learning. This finding indicates that the less formal education an individual is exposed to, the more limited their beliefs about knowledge become. Schommer-Aikins (2000) reported that middle school students differ from high school students primarily on the nature of epistemological beliefs. Beliefs about learning appeared to be better developed on each factor. She speculated that this may have occurred because the nature of learning is less abstract than the nature of knowledge. Another reason could be that the early appearance of beliefs about learning closely reflects the developmental reality of the middle school children. Learning is more the focus of school, where children are intentionally focused on learning and teachers place more emphasis on getting children to talk and think about learning. This is not so much the case with knowledge.

Schommer-Aikins (2004) admittedly perceives the reliability scores on many of the instruments (.54 to .76) as moderate but acceptable considering the complexities involved in measuring a construct such as personal epistemology. In relationship to the perplexing hurdle of quantifying personal epistemology Schommer & Walker (1995) propose that reliability scores may improve if researchers narrow the focus of their assessment to domain-specific epistemological beliefs or epistemological beliefs within the context of a specific classroom.

*Summary and critique.* In the process of developing the Epistemological Questionnaire, Schommer has been instrumental in demonstrating how epistemological
beliefs affect academic work, specifically in building relationships between the beliefs about knowledge, use of strategies, and performance (Hofer & Pintrich, 1997).

Hofer & Pintrich (1997) argue that the concept of epistemological beliefs should be restricted to beliefs about knowledge. Their point-of-view is that beliefs about learning are slightly removed from the core of epistemological beliefs. It seems that both beliefs about learning and beliefs about knowledge impact learning. Knowing more about how epistemological beliefs develop will certainly have implications for education, hence impacting learning. Schommer-Aikins (1990) hypothesized that beliefs about learning may come before beliefs about knowledge.

It is important to point out that although many researchers may utilize the EQ as a means of quantifying their participants’ epistemological beliefs, much of the research that consistently supports the instrument has been done by Schommer-Aikins and her colleagues. This observation definitely speaks to her dedication to improving both the instrument and the model she proposes. However, it absolutely raises questions about the source of the discrepancies in the factor loading of the instrument. It remains open for debate whether personal epistemologies should include dimensions of personal epistemology. Some researchers of personal epistemology have gone forward to include personal epistemology in larger frameworks such as social interactions (Baxter Magolda, 2004; Bendixen & Rule, 2004). Lastly, the age of the participants presented in all of the studies discussed represent a small group of some of the youngest populations (age 12) assessed in the area of personal epistemology and remains an area that should be investigated from an earlier age (Haerle 2005, Hofer, 2002).
Included in the Embedded Systemic Approach (2004) is another important contribution: the suggestion that researchers consider the interactions of peers and other influences on epistemological beliefs. The proposed study draws on many aspects from the work of Schommer-Aikins in the following ways: (a) the investigation of young children, (b) the idea of utilizing a systems perspective, (c) the role of peers; and (d) contextualizing the research methodology.

Personal Epistemologies as Theories

Viewing individuals' epistemological beliefs as epistemological theories was introduced by Hofer & Pintrich (1997) and is based on a review of existing models and empirical work in the area of personal epistemology. Hofer and Pintrich (1997) propose two general areas that represent the core of an individual's personal epistemologies: (a) the nature of knowledge and (b) the nature of knowing. In each general area there are two dimensions for a total of four dimensions of epistemological theories: the nature of knowledge is characterized by (a) certainty of knowledge and (b) simplicity of knowledge, and the nature of knowing is characterized by (c) source of knowledge, and (d) justification for knowing. This definition comes in part from the way in which personal epistemology has been developed in the past thirty years but is also deeply rooted in the philosophical nature of the study of epistemology (Hofer, 2001). This view will also be used as the current study's definition of personal epistemology.

According to Hofer (2001) the personal theories view is aligned with theory of mind research (Wellman, 1990) and conceptual change literature (Vosniadou & Brewer, 1994; Wellman & Gelman, 1992) which suggest that knowledge of a specific domain is structured in much the same way that scientific theories are structured. This combination
may be the ideal compromise as a way of avoiding the overgeneralization of stages that do not account for enough variation within individuals in the structure of their beliefs and models that represent beliefs and thinking as multidimensional that lack cohesiveness between the structures.

The personal theories model follows the description of a theory described by Wellman (1990) that includes three elements: (a) a continuum of initially loosely connected ideas or concepts that are discrete in their connectedness but gradually mature into sophisticated interrelated parts in a domain; (b) a mechanism that categorizes the domain by making ontological distinctions between its parts; and (c) a causal-explanatory framework for the events within the domain. In reviewing the personal epistemological literature, Hofer & Pintrich (1997) concluded that: (a) Different aspects of beliefs about the nature of knowledge and the process of thinking are interrelated in ways that could be theory-like; (b) all of the models of epistemology make some distinction between the nature of knowledge and the process of knowing; and (c) it is premature to say that personal epistemologies include a causal-explanatory framework but that aspects of the nature of knowledge can serve as constraints on the process of knowing.

Since the introduction of this model, many researchers in the field of personal epistemology have adopted the application. The model has prompted research in younger populations (e.g., Burr & Hofer, 2002; Haerle, 2004) and is particularly significant to this proposed study because it is the model which is most closely related with the design of the study.

Discussion of the model. Hofer & Pintrich (1997) propose a multidimensional view of epistemological development from naïve to sophisticated epistemological beliefs taken
primarily from the combined works of Perry (1970) and Schommer (1990). Hofer (2001) points out that using this model of epistemological theories is consistent with Schommer's (1990) epistemological beliefs but is more open in terms of the integration of epistemological dimensions or structures. The model does not function in a rigid structural manner; it is more representative of loosely interrelated structures that become integrated as an individual’s epistemological beliefs become more advanced and complex. This is similar to the neo-Piagetian view of cognitive development that has turned away from the more rigid view of stage development (Bidell & Fischer, 1992). It is conceptualized that identifying these ideas as theories may clarify epistemological thinking related to belief acquisition and change.

The view of epistemological theories subsumes most of the epistemic dimensions according to developmental (e.g. King & Kitchner, 1994) and independent belief (e.g. Schommer, 1990) theory, with the exception of Schommer’s beliefs about learning. Although Hofer & Pintrich (1997) admit there is a close connection between beliefs about knowledge and beliefs about learning, they are persistent in their notion that beliefs about learning should be represented as a peripheral psychological construct that can contribute to an individual’s beliefs about knowledge but is separate. Further, Hofer (2001), in support of delineating beliefs about learning, argues that personal epistemology models need to stay tucked in tightly with the philosophical meaning no matter how they get designated. Therefore, beliefs about learning and education are viewed as supplemental means of acquiring information about an individual’s beliefs about knowledge, rather than being included as a dimension of their belief about the nature of knowledge and knowing.
Empirical support. Hofer (2000) provides empirical support for the Epistemological Theories Model by investigating the dimensionality of personal epistemology and the nature of disciplinary differences. This study involved 326 first-year college students (53% female, 47% male) who were enrolled in an introductory psychology course. The participants completed an abbreviated version of the Epistemological Questionnaire (EQ) (Schommer, 1990) and two newly developed epistemological belief instruments which were identical except that one was labeled for “Psychology” and the other was labeled for “Science.” They used academic achievement and academic performance scores in the analysis to measure achievement in either psychology or science and used GPA to track overall academic performance. The factor analysis supported the existence of multiple epistemic dimensions, but certainty of knowledge and simplicity of knowledge did not emerge as separate factors. Perhaps certainty of knowledge and simplicity of knowledge are not distinctive enough factors (Hofer, 2000).

In another study Hofer (2004a) used case study methodology to investigate 25 college students during their first semester. The study focuses on experiences, perceptions, and meaning making of students in sciences and social science courses. She triangulated data from classroom observations, individual semi-structured interviews, and instructional documentation (syllabi, exams, and handouts from each class). The goal was to uncover how the students expressed personal epistemologies in their own words within the educational context. The data was reviewed multiple times for evidence of dimensionality of beliefs, representations of a continuum of beliefs, and connections between beliefs and instructional practices.
There were four dimensions that emerged from the data: (a) Simplicity of knowledge was perceived by the students as a continuum spanning from perceiving knowledge as an accumulation of discrete, concrete, knowable facts to interrelated networks of concepts that are relative, contingent, and contextual; (b) certainty of knowledge was found all along the continuum ranging from the idea that knowledge can be known with some certainty, to knowledge as less certain, evolving, and always changing; (c) source of knowledge was found to be primarily external, coming from lectures or textbooks, and only a small amount of students claimed that knowledge was internally constructed, and (d) justification of knowledge was predominantly uncovered on a naïve level; students were minimally cognizant of criteria and procedures that would verify scientific knowledge. Hofer (2004a) points out that although there were four dimensions of personal epistemology accounted for, the evidence that represents the student’s source of knowledge could also have been accounted for by the criteria used to label the dimensions of certainty and justification of knowledge. In other words, when students responded that the source of knowledge is derived externally from lectures and textbooks, it could be overlapped with certainty or justification of knowledge.

**Summary and critique.** Hofer & Pintrich’s (1997) *Epistemological Theories Model* has contributed largely to the literature. It is consistent with many of the recognized and empirically validated models of personal epistemology. It incorporates a developmental, as well as, an independent dimensional perspective. It can be applied to quantitative, qualitative, and mixed methodologies with ease. It offers acknowledgement of beliefs about learning in the periphery rather than encapsulating them within the realm of personal epistemology per se. In her efforts to validate her model, Hofer has tapped into
possibilities to acquire further information to support the model using domain-specific areas, classroom context, and fine-grained elements.

Viewing personal epistemologies as theories is paving the way for a better understanding of domain-specific beliefs as well which is consistent with other research in cognitive developmental areas. This is a progressive and innovative notion in personal epistemology. Hofer (2000) found that individuals appear to have differing epistemological assumptions regarding different disciplines; in this case the students’ epistemological beliefs about psychology differed from their beliefs about science.

Conceptualizing personal epistemologies as theories is an emerging perspective and requires much more research. The framework it provides may lead to a better understanding about the teaching and learning process. It lends support to important issues pertaining to students’ and teachers’ beliefs about knowledge and the way that they think about knowledge; however, it does need to accumulate much more empirical support.

**Personal Epistemologies as Resources**

Hammer & Elby (2002, 2003) and Loucas, Hammer, Elby, & Kagey (2004) have introduced a new category of designating epistemological beliefs as resources. For Hammer & Elby (2002, 2003), conceptualizing personal epistemologies is troublesome because of ontology issues. They have a more condensed and domain-specific perspective of personal epistemology; they approach the topic through students’ beliefs about science and science learning. Despite the fact that they are studying primarily introductory physics beliefs, they claim that their perspective can be applied to other disciplines and concur that epistemology refers to the nature of knowledge and knowing.
This model challenges the existing theory, research, and methodology of the personal epistemology literature. For example, the model accounts for consistency within a specific domain or context, but it does not support the notion of consistent beliefs across domains or multiple contexts. According to what is generally accepted in the research on personal epistemology, this model suggests that personal epistemology is less stable and consistent and does not ontologically represent a trait-like or stage-like trajectory (Hofer & Pintrich, 1997).

Hammer & Elby (2002) set themselves apart from the unidimensional stage-like theories set forth by Perry (1970), Belenky et al. (1986), and King & Kitchener (1994) and connect themselves more closely with those who have argued that personal epistemologies need to be viewed in multiple dimensions such as Schommer (1990) and Hofer & Pintrich (1997). Hammer & Elby (2002) also agree that personal epistemologies need to be viewed as theories or traits but cannot be generalized.

Discussion of the model. Personal epistemologies as resources is defined by Hammer & Elby (2002) as fine-grained components of cognition that are highly sensitive to and dependent upon the instructional context of an individual. They categorize epistemological resources in four ways: (a) the nature and sources of knowledge, (propaganda, free creativity, and fabrication); (b) as epistemological activities such as accumulation, formation, and checking; (c) as epistemological forms, like stories, games, rules, and facts; and (d) epistemological stances, for instance, acceptance, understanding, and puzzlement.

Hammer & Elby (2002) argue that it is not a question of unitary consistency or inconsistency but rather a question of if the context (classroom or measure) is presented
in a manner that enables the student to enter a specific epistemological space to tap into their epistemological resources. They believe that to achieve higher levels of epistemological beliefs depends on two related processes: (a) the form of the students’ personal epistemologies, and (b) the teachers’ perceptions of their students’ form of personal epistemologies. Louca, Hammer, & Elby (2004) define form of personal epistemology as grain sized, stable, and context-dependent according to the cognitive domain. In this view, children are not seen as possessing epistemological beliefs. Rather they have a belief of certain knowledge based on external information and internal information which are finer grained resources that the child does not integrate or has not yet compiled. Epistemological beliefs are reserved for experts and some thoughtful novices because they are capable of conscious beliefs (a theory) about the constructivist nature of scientific knowledge, and these beliefs do not vary by context. These conscious, stable beliefs are considered to be compiled into a rich network of finer-grained cognitive resources.

In this resource framework, Hammer & Elby (2002) point out some mild rigidity in terms of identifying epistemological beliefs research; they warn that this rigidity has some methodological consequences because they do not support labeling a belief based on an individuals’ response to a single statement(s) in one context. They point to the use of multiple contexts to more accurately derive an individual’s epistemological beliefs. They argue that different contexts can trigger different resources. Their goal is to model personal epistemologies as context-dependent activations (choices) of resources.

Empirical support. Hammer & Elby (2004) present a theory about how teachers can foster more advanced levels of epistemological beliefs in physics. This research is based
on two assumptions: (a) Students with higher levels of epistemological beliefs are more active in learning, and (b) classroom interventions that are directed toward addressing students' epistemological beliefs improve learning. In this way, the instructional strategies are the key to having students achieve their highest attainable epistemological belief. Rather than trying to confront and change students' beliefs or trying to offer mounds of contextual evidence to support a specific concept to move students to reach their developmental milestone, a teacher should attend to helping students find and apply productive resources that they know and understand from other contexts that they would fail to transfer in the present context (Hammer & Elby, 2003). Louca, Hammer, & Elby (2004) examined a case study of a third-grade teacher's science instruction. The science lesson was on the topic of autumn leaves and took place in a public elementary school. The data is divided into four segments: (a) the teaching diagnosis and initial intervention, (b) discussion of the "how" question, (c) Miss Kagey's new intervention, and (d) the post-cookie discussion. Each segment is broken down further into teacher and student perspectives.

In Segment 1, the goal of the instruction was to prepare the students to have more causal explanations of the processes of why leaves change color and what is happening inside of the leaves in order for them to change colors. Some students were unable to distinguish between the two questions and ultimately wrote the same response for both questions. The teacher followed-up with an explicit description of the differences in the two questions by comparing the first question to why you are hungry and the second question to what happens in your stomach when you are hungry. She then returned to the questions and proceeded through the discussion. The analysis, according to the resources
framework, predicted the fine-grained context dependence in the students' initial confusion. They did not intuitively link why leaves change to why they are hungry. The connection made has more to do with the teacher's ability to link what she believes the students can associate to the leaves, in this case hunger; therefore, the idea is that the strategy used will advance the students' understanding about the leaves. The teacher attempted to tap into the students' epistemological resources for understanding the causal, mechanistic knowledge forms of the lesson and how they differed from the students' more general descriptive understanding.

In Segment 2, most students did not adequately settle the confusion regarding the two questions and, despite repeated prompts, the students continued to develop general descriptions significantly removed from the mechanistic goal. There were hints, however, of mechanistic understanding beginning to formulate. It is theorized in this segment that the difficulties may stem from inadequate conceptual knowledge about leaves; that the students simply did not have epistemological knowledge about the mechanistic nature of scientific explanations.

In Segment 3, the teacher made a new attempt to show the students the difference between the general description question and the mechanistic question. She created a scenario about baking cookies because her birthday is coming soon. Immediately following the descriptive cookie-making process, she asked, "how are the leaves changing colors?" in addition to several prompting questions following. The analysis goes accordingly; using a familiar scenario that the students readily are able to distinguish the purpose from the mechanism triggered the students' mechanism/causal resources, which enabled them to understand the leaf questions.
In Segment 4, the students began to ask the teacher questions about how they now thought about what was happening inside the leaves that make them change and, interestingly, many of the students’ understandings were more causal in nature. The take-home assignment was to now re-write their new understanding. In their conclusion, Louca et al. (2004) states this study is an illustration of an everyday life example that really helps students understand the difference between a “how” and “why” question.

Rosenberg, Hammer, & Phelan (2006) applied the same resource framework to an eighth-grade science class about rock cycles. The study followed the same case study format. The lesson was 15 minutes long and occurred toward the end of a multi-week unit on rocks and minerals. The lesson began with the teacher showing the class a video of themselves discussing the question, “How are rocks formed?”, that had been recorded at the beginning of the unit. There were 22 students in the class, and the teacher’s role was similar. They concluded that their results were consistent with Louca et al. (2004). The students had treated knowledge as comprised of isolated, simple pieces of information expressed with specific vocabulary and provided by authority. The students drew on what they knew to construct a sensible, causal account, looking to their own reasoning ability to fill in gaps and make sense of inconsistencies in their knowledge structure.

More work is needed in order to more clearly conceptualize and empirically solidify this framework; however, it introduces important issues to the field of personal epistemology such as, researching in the classroom, qualitative case studies, and places an emphasis of teacher’s beliefs and their impact instruction and learning (Hofer & Pintrich, 1997).
Summary and critique. Hammer & Elby have not dug deep into the archives of personal epistemology literature, but they have utilized literature that is not the norm in developing a conceptualization of personal epistemology (e.g., Dennett, 1991; Lakoff & Johnson, 1980; Minsky, 1986). Hammer & Elby’s (2002) resources view appears to be in an infancy stage of development. There are incomplete and vague representations of their proposed resources, and there is very limited empirical support (Louca, Hammer, Elby, & Kagey, 2004; Rosenberg, Hammer, & Phelan; 2006) of their model.

Hammer and colleagues currently have shown that they are able to analyze a case study applying their framework, but it appears that it may be a perplexing challenge for other researchers to replicate their research with any type of reliability or validity to support their interpretations. Although the context-specific component is embraced positively in personal epistemology research, this approach could quite possibly be too specific in nature. In fact, the approach could be edging on the verge of being more identified as a methodology than a true theory of personal epistemology. It is also useful for the field that they include young children in their attempt to identify epistemological resources as this is a trend that needs far more attention than is received in personal epistemology research. Another positive aspect of this research that is valuable in personal epistemology is the role of the classroom teacher and the modification of instructional techniques as a means of tapping into students’ epistemological beliefs. This may lead to their research making a greater impact on curriculum and instruction than previous models of personal epistemology because their educational implications can be directly identifiable in terms of suggestions for teachers.
Integrative Personal Epistemology Model

Bendixen & Rule (2004) point out several of the more important issues in personal epistemology that plague researchers and need attention in future epistemological research; they compare and contrast the current models of personal epistemology and propose the Integrative Personal Epistemology Model. This model was introduced because there is no existing integrated model of personal epistemology that emphasizes the "relationship between personal epistemology and how epistemological beliefs change and develop" (Bendixen & Rule, 2004, p. 69; Schraw, 2001). Most researchers in the field of personal epistemology would probably agree (Baxter Magolda, 2004; Haerle 2006; Hofer & Pintrich, 1997; King & Kitchener; 2004; Schommer-Aikins, 2004) that this is currently the most significant issue that needs to be addressed in the field.

Bendixen & Rule (2004) pose the question, What would we gain from a more integrated model of personal epistemology? They believe that mainstreaming the focus of personal epistemology can inform and guide future research and educational practices. They provide an extensive list of general issues in the field of personal epistemology, but for the purpose of keeping this section closely tied to the proposed study, the list is slightly condensed and adapted. Some of the general issues and recommendations that they discuss include the following: (a) engaging in research that closely parallels cognitive development (Hofer, 2001), (b) embedding research methodologies within a real-world context (Louca, Elby, Hammer & Kagey, 2004), (c) engaging in research that will yield in-depth explanations rather than general descriptions of personal epistemological development (Burr & Hofer, 2002), (d) identifying the relationship between personal epistemology and how beliefs develop and change (Schraw, 2001), (e) adopting a process
that leads to change (Bendixen, 2002), (f) including affect as a factor in identifying personal epistemologies (Schoenfeld, 1985), and (g) working toward consensual definitions with more inclusive frameworks (Hofer, 2002). Bendixen & Rule (2004) propose the *Integrative Personal Epistemology Model* to address the issues they believe to be prevalent in the field of personal epistemology and do not assume that their model subsumes all of the issues or models in personal epistemology.

Discussion of the model. The *Integrative Personal Epistemology Model* (Bendixen & Rule, 2004) is centralized around a mechanism of epistemological belief change and is the only model in the research literature that examines, in a more small scale, the change process. There are three components within the mechanism of change: (a) epistemic doubt, (b) epistemic volition, and (c) resolution strategies.

The model is intended to be both linear and hierarchical because its components can progress incrementally but one is dependent on the next. This does not mean, however, that the mechanism of change occurs in a stage-like manner, but the model views the development of personal epistemology as a dynamic process that includes effects such as context, affect, and environment. Three components are interrelated, and it is conceptualized in the model that all three components must be in sync for epistemic change to occur. For example, if an individual experiences only epistemic doubt without the epistemic volition component, then the mechanism of change will not be effective. Therefore, a reversion back to an existing epistemological belief at any point during the process of change is conceivable (Bendixen & Rule, 2004).

The model uses aspects of Piaget’s cognitive development theory to explain how epistemic doubt paves the way for the mechanism of change process. As was discussed
previously, for Piaget, cognitive development is based on the equilibration process. Individuals strive to obtain equilibrium between themselves and their environment. When balance is not achieved, the individual enters a state of disequilibrium. This disequilibrium is alleviated when the individual either assimilates or accommodates the information.

Epistemic doubt in the *Integrative Personal Epistemology Model* is thought to be quite broad and extending from dualism to evaluativism. This line of thinking accounts for individuals at all levels of epistemological development and that they could engage in some degree of doubting their beliefs at one time or another (Bendixen & Rule, 2004). Due to the interrelatedness of the components that make up the mechanism of change, epistemic doubt is one driving force for change to occur, but it quite possibly requires the accompaniment of epistemic volition as well.

Epistemic volition incorporates many assumptions related to both Piagetian and Vygotskian theory and conceptual change. Epistemic volition refers to the purposeful actions of the individual and, as Bendixen & Rule (2004) point out in their model, change may occur when epistemic doubt is joined with epistemic volition. Even if epistemic volition is achieved, it remains a possibility that an individual can return to an existing belief and change does not take place. Epistemic volition is perhaps indirectly somewhat present in the personal epistemology literature; it places emphasis on metacognitive awareness as discussed Hofer (2004b) and stresses the accountability of the individual to take ownership for their epistemological beliefs (Baxter Magolda, 2004).

Resolution strategies are the final component of the mechanism of change process. This component relies heavily on the individual’s previous experiences of epistemic
doubt and epistemic volition. This is a time for the individual to be reflective about past experiences; thinking is geared toward weighing the implications of one’s beliefs in connection with goals and finally resulting in an outcome that is reasonable and acceptable. Reflection and social interactions are central factors during this process for achieving epistemic change (Bendixen & Rule, 2004). Although individuals reach the resolution strategies component, it is believed that they can still return to their existing beliefs or revisit the epistemic doubt and/or epistemic volition component. Reflection strategies are also discussed in the personal epistemology literature. Baxter Magolda (2004) discusses making educated decisions, and King & Kitchener (2004) discuss a more detailed account of reflection during later stages of development. Also Dewey (1925) believed that reflection of one’s own experiences was the catalyst for development.

The Integrative Personal Epistemology Model maintains the four dimensions of Hofer & Pintrich (1997): the nature of knowledge (certainty and structure of knowledge) and the nature of knowing (source and justification for knowing). The dimensions are ultimately affected by the process of the mechanism of change.

There are two conditions for change described in the Integrative Personal Epistemology Model: dissonance and personal relevance. These conditions are believed to be the precursors for personal epistemology change. Dissonance is separate from epistemic doubt and does not ensure commitment to change; dissonance is a vague emotion where individuals may encounter dissatisfaction that impacts them on the surface but does not trouble them deeply (i.e. epistemologically). Personal relevance involves emotional engagement on the part of the individual that relates to personal
issues or a high level of efficacy. It is then conceptualized that these two conditions of change are similar to conceptual change theory and may influence change in personal epistemologies (Bendixen & Rule, 2004).

Affect also contributes to the Integrative Personal Epistemology Model and is similar to the term “hot conceptual change” (Bendixen, 2002; Dole & Sinatra, 1998, p. 208). Affect is a critical element in the Integrative Personal Epistemology Model and is present in every component of the mechanism of change. Bendixen & Rule (2004) believe that this element is at least implicit in most of the personal epistemological frameworks. For example, Bendixen (2002) found that college students choose to be evasive regarding their emotions provoked by epistemic doubt for one of two reasons: (a) They were so strongly attached to their belief, or (b) they were overwhelmed with their emotion and did not have adequate coping skills. Either way the individuals did not experience epistemic change. More positively, emotions were shown to trigger the individual to take action which prompted them to implement resolution strategies. More work needs to be done in this area, but regardless of the uncertainties, affect may contribute to the research in personal epistemology development, and this remains a strong area for future investigation.

Two other factors in the Integrative Personal Epistemology Model are important to the current study: the role of peers and cognitive ability. Peers are significant due to their level of social equivalency. The role of peer influence on cognitive development is handed down from Vygotsky’s theory of cognitive development (Vygotsky, 1978). Cognitive ability in this model stems from both Piaget’s cognitive development theory and Vygotsky’s sociocultural approach because they both viewed development as the
interaction between the individual and the environment. For example, for an individual
to have a high level of personal epistemology it requires the coordination of interactions
from the individual’s cognitive ability while juggling the influences of environmental
demands.

**Empirical support.** The Integrative Personal Epistemology Model is derived from
classical work by Bendixen (2002). The Process Model of Epistemic Belief Change was
derived from a phenomenological study that investigated 12 undergraduate students and
their views of epistemic change. She found that epistemic doubt was critical in fostering
the changes within the student’s epistemological beliefs. In addition, Bendixen (2002)
found that peers were instrumental facilitators of epistemic doubt and dissonance and
were more often the catalyst for resolving epistemic doubt. Similarly, peers were found
to be more sought after to assist with ill-structured problems than were individuals in
roles of authority (Mansfield & Clinchy, 2002), and Schommer-Aikins (2004) found that
peers can play a large role in restructuring individual’s personal epistemologies.

**Summary and critique.** The Integrative Personal Epistemology Model (Bendixen &
Rule, 2004) attempts to compile the most potent factors relevant in the personal
epistemology research to date while incorporating the most sound definitional foundation
of the construct that exists in the literature. The goal of this model is to clarify and guide
personal epistemology research.

The model not only incorporates the personal epistemology frameworks but links the
theories of cognitive development of Piaget and Vygotsky. The emphasis on the
importance of social interactions, context, affect, and environment are correlated and
form the fundamental operational system of the individual’s personal epistemology, and
this is central to the proposed study. Although Bendixen & Rule (2004) do not call their model a system, it definitely represents the ideas of systems theory as it relates to the development of personal epistemology.

Young Children’s Personal Epistemology

Research on epistemological development has focused primarily on adolescents and adults and has neglected very young children. Most of the research in personal epistemology is conducted with college students ranging from young to middle adulthood. There is more interest as of late in researching adolescent personal epistemology, but the field in general is strongly criticized for neglecting young children (Kuhn & Weinstock, 2002). Originally it was thought that epistemological development began in late adolescence, triggered by the intellectual demands of college (Burr & Hofer, 2002). It is also speculated that researching young children was simply inadvertently overlooked because early researchers in the field had their interests in higher education and not developmental psychology and, therefore, studied the age group of most interest to them (Hofer & Pintrich, 1997).

For the purpose of the current study, “young children” refers to children whose age ranges from 2- to 8-years-old, and the present study is specifically targeting 3-and-4-year-olds (i.e. preschool age). The following section on young children’s personal epistemology includes six parts: (a) the importance of children’s personal epistemology, (b) developmental issues, (c) research on children’s personal epistemology, (d) methodological issues, (e) children’s theory of mind, and (f) children’s personal epistemology and theory of mind.
The Importance of Children’s Personal Epistemology

Researching young children addresses the broader issue of engaging in research that closely parallels cognitive development (Hofer, 2001). Development is historically a prominent issue in the personal epistemology of college students, but researching young children can be instrumental in identifying periods of epistemic development that have only been hypothesized but never identified. Hofer (2001) proposes that researching young children would contribute toward a “Life-Span” view of personal epistemology (p. 365). Kuhn (2000) states that the development of epistemological theories is advancing but consistently remains distant from other cognitive developmental research. Research that investigates young children is severely underrepresented in the personal epistemology literature. Currently, there is a single study of young children’s personal epistemology by Burr & Hofer (2002) that will be described in a later section.

Developmental Issues in Children’s Personal Epistemology

It has been pointed out in reviewing the personal epistemology literature that individuals generally organize and reorganize their beliefs about knowledge and knowing in an orderly continuous flow resulting in a developmental pattern. Although much of the research in personal epistemological development has focused on adults and some adolescents, there still needs to be substantial investigation into young children’s personal epistemological development (Burr & Hofer, 2002).

Piaget’s theory. In most accounts, early childhood refers to an individual from age two until seven years old, and, according to Piaget (1964), this period of time is called the preoperational stage of cognitive development. This stage of development is characterized by children’s ability to use symbols to mentally represent objects that exist
in the world, and their thinking is egocentric and centrally focused. This is a period of
time when children begin to acquire language skill at lightning speed and build
knowledge of concepts at an equally fast pace. Piaget believed that much of the way that
children think at this stage of development is primitive; however, there is some literature
that would argue that Piaget underestimated young children and believe that children’s
ways of thinking are more sophisticated and complex than initially theorized (Flavell &
Miller, 1998; Wellman, Cross, & Watson, 2001).

Children in the preoperational phase of development generally lack understanding of
the principle of conservation, which demonstrates their inability to focus on more than
one event or concept at one time. For example, if a sandwich were cut in four small
pieces, preoperational children would have the tendency to think that the four smaller
pieces indicate a larger amount of sandwich than an uncut sandwich because they can
only focus on the greater number of pieces. This ability to focus on only one aspect of the
situation is called centration. Gelman (2000) and Siegler (1998) have found that children
in the early preoperational stage of development are capable of succeeding on simpler
forms of these tasks that require the same skill. Boden (1980) had similar findings and
discovered that the pass rate on many of the tasks depended on the variation of the
instructions given to the child. Likewise, Nagy & Griffith (1982) found that when the
directions were more complex, the children did more poorly on the tasks than when the
directions were introduced more simplistically.

Irreversibility is another characteristic of a preoperational child. This Piagetian term
means that the child cannot manipulate a change of direction in their mind. For example,
just because a child knows how to walk to the store does not mean that it can be assumed
the child could figure out how to walk home in early preoperations. At this stage it is assumed by Piaget that the child has mastered object permanence; they now know that an object continues to exist even though it may not be directly visible to them at the moment. For example, if mom puts candy behind her back, the candy is still present.

Egocentricity is another main characteristic associated with the preoperational child. Egocentricity refers to children’s belief that everyone views things in the same way that they do. Supposedly, children have the inability to view situations and objects from the perspective of another individual. Piaget & Inhelder (1956) in a renowned study placed a child facing in one direction and a doll in the opposite direction, then asked the child to describe the view in the scene (that the doll could not see) from the doll’s perspective. Children below age six were more likely to describe the doll’s view similar to what they could see while it would be apparent to an adult that the child and the doll do not have the same view.

In many areas of cognitive development, Piaget’s work is viewed as foundational because of his many insights and contributions; however, there is research that demonstrates some weaknesses about his theory. Baillargeon, Graber, DeVos, & Black (1990) found that when practical knowledge is assessed, young children are more competent than Piaget originally thought. It could be that we do not consistently capture the sophistication and complexity of preschooler’s cognitive abilities because they are more fragile than those of older children and are therefore only present under certain more familiar conditions than they are generally assessed (Gelman, 1979). The heart and soul of Piaget’s stage development is more recently being doubted; some researchers
question that the broad stages of cognitive development represent the true course of human development.

*Personal Epistemology.* The lack of research with young children has made way for researchers to speculate conceptually regarding the beginnings of personal epistemological development. Chandler, Hallet, & Sokol (2002) point out that regardless of the age, the participants studied thus far demonstrate similar patterns of thinking and seem to have similar starting points. There are five arguments for this phenomenon, and Chandler, Hallet, & Sokol (2002) propose three of the five: (a) Early onset suggests that young children have more sophisticated epistemologies than can be predicted based on studies of college students; (b) recursion is conceptualized as a spiral-like development in which epistemological stages continue to occur and reoccur in a cyclic process, rather than in a linear motion; and (c) suppression which suggests that prior to entering school and during school, children’s advancing beliefs are discouraged which prompts them to suppress their epistemological development until adulthood.

Two other arguments can be identified in the literature: (d) late onset supports the idea that true epistemological development does not begin until students reach higher academic environments and researchers have been overestimating the ability of young children (Perry, 1970; King & Kitchener, 1994), and (e) domain dependence suggests that early epistemic thinking is dependent on the domain in question. For example, young children may demonstrate multiplistic epistemological perspectives about subjective knowledge (i.e., personal judgments or procedural knowledge) and, on the other hand, not demonstrate similarly multiplistic epistemological perspectives about objective-type-knowledge (i.e., declarative knowledge) until much later (Kuhn &
Weinstock, 2002; Mansfield & Clinchy, unpublished). One of these alternatives may be more valid than another, but it is much too premature to make this judgment.

Preschool. Addressing developmental issues with young children may require that personal epistemology researchers adopt a more situated perspective and examine more microgenetic levels of change (Hofer, 2001). This will be particularly useful at the preschool level because most preschool curricula do not have designated standards; therefore, once researchers begin to study preschool classrooms there will be a vast array of instructional philosophies and strategies that may be informative about how children come to know and understand the nature of knowledge and the process of knowing.

It is also important to point out the National Center for Education Statistics and the Institute of Educational Sciences at the Department of Education in 2000 indicated that there was a 15% increase in preschool enrollment from 1990 to 2000. Over those same years they indicated that 40% of all 3-year-olds attended preschool, followed by 60% of 4-year-olds, and 92% of 5-year-olds. This increasing trend is consistent across Caucasian, African-American, and Hispanic populations and showed no correlation between household income and the parents' highest level of education (National Household Education Survey, NHES, 2000). This is an indication that there is an educational need to gather information about young children in the preschool classroom environment. It is important to investigate young children in a structured learning environment in order to identify patterns during their interactions with others and to understand their epistemic development. Students are entering school younger, demands on teachers are becoming greater, and many states do not require preschool teachers to have specific educational backgrounds. Considering the increase in preschool
attendance, developmental factors of personal epistemology could prove to be beneficial for learning and instruction by stimulating the classroom environment (Bendixen & Rule, 2004; Hofer, 2001) or linking personal epistemology with a construct such as situational learning (Schraw & Lehman, 2001).

Research on Children's Personal Epistemology

There is some research in personal epistemology that investigates older children. Haerle (2006) examined fourth-grade children, teacher epistemology, and classroom climate and found that the student's epistemologies were representative of personal theories about knowledge and knowing. He proposed that the findings were identifiable and interrelated according to four dimensions: (a) certainty of knowledge, (b) structure of knowledge, (c) justification of knowledge, and (d) source of knowledge. This is consistent with Hofer & Pintrich (1997). Further, the students were categorized according to their developmental patterns: absolutism, multiplicity, and evaluativism (Kuhn & Weinstock, 2002). Haerle (2006) developed a model that incorporates the findings of the fourth-graders' personal epistemologies with the teacher and the classroom climate called The Educational Model for Personal Epistemology Enhancement (EMPEE). He argues that the students' epistemologies are an essential component in the model and the primary focus of educational enhancement. Haerle (2006) represents another important study that supports the importance of researching children's personal epistemologies for the implications that it presents for education. This study will focus slightly on the instructional technique of the teacher primarily because it is situated within the classroom context, but the main concern is with
identifying the ways in which children develop personal epistemological systems in relationship to influences and the processes within their learning environment.

Methodological Issues

Measuring young children’s epistemological awareness will be challenging if researchers do not make accommodations for their cognitive abilities. This may well explain the discrepancies in the theory of mind literature that illustrates how changing the false-belief task changes the age that children can successfully complete the task (Chandler, 2002; Gopnik & Graf, 1988; O’Neill, Astington, & Flavell, 1992; Perner, 1991). If researchers have expectations that children need to perform at a higher level than they are developmentally capable, identifying children’s personal epistemologies may prove to be emotionally taxing for the child and ineffective for the researcher; however, young children should not be underestimated in their ability to perform sophisticated cognitive tasks. King and Kitchener (1994) argue that the research instruments designed to study personal epistemology are geared more toward college students and may be too cognitively challenging for young children.

Ultimately, with virtually no research in children’s personal epistemological development, identifying clear methodological issues remains unknown. It could be anticipated that there will be some measurement issues related to those seen in the research in adult personal epistemological development or present in other areas of cognitive development with young children.

Personal epistemologies are complex even in adult investigations; therefore, it is reasonable to believe they may be equally as elusive in young children. King & Kitchener (1994) and Kuhn (1991) emphasize measuring personal epistemologies as
components of reasoning. The concern with this type of method is that they can vary depending on the nature of the participant, the investigator, and the setting of the investigation. The field of personal epistemology has been critical of measures and frameworks that are too subjective insofar as they can lead the participants to the desired results by focusing on a specific dimension or using a guiding or prompting question. Hofer & Pintrich (1997) conclude that it may be more beneficial to develop more precise measures and innovative ways to measure personal epistemologies that can investigate specific dimensions of knowledge or address specific developmental issues (Baxter Magolda, 1992; King & Kitchener, 1994; Kuhn, 1991). The biggest problem with phenomenological or open-ended types of questions is the low degree of replicability (Hofer & Pintrich, 1997).

Interviews and more qualitative methodologies have led to a deeper understanding of individual’s beliefs about knowledge; however, the problem with this type of approach is that it tends to be an issue of time during data collection on the part of the participants and the researcher. This may prove to be a measurement issue in researching young children in general because of their shorter attention span, but specifically, for this study, because it is conducted in the classroom setting. While conducting research within a classroom context, the researcher needs to be conscientious of multiple factors that cannot be controlled, in addition to being respectful to the teacher and students. An alternative to structured and unstructured interviews with adults is a paper-and-pencil questionnaire, but this can be problematic with younger children because of their developmental restraints. Not only are they limited in their reading ability, but if the
questions were to be read to them, the understanding of the Likert scale may be too complex for a young child to understand.

Language development in young children is a gradual process and is found to be a limitation in other areas of cognitive development, such as theory of mind (Wellman & Cross, 2001) and will need to be strongly considered prior to the examination of any cognitive constructs. The language and activities need to be tailored specific to the age group being studied (Poole & Lamb, 1998). In this case, a pilot study was conducted to address language issues. Piloting research with young children is recommended (Greig & Taylor, 1999). Although piloting research can produce crucial information, it contributes to the time factor.

Besides concerns of measurement, there may be some conceptual issues that exist in researching young children’s personal epistemology. Piaget’s theory of cognitive development has been criticized for underestimating young children’s ability (Burr & Hofer, 2002). In addition, Hofer & Pintrich (1997) point out that current shifts in educational thinking continue to impact the way personal epistemology is conceptualized and approached, and this can impact the way in which individuals believe what they know. Although the field is making strides toward achieving a unified consensus, it remains negotiable. Considering findings from Burr & Hofer (2002), researching young children may slightly impact current conceptions regarding the trajectory of personal epistemology. Regardless, there is insufficient research, and these thoughts are only speculation based on the existing research. Researching young children’s personal epistemology needs to be pursued more aggressively.
Theory of Mind

Theory of mind development is an area of cognitive development research that investigates the nature of and development toward understanding of the mental world. The individual’s inner world consists of: beliefs, desires, emotions, thoughts, perceptions, intentions, and other states (Flavell, 2004). In contemporary research the term theory of mind surfaced from Piagetian literature and with the work of Premack & Woodruff who investigated chimpanzees and their cognitive ability. Woodruff & Premack (1978) defined theory of mind as a system of inferences that can be used to predict behavior by attributing mental states to individuals.

Piaget framed two separable entities of an understanding of mind: an understanding of the nature of mental states, such as, thoughts and dreams; and the use of psychological reasoning to explain human actions, such as how intentions and desires cause and explain human action (Wellman & Phillips, 2001). Piaget underestimated the capabilities of young children, specifically preschoolers. He thought that they reasoned incorrectly by contemplating physical objects by psychological reasoning and applied physical reasoning to human actions.

Although Piaget has been an enormous contributor, his theories have been criticized and challenged on the basis of these two assumptions: with the examination of children’s mental states (Shatz, Wellman, & Sibler, 1983) and examination of psychological reasoning regarding mistaken actions resulting from false-beliefs (Wimmer & Perner, 1983). One thing that has been determined as a result of the resurgence of this research is that young children, in fact, do understand the fundamental differences between mental versus the physical world (Flavell, Green, & Flavell, 1995). Harris, Johnson, Hutton,
Andrews, & Cooke (1989) demonstrated that when a child is told about a person who has a dog versus a person who is thinking about a dog and then, subsequently asked which dog is able to be seen or petted, even three-year-old children were able to judge correctly. Estes, Wellman, & Woolley (1989) told three-year olds a story about a “raisin in the head” (i.e. a thought about a raisin) versus a “raisin in the stomach” (i.e. a swallowed raisin), and they correctly acknowledged that neither raisin could be seen or touched, and that one was imagined and one was physically real. Further, young children are able to distinguish between thinking and doing. Wellman, Hollander, & Schultz (1996) found that even three-year-olds viewed thinking as internal, private, and just mental, as opposed to external, public, and just physical phenomena.

In terms of theory of mind, another frequently researched topic is children’s understanding of beliefs and, in particular, false beliefs. Understanding false beliefs demonstrates a child’s knowledge or awareness that differences exist between contents of the mind and content of the world. Wimmer & Perner, (1983) initiated the false-belief task in which one subject (A) puts an object in a certain location (a), but then while subject (A) is away and cannot see what happens, subject (B) moves the location of the object to location (b). Subject (A) returns, and the child is asked where subject (A) will look for the object: location (a) or (b)? Children who pass the false-belief task are able to predict that subject (A) will look for the object in location (a) because that is where subject (A) put it and has no knowledge that subject (B) moved it. This infers that the child can adequately distinguish between what they themselves know and what subject (A) knows. Conversely, children who fail the false-belief-task will report that subject (A) will look for the object in location (b), assuming that subject (A) knows that subject (B)
has moved the object to location (b). This incorrect prediction on the part of the child indicates an inability to differentiate between what they think/know and what others think/know.

Many researchers have conducted similar false-belief task research; however, they have altered the original task in various ways, such that the variety of interpretations are too numerous to elaborate (Astington & Jenkins, 1999; Bartsch & Wellman, 1995; Chandler, Fritz, & Hala, 1989; Call & Tomasello, 1999). The vast findings raise questionable doubt about children’s thinking. It may reflect general language or social development rather than truly reflect their understanding of the mind. In general, most accounts conclude that this developmental criterion is absent in three-year olds and supposedly emerges closer to age four, and is in place by age five. This is not altogether absolutely agreed upon and in some cases noted as inaccurate (Chandler et. al., 1989). Chandler et al. (1989) showed that, at least in some situations on some task variations, three-year olds can also demonstrate correct responses on the false-belief task when they are more actively engaged in deceiving the target person. Lewis & Mitchell (1994) found that three-year olds could pass the false-belief task when the questions are phrased in a certain manner. In a meta-analysis of theory of mind development, Wellman, Cross, & Watson (2001) looked at over 500 false-belief conditions with a variety of ages and procedural conditions and concluded children from two-and-a-half to five years old proceed from consistently making false-belief errors to successful completion.

Preschool children acquire an understanding of representational mental states such as thoughts, beliefs, and knowledge over several years, but at the start of preschool display evidence of a subjective, psychological understanding of others’ desires and emotions.
Bradmetz & Schneider (2004) used a simplified judgment task with two-year olds to show that they know that others may have different emotions from their own. Wellman & Woolley (1990) took the same age group and showed children’s ability to understand that others may hold different emotions and desires for the identical objects or events. Despite the child’s understanding of desires and emotions, they consistently fail the false-belief task. Why? Perhaps it is because the false-belief task utilizes an incorrect application of a young child’s language ability or misrepresents the role of language in child development. This contrast in a child’s ability needs to be investigated from a much closer look at the role of language in the development of theory of mind.

Children use words like happy, sad, want, and like by their second birthday to refer to others’ internal mental states separate from the individual’s external behaviors, physical features, and facial expressions (Bartsch, 2002; Bartsch & Wellman, 1995). As the child continues to develop and conversational skills advance, there is an apparent shift in children’s mental states of early understanding of desire and emotion to later understanding of beliefs, thoughts, and knowledge. It is not until around three-years old when children begin to use words like think and know to refer to thoughts and beliefs. Why the difference between children’s connection with emotion and their delayed connection to beliefs? Perhaps emotions are routinely viewed as external based on personal experience (but in reality we cannot feel someone else’s pain) whereas beliefs are inherently internal and are not easily monitored.

There is an interesting proposition to deviate from the current theory of mind literature and adopt a “community of mind” (Nelson, 2003, p. 311). The assumption is as follows: in early childhood development, an individual is exposed to a large community
and attempts to gain membership to this community. This community is synonymous with a person’s surrounding and social context, sometimes referred to as social cultural environment. The emphasis is on the minds that interact with and also differ from one another as well as having certain similarities of structure and content. In the end understanding differences among minds requires understanding the source of the differences among people, their backgrounds, personalities, relationships, and experiences.

Nelson’s perspective corresponds to a Vygotskian view which is more compatible in terms of incorporating affect and language as components of an individual’s environment. In terms of external associations, a child’s receptive language skills, such as listening to stories, are largely related to developing representational functions of language. In order to develop these types of skills, children are dependent on their environment to provide these experiences, and their community is fundamentally pivotal.

This idea of “community of minds” (Nelson, 2003, p. 311) has significant possibilities for assisting research to move forward with attempts to link theory of mind and personal epistemology in young children. Although it emphasizes the role of the external as the innovator of self, the individual remains in an egocentric subjective phase and potentially developing pre-dualistic epistemologies (Burr & Hofer, 2002) which may be more specifically identified in relationship to the children’s environment and experiences as members of their community.

There is very little known about the origins of epistemological awareness or how epistemological beliefs can be connected to other aspects of children’s cognitive development (Burr & Hofer, 2002). Interestingly, the inkling of research that has been
conducted on the personal epistemology of young children seems to indicate similar stages to those found in college students. Chandler, Hallett, & Sokol (2002) bring up an important observation; they have noticed that, despite the age of the participants, dualism is consistently the initial stage identified. They identify several explanations for the parallel: early onset, late onset, recursion, or suppression. Kuhn & Weinstock (2002) pointed out evidence of a domain dependence perspective for the similarities between age groups. Wellman (2001) concludes that the theory of mind accomplishments of young preschoolers is consistent with the theoretical accounts that suggest young children have an understanding of beliefs and a related understanding of mind.

Theory of mind researchers have been asking questions such as “How, when, and in what manner does an everyday theory of mind arise” (Wellman, 2001, p. 352). Researchers in the last decades have made notable progress. The field of personal epistemology is at a similar point. We need to ask, how, when, and in what manner does personal epistemology arise. One area worth investigating is the relationship that personal epistemology may have with theory of mind development in young children; this is a link which is proposed in this study.

**Personal Epistemology and Theory of Mind**

Theory of mind (TOM) involves the awareness that others have different perspectives about what is known, and this awareness bares significance on the concept of epistemological thought (Hofer and Pintrich, 2002). This is important for understanding personal epistemology because it focuses on the nature of human knowledge and how individuals come to know the world (Burr & Hofer, 2002), and how individuals justify, interpret, and construct knowledge and knowing (Schommer, 1990). In a special issue of
New Ideas in Psychology (2002), researchers from personal epistemology and theory of mind collaborated regarding a possible connection between the two constructs. Recently, uniting these two strands of research required some new vocabulary; folk epistemology was produced to identify the child’s TOM and adolescent epistemological development (Bartsch, 2002). It is conclusive among researchers in this field that there needs to be a better understanding of how folk epistemology develops from childhood to adulthood. Although this section discusses how the two constructs may be linked, there is very little empirical evidence that exists in the current literature.

The research proposed here will direct attention toward three- to four-year-old children. Mansfield and Clinchy (1985) reported identifying epistemological beliefs in three- to five year olds. Although children have been reported to demonstrate successful false-belief achievement as low as age three and four (Flavell, Miller, & Miller, 1993; Leslie, 1987; Lillard, 1998), TOM is far more commonly studied and reported at ages five and six. It has been suggested by some in the field that personal epistemologies may be developing and even in place prior to TOM. If this is true, there may be a pre-dualistic stage of epistemological development that has not been investigated because a child could not hold a belief about knowledge without acknowledging that there are alternative perspectives (Burr & Hofer, 2002).

By successfully completing a false-belief task, understanding that others can/do have different beliefs based on knowledge of their experiences is equivalent to achieving a dualistic epistemological point of view, acknowledging that there can be competing notions of reality, and understanding that there is no absolute right or wrong interpretation (Kuhn, 2000). According to the literature, TOM research in children has
much more depth and breadth than childhood epistemology; however, Piaget (1952) labeled his investigations of children's cognitive development as "genetic epistemology" (p. 778) with a focus on how individuals come to know the world and reflective of his interest in formulating a theory of knowledge (Burr & Hofer, 2002). Individuals do not simply acquire a full capacity for TOM or personal epistemology all at one time; it is a gradual and continually evolving developmental process. In Piaget's theory of knowledge, he focused on how individuals "progressively reconstruct the relationship between the knower and the known" (Piaget, 1952). The research in this area is in its infancy stage, and developmental researchers have raised some questions regarding the order in which these two constructs (TOM and personal epistemologies) occur in development (e.g., Chandler, 2002). First, a supposed pre-dualistic phase is characterized by "unwavering egocentric subjectivity," and evokes TOM (Burr & Hofer, 2002, p. 204). Second and in contrast, Astington, Pelletier, and Homer (2002) suggest from their findings that false-belief understanding is fundamental to children's epistemological development because it underlies their understanding of the epistemic concepts of evidence, inference, and truth.

Studies linking TOM and epistemology need to move toward a deeper, richer level of understanding about what the child is contributing when he provides a response to a false-belief task or answers an epistemological question, and these studies need to look at specific information about the child's background knowledge, prior experiences, and personal goals.

In a pre-dualistic stage of epistemological development, there would be no proposal for uncertain knowledge or acknowledgment that an unsolvable problem could exist.
King & Kitchener (1994) found evidence of this type of thinking in their sample of teens and hypothesized it would most likely be present in much younger children because they do not have the capability to respond to ill-structured problems. Burr & Hofer (2002) propose a connection that overlaps theory of mind development, placing a “realist” stage prior to the absolutist stage, with both positions defining knowledge as certain and objective. The core difference is that realist thinking would simply be copies of the external world needing no justification, and absolutist thinking views facts as being right or wrong. Another possible theory of epistemology in young children was presented by Chandler et al. (2002) as a stage that represents knowledge is objective and is present prior to awareness of competing knowledge claims using the term, “naïve realism” (Chandler et al., 2002, p. 338).

One problem that consistently surfaces is that of subjective and objective knowledge and knowing (Burr & Hofer, 2002). This is a reoccurring problem in the theory of mind literature as well. Perhaps it is not a development of either/or in terms of one over the other but that both are at a level of incongruence because of changing contexts or environment. The structure that supports epistemological development places absolutists as objective knowers, multiplists as subjectively aware, and evaluativists as the judge between the objective and subjective.

Burr & Hofer (2002) make a similar claim: “realist or pre-dualist stage needs further attention, particularly in regard to the individual’s comprehension of ‘objectivity’” (p. 209). It is necessary to distinguish between pre-dualistic and dualistic thinkers by looking more closely at the significance of the source of knowledge and the justification for knowledge used by younger children.
Burr & Hofer (2002) propose a pre-dualistic stage of epistemological development as preceding theory of mind development and conceptualize the transition from pre-dualistic thinking to dualistic thinking in conjunction with the successful completion of the false-belief task. They tested their theory with 25 children ranging in age from 3.1 to 5.4 years using two false-belief tasks and four epistemological vignettes. They found a period in which children could not yet pass the false belief tasks and were completely unable to address issues of justification for knowledge. Following this level, there appears to be a transitional level at which point children are able to conceptualize the idea of justification but continue to demonstrate the inability to successfully pass the false-belief tasks. The last transition accounts for the child to provide acceptable justifications for their knowledge and are able to successfully complete the false-belief task. Burr & Hofer concluded that there is an important relationship between theory of mind and personal epistemology. A child’s developing personal epistemologies appear to be foundational in theory of mind which involves the awareness that others have different perspectives about knowledge.

The prospect of drawing a cognitive link between personal epistemology and theory of mind is an intriguing proposition and could address many of the issues that are emerging in the field of personal epistemology. In order to do develop this theory it will be necessary to shift the ordinary theoretical lens. Many of the questions that are in the broader scope of this study are consistent in suggestions for future research from those who are beginning to investigate children (Bartsch, 2002; Burr & Hofer, 2002). There is much that can be learned about personal epistemology in general, and children in
particular, by investigating possible links between personal epistemology and theory of mind development in young children.

Another contribution that has not been mentioned in the brief review of the literature is the impact that TOM and personal epistemology development have on areas such as social skills (Harris and Kavanaugh, 1993), moral reasoning (Bendixen, Schraw, and Dunkle, 1998), memory (Carlson, Moses, and Breton, 2002), and self efficacy and motivation (Linnenbrink and Pintrich, 2003). Exploring the interrelatedness of TOM and personal epistemology development can contribute to the research in several other areas. As a future study maintaining similar methodology it would be interesting to look at gender and social cultural differences; this is an area which remains completely bare in terms of research on TOM and epistemic understanding in preschool child development.

*A Pilot Study on Preschool Children’s Personal Epistemology*

A pilot study was conducted to ascertain information about designing each facet of the current study. The purpose of the pilot was to fine-tune epistemological questioning and procedures for the current study. The pilot was integral to studying children’s personal epistemology; it provided information in regard to identifying protocol ideas for specific research tasks, as well as scheduling, time limitations, cognitive abilities, and other important procedural factors.

The pilot lasted 12 weeks during which the classroom was observed three times per week from 8AM until 1PM. Observation included various aspects of the preschool environment including whole class instruction and small group activities (centers). There was a theme of the week which would drive the focus for all of the activities that the children engaged in throughout the week. Along with the observations, there were peer
focus group activities that were implemented during times that did not conflict with the classroom instruction.

Focus groups emerged from sociological theories regarding data collection and group interaction to study values, attitudes, and the impact of products and services (Walker, 1993). Bogdan & Biklen (2003) recommend that focus groups be used for hard to reach groups and sensitive issues because they provide a mechanism that identifies what individuals think/believe and promote questioning that potentially links to how or why they hold a certain position. The focus groups help to gain an understanding of the nature of knowledge (i.e., simple, certain) and the process of knowing (i.e., source and justification) in terms that the child-participants can identify. Focus groups provide the child-participants with a platform for the investigator to capture the essence of their knowledge in their own words.

Participants

The pilot study took place in the Cricket classroom at a local public preschool and involved 25 students (14 girls and 11 boys) from culturally diverse backgrounds. The teacher was an 18-year veteran of elementary and preschool teaching.

Child-Participants’ Personal Epistemology

The questions in the focus groups probed personal epistemological reasoning and beliefs (Kuhn, Cheney, & Weinstock, 2000). The script for the interview and focus groups was strictly based on the classroom instruction that was taking place in the classroom at the time of the pilot. Some of the questions were probing for elaboration of cognitive processes and the participants’ own real-life experiences. Specifically, the questions were related to the four dimensions of epistemology (i.e., simplicity and
certainty refers to the nature of knowledge; and source and justification refer to the process of knowing) (Hofer, 2001).

**Observation of Classroom Instruction.** There were two weeks of consecutively observed lessons that lasted 20 to 40 minutes. The observation of the lessons were used as the context/catalyst for the child-participant interviews and the focus group, as a way to tap into the child-participants’ understanding of the current lesson’s theme and beliefs about knowledge and knowing related to that theme.

**Child-Participant Interviews.** There were two weeks of semi-structured individual interviews with each child-participant, and the interviews did not exceed 15 minutes per child at any one time. Each child-participant was interviewed at least two times per week, but some children were interviewed up to five times per week.

**Child-Participant Focus Groups.** Each child-participant was active in six focus groups during the study (introduction, two pre-instruction, two post-instruction, and a conclusion). Each of the focus groups consisted of six child-participants and the researcher and lasted approximately 15 minutes.

**Results**

The pilot study used focus groups with preschool children as a means of identifying dimensions of beliefs about knowledge. Themes and patterns were identified among individuals and within and between groups. The following section provides some insight about the coding categories and describes the five general themes that emerged from the analyses:
1. Epistemological beliefs are multidimensional. In general, preschool children in the pilot study do indeed have epistemological beliefs at different levels and can be categorized along the various dimensions.

2. Influences on multiplist and absolutist beliefs. Child-participants with high numbers of multiplistic statements in terms of simple and source of knowledge demonstrated consistently high scores in affective and social categories. These individuals tended to be more confident, animated, and spontaneous. They also seemed to have a better concept of the rules of the focus group and tended to take more of the lead in the discussions. They demonstrated less egocentric perspectives which is in contrast to developmental theories about the social-cognitive capabilities of this age groups that say that egocentrism is quite prevalent in preschool-aged children (e.g., Flavell, 1999).

Conversely, child-participants with the highest absolutist ratings had the lowest number of overall contributions across all of the focus groups. They were consistently unable to give their views of knowledge unless the conversation was initiated by their peers. This finding suggests that children with more multiplistic views acted as a scaffold for other children who were not as comfortable and/or able to discuss their views on their own. These findings support the theory that students are receptive to peer-learning environments. It also suggests that affective and social factors are important influences in epistemological development and peer-learning.

3. Importance of group dynamics. In comparing Groups 1 and Group 2 within the category of social statements and behavior, the child-participants had more statements
and behaviors categorized as social than the other two categories (epistemological and affective).

The social group dynamics of the focus groups were interesting because without the teacher as the clear authority, the peer groups seemed to work more efficiently within the structure of the focus groups than what they demonstrated in their peer-play environments. One interpretation of this finding is that the children seemed to have grasped their different roles in certain social environments and/or were able to conform to the social conventions expected within different focus groups and peer-play environments. During the focus groups the children were less egocentric and less aggressive toward their peers. When those same child-participants were observed during unstructured play intervals, they seemed to display behaviors that were more characteristic of their age. The results indicate that the child-participants demonstrated a greater sense of social conventions within the more structured environment of the focus groups in that they utilized more appropriate behaviors and implemented more appropriate problem-solving and critical thinking skills.

4. Affect - positive affect. The dimensions within this category were defined as positive comments regarding the lesson and processes of the group. It was apparent in the children’s enthusiastic responses, their eagerness to participate, and the cohesiveness displayed in the focus groups when discussing their views of knowledge. The affective nature of the child-participants is critical because it appears to be an important part of the foundation of how they interact with one another as they construct group knowledge.

Lack of negative affect. There were extremely low numbers of negative responses generated within the groups. The low negative affective component supports the
generally positive outlook most young children have for learning; they are upbeat and excited about what they know (Rosenburg, 1998).

5. The role of peer groups in evaluativism. Is evaluativistic thinking even possible in young children? The results indicate that child-participants did display this more sophisticated way of thinking about knowledge and knowing but only in a group sense. In essence, patterns emerged from the data showing evidence that discussion during the focus groups allowed for evaluativistic-like thinking to occur. In other words, by building on what each of the group members had to say, instances of evaluativistic thinking in more of a collective sense was apparent.

Discussion

In terms of preschool education, exposure to group evaluativism may allow students to generate higher levels of thinking, and this reciprocal influence among group members is consistent with theory in the field of personal epistemology (e.g., Bendixen & Rule, 2004) and in the framework of Vygotsky’s (1978) sociocultural theory of child development.

The study uses real-world examples and an authentic classroom setting; therefore, it was integral to achieve relationships with the child, the teacher, and peers. It was a goal to maintain the organization and flow of the classroom; therefore, it was important to structure the study around the teacher’s lesson plan and instructional style rather than develop a study and incorporate it into the classroom.

Another facet of the study that was driven by the findings of the pilot study was the types of questions that needed to be asked of the children. On the surface much of the information may seem subjective and fragmented, but collectively there are visible
patterns of developing personal epistemologies that emerge from the children’s own words as collectively interpreted from three or four different perspectives (i.e., the teacher, the researcher, and peers).

There were two outcomes of the first focus groups that really laid the groundwork for what turned out to be many successful focus groups. First, developmentally, preschool children have significantly shorter attention spans and cannot focus for more than 15 to 20 minutes. Therefore, the length of the focus group was decreased. Second, preschoolers like to interact; therefore, six children in a group was too many. By decreasing the number of children in each group to three, everyone had a chance to participate without falling over another child’s responses. Reducing the number of children in the focus group also distinguished it further from the child’s experience in the whole group instruction experience. Six children in a group ended up mimicking the complexities of the whole class instruction. In order for the children’s voices to truly be heard, the number of children per group needed to be decreased by half.

On a larger scale the pilot study was integral in constructing a framework for future research. There were several themes that emerged dealing with the classroom teacher, parents, and the children’s peers. In addition, characteristics that may influence preschool children’s personal epistemology were identified (i.e., affect, social skills, language, setting). The complexity of personal epistemology and researching very young children guided the construction of the Dynamic Systems Framework for Personal Epistemology Development (Winsor, 2005) (See Figure 1). This framework will be used in Chapter 5 as part of the discussion of the results in this current study.
Considering the Dynamic Systems Framework for Personal Epistemology Development, the current study incorporates only a fraction of the system. The goal of the current study is to investigate the relationship between the individual child and his peers in a classroom environment while considering several of the developmental issues that coincide to preschoolers.

Figure 1: Dynamic Systems Framework for Personal Epistemology Development (DSFPED)
Purpose of the Study

The purpose of this study is to investigate three- to four-year-olds' personal epistemology through the use of peer focus groups. The current research stems from a larger study that includes the Dynamic Systems Framework for Childhood Epistemology (Winsor, 2005; see Figure 1) that will be elaborated on in the discussion portion of this article. Investigating personal epistemology using focus groups is a new and innovative approach for the age group being investigated. In terms of developmental theory, this research offers a more integrated and comprehensive view of the child's experiences and the child's world. For example, in this study we use the child's words to guide the line of questioning in individual interviews, focus group sessions, and classroom observations. This study contributes to personal epistemology research by addressing several needs of the field and offers new insights into the education of young children.

The purpose of this study is to develop a framework which investigates children's personal epistemology. To understand the dynamic aspects of children's epistemology, the framework focuses on the child and includes its theory of mind, affect, and language. The framework also will investigate the subsystems that exist in the child's external environment, including the child's parents, teacher, and peers. It is the aim of the study to contribute to personal epistemology research by meeting the future needs of the field, enhancing educational perspectives for young children, and impacting the larger spectrum of personal epistemology with insights about early childhood epistemological development.

The area of researching young children's personal epistemologies is virtually absent in the literature, and many personal epistemology researchers suggest this is an area that
needs investigation. We know little about what children know and understand about the nature of knowledge and the processing of knowing. Therefore, the primary purpose of this study is to look closely at a small group of young children’s personal epistemology within a preschool classroom environment.

The results from this study may offer new insights in several ways: (a) It could provide information about an early onset of personal epistemology, (b) it might serve as a foundational perspective regarding the trajectory of epistemological growth or change throughout the lifespan, (c) knowing more about the trajectory of epistemological development can contribute to the understanding of the role of epistemic doubt in epistemological development (Bendixen, 2002), and (d) it may open the door for more innovative methods of measuring personal epistemology.

Research Question

To guide the current study’s exploration of young children’s personal epistemology, the research question was as follows: What are the personal epistemologies of preschool-aged children?
CHAPTER THREE

METHOD AND DESIGN

This is a qualitative research study that examines the personal epistemologies of very young children. The theoretical framework used to place a new perspective on child cognitive development is complex and multi-faceted: (a) There are multiple perspectives (i.e., the individual child and interactions with their peers), (b) The individual and peer interactions are observed and epistemologies are questioned in various ways as a means of looking for themes and patterns of individuals and within peer relationships, and (c) Various qualitative research methodologies are used (i.e. formal and informal classroom observation, cognitive and epistemological screening, individual semi-structured interviews, and semi-structured focus groups). All data was analyzed independently. The data was analyzed daily using a constant comparative method of analysis. This type of method allowed for constant analysis of the data making it possible to continually probe specific aspects of the child’s belief system. It was useful for identifying themes among the participant early and made it possible to target certain aspects during subsequent data collection. When data collection was completed, despite the constant comparative method of analysis throughout the study, all data was ultimately triangulated to gain a broader perspective about individual child epistemology and within group interaction.
Design

The design of the study is based on a case study approach to investigating the beliefs about knowledge and knowing in preschool children. A case study is a detailed examination of one setting, and/or a single/multiple subject(s), or one particular event (Bogdan & Biklen, 2003; Merriam, 1988). The current study incorporates multiple components of a case study: (a) I look at one setting, the Cricket classroom, set within the context of a preschool environment; (b) there are six child-participants; therefore, there are six case studies; and (c) I utilize several protocols (i.e., whole class instruction, informal center activities, individual interviews, and peer focus groups). Creswell (1998) defines a case study as, “An exploration of a bounded system or a case over time through detailed, in-depth data collection involving multiple sources of information rich context” (p.61). The primary event that is being investigated is the use of focus groups to understand preschool children’s epistemological development. The current study looks at six cases of children interacting with their peers during several focus group tasks. Researching children in this field is relatively new; therefore, it does not warrant large samples or following rigid protocols in order to examine a limited number of variables. Rather, it is more useful at this stage in the investigation of young children’s developing epistemologies to use multiple instances or events as a means of gaining a more in-depth perspective (Creswell, 1998; Merriam, 1998). Case studies can provide a systematic way of looking at specific phenomenon, collecting data, analyzing information, and reporting the results (Ellet, 2007). As a result, the researcher gains a sharper understanding of why and how the instance/s have occurred and what might become more important or worthwhile to research in the future. Case studies lend themselves to both generating and
testing hypotheses (Merriam, 1998). Choosing a case study as the research strategy for the current study is critical for researching children and investigating epistemological development because the context in which the study is designed is a naturally occurring authentic learning environment, in which none of the daily activities are altered but rather are elaborated upon to get a more in-depth perspective of the thinking patterns of the children.

I rely on multiple sources of evidence on which I use a constant comparative data analysis method (which is discussed in Chapter 4) to continually reduce data to identify themes and regenerate details from each child to gain deeper knowledge and understanding about their epistemological understanding (Bogdan & Biklen, 2003). In other words, I used data as it was collected to construct more specific inquiry for follow-up interviews and peer focus groups (Corbin & Strauss, 2007). Case studies are socially-constructed research approaches situated between concrete data collecting techniques and methodological paradigms and function as a tool that can assist in theoretical development as is necessary for investigating children’s epistemological development (Charmaz, 2006; Hancock & Algozzine, 2006).

The very nature of children’s epistemological development is complex, which supports the reasoning to understand the child’s experiences using a case study technique and constant comparative data analysis. Multiple case studies provide a strong platform to investigate children’s developing epistemologies in an authentic learning environment. This type of approach does not make any assumptions about what meaning experiences have to a specific individual (Bogdan & Biklen, 2003). Grounding the research in the children’s familiar environment, it was possible to gain insights into their epistemological development.
understanding and how they apply meaning to what they understand. One important component of the semi-structured interview process will be a focus on the words of all participants. Active listening and keen observations are necessary in case study research (Strauss & Corbin, 2007) as the goal is to look for the meaning of child perceptions and experiences, both working independently and during interactions with others.

According to Bogdan & Biklen (2003), “If you want to understand the way people think about their world and how knowledge is formed you need to get close to them, to hear them talk, and observe them in their day-to-day lives” (p. 32). The current study utilizes whole class instruction, informal center observation, individual semi-structured interviews, and structured to semi-structured peer focus groups as a means to understand the children’s experiences in their learning environment and learn how their experiences are related to epistemological development. The interviewing process is always unpredictable and ambiguous (Bogdan & Biklen, 2003.) Therefore, it was essential to be flexible about the sequence of the interviews and activities (Merriam, 1998). By using case studies the interview questions were able to be adjusted as needed based on the disposition of the participants and their ability and willingness to provide the requested information. During interview sessions, minor inquiry adjustments are often needed and this is a judgment call on the part of the researcher (Bogdan & Biklen, 2003).

Role of Researcher

The role of the researcher in the current study was to become involved in the child’s “conceptual world” (Bogdan & Biklen, 2003, p.55) and to gain a deeper understanding of their experiences and the meaning of these experiences. This type of involvement could be an intrusion on the daily activities of the child and the teacher; therefore,
thought was given to put time and effort into building a cohesive relationship including trust, mutuality, and honesty with all of the people involved. Once relationships were established, it was important to conform to the schedule that best fit all of the individuals involved in order to effectively collect the data without being intrusive or disruptive to the schedule or routine. This type of protocol is fundamental in establishing a successful milieu in which the researcher is the participant observer. This occurs when the researcher seeks to maintain a balance between being an insider and an outsider. There were instances during the study where it was productive and informative to be an active participant; however, conversely there were times when more information could be acquired as a passive outsider.

A role as a participant observer entails fitting into the everyday setting in ways that enhance awareness and curiosity about the interactions taking place in the setting (Glesne, 1999). The researcher becomes immersed in the research questions, the individuals, and the environment in ways that are uncommonly heightened and that they themselves would not witness ordinarily. The participant observer comes to a social situation with two purposes: (a) to engage in activities appropriate to the situation, and (b) to observe the physical characteristics, the individuals, and the activities (Spradley, 1980).

A role as participant observer can be challenging. It requires that the researcher is consciously aware of the environment and its multi-faceted activities and interactions, which means overcoming years of attempting to block out these same kinds factors. Due to the nature of this study, it is necessary to look broadly at seemingly trivial items and probe deeply at others. This technique can be more effortless if the researcher perceives
her role to be as an insider/outsider simultaneously to help experience the situation as a participant and an observer (Spradley, 1980).

Conducting a case study provides an opportunity to utilize the researcher’s background knowledge and previous experience to capture the “essence” (van Maanen, 1988, p. 78) of the children’s subjective voice in their understanding of what, how, and why they know themselves and others.

Setting

A public preschool program in a Southwestern city in the United States was the site for this study. It is a university-run preschool; it employs certified teachers and is open to children of students, faculty, staff, and members of the community. It is a two-story building with convenient parking, and the hours of operation are accommodating from 7:30am until 7:00pm. The campus is handicap accessible for physically challenged students, and they have the capability to accommodate visual and auditory impaired students too. The school also has a thorough security protocol for visitors so that the children are safe.

The center recently opened, in 2004. The purpose of the preschool is to provide assessments and training opportunities for the local university students and staff with young children birth to 60 months, their families, and community members. The new facility is state-of-the-art, utilizing student-friendly classrooms with a video-recording system for teacher observation, training, and research. They have a multi-purpose room, playground, and administrative offices for meetings and conferences.

The Cricket classroom where the study took place is open and bright. One entire wall consists of two large garage-type doors (40ft. x 40 ft. clear plexi-glass windows). These
doors open to a secure private courtyard that can be opened on nice days. The Cricket classroom frequently has some activity going on in its courtyard, such as growing herbs and vegetables, conducting various science experiments, or creating a product too large for the inside. The colorful and friendly environment displays a large amount of the students work on the walls. They have five small tables and chairs in a cluster where they have centers for activities throughout the day. There is a large open area with a carpet that has each student’s name, indicating where each student should be seated for the collaborative inquiry instruction.

As for the more informal areas of the classroom, the students are equipped nicely for free time. They are encouraged to interact with their peers, work on the computer, pretend in the dramatic play area, construct in the action area (this area has blocks, puzzles, and games), or create in the craft area. The students are allowed to choose what activities they want to do, and they can move from area to area. The classroom has its own kitchenette where the staff prepares their snacks and lunch/dinner; children are prohibited in the kitchen. They also have their own lavatory in the classroom, so that it is easy for staff to address any of the children’s needs easily.

There are 28 total students enrolled in the Cricket classroom, but there are never more than 17 students in the room at one time. Some students only come for a-half-a-day while others come for only 2 or 3 days per week. The Cricket classroom follows the campus-wide rule of one aide for every three children in the classroom. This is strongly monitored and enforced. The center has someone who goes class-to-class for attendance so the aides can get to the classrooms if they are needed. They try to keep the aides consistent in the classrooms, but they do have a couple that float among classrooms as
needed. The classroom aides are undergraduate and graduate education or psychology majors.

**Whole Class Instruction**

A central component of the teacher instructional technique is an activity that begins the school day. This activity will be referred to as whole class instruction and had a different theme each week (See Table 5). There were four weeks of whole class instruction observation. The themes were as follows: Week One was monsters, Week Two was winter, Week Three was building and construction, and Week Four was airports and airplanes. The whole class instruction involved question and answer interactions between the teacher and the children and was the basis for the follow-up epistemological probing. The theme carries a week-long (five days) progression of group and individual activities which center on that single theme. Whole class instruction included a discovery learning technique that encourages children to reflect on their knowledge and actively participate.

Students are initially drawn into their room from the playground in the morning with a “Good Morning” song. When the students hear this song, they know it is time for the school day to begin and time to prepare for the whole class instruction. They promptly sit in a semi-circle on the floor around the teacher. During this time, the teacher introduces the theme (e.g. monsters) of instruction for the week and begins to ask the students questions, constantly probing their knowledge and their experiences regarding the theme. Frequently, when the teacher asks a question, there may be several students who answer. This prompts more in-depth questioning of all of the students. The students build upon each others’ knowledge and contribute their experiences, which in turn
prompts other students to think of more information to contribute. At times this process
can become quite escalated because the students are enthusiastic about answering the
teacher’s questions about what they know and how they know what they know.

This whole class instruction ranges from 20 to 30 minutes and includes the teacher
reading a book to the children. During the read aloud, the teacher will frequently pause
and ask more questions about what the students think will happen next or why they think
something is happening or even why someone is doing something.

When the instruction is over, the children participate in a round-robin format of
centers that include dramatic play, art, snack, manipulatives, and computer. The theme of
the week is the central focus of the activities within the classroom and therefore it
became the central theme of all individual interviews and focus groups.

Participants

Children-Participants

Participants are six preschool children; their ages range from three years ten months
to four years four months. The gender was balanced evenly between girls and boys. The
students were enrolled in the Cricket classroom at a diverse public elementary school.
Demographic information was collected on the child-participants regarding their cultural
background, socioeconomic status, and parents’ educational history (See Table 5).

Teacher

The teacher in the Cricket classroom is male. His nationality is Hawaiian/Asian;
however, he was born in the United States. He is openly homosexual and is highly active
in gay rights and culturally diverse programs in education. He is 22-years-old, s a first-
year teacher, and at the time of the study was currently enrolled in the teacher education
program at a local university but had not completed his Bachelor of Arts degree in Elementary Education. He has attempted to adapt his teaching style to conform to the characteristics of the teacher who led the classroom during the pilot study. More complete information regarding the teacher will be discussed at the end of this chapter.

TABLE 5: Child-Participants’ Demographics

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age Years &amp; Months</th>
<th>Gender</th>
<th>Cultural Background</th>
<th>Economic Status</th>
<th>Parent Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-P # One</td>
<td>3 yrs., 10 mos.</td>
<td>M</td>
<td>African-American</td>
<td>$62K</td>
<td>M=H.S.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Caucasian</td>
<td></td>
<td>F=H.S.</td>
</tr>
<tr>
<td>C-P # Two</td>
<td>4 yrs., 4 mos.</td>
<td>F</td>
<td>Caucasian</td>
<td>$75K</td>
<td>M=B.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F=H.S.</td>
</tr>
<tr>
<td>C-P # Three</td>
<td>3 yrs., 11 mos.</td>
<td>F</td>
<td>Caucasian</td>
<td>$45K</td>
<td>M=H.S.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F=H.S.</td>
</tr>
<tr>
<td>C-P # Four</td>
<td>4 yrs., 1 mos.</td>
<td>M</td>
<td>Caucasian</td>
<td>$52K</td>
<td>M=H.S.</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>F=M.A.</td>
</tr>
<tr>
<td>C-P # Five</td>
<td>3 yrs., 11 mos.</td>
<td>M</td>
<td>Caucasian</td>
<td>$80K</td>
<td>M=M.A.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>F=B.A.</td>
</tr>
<tr>
<td>C-P # Six</td>
<td>4 yrs., 1 mos.</td>
<td>F</td>
<td>Caucasian</td>
<td>$70K</td>
<td>M=M.A.</td>
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<td></td>
<td></td>
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<td></td>
<td>F=B.A.</td>
</tr>
</tbody>
</table>

Data Sources

Child-Participants’ Prescreening

There were 28 students enrolled in the Cricket classroom at the time of the current study. Parent permission forms were required for all 28 students to proceed with the study. The parent permission allowed the researcher to: (a) observe and assess each child in the classroom, and (b) continue to observe the classroom for the duration of the study after the six child-participants were identified. There were three phases of prescreening for this study: (a) one week of classroom observation, which included the
whole class instruction and the informal center activities, (b) a battery of cognitive achievement assessments, and (c) a standard theory of mind task (Wimmer & Perner, 1983). The following three sections describe the procedure and materials used for each phase of prescreening.

Prescreening Phase One. Phase 1 of the prescreening lasted for a week and included the researcher passively observing the daily routines within the Cricket classroom. This observation included the formal whole class instruction and the informal center activities. The whole class instruction began each day, and every child enrolled in the classroom attended this gathering in the center of the room where the teacher would read a book which was selected based on the theme of the week. During the whole class instruction the teacher would frequently interact with the children by listening to their comments and addressing their questions; also he would engage the children in a brief inquiry session pertaining to the details of the story. The whole class instruction usually lasted 15 to 20 minutes. The purpose of observing the whole class instruction was to: (a) observe the teacher's instructional technique and become familiar with the types of questions he would typically ask the children; (b) observe the interactions of each child with the teacher in a structured learning situation; (c) observe and assess social, affective, and cognitive abilities of the children in a structured learning environment to better understand their level of functioning; and (d) begin to build a rapport with the students and the teacher through consistent presence in the classroom.

Materials. The materials used for the whole class instruction included a notebook and pen to take notes about student engagement. Examples of student engagement include which children were able to follow classroom rules such as raising a hand to be
called on in order to participate, their ability to maintain attention and sit still during the instruction, and how relevant a child's comments or questions were to the content being presented. Another reason for note-taking was to begin to learn the names of the students and make notes regarding the disposition and particular characteristics of each child.

The researcher designed a checklist of age appropriate personality traits/dispositions, cognitive abilities, and social characteristics commonly present in well-adjusted preschool-age children. This checklist was used during each whole class instruction observation during the prescreening week. The purpose of the checklist was to systematically observe and assess social, affective, and cognitive abilities of the children in a structured learning environment to better understand their level of functioning.

Everyday a new checklist was used. The checklist was dated, and each child had his own checklist. Therefore at the end of the first week of prescreening each child in the Cricket classroom had a checklist for each day he had attended the preschool. Some children had only two checklists while others had five; it depended on the number of days they were enrolled and present in the classroom.

The informal center activities frequently aligned with the theme of the week and consisted of dramatic play, art, table games, and computer. Immediately following the whole class instruction, the children were given the option to choose which center they wanted to attend. The center activity time was typically one-and-a-half hours. Other routines in the classroom were exercise, snack, nap time, and playtime (inside or outside, depending on the weather). The purpose for observing the informal center activities was to: (a) formulate a presence in the classroom and to begin to build relationships with all of the children during unstructured interactions prompted by the children; (b) observe and
assess the children’s social interactions with their peers; and (c) become acquainted with how the structured whole class instruction transferred into unstructured learning activities. The goal was to observe the students engaging in their daily routines and provide another modality of assessment as a means to strategically evaluate all 28 students and gather information for the selection of the six child-participants.

*Materials.* The materials utilized by the researcher during the informal center activities included any of the props, objects, and games currently present in the classroom which the children used at their designated center. All of the items that were used by the researcher to interact with the children were items they were familiar with and invited interaction with the researcher. During observation of the center activities if no child engaged the researcher, a notebook and pen were used by the researcher to take notes regarding the activities in the classroom. Again, more notes pertaining to individual students were taken including: which students interacted frequently, which students did not interact with their peers, and which students chose to be at which centers.

The researcher designed a checklist of age-appropriate peer social behavioral characteristics for preschool age children. It was utilized in the same manner as the checklist for the whole class instruction, in that a new checklist was used daily and each child had his own checklist. Often it was difficult to complete this checklist for each student during the observation because of note-taking or interaction with the children. Therefore, each day when the center activities concluded and the students were involved in one of the other activities, the researcher would take the time to complete the checklist while the experience was still clear and easily recollected.
Prescreening Phase Two. The next phase of prescreening the Cricket students consisted of standardized measures used with preschool-age children; this took one week and occurred the week following phase one of the prescreening process. Each child-participant was individually administered all three screening measures consecutively in a single session, and all of the children received the assessments in the same order. The order of administration was as follows: (a) The Peabody Picture Vocabulary Test (PPVT-III), (b) Phonological Awareness Literacy Screening Pre-K (PALS), and (c) Get It Got It Go (GGG). Collectively, all three assessments took approximately 20 minutes per child-participant, and six to eight children were assessed daily.

The screening process consists of visual and verbal assessments for cognitive functioning of preschool children. A battery of cognitive ability tests were administered to each child individually. Phonological Awareness Literacy Screening Pre-K (PALS) measures knowledge of factors essential in emergent literacy (See Appendix A on CD-ROM (Curry, University of Virginia, 1991). The Peabody Picture Vocabulary Test (PPVT-III) is an assessment of receptive (hearing) vocabulary and is a test of listening comprehension for the English language (See Appendix B on CD-ROM (ECRI/MGD, 1983). Get It Got It Go measures the developmental growth of young children through skills such as picture naming, alliteration, and rhyming (See Appendix C on CD-ROM (ECRI/MGD, 1994). It is typical for academic achievement, ability, and intelligence tests to be used as tools for research participants of all ages (Flavell, 1983.) In schools these types of assessments are used for placing students within a school, determining learning disabilities and developmental delays, identifying giftedness, and tracking development (Kaplan & Saccuzzo, 2005).
The purpose of the cognitive screening was to ascertain the child-participants' cognitive ability level with standardized measures of mental functioning. Achievement and ability tests are designed to measure the ability level of the child-participants' intellectual level and cognitive ability (Sternberg, 2004). It is recommended that they never be used as the sole basis of any investigation (Greig & Taylor, 1999). These cognitive ability assessments are widely accepted as more objective measurement tools and provide another element of investigation. It is heavily suggested that these types of assessments be complemented with an in-depth personal history, academic performance, and observation (Greig & Taylor, 1999). In addition, three variables need to be considered with standardized measures: (a) cultural background, (b) language ability, and (c) motivation to complete the tasks (Poole & Lamb, 2002; Wood, 1988). These factors were taken into consideration when all of the data was collectively evaluated.

As a courtesy, the parents were invited to observe the cognitive screening of their child, but it was not a requirement of the study. This strategy was to alleviate child and parent anxiety regarding the assessments as children at this level are not accustomed to standardized testing, and it was believed that optimum results could be achieved if the children felt comfortable and relaxed. Out of the 28 children in the classroom, 11 children had parents present for the assessments. Two of the children who had parents present for the cognitive screening were ultimately chosen as child-participants for this study.

Materials. The PALS test includes a photocopy of a box containing all 26 letters (capital letters) of the English alphabet. This test requires that the researcher point to each letter saying, “Can you tell me what this letter is?” If the child gets the letter
correct, the researcher circles the letter; however, if the child provides the incorrect response for the letter, a line is drawn through the letter. After all of the assessments were administered, the test was scored using the standardized scoring criteria.

The PPVT-III has a picture plate chart that consists of several different age-level sections, beginning at two years six months up to age 11. The picture plates show four different pictures, and the child points to one of the pictures when asked. For example, the researcher asks, “Can you point to the picture of the broom?”, and the child points at the picture of the broom. The test has a scoring form where the child’s answers are recorded and later scored. The scoring form includes the following: (a) the age-level set, (b) the picture item that the child is asked to point to, and (c) a space for marking the item if it is incorrect. The test continues until the child has missed eight items at a single age-level. A total of all correct responses is tallied. There is a norm-reference manual which is used to convert the scores.

The GGG assessment has three sections that are administered in the following order: (a) rhyming, (b) picture naming, and (c) alliteration. Each section has a separate set of pictures, and each card in the set has three different pictures. The assessment is timed, and the child is informed about the time restriction and is encouraged to respond as quickly as possible. In addition, each section has sample cards that are reviewed with the child until he understands the procedure. (For an example from each section, see Appendix C on CD-ROM).

Prescreening Phase Three. The third and final task for the prescreening process was a false-belief task or theory of mind task. A theory of mind task was used as another screening tool primarily because recent research in children’s epistemological
development has been linked to children’s theory of mind development. In addition to this recent link, theory of mind has been strongly emphasized in the research literature (Wellman, 1990). Including theory of mind tasks as a prescreening tool may provide valuable information in terms of prospective methodologies for future research. The prescreening theory of mind task was administered to all students in the Cricket classroom during phase two of the prescreening process; however, it was given separately from the cognitive assessments and took approximately ten minutes per child. The purpose of the false-belief task was to identify six students that were able to successfully complete the false-belief task.

Each child was told a story to see if he was able to understand another person’s wrong belief, which requires explicit representation of the wrongness of the person’s belief in relationship to one’s own knowledge (Wimmer & Perner, 1983). The child listened and watched as a protagonist put an object in location $x$ and then left. While the protagonist was gone, the object that was placed in location $x$ was subsequently moved to a second location $y$, unbeknownst to the protagonist. The child was asked a series of questions that have different purposes: (a) a belief question, (b) an utterance question, (c) a reality question, and (d) a memory question. The following questions form the set of questions that screened for theory of mind ability:

1. Where will the individual look for the item?
2. Where will the individual say the item is?
3. Where is the item really?
4. Do you remember where the individual put the item in the beginning?
In order to pass the false-belief task, the child had to correctly predict that the individual would look for the item in location \( x \) and that the individual will be able to demonstrate deception by saying that the item is in location \( x \) while at the same time realizing the item is really in location \( y \).

**Materials.** The materials for the false belief task included two puppets and a candy bar. The story involved one puppet, which was the main character of the story, and the other puppet that acted as the protagonist. The candy bar was the item that was displaced from the main character. The questions were predetermined and based on the child’s responses. The child’s responses were reported in the researcher’s notebook. Scoring for the false-belief task was recorded as pass or fail.

**Child-Participants’ Personal Epistemology**

Assessing the child’s personal epistemology in the present study entailed the following: (a) whole class instruction observations, (b) child interviews, and (c) peer focus groups. These three components signify the heart of the current study and occurred for the four weeks of the study following pre-screening with the six child-participants whom were selected from the Cricket classroom.

**Whole class instruction.** This section deals with the emphasis on the whole class instruction. There were four weeks of this technique that were observed and will be referred to as: Week One, Week Two, Week Three, and Week Four. The parents of the six children selected for the study were contacted, the details of the study were explained, and they were asked to sign informed consent releases which signified their approval for their child to participate in the rest of the study.
### Table 6: Protocol Overview

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity Details</th>
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<tbody>
<tr>
<td><strong>Week One</strong></td>
<td></td>
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</table>
All students  | - Prescreening Phase 1  
- Observation of Whole Class Instruction (structured)  
- Observation of Center Activities (unstructured) |
| **Week Two**  |  
All students  | - Prescreening Phase 2  
- Cognitive Ability Assessments  
- Theory of Mind Task  
- Identify six child-participants  
- Sign Informed Consent  
- Conduct Introductory Peer Focus Group (2 groups of 3 children) |
| **Week Three**  |  
Six Child-Participants  | - Theme-of-the-Week: Monsters  
- Pre-Instruction Peer Focus Group  
- Whole Class Instruction Observation x 5 days  
- Center Activities Observation x 5 days  
- Individual Interviews 2-to-5 per child  
- Post-Instructional Peer Focus Group  
- Constant Comparative Data Analysis (daily) |
| **Week Four**  |  
Six Child-Participants  | - Theme-of-the-Week: Winter  
- Pre-Instruction Peer Focus Group  
- Whole Class Instruction Observation x 5 days  
- Center Activities Observation x 5 days  
- Individual Interviews 2-to-5 per child  
- Post-Instructional Peer Focus Group  
- Constant Comparative Data Analysis (daily) |
| **Week Five**  |  
Six Child-Participants  | - Theme-of-the-Week: Buildings & Construction  
- Whole Class Instruction Observation x 5 days  
- Center Activities Observation x 5 days  
- Individual Interviews 2-to-5 per child  
- Post-Instructional Peer Focus Group  
- Constant Comparative Data Analysis (daily) |
| **Week Six**  |  
Six Child-Participants  | - Theme-of-the-Week: Airports & Airplanes  
- Whole Class Instruction Observation x 5 days  
- Center Activities Observation x 5 days  
- Individual Interviews 2-to-5 per child  
- Post-Instructional Peer Focus Group  
- Constant Comparative Data Analysis (daily) |
| **Week Seven**  |  
Six Child-Participants  | - Wrap-up Peer Focus Group  
- Begin data analysis (Triangulation) |
Formal observations refer to the whole class instruction led by the teacher. As was discussed, the whole class instruction is what drives the theme of the week and is the foundation from which all future child-participant questions were derived. In other words, the informal center activities, individual interviews, and peer focus groups incorporate the theme from the whole class instruction and utilize specific details that originate during whole class instruction using specific quotes or behaviors from the child-participants that are observed during the whole class instruction. All questions posed to the children during the study probed and prompted personal epistemological reasoning and beliefs. The focus was to monitor the cognitive ability in connection with developing epistemological theories.

*Week one-Whole class instruction observation.* The whole class instruction began each week on Monday morning from 8:30am to 9:00am and is held every day at the same time. This instructional observation took place on the third week of the study. This first week focused on the six child-participants; the theme-of-the-week was “Monsters.” The whole class instruction acted as the catalyst for the child-participant interviews and the focus group as a way of tapping into the child-participants’ understanding of the current theme.

The researcher and the teacher met each morning before the school day for 15-30 minutes to discuss the plan for the day. This daily meeting time was spent having brief conversation about each of the child-participants’ performance in the whole class instruction. It is estimated that the amount of time spent on each child-participant was approximately four minutes. This time served as a member check; it was a chance to
compare the investigator’s impressions, observations, and perceptions with those of the teacher.

*Week two-Whole class instruction observation.* Week two of whole class instruction was identical to Week One in terms of purpose and goals. It took place under all of the same conditions as Week One. The single difference is that the theme of the week was different from the first week; the theme of the week for Week Two was “Winter.” The investigator and teacher resumed the morning meetings for scheduling, review of the daily lesson plan, and member checking. The second week of collaborative inquiry observations took place during the fourth week of the study.

*Week three-Whole class instruction observation.* Week Three of whole class instruction was identical to Weeks One and Two in terms of the procedure and took place under all of the same conditions as Week One and Two. There were two main differences: (a) The theme of the week was “Buildings and Construction;” and (b) due to the constant comparative data analysis, the focus became more narrow in the sense that themes and patterns had started to emerge; therefore, the target (i.e. epistemological) information was generally different for each of the six child-participants. The differences among the children prompted the concentration away from the peer focus groups and required follow-up sessions with the child-participants to be more centered on the individual interviews. However, at the end of the week, there was a post-instructional peer focus group as an attempt to maintain the fidelity of the design for the study. The investigator and teacher continued the morning meetings for scheduling, review of the daily lesson plan, and member checking. The third week of collaborative inquiry observations took place during the fifth week of the study.
Week four—Whole class instruction observation. Week Four of whole class instruction was identical to Weeks One, Two, and Three in terms of the procedure and took place under all of the same conditions as Week One, Two, and Three; however, Week Four was more in-line with the purpose and goals of Week Three. Using the constant comparative method of data analysis provided preliminary results that urged the researcher to alter the focus of follow-up investigations. The design of the study was more individualized in order to target specific epistemological information. The theme of the week was “Airports and Airplanes.”

Child-Participant Interviews

Procedure. During each of the four separate weeks of whole class instruction, the child-participants were involved in individual interviews (See Table 6). The interviews were semi-structured and did not exceed 15 minutes per child at one time. Each child-participant was interviewed a minimum of two times in each week but could be interviewed up to five times per week. The number of times a child-participant was interviewed in one week had no bearing on how many times they were interviewed during other weeks. For example, an individual could be involved in four individual interviews in Week One but only be interviewed two times during Week Two, then three times during Week Three and Week Four. The number of times a child-participant was targeted for an individual interview was dependent on the context and their participation in the whole class instruction. The more engaged a child was or the more frequently he participated provided more information to follow-up on in an individual interview; therefore, it was more likely that he was interviewed more frequently. Interestingly, the
six child-participants involved in the study typically were more involved in the whole class instruction than the other students.

The interviews consisted of questions or activities that came directly from the following: (a) the whole class instruction, (b) a previous peer focus group, and/or (c) investigator observations.

The purpose was to get more individualized information and also to gain a deeper understanding of the child-participants' epistemological understanding and beliefs.

**Materials.** The individual interviews were conducted in a small conference room which was attached to the classroom. The individual interviews were videotaped, which involved a small hard disk video-camera and a tripod. It was common to bring the storybook which was read in the whole class instruction earlier that day in order to prompt the similar cognitive processes that occurred during the whole class instruction. Occasionally the researcher would bring other props such as pictures of monsters for the child-participant to color while talking about the theme of the week, play-dough to construct a building, or puppets for pretend-play scenarios in which the child-participant could respond to “what if” questions with more ease. In addition, there were individual interview sessions that required a laptop computer in order to show the child-participant a video-clip of themselves during a whole class instruction or an informal center activity that the researcher wanted to inquire more about from the child-participant.

**Child-Participant Peer Focus Groups**

The focus group activities were facilitated by the investigator and corresponded with the four weeks of whole class instruction observation (See table 6). There were eight total peer focus group sessions; however, the six child-participants were separated into
two groups of three. It was a goal of this study to identify subjective and objective perceptions of the children using their own words during the whole class instruction and the focus group activities. In addition, the study was conducted in an authentic environment that was familiar to the children. There were eight peer focus groups. This section details the systematic organization of the focus groups: (a) an introduction; (b) during week one/theme one there was a pre/and post-instruction focus group; (c) week two/theme two there was another pre/and post-instructional focus; (d) a wrap-up, (e) week three/theme three had a post-instruction focus group, and (f) week four/theme four had a post-instruction focus group.

*Introductory peer focus group.* This group was to familiarize the children with the study and explain the format for the peer focus groups.

*Pre-instruction peer focus group.* There were two pre-instruction focus groups. They took place at the beginning of Week One (Monster Theme) and Week Two (Winter Theme). These pre-instructional focus groups centered on the theme of the week and occurred prior to the whole class instruction. The purpose was to gain understanding about the child-participants' background knowledge of the theme.

*Post-instruction peer focus group.* There were four post-instruction focus groups. They took place after all four weeks of class instruction observation (one at the end of each week). Each week the post-instruction focus group centered on the theme of the week. The post-instruction focus groups attributed more meaning of the range of knowledge gained during the week of instruction both on an individual and group level.
Wrap-up peer focus group. This group was to bring closure to the study. The researcher answered child-participants’ questions and asked them to share their experience about reviewing the themes of the week and of being asked questions.

Each focus group took approximately 20 minutes and took place in the small activity room attached to the classroom in order to alleviate confusion in the classroom and provide an atmosphere that was less stimulating for the child-participants.

The two groups maintained the same child-participants for peer focus group sessions 1 to 6. For focus group sessions 1 to 6, Group 1 had two females and one male, and Group 2 had two males and one female. As mentioned earlier, some of the whole class instruction follow-up procedure had changed due to the constant comparative method of data analysis that had been consistently used throughout the study. While reviewing the preliminary results of the constant comparative data analysis, it was clear that each child-participant had started to demonstrate specific patterns that may or may not have corresponded with other child-participants. Peer focus groups had been beneficial up to this point, but it was decided to target more individual information as a means of capturing more in-depth epistemological perspectives. Faced with the opportunity to make some changes to the format of the peer focus groups, it was decided to make a participant change between the two groups. It was the small matter of taking one of the females from Group 1 and swapping her with the female in Group 2. This change kept the gender balanced between the two groups; however, it clearly made Group 1 a much stronger functioning epistemological group as compared to Group 2.

Focus group activities were an extension of the whole-class instruction because the format and the content were similar to what has been previously introduced by the
teacher. The primary difference of the focus groups is that the groups are considerably smaller, which provides the children with the opportunity to be more interactive and discuss their knowledge in more depth. The smaller group size provides them with a more structured setting to listen and respond to their peers. Finally, the focus groups provide the researcher with the opportunity to design in-depth epistemological questions based on the whole class instruction and identify contributing factors to the child’s developing personal epistemology.

Questions were directly related to the content of the particular lesson as a way to better understand the child-participants’ beliefs about the nature of knowledge and process of knowing. Specifically, the questions were related to four dimensions of epistemology: simplicity and certainty of knowledge in reference to the nature of knowledge and source and justification of knowledge relating to the process of knowing (Hofer, 2001.) For example, after an instructional lesson, the teacher may pose the question, “Do you think Max was afraid of the wild things?” A student may respond, “No silly, the wild things are Max’s friends.” Because of the multitude of students participating at once, this particular student doesn’t get to elaborate in the context of the whole class instruction. The questions that will be asked individually will be follow-up questions such as, “What makes you think the wild things are Max’s friends?” or “What do the wild things do that makes you think they are friendly?”

The purpose of the focus groups was to gain an understanding of the child-participants’ preliminary knowledge and experiences as they relate to the theme of the week. The focus group provided the child-participants with a platform for the
investigator to capture the essence of their knowledge and how it is impacted by the affect and environment.

The pre-instruction and post-instruction focus groups were compared to each other and then later analyzed collectively for similarities and differences. There are several purposes for comparing the pre-instruction focus group with the post-instruction focus group. First, children are uninhibited with their peers, and they speak the same naïve language (in adult cognitive terms.) Second, young children are eager to convey their knowledge and experiences. Third, the group interactions allow for finding transitions or changes in each child’s affect, language, and environment. This process captured and identified interactions between child-participants, as well as, transitions in language and affect that occur as peers at this age interact closely but in much smaller exchanges. This made it possible to maximize the observations and focus on possible dimensions of epistemic thinking, affect, and peer interactions.

*Teacher*

The role of the teacher was another component of identifying children’s beliefs and influenced the nature and level of questions which occurred during the individual interviews and the peer focus groups. This section will talk about the methods used to obtain information from the teacher and understand his beliefs about the nature of knowledge and the process of knowing. The protocol for the teacher was as follows: (a) the Epistemological Belief Inventory (EBI), (b) three teacher interviews, and (c) a teaching style questionnaire.

*Teacher EBI.* The teacher completed a revised version of the EBI (Schraw, Bendixen, & Dunkle, 2002), during the first week of pre-study screening for child-
participant selection. It took 10-15 minutes to complete. The results of the EBI were compiled and served as the foundation for teacher interview #1; this meeting took place during the first week of prescreening.

Teacher interview 1. The interview took place in the conference room in the administration building of the preschool during scheduled teacher prep time by choice of the teacher; it lasted approximately 90 minutes and was audio-taped. The purpose of interview #1 was to acquire as much information about the teacher’s epistemological beliefs. Further, it was important to identify any impact that his beliefs had on his approaches toward curriculum and instruction. Lastly, the interview aimed to collect information about the teacher’s perspective regarding the child-participants’ understanding of knowledge. Investigating teacher beliefs can provide insight on instructional strategies that may impact child epistemologies. Asking the teacher about each child served as a way of member checking the researcher’s observations.

Teaching style survey. Prior to teacher interview 2, the teacher completed a teaching style survey designed by the researcher. The survey included topics such as: (a) teacher-student relationship, (b) instructional goals, and (c) teacher expectations. It is a 40-item self-report instrument and is measured on a five-point Likert Scale. The purpose for administering the survey was to help the teacher become more cognizant about his teaching style. Raising his metacognitive awareness about his area of expertise allowed for a richer interview and provided opportunities to draw connections between his beliefs about knowledge and his classroom strategies. The questionnaire was reviewed prior to the second interview and a set of semi-structured questions were developed.
Teacher interview 2. This interview took place in the classroom prior to the start of
the school day and was limited to one hour, at which time the children were supervised
by the teacher aides on the playground. The teaching style survey was the focus of the
interview as a way to identify his beliefs about curriculum and instruction and how it is
impacted by his epistemological beliefs. The purpose of teacher interview #2 was to
focus more intricately on beliefs about teaching, specifically the whole class instruction.
Questions were constructed prior to the interview based on the teaching style survey, but
the interview was not limited to those questions.

Teacher interview 3. This interview took place during the final week of the study. It
was in the conference room during teacher prep time and lasted 90 minutes. The purpose
of teacher interview #3 was to bring closure to the study; it also served as a debriefing
session to ask questions that had surfaced during the study that required clarification or
elaboration. Another function of the interview was to conduct final member checking for
reliability and validity.

Videotaping

The entire classroom experience was overtly video-taped; intentionally selected
pieces of the recording were used as a catalyst for individual interviews with the child-
participants and during the child-participant focus groups.

Equipment

A hard-drive digital video camera was used to record all participant interviews, the
focus groups, the whole class instruction, and selected classroom centers in which the
child-participant was engaged in an activity. All video footage was downloaded to DVD
daily. Complete transcription was done for the individual interviews and the focus
groups, and partial transcription was completed for the classroom center activities and the whole class instruction.

In order to use the video camera in the classroom, all parents who have students in the classroom needed to sign a general consent form and a separate videotaping consent form according the Office for the Protection of Research Subjects.

A laptop computer was used during some of the individual interviews and the focus groups in order for the participants to monitor video-clips.

*Constant Comparative Method*

This section discusses the use of the constant comparative method of data analysis that took place in conjunction with data collection. The constant comparative method (Bogdan & Biklen, 2003) is used with research designs that incorporate multiple data sources (Bogdan & Biklen, 2003) and is consistent with analyzing case study data (Strauss & Corbin, 1998). This is a complex method of data analysis and requires persistent, consistent, and simultaneous ongoing data collection and data analysis, so that the researcher can identify preliminary characteristics of the individual child or group. Using the constant comparative method assists with the process of classifying words/behaviors into preliminary categories and sub-categories as well as assists with documenting particular strengths and weaknesses of individuals and groups (See Figure 2). Over time as new and existing information emerges, reoccurring data analysis allows for more in-depth investigations.

In this study, the constant comparative method allowed for many accommodations which reflected the purpose of the study: (a) It assisted the researcher in identifying preliminary individual and group traits throughout the data collection phase; (b) it

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provided opportunities to construct specific in-depth questions for each of the child-participants; (c) it made preliminary patterns in the data visible so that gaps could be easily identified, targeted, and probed during future data collection; and (d) because of the recursive nature in the design of the study, comparing the data continually maximized the researcher's ability to build strength and richness to the questioning (i.e., use the child's own words to get him or her to elaborate about a specific topic), compare individual and group data (i.e., probe a topic more deeply when patterns or themes were identified for and individual or group interaction), and link theory to individual and group epistemologies as patterns and themes began to emerge (i.e., preparing a line of questioning according to current developmental and epistemological theories).

Figure 2: Constant Comparative Data Analysis Method

Peer Focus Groups

Whole Class & Center Activities

Individual Interviews
Reviewing the data daily enhanced the researcher’s ability to investigate specific child-participants in certain topic areas and in particular, at a level that was consistent with their individual psychosocial developmental level and within their cognitive range of ability. Using the constant comparative method accentuated the focus of the study as categories: (a) became more developed and visible, (b) new categories began to emerge, (c) sub-categories were unpacked, and (d) some simply diminished. Over time, categories and subcategories became more apparent from an individual and a group perspective and across individuals and groups. This constant integration of information ultimately informed the researcher about possible areas that would be beneficial to tap into for each individual and group epistemology. The following explains how the constant comparative method was applied to the current study. Each step is explained, and an example is provided.

This study spans four weeks of whole class instruction, and data was reviewed daily as a function of the constant comparative method (See Figure 3). Whole class instruction and center activity data were collected daily, and peer focus groups occurred on Monday and Friday each week. Individual interviews for each child-participant occurred at least one time per week but could have occurred as many as five times per week. The number of individual interviews depended on three main issues: (a) the child-participant’s level of engagement in the whole class instruction, (b) the researcher’s subjective nature of inquiry based on the research question (more so during initial data collection), and (c) characteristic and traits identified in previously analyzed data (progressively dominant as more data was collected).
Each subsequent week followed the same format, for each of the six participants, as a means to inform the researcher how to proceed in terms of: (a) individual interviews, (b) concentrating on a specific method of data collection, and (c) formulating more in-depth epistemological questions.

Figure 3: Steps of Constant Comparative Method

- Step 6: Constant Comparative Weekly Looking across groups
- Step 5: Comparing group characteristics to Epistemic Levels & Dimensions of Knowledge
- Step 4: Comparing Individual Characteristics to Epistemic Levels and Dimensions of Knowledge
- Step 3: Constant Comparative Weekly Looking across individual characteristics
- Step 2: Constant Comparative Daily Individual Characteristics for next day questioning
- Step 1: Collecting Data Daily Whole class Instruction, Center Activities, Individual Interviews, Focus Groups

There are six steps that Bogdan & Biklen (1998) recommend for use in constant comparative data analysis. Using this as a guideline, the preliminary data analysis steps during data collection adhered to in the current study are described next in more general
terms, followed by specific examples. There were four weeks of data collection; each week was exactly the same format with two exceptions: (a) The topic of instruction was different each week; therefore, the center activities were changed to reflect the nature of the instruction, and (b) the number of individual interviews was different because it was based on the child’s level of engagement or contributions.

Step 1

Whole class instruction was generally 30 minutes each day and was video-recorded. During the whole class instruction the researcher was observing and taking notes on the six child-participants who were present during the instruction. Immediately following the instruction, a checklist was completed for each child-participant while the class was preparing for the center activities. Center activities lasted one hour, and video was taken of each of the six participants during his/her involvement in the center activity of choice. During this time the researcher was observing, taking field notes, and moving the camera around the classroom. Later a checklist was completed for each participant. Individual interviews were generally 10-20 minutes each and included the researcher and one child. The interviews took place in a private area connected to the classroom, and they were video-recorded. The peer focus groups were also video-recorded and took place in the same location as the interviews; each group was approximately 20 minutes. The pre-focus groups occurred on the Monday or Tuesday morning prior to the instruction, and the post-instruction groups were on Friday afternoons.

Step 2

Each day the video was reviewed, and field notes were amended to reflect observations that were not fully addressed during the observation in real-time. Field
notes and checklists from the whole class instruction and center activities were transcribed. Individual interview videos were reviewed on the same day as the interview occurred; however, the number of interviews fluctuated from participant to participant and varied from week to week. Peer focus groups were video-recorded and immediately reviewed by the researcher; notes were taken and transcribed by the researcher for planning the next week's focus groups. This immediate preview of the data helped prepare for the next day of data collection in terms of: (a) identifying specific language the children used most spontaneously and with ease, (b) identifying the types of associations that were made to the instructional topic, (c) identifying which context each child seemed to provide the most interest and productivity, and (d) identifying which peers were drawn together and observing their social interactions.

The questions pertained to contributions or interactions during the whole class instruction or center activities' observations as a way of probing the child-participant to elaborate on his/her statements. This included reminding the child of his/her own words using one of two methods: (a) verbally reminding the child-participant what was said and asking specific follow-up questions or (b) visually reminding them by showing a video clip of the specific instance that was being referred to and asking a series of related questions. For example, during whole class instruction, a child-participant says the following statements:

"I had to go to the doctor and get a shot, and I still feel sick."

"We go to the doctor to make us better so we can feel better."

He also knows that one of his friends' mother is sick, saying, "Joe's mother was sick so his dad had to bring him to school."
A peer says something about medicine and he says, “Medicine is not good for children.” {Tone of Voice Change} “Only when mommy and daddy tell us too.”

To demonstrate how the constant comparative analysis assisted the researcher in identifying areas of strength and pinpoint reoccurring characteristics that may exist, the transcripts were reviewed and specific questions were later used in an individual interview format with this child-participant. In this case the researcher verbally reiterated the statements the child had made separately; the following are some of the researcher’s questions. “You said that you had to go to the doctor and get a shot but that you still feel sick. Can you tell me more about how you feel sick?” “What was it like for you to go to the doctor?” “What was the best part, and why?” “What was the worst part, and why?” “You said that we go to the doctor so we can feel better. How do you know that the doctor makes us feel better?” “You are very observant. You noticed that Joe’s dad brought him to school. How did you know his mother was sick?” “What happens when your mother is sick?” “What changes for you when your mother is sick?” “You said that medicine is not good for children. Why do you think medicine is not good for children?” “Do you think that is always true?” “Can you think of times when it is good for children to take medicine?” “You said that it was okay to take medicine when your mommy and daddy tell you to take it. When do they tell you it is okay to take medicine?” “You seemed very sure when you said it was okay to take medicine when your mommy and daddy said it was okay. Do you think they are always right?” For this particular question the researcher showed the child a brief video-clip of the whole class instruction when he made the comment. The question was to tap into the cognitive as well as the affective aspects of the response. Then a series of questions continued, “Who is usually more
right, your mom or your dad?” “What other things do your parents tell you it is okay to do?” “Do you always listen to what your parents say?” “What happens when you do/don’t listen to your parents?” “Why do you think you do/don’t listen to your parents?”

Also, because the children related *Where the Wild Things Are* to their knowledge about rules and discipline, this opened the door for moral questioning that was appropriate for their developmental level. For example, it became possible to ask what they know about the difference in the rules at home versus their rules in school and “getting in trouble” at home versus at school. Evaluating their response to such questions lead to hypothetical questions such as giving a scenario about a boy who does not listen to his parents regarding a bedtime and is tired the next day at school, then asking “what do you think his parents should do?” or “what do you think his teacher should do?” This type of question requires complex thinking skills and evolved from preliminary analysis of previous data. It definitely was not an initial question but instead was constructed by knowing information about the child’s current epistemic ability.

Questions like this may not always be appropriate for all preschool-age children; however, given the content of the lesson and the subsequent questioning of individuals and groups in the current context it was constructed and proved to be an appropriate question tailored for the purpose of the research question. There is no agreed upon format of questioning for preschool epistemology, so it was imperative to identify how children associate new information to their prior knowledge to ask appropriate age level question in a manner that they can relate to and answer in a way that demonstrates their epistemologies. The exploratory nature of the study required constantly evaluating the
data and assessing the trustworthiness of the statements and going back to the source and asking more questions that would allow the child to elaborate upon his/her knowledge.

The process of reviewing the field note transcripts and watching the videos facilitated the constant comparative method. In this step the individuals and groups were compared primarily to themselves more in isolation. This allowed the researcher to collect data each day and review the data to inform the next day’s data collection and so on.

Step 3

At the end of each week, field notes and checklists were updated, and/or videos had been transcribed. A closer more in-depth review of the data occurred at this time in which notes and preliminary traits were compared across individuals to obtain a more general perspective about the preschoolers’ epistemologies. Looking across the individuals at this point allowed for pre-planning activities for the next week. The main idea here was to look at the range among the child-participants to be able to coordinate individual and group tasks that corresponded to the theme of the week but also to work within the individual and group ability level. At this point many things had to be considered: (a) language ability, (b) cognitive ability, (c) social skills, (d) behavior, and (e) interests. This process continued to be in-line with the constant comparative method in terms of previewing the growing data in order to target specific characteristics, plan appropriate activities, and construct questioning pertaining to the theme and the activity that would tap into the individuals’ and groups’ epistemologies. This provided a glimpse into potential areas to probe the children’s epistemologies in more depth and to identify strong and weak areas; it also directly influenced the semi-structured interviews and the focus groups.
Initially, the preliminary analysis set up a broad foundation and over time distinctly separate hierarchical characteristics such as: (a) areas of interest (i.e., cartoons, toys, movie characters), (b) levels of attention or engagement, (c) amount of detail and associations (i.e. drawing comparisons to family, personal experiences, peers), (d) problem-solving and decision-making (i.e. strategies, understanding, need for redirection), (e) patterns of behavior (i.e., mimicking, facial expressions, non-verbal gestures, animation, coping skills), (f) social behaviors (i.e., eye contact, cooperativeness, sharing, influence of/on peers, curiosity), (g) use of language (i.e., ability to answer questions, ability to answer questions, spontaneity and relevance of responses to topic).

Ultimately, over the course of the study certain characteristics became targets that influenced what type of activities worked best, whom to question, what to question, which method to use, and how frequently to question. Responses to these questions during an individual interview were later compared to other statements from the same child, as well as other child-participant's responses, and if there were even vague categorical similarities (i.e., family, peers, associations, interests, imagination) then the researcher developed a set of questions to be discussed among the three child-participants in the peer focus group activity at the end of the week.

*Step 4*

The constant comparative method allows for the design of the study to be somewhat malleable. The researcher has the ability to adapt the study and questioning to address the research question. Therefore, once specific characteristics have been identified and questions that address these characteristics have been implemented, this step begins to look at these identified characteristics in relationship to the epistemological
developmental levels (i.e. absolutist, multiplist, evaluativist) and the dimensions of knowledge (i.e. simple, certain, source, justification). Characteristics that are apparent during the data collection are preliminarily assessed in two ways: (a) if they are epistemologically meaningful, and (b) how they could be labeled epistemologically. This allowed the researcher to develop specific epistemological questions that are modeled after adult epistemological surveys but that address the interests and abilities of preschool-aged children. This approach contributed to tapping into their epistemologies in more depth by scaffolding previous actions/responses with their own words and interests to more clearly identify epistemological strengths and weaknesses. For example, a child-participant frequently talks about Transformers; therefore, questions are tailored around what he already has disclosed that he knows or takes interest in. This more direct line of questioning provided a more visible link to his multiplistic perspectives and captured simple, certain, and source of knowledge dimensions. He was able to make associations independently between the *Wild Things* (monsters) and Transformers (toys). However, after direct questioning, he was able to elaborate upon his knowledge and understanding to Power Rangers (cartoon characters), then further compared the “powers” of each to determine that some of the Transformers and some of the power rangers are “bad guys” and fall more in-line with monsters than others. This led to another line of questioning regarding which ones they like/dislike and why. Using his affective responses, he demonstrated his knowledge regarding fear and his knowledge of following rules and being a “good person.” Detailed questions which integrated their individual characteristics with an epistemological focus demonstrated a deeper level of intellectual power.
Step 5

This step is similar to step 4. The difference is that rather than prepare epistemological questions for an individual interview, this step addresses the characteristics of the group and allows the researcher to design even more direct and in-depth epistemological questioning for the post-instruction focus group. Taking preliminary findings from classroom instruction, center activities, and individual interviews and transferring them to the focus groups provided further reliability and validity to the interpretations. The recycling of child-participant knowledge provided insights into the following areas: (a) the consistency of each child's epistemological thinking of the instructional content or according to an identified theme or pattern, (b) comparisons of the individual child-participants epistemic ability, (c) assessment of peer group ability, (d) identification of the hierarchy within the group to see which individual characteristics led to more sophisticated epistemologies, and (e) the social dynamics of epistemological thinking. By using constant comparative analysis, comparing individual's responses was beneficial for tapping into areas of knowledge that were pertinent to the children and connected with their experiences. This allowed the researcher to identify the strongest characteristics and epistemological levels and dimensions of knowledge from the week and incorporate them into the post-instructional focus groups for each group. Using the constant comparative method it was possible to look across the individual child-participants to scaffold their strengths so that theoretically all members of the group had an equal vantage point. This proved to be a beneficial collaborative activity that yielded a greater amount of knowledge from their personal experiences and prior knowledge. For example, taking a consistent response
that reoccurred with each individual throughout the week such as (for the family theme), "I love my mommy and daddy" (or some form of the same). Every child demonstrated a non-verbal gesture (hugging themselves) in conjunction with the statement. This same behavior was addressed in an individual interview context, but each response varied slightly; therefore, it was introduced again in the focus group to see how they would respond collaboratively. This technique yielded several interesting observations regarding the importance of personal experiences, prior knowledge, and social interactions.

*Step 6*

This step is very similar to step 3. The difference is that comparisons were made across groups rather than across individuals. Looking across the groups provided for more reliable and valid interpretations because it allowed the researcher to double check on identified characteristics, investigate new characteristics, and continue to search for embedded developmental levels or dimensions of knowledge. This filtering of group data occurred for the focus groups weekly.

Narrowing the data in such a manner made it possible to characterize each child-participant's epistemic thinking in relationship to previously identified traits (i.e., family, peers, affective dispositions, creativity, good/bad decision-making, ability to follow direction, on/off-task) and behaviors (ability to change, role as leader, autonomous, animated, eye contact) as a means of constantly using the children's words and actions to investigate their epistemologies more deeply and more clearly.
Confidentiality

Confidentiality of all participants was a priority; Bogdan and Biklen (2003) urge researchers to “be discreet” (p. 181). All names and identifying information were removed from the documents and properly coded to ensure the participants confidence (Berg, 2001); some of the information that is shared may be of a personal and sensitive manner (Bogdan and Biklen, 2003). Since confidentiality is of utmost importance and is indicative of professionalism, all documents will be turned over to the Lynn Bennett Early Childhood Education Center and stored in a safe and secure locked cabinet.
CHAPTER FOUR

DATA ANALYSIS & RESULTS

The research question addressed in this study was as follows: what are the personal epistemologies of preschool children? The research in children's personal epistemology is sparse, but, according to the literature, very young children are either incapable of demonstrating epistemological beliefs or they are merely capable of functioning at an objective (i.e. absolutist) perspective. Based on the literature and expectations from the pilot study, there were two hypotheses. First, preschool children can and do individually demonstrate personal epistemologies; that is, that three- and four-year-old children express their beliefs about knowledge and knowing. Second, preschool children's personal epistemologies vary in regard to developmental levels and dimensions of knowledge; in other words, preschooler's epistemologies range in sophistication or complexity and differ in scope of knowledge.

This chapter has three sections: (a) content analysis and ATLAS-TI, (b) levels of data analysis and (c) results. First, based on the preliminary constant comparative analysis that accompanied the data collection procedure, it was necessary to continue to organize and reduce the data still further to identify individual and group epistemologies. Content analysis describes how the codes were assigned to generate categories and subcategories. Following Level 1 (Coding), the use of ATLAS-TI, a qualitative software tool, is discussed. Second, using content analysis, 12 levels of data analysis are outlined and
described. Third, the results section of the chapter is divided into three parts: (a) individual results, (b) group results, and (c) overall preschooler’s personal epistemologies. The individual results will be presented as six case study formats, and individual’s epistemic profiles are provided to demonstrate how final individual personal epistemological results emerged. The group findings are discussed. One group’s profiles are provided as a means of understanding the process of identifying patterns and themes. The overall preschooler’s personal epistemological results are reported and are derived from the individual and group results.

This study investigates six child-participants and triangulates four methods of data collection: (a) observation of the whole class instruction, (b) center activities’ observation, (c) individual interviews, and (d) focus group data. There were four weeks of data collection, and each week had a different instructional topic. There were four primary tasks during the data analysis: (a) to identify individual epistemological profiles for each of the child-participants; (b) to identify relationships among the individual epistemological profiles, (c) to identify epistemologies that were generated between focus groups (here the focus was on peer interactions and collaboration), and (d) to draw final conclusions regarding preschooler’s epistemologies based on individual and group epistemological themes.

Content Analysis Procedure

This section describes the content analysis procedures utilized using levels of analysis that were rigorously executed in order to zero in on preliminary categories and subcategories that had been identified and probed during the data collection steps (i.e.,
dimensions of knowledge, cognitive and social behaviors, verbal and nonverbal characteristics). There were two distinctive types of content analysis used including: (a) Conceptual Analysis and (b) Relational Analysis.

Content analysis is a method used regularly in the social sciences for investigating the content of communications and relationships. The foundation of content analysis is attributed to Harold Lasswell who introduced the core questions of content analysis: “Who said what, to whom, how, to what extent and with what effect?” (Flick, 2006, p. 56). One goal of content analysis is to reduce large amounts of data by compressing the data into categories. These categories can be derived from a theoretical model or emerge from the data. In this study, the categories are drawn from the personal epistemology literature, from emerging categories using constant comparative analysis, and from observation. Many of the observational categories that surfaced are consistent with early childhood theories but were not initially sought out at the onset of data collection. In this study content analysis was used as a research tool to investigate the area of personal epistemology from an individual perspective as well as a group perspective. Therefore the data were analyzed in two sections, individual and group, and the results of each section were combined in the final results to answer the research question: what are the personal epistemologies of preschool children?

The individual and group analysis followed the same format; initially the conceptual approach was used followed by the relational approach. Conceptual Content Analysis involves first establishing the presence and frequency of concepts in the text. In this case the text data were the transcriptions from the individual interviews and the focus groups. Other text included researcher notes taken from the actual observations of the whole class
instruction and center activities as well as notes that were made by the researcher as the
videos were reviewed later. The researcher notes included observations of cognitive,
affective, and social behaviors that coincided with the individual’s statements. Since the
categories could be implicit and explicit, to avoid subjectivity, all codes and emerging
categories were defined in advance for consistency and thought out in comparison to the
research. The process of coding and categorizing is basically one of selective reduction,
that is breaking down the content of all the information into meaningful and pertinent
units of information and certain characteristics for later interpretation, which is the
central idea of content analysis (Merriam, 2002).

Relational Content Analysis builds on conceptual analysis by examining the
relationships among the concepts in the text. The idea of relational analysis is to be able
to map networks or interrelated ideas, beliefs, attitudes, and other information available
to the researcher when making decisions or inferences about the text, coding, or
categorization. In this study the relational analysis is represented in mental models or
networks using ATLAS-TI. These networks demonstrate the strengths and weakness of
the interrelatedness between the categories.

ATLAS-TI.

All of the data was transcribed and uploaded and stored into ATLAS-TI, a powerful
qualitative software program that assists the researcher to uncover and systematically
analyze complex phenomena within rich text or multi-media data (Lewins & Silver,
2007). The program provides tools that allow the researcher to locate, sort, code, and
annotate preliminary data material; to weigh and evaluate their importance; and to
visualize complex relationships among them (Lewins & Silver, 2007). This study is
comprised of a large amount of transcribed documents, field notes, and codes which ATLAS-TI was able to keep track of for preliminary analysis and retrieve upon request. In addition, ATLAS-TI provided analytic and visualization tools designed to lead the researcher to a variety of unique interpretive views of the information. ATLAS-TI (qualitative software) was used to organize the coded data.

In order to attribute specific characteristics and traits into categories and subcategories, ATLAS-TI has a code manager to retrieve certain categories and run a code forest search to find out which of the highest ranked categories originated from which context (i.e., classroom instruction, center activities, individual interviews, or focus groups). For example, there were 1439 units coded for the subcategory of multiplist. When asked, ATLAS-TI was able to sort these units and identify that: 531 units were derived from the classroom instruction, 83 units derived from the center activities, 611 were a result of the individual interviews, and 214 derived from the peer focus groups. The ATLAS-TI software was also able to run another code forest search for the content of each context in this case. For example, of the 531 multiplist units found resulting from the classroom instruction, 209 were pertaining to monsters, 79 were identified when the instructional topic was winter, 111 were present during the week when construction was the topic, and 132 were present during the week of instruction about airplanes.

Using ATLAS-TI’s Code, Family, and Network Managers and the Memo Board, epistemological subcategories (absolutist, multiplist, evaluativist, simple, certain, source, justification, and the integrated levels and dimensions) were combined with each component of the network profile. This “epistemic wash coupled the children’s own words and behaviors to produced a direct connection between their epistemic
development and the developmental components representative of their performance and ability in the network profile.

Levels of Data Analysis

There are 12 levels of data analysis in the present study, and these will be outlined in this section (See Figure 4). Although it is illustrated as a single process it depicts the individual participants and the group analysis. Ultimately the results from the individual profiles were combined with the group profiles, so that the study technically has three sets of results: (a) an individual epistemic profile (See Figure 11), (b) a group epistemic profile (See Figure 33), and (c) an overall preschooler epistemic profile (See Figure 35). As with all hierarchical representations the levels of analysis begin at the bottom and work to the top, all along the way data is being condensed in such a way that themes and patterns become more visible and consistent. Within each level of analysis there are multiple sub-levels, a miniature graphic will assist in identifying the actual epistemological construct (i.e., developmental level, dimension of knowledge, matrix cell) that is being analyzed at each level of analysis.
Level 1: Coding

This section conveys details regarding the coding of the data using ATLAS-Ti. Coding is the process of organizing data according to ideas, units, or sentences in a way that collapses the data so that meaning can be made based on relationships that are identified within the data (Creswell, 2003). The data were coded inductively and
deductively during the data collection and after data collection was completed leading up to the findings of the research question: what are the epistemologies of preschool-age children within a classroom context? This section discusses the initial coding scheme (inductive, based on observation and inferences) and the epistemological coding scheme (deductive based on developmental levels and dimensions of knowledge). This first section is divided into three parts: inductive coding, deductive coding, and ATLAS-TI.

The coding for this study was developed using inductive and deductive reasoning. Inductive reasoning is more open-ended and exploratory, especially at the beginning of research such as the current study. It pertains to methods that begin with specific observations and work toward broader generalizations and theories. Deductive reasoning assumes a more narrow perspective in that it is concerned with testing or confirming hypothesis. It begins with existing theories and works toward more specific observations. Most social or authentically approached research tends to utilize both inductive and deductive reasoning processes at the same time (Bogdan & Biklen, 2003). Due to the exploratory nature of the current study, a more inductive approach was predominant in that initially nearly every idea was given a code but at the same time as data was being evaluated according to the research question (i.e. what are the epistemologies of preschool children), it was imperative to keep in mind theories of development and current theories of personal epistemology which called for more deductive reasoning skills. Initially all data was coded by idea units; a unit of data is any meaningful or potentially meaningful segment of data (Merriam, 1998). The coding scheme was developed by reviewing the transcripts and field notes to see what types of information had been collected.
Inductive coding scheme. The data was coded based on verbal and nonverbal units, and then items were coded based on a particular idea (See Table 7). Many of these codes emerged during the constant comparative method of analysis that occurred during data collection. The codes developed as a starting point due to observations of the occurrence in the classroom. Later many of the codes began absorbed into the epistemic categories. Verbal information was coded based on an individual’s ability to demonstrate an idea; in some cases an idea was represented by a complete sentence, but often it was a portion of a thought (i.e., a single word or phrase). Nonverbal behaviors required more interpretation and needed to be considered within the content of the responses; therefore, it was more challenging but pertinent to the study. Due to the age of the participants, their verbal ability to articulate certain information was limited, but it was thought that they made conscious attempts to communicate information through their behaviors. Therefore, individual verbal and nonverbal ideas that were believed to be relevant were coded.

Multiple units of data were used, ranging from a single word that a child-participant used consistently to a complete thought. The child-participants’ complete thoughts varied among the children in terms of the number of sentences and included repetitive behaviors such as, using their body or voice to explain what happened (e.g., standing up from a sitting position and falling to the ground; stretching their arms out to show emphasis of size or proportion; displaying approval or disapproval with facial expressions; making sound effects such as, boom, crash, bang; and fluctuating the tone of their voice).
Table 7: Inductive Coding Scheme

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Deductive coding scheme. Merriam (1998) states that identifying categories and distributing codes can come from the literature and the researcher; however, Glaser and Strauss (1967) caution researchers about using categories that are “borrowed” (p. 183) from other research unless they are compatible with the purpose and the theoretical framework of the study. The epistemological categories used in this study are present in the research literature and are concurrent with the purpose and the theoretical framework of this study. The unique part of the epistemological categories is that, in the literature, personal epistemology is viewed as either levels of development (i.e., absolutist, multiplist, evaluativist) or dimensions of knowledge (i.e., simple, certain, source, justification) and are viewed more as contrasting perspectives. In the current study each level and each dimension were coded separately (first as developmental levels, then as dimensions of knowledge); and then the developmental levels and dimensions of

<table>
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<th>No.</th>
<th>Code</th>
<th>Definition</th>
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<td>Evaluativist Justification</td>
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</table>
knowledge are combined in a matrix (i.e., absolute simple knowledge, multiplist justification of knowledge) (See Table 8).

To thoroughly grasp the epistemological matrix it is necessary to review how personal epistemology is defined in the current study. Personal epistemology is generally accepted as being comprised of two dimensions concerning beliefs about the nature of knowledge and the process of knowing (Burr & Hofer, 2002). The nature of knowledge includes (a) the simplicity of knowledge (i.e., the relative connectedness of knowledge); and (b) the certainty of knowledge (i.e., the perceived stability of knowledge). The process of knowing includes (a) the source of knowledge (i.e., where knowledge resides, internally or externally); and (b) the justification of knowledge (i.e., how individuals evaluate and warrant knowledge claims). In addition to the dimensions of beliefs just described, the current study also examines epistemic development in the form of three levels: (a) absolutism (i.e., simple, dichotomous views of knowledge), (b) multiplist (i.e., reasoning is more complex and relativistic), and (c) evaluatism (i.e., views of knowledge focus on evaluation and decision-making among differing views) (Kuhn & Weinstock, 2002). Units of data that had been previously coded using the inductive coding scheme were also coded using the deductive coding scheme in order to identify overlapping characteristics.

The purpose of coding the data in all three ways was to allow a unit to be one or two dimensional. This distinction is important for this study and the research literature because little is known about preschool children’s epistemologies; using the epistemic matrix demonstrates the complexity of preschooler’s thinking. Identifying preschoolers’ ways of interpreting knowledge in the epistemic matrix achieved three main goals: (a) It
helped illustrate the varying ability of the individual child-participants, (b) each cell of the matrix made the preschoolers’ thinking more visible in terms of an individual’s strength in specific content areas and context, and (c) it illustrated the advantages of peer social interaction and collaboration in learning environments.

Identifying cells in the epistemic matrix was more deductive reasoning in nature because the two theories (developmental levels and dimensions of knowledge) exist in the literature although they are not typically integrated in this manner and particularly not with participants as young as in the current study. In this sense identifying epistemological thinking within the matrix was more of an inductive reasoning task because of the exploratory objective of the study. Table 8 provides general examples of each cell of the matrix as a category. The columns across the top of the matrix are the dimensions of knowledge and the rows down the left-hand side are the developmental levels, so that each cell identifies characteristics or features of one developmental level and one dimension of knowledge (i.e., absolute simple knowledge, multiplist source, evaluativist certain). Within each cell of the matrix, an example is provided to illustrate a more general description. More specific examples related to this study will be reported in the next section of this chapter for each case study.
## Table 8: Epistemological Matrix Examples

<table>
<thead>
<tr>
<th></th>
<th>Simple</th>
<th>Certain</th>
<th>Source</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absolutist</strong></td>
<td>I think teachers should focus on facts rather than theories.</td>
<td>If two students are arguing about something, at least one of them must be wrong.</td>
<td>I think children should always listen to their parents.</td>
<td>I am going to do what I want to do because I know what is best for me.</td>
</tr>
<tr>
<td><strong>Multiplist</strong></td>
<td>Some basics require basic factual knowledge, but other times we need to have a deeper understanding of concepts.</td>
<td>Every student has equally valuable contributions and their opinions should be heard.</td>
<td>At home I listen to my parents, but when I am at school I listen to my teachers because they know what is best for me at that time.</td>
<td>In some situations ignoring a student’s behavior is more productive, but other situations require timeout because it is necessary to get them under control more quickly.</td>
</tr>
<tr>
<td><strong>Evaluativist</strong></td>
<td>The more you know about a topic the more there is to know.</td>
<td>The best way to learn about global warming to present several theories &amp; allow the student to decide which is best based on their knowledge &amp; experience.</td>
<td>I think children should be able to question their parent’s authority.</td>
<td>Being an effective teacher means that you consider the individual students needs and apply what you have learned from books, experience, &amp; others.</td>
</tr>
</tbody>
</table>

### Level 2: Individual Developmental Levels

Level 2 of the analysis is comprised of organizing the data into individual developmental levels (i.e., absolutist, multiplist, evaluativist). In-line with Piaget’s developmental stage theory, epistemological development is thought to occur in the same general trajectory, that is from more naïve to more sophisticated. In addition, individuals are thought to advance from lower levels to higher levels; absolutism is an objective view of knowledge, multiplist is a subjective view of knowledge, and evaluativism allows the individual to move between and coordinate objective and subjective perspectives while using valid warrants for their knowledge claims. The identifying feature of this level of analysis is that it seeks to find the specific characteristics that might define and
distinguish one level from the others in a qualitatively distinct manner. Also, it provides an opportunity to identify sequences of epistemological development and shifts in epistemological understanding

*Level 3: Individual Dimensions of Knowledge*

Level 3 of the data analysis is comprised of organizing the data into categories based on the dimensions of knowledge. There are four epistemological dimensions of knowledge (i.e., simple, certain, source, justification). The four dimensions are divided into two central themes, the nature of knowledge and the process of knowing. The nature of knowledge is represented by simple and certain knowledge, and the process of knowing incorporates the source and justification of knowledge. The identifying feature of analyzing the dimensions of knowledge is to unpack what the participants know and how they know the information. Analyzing the data according to the dimensions of knowledge provided a better perspective about each dimension; for example, whether the dimensions are separate constructs or more integrated. Also, it allowed a clearer account of which dimensions or themes (nature of knowledge, process of knowing) are more potent in preschooler’s developing epistemologies. Analyzing the dimensions of knowledge can also lead to evidence involving issues of domain-generality and domain-specificity. In addition, breaking epistemological thinking into potential dimensions provides an opportunity to identify if similar dimensions are characteristic of each developmental level.

*Level 4: Individual Matrix: 12 Cells*

Level 4 integrates the developmental levels (absolutist, multiplist, evaluativist) and the dimensions of knowledge (simple, certain, source, justification) into twelve cells.
The idea of a matrix is to show the relationship between the two categories (developmental level and dimensions of knowledge).

**Level 5: Individual Matrix: Integrated Dimensions**

Level 5 summarizes each developmental level individually (absolutist, multiplist, evaluativist); however, each developmental level integrates the dimensions of knowledge into two larger categories: the nature of knowledge (simple and certain) and the process of knowing (source and justification). Each developmental level conveys the strengths and weakness at that level in terms of the nature of knowledge and the process of knowing. This provided a closer glimpse of reoccurring themes and patterns (i.e., family, peers, nonverbal) and how they related to epistemological themes and patterns that were beginning to emerge. Examples include overlapping characters between simple and certain knowledge, links between certain knowledge and justification of knowledge, and inability to identify sources of knowledge. This level had three sublevels: (a) Absolutist + Nature of Knowledge/Process of Knowing, (b) Multiplist + Nature of Knowledge/Process of Knowing, and (c) Evaluativist + Nature of Knowledge/Process of Knowing.

**Level 6: Individual Epistemic Profile**

Level 6 is an individual epistemological profile for each of the six child-participants; therefore, there are six epistemic profiles. This epistemic profile represents the four strongest epistemological themes that consistently resurfaced throughout the in-depth analysis. Included in the epistemological themes are general patterns that were associated with the child’s epistemic perspective (i.e., using background knowledge, personal experiences, association to family, mimicking peers). Included in the epistemic
profile are specific examples from the data that portray the child’s words. These examples are embedded in the epistemic matrix as a way to illustrate how words, phrases, sentences, and behaviors were coded within the integrated description of the developmental levels and the dimensions of knowledge. In addition, the individual examples that represent each cell within the matrix provided an authentic perspective of how each child demonstrated his/her personal epistemologies within the classroom environment.

**Level 7: Across Individuals’ Epistemic Profile**

Level 7 is the final individual level of analysis in the current study. Here all six of the individual’s epistemic profiles were analyzed for consistent epistemological themes and corresponding patterns that occurred across all six of the child-participants. Level 7 represents a single epistemic profile for preschooler’s within a classroom context. These results are reported in the next section of this chapter.

**Level 8: Focus Group Themes Pre-Post-Instruction**

Level 8 begins the group analysis. At this level the data were divided into themes. There were four weeks in which each week had a different theme of the week (i.e., monsters, winter, construction, family). Each theme had two focus groups (i.e., pre-instruction and post-instruction). The six child-participants were divided into two groups of three for the initial two themes (monsters and winter). Therefore, the data were analyzed according to the following sublevels: (a) Group 1 Monster Pre/Post-Instruction, (b) Group 2 Monster Pre/Post-Instruction, (c) Group 1 Winter Pre/Post-Instruction, and (d) Group 2 Winter Pre/Post-Instruction. For the final two themes (construction and family), the researcher selected the three child-participants who demonstrated the
strongest epistemological ability using the individual results and results from the first two theme-based focus groups. These three child-participants made up Group 3; the format for the final two themes followed the same format as the others, in that there was a pre-instructional focus group and a post-instructional focus group for each of the two themes (construction and family). However, rather than two groups doing the same themes there was only one (Group 3). The sublevel analysis included the following: (a) Group 3 Construction Pre/Post-Instruction and (b) Group 3 Family Pre/Post-Instruction. Group data was coded according to developmental levels (similar to Level 2), dimensions of knowledge (similar to Level 3), and epistemic matrix (similar to Level 4).

**Level 9: Focus Group Theme Based Epistemic Profiles**

Level 9 continues to further analyze the focus groups, but at this level the focus groups are collapsed into theme-based profiles for each of the three groups. The sublevel analyses at this level are as follows: (a) Group 1 Monster, (b) Group 1 Winter, (c) Group 2 Monster, (d) Group 2 Winter, (e) Group 3 Construction, and (f) Group 3 Family. In contrast to looking at the type of group that it was (pre-instruction or post-instruction), this level of analysis considers the content of the themes being discussed. Here epistemological themes and behavioral patterns were identified between the groups based on the topic. This allowed a clearer perspective of the significance that the topic might have on how the individuals demonstrate their epistemologies as well as how that might impact the group epistemic climate. This level of analysis also sought out individual epistemological contributions, group interactions, and changes in themes or patterns among the different topics.
Level 10: Focus Group Epistemic Profile

Level 10 reduced existing epistemological themes and patterns further to identify a group profile for each of the three groups; therefore, this level has three sublevels: (a) Group 1, (b) Group 2, and (c) Group 3. This level accomplishes the same general task as Level 6 (Individual Epistemic Profiles).

Level 11: Across Group Epistemic Profile Results

Level 11 is the final level of focus group data analysis, and it is similar to Level 7 (Across Individual Epistemic Profiles). Here the analysis looks across the epistemic group profiles to identify the results of preschooler’s personal epistemologies within a focus group setting. There are four main results that will be reported in the next section of this chapter.

Level 12: Preschoolers’ Personal Epistemologies

Level 12 is the final level of data analysis for the current study. In this level of analysis the individual epistemological results and the group epistemological results are compared to identify overall preschooler’s personal epistemologies. There are four themes and patterns that make-up the overall results for the current study, and they will be reported in the next section.

This section has described the twelve levels of data analysis for the current study. These levels of analysis have garnered three sets of results for preschooler’s personal epistemologies within an authentic classroom environment: (a) individual results, (b) group results, and (c) overall study results. The next section reports these results according to the following format. First, six individual case studies are presented; each case study gives a description of the child-participant as viewed by the researcher within
the classroom environment, followed by a discussion of that child-participant’s individual epistemological results. Preceding the discussion of the results, the child-participants epistemic profile is presented. Second, a discussion of each of the three group epistemic profiles is followed by the network model of their group epistemic profile and the preschool epistemological group results. Third, a discussion of overall results from the current study.

Case Studies

In this section the results of the six case studies are presented in a case-by-case format. Each case study will follow the same outline: (a) a description of the child within the classroom including behavioral, social, and affective characteristics as a way to become familiar with the child-participant as an individual in his/her environment; (b) a network profile created in ATLAS-TI which illustrates the hierarchy of the strongest identified categories, the corresponding subcategories, and the epistemic cell that was coupled most frequently from each the categorical and subcategorical frame of reference; (c) an epistemological matrix that summarizes the individual results from the study with specific quotes (i.e. the child’s words) in each cell of the matrix that the child-participant was capable of formulating with or without probing; and (d) a report of individual results regarding major epistemological patterns and themes. In the final section, results from each case will be reported in terms of connecting the themes and patterns across the child-participants, as well as report focus group themes. The case studies will be presented in order according to the child-participant’s number in descending order which

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were coded in alphabetical order: (a) Adam (1M), (b) Amy (2F), (c) Carl (3M), (d) GiGi (4F), (e) Trudy (5F), and (f) Jeremy (6M).

Case Study: Adam

Description

Child-Participant #1 is a 3yr-10 month-old African-American (father) and Caucasian (mother) male. He attends the preschool five days per week for the full day. His mother or grandmother usually drops him off, and their relationship is a close one. It is standard to get a kiss good-bye, but he does not seem to mind being left. Adam explains, “I really like coming to school, I get to play with my friends, I learn new things all of the time, and my mommy misses me when I am here.”

During the whole class instruction, Adam is very articulate, frequently raising his hand to volunteer his experiences or to answer questions; however, he is easily excitable and will frequently disregard the classroom rule of raising his hand to be called on before contributing. Adam’s pattern for raising his hand is consistent; he raises his hand when there are only a few other students who are sharing, but when peer contributions are high he talks out more regularly. He has an intuitive sense for difficult questions that he understands his peers will not be able to answer. Often, it is common for him to mumble the correct (i.e. declarative knowledge) answers to himself, in a way that confirms to himself that he knows the answer but is less interested in making the effort to raise his hand and tell the teacher or the class. For example, the teacher asked, “What do we call the person who writes the story?” He put his head down and quietly said, “The author.” Or the teacher asked, “What do we call the person who draws the pictures?” Again, he turned away and quietly said, “The illustrator.” Adam is more inclined to tell others

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about his experiences or how he knows something. He is forthright about making his knowledge associations verbal. For example, when the teacher asked, “What is it like when it is cold?”, he responded, “The wind blows and my ears get cold. I have to get my jacket because I will get sick and have to go to the doctor and take medicine. I hate taking medicine so I wear my hat when it is cold outside.” It is very common for him to ask several questions before, during, and after the story. For example, he asked, “Why is the bear sad?” or “Why do you think they are not friends?” If the teacher does not immediately announce the author, he will ask, “Who wrote it?” His questions and comments are always relevant to the topic.

Adam’s behavior during whole class instruction is to be applauded. He comes in from the playground and knows to wash his hands and go to the circle for instruction without direction. He promptly sits “criss-cross applesauce” and patiently waits for the instruction to begin. He typically sits very close to the teacher and makes sure he can see the pictures during the story. If he chooses a place to sit that impairs his vision, he will always move to a spot he is able to see. When other children are behaving inappropriately during whole class instruction, he does not pay attention to them and remains focused on the story. Adam is attentive, engaged, and enthusiastic about the topics that are chosen as the theme of the week.

Center activities are more unstructured, and the children get to choose which center they want to go to. Adam never has trouble making a decision as he always has a center in mind. He likes to go to the reading center and look at the books. He also enjoys the block center where he builds things or does puzzles. This is a time when the children get to interact freely with their peers. During this time he generally will interact with one
other male friend. Interestingly, Adam’s friend is not as socially well-adjusted nor is he as inquisitive, but they have many of the same interests and have talked about spending time together outside of school. When it is an instance where there are several peers at one center, he is socially well-adjusted. He is conscientious about taking turns, keeps his hands to himself, and has a good concept of right and wrong behavior. If the center holds his attention, such as the treasure hunt bin, he will stay at the center. However, if there are several children and he has to compete for space, he will wander to a center that is less occupied.

During the individual interviews Adam was initially quiet and uncertain about what to expect, but he quickly became adjusted and would request to have an individual interview. He appeared to enjoy the individual attention and was eager to please the researcher by answering questions or completing a task. Adam particularly liked to watch himself on the videos that had been taken of him in whole class instruction or center activity. When asked to elaborate on his comments or behaviors, he was always able to provide more details about what he was thinking or doing. Adam was cooperative and attentive, but when the interview was over, he would invent things to do or things to talk about to make it last longer. For example, anything in sight would prompt him to encourage the researcher to reengage in a one-on-one interaction; there was a book Give a Pig a Party and he said, “I will read this to you (he cannot read) and ask you questions now.” Adam would want to look in the researcher’s bag to see if there was anything we could use to talk about; often he was creative about how he approached it. For example, one day there was play dough and the theme was construction, he said, “We can use this to build the big bridge that was in the story today.” He required frequent redirection to
bring the session to a close. Interestingly, he did have a concept that the goal was to talk about topics related to the theme of the week. The theme of the fourth week was airplanes and airports. When time was up he said, “Did you see that airplane (there was no airplane)? It was green and yellow. I was on an orange and blue airplane once, but I fell asleep and didn’t get a drink.” He asked, “What color of airplanes have you been on before?”

During the peer focus groups, Adam was in group 1 with two female peers. He was easy to engage and interacted well with the others. They had very dissimilar interests, and it was sometimes difficult to keep him on the topic. Adam frequently wanted to run the group and would correct the other child-participants if he thought they were incorrect. However, if he believed they just had a different experience, he would appropriately share his experience. He was an initiator of ideas and asked many questions of the researcher and his peers on several of the topics discussed. He demonstrated excellent listening skills and was able to elaborate often on what others had said.

Adam’s affect and disposition was consistent from day-to-day throughout the study. He was pleasant, cheerful, bright, and energetic. Adam appeared well rested, and his hygiene was good, although his hair was primarily unkempt. He is potty trained and had no accidents during the course of the study. He is animated but can be shy and quiet at times when he seems uncertain of himself or his knowledge. Adam is one of the highest functioning students in the class despite that he is one of the youngest in the class and the youngest of the six child-participants.
Table 9: Adam’s Epistemological Matrix

<table>
<thead>
<tr>
<th>Nature of Knowledge</th>
<th>ABSOLUTIST: Objective view of knowledge</th>
<th>MULTIPLIST Subjective view of knowledge</th>
<th>EVALUATIVIST Shift of objective &amp; subjective stance when claims are evaluated &amp; warranted</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMPLICITY</td>
<td>Megatron is the baddest, but remember Megatron got Optimus &amp; knocked him down.</td>
<td>I think the baby is trying to get in the water. That’s what I see in the picture.</td>
<td>I think that dog is sleeping because his eyes are closed, but my dog sleeps with one eye sometimes open (gesture with eye).</td>
</tr>
<tr>
<td>CERTAINTY</td>
<td>The picture shows when a monster attacked a bear. That was in the story and that is how it was.</td>
<td>I’m making a dotted monster, not like his. I know how to make it, watch me do it.</td>
<td>I like my food hot but I don’t like Chinese food because it spices me. My mommy and daddy like it a lot. When we have Chinese food I have a peanut butter and jelly sandwich.</td>
</tr>
<tr>
<td>SOURCE</td>
<td>Row, row, row your boat gently down the stream. Merrily, merrily, merrily life is but a dream. (singing)</td>
<td>When I’m sick my head hurts. My dad said he gets the same way as me.</td>
<td>I think it was Megatron who saved Jack. Do you know who it was? He knows more about them than me.</td>
</tr>
<tr>
<td>JUSTIFICATION</td>
<td>Optimus is most popular because everyone likes him and he beats Blackout.</td>
<td>I just know it because I just do.</td>
<td>We go to the doctor when we are sick in the winter because he will make us feel better or else we get sicker and I can’t come to school.</td>
</tr>
</tbody>
</table>

*Theme 1: Multiplistic level of development.* Adam demonstrated perspectives regarding his knowledge at each of the three developmental levels (absolutism, multiplism, evaluativism) and in all four dimensions of knowledge (simple, certain, source, justification) during the course of the study. The developmental levels and dimensions of knowledge did fluctuate depending on the content that was being discussed (i.e. monsters, winter, construction, family) and the context that the discussion took place.
(i.e. whole class instruction, center activities, individual interviews, focus groups). Table 9 provides a glimpse at some of his statements out of the context of the discussions; however, they reflect how the researcher interpreted them within a specific context. Each cell in the matrix identifies a statement that was viewed as tapping into a developmental level as well as a dimension of knowledge.

Overwhelmingly, Adam presented himself at a multiplistic developmental level. That is, he portrays his knowledge on most topics from a subjective point-of-view, sometimes in an egocentric way but more often speaking from his personal experiences. The egocentric subjectivity (i.e., “I want,” “I have,” “I need.”) appeared more in group settings such as whole class instruction and the focus groups and seemed to be of a competitive nature. He has a good memory and conveys his personal experiences with a great deal of affect, not as matter-of-facts. For example, he acknowledges that his experiences are different from others and makes statements such as “I know because I feel and got my knee hurt, maybe that didn’t happen to you but it did to me.” In conjunction with this verbal statement he points to himself and then to his peer and holds his up his arms and shrugs his shoulders. This type of behavior was interpreted as affectively communicating that they have a different understanding because they have had different experiences. Adam generally accepts others’ points-of-view and listens to his peers. He often will build on what others say. He is also accepting that others have different ways of thinking. For example, he was coloring with a peer and asked for the blue crayon. The peer gave him a shade of blue but not the one he wanted. He said, “That’s not the one I want.” The peer responded, “But you are making Optimus right?” Adam said, “Yes, but I think he is closer to this blue.” The other boy said, “You should
make it more like this color.” Adam said, “He could be either color but if you think he should be that color then you should make Optimus cuz I want him to be with this color, it doesn’t matter they will both be Optimus.” He made the statement, “we are all different” several times throughout the study.

His multiplistic perspectives are more spontaneous, but when his knowledge is probed slightly, he leans toward evaluativistic statements but gets confused by what he is saying. He does catch himself off-topic or not making sense and constructs his knowledge from an absolutist perspective. For example, he confused the words construction and destruction; “there is destruction all over the place and that makes people get to work a lot, wait what is that word again?” When he heard the word construction he immediately referenced the story that was read in the whole class instruction by saying, “You need to have really big truck to make construction, that building things like skyscrapers and bridges.” Once he feels stable in his understanding he shifts to a multiplist perspective by elaborating on his experience. For example, he said, “I have been on a big bridge over the water when we went to California. It was scary being so high but bridges are strong so lots of cars can be on it and it won’t fall.” Although this is a common pattern, he often uses a variety of strategies that distract the process as he moves between developmental levels. In addition, he relies heavily on his charm and animation as coping skills which deflect the attention off of him. This was observed in all formats throughout the data collection. Adam’s multiplistic knowledge revolves around his past experiences and prior knowledge primarily in relationship to pop culture, his family, and interactions with his peers.
Theme 2: Strength of the nature of knowledge. The nature of knowledge (simple and certain) is more potent than his understanding through the process of knowing (source and justification). He conveys his knowledge through simple and certain knowledge more often and with more ease. For example, “I know wintertime is cold, and summer is really really hot.” He does use justification of knowledge (“because in the winter I have to wear my hat and mittens to stay warm and not get sick”) but far less and source of knowledge rarely. Even when probed for the source of knowledge, he has difficulty understanding what is being asked and responds using his internal source of knowledge. For example, “I think it is that way so we feel clean and get ready for school” (in responding to why they have to wash their hands when they come in from outside).

At times it is difficult to assess his simple knowledge from his certain knowledge; they seem to have a great deal of overlap, and there is a tendency to link them together. He begins with simple and certain views of knowledge, but when probed his knowledge appears more complex and uncertain. However, when his knowledge is simple and certain, he is more affectively and behaviorally stable in his performance. When knowledge shifts to more complex and uncertain, he becomes curious and engages the teacher in a line of questioning. For example, he does not understand why he cannot see himself in the camera during videotaping and asks, “Why am I not in there? The red light is on so I know it is running but I am not there.” When he makes connections to prior knowledge or past experiences he remains engaged and on-task, but if his questions do not yield advancement in his understanding, he becomes disengaged and disruptive. For example, he could not make sense about the camera so he began to run in front and behind the camera quickly trying to see himself in the camera. The researcher allowed
him to look through the camera at the others and had them walk out of view, and he began to understand and became more engaged. He said, "I will be able to watch me later when you show it to me, right?"

He does appear to contemplate his responses for a moment, but once he begins he is quite spontaneous. He makes strong associations between the classroom topic and instances of play with his friends and interactions based on rules with his family (mainly his father and grandmother). When he discusses his mother, it deals with associations that are affective in nature. He regularly compares himself to characters in the stories in terms of their emotional disposition and will incorporate experiences he has had with his mother. For example, "When I'm bad like Max, my mommy makes me eat away from the table by myself; then we talk about what I did. I feel sad and she hugs me and I feel better, I think that is why Max left the Wild Things."

Theme 3: Interaction with other link the nature of knowledge and process of knowing. This result is in direct relationship to result two, his understanding of the nature of knowledge is strongest in an individual setting, but when he is in a group, his pattern shifts to incorporating the nature of knowledge and the process of knowing. Specifically, he shifts from linking simple and certain knowledge to linking either simple or certain knowledge with justification of knowledge. He excels with the unintentional probing of his peers in a structured setting. By relying on his prior knowledge and interacting with his peers, he combines ideas and experiences to develop reasoning for his knowledge; that is he chooses what others say if it coincides with his present understanding and applies it as justification for his current knowledge. For example, one of his peers is telling how he went hiking in the woods with his family. Adam said, "I think you have to
stay with your mommy and daddy so you don’t get lost because then you will be scared and need water and animals might get you, it’s the same in the desert too, right?” This is particularly noticeable when his knowledge is followed-up on at the end of the week, and he is consistent with his knowledge and associations made earlier in the week or even the previous week. He was asked, “Why is it important to stay with other people when you are in an unfamiliar place?” He responded, “You should always be with a grown-up because they will keep you safe and you won’t get hurt, like hiking. If you get lost from your family you could get hurt bad and be a scared and be lost.”

Taking into consideration that he is generally outgoing and confident in his knowledge, he is more so when he is on the verge of more complex and uncertain knowledge. He is aware that questions posed to him by the teacher, researcher, or peers probe his knowledge and understanding; he has a developing sense of being motivated to learn from others. However, he demonstrates signs of cognitive overload and becomes quite frustrated when he is unable to make sense between his present knowledge and new knowledge, whether it is subjective or objective knowledge. His breaking point is observable by his confused facial expressions, the increase in questions that are not coherent, and deterioration of behavior (psychomotor agitation, laughter, disengagement). However, when he conveys knowledge as simple and certain, he can be lethargic and uninterested. He will intentionally attempt to challenge himself. For example, he will pose hypothetical scenarios, contribute an affective response, or ask questions to the researcher that scaffold with his knowledge. These types of behaviors (i.e. strategies to acquire knowledge) seem indicative of self-regulated learning and a naïve evaluativistic
developmental level although he is not consciously aware that he is engaging in a sophisticated manner.

Theme 4: Limited ability for source of knowledge. Source of knowledge is the weakest dimension of knowledge for Adam. Because he demonstrates more multiplistic ways of thinking, source of knowledge is accounted for most often internally. He watches others and listens; he reflects on his personal experiences and generates his knowledge internally. However, he is unable to articulate how he filters knowledge and because this internal process is not observable, the researcher probed his source of knowledge continually. The patterns surrounding his source of knowledge were similar throughout the study. Initially his responses are multiplistic and are constructed internally and filtered in a way that relate to things he knows or has experienced (i.e., characters, consequences). He makes attempts at evaluativism, but he has difficulty making sense of his internal filtration process (most likely because of a lack of experience) and cannot coordinate internal and external sources of knowledge in a coherent way. He then shifts to an absolutist perspective and with probing can articulate the external sources of knowledge in his associations. For example, he will identify rules and reasons for the rules that originate from interactions with his father or grandmother. He clearly links himself to characters in a story and makes comparisons to experiences that are highly emotionally charged between himself and his mother.

He links much of his knowledge to television characters and toys; therefore, another external source of knowledge that he defers to is his peers. It is a common bond that he has with his peers that contribute to his understanding of knowledge; he perceives his peers as being knowledgeable and uses them as a tool to demonstrate how he

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constructs his knowledge. He frequently asks his peers about behaviors and characteristics of animated characters or storylines that can contribute to his knowledge and understanding. It is common for him to evaluate what his peers say; he will accept some aspects and discard other aspects of their contributions, just as he does from other aspects of authority.

Case Study: Amy

Description.

Child-Participant #2 is a four-year-and-four-month-old Caucasian female. Amy is tiny for her age and has long blond hair that is typically not brushed and falls in her face; however, on the rare occasion that it is pulled back, she always removes the tie. She attends the preschool five days per week for the full day. Her mother brings her to school, and the routine is the same each time. Amy carries all of her daily materials (i.e., blanket, lunch, change of clothes). She places them in the appropriate places in the classroom (i.e., cubby, refrigerator), gives her mom a hug, and joins the group on the playground. Her mother leaves immediately. It is common for her mother to arrive early for pick-up to observe what is going on in the classroom, and she corresponds regularly with the teacher about Amy’s behavior during the day. Mother and daughter appear to have a good relationship; however, neither has any difficulty leaving the other.

When asked what she likes best about coming to preschool she replied, “Because one day I am going to be beautiful and smart just like my mommy.” Amy added, “I like when my mommy puts all of my pretty pictures on the refrigerator for my daddy to see.” Her father travels for work and is typically away from home for extended periods of time. She has a two-year-old brother who she describes as “bad.” She is aware of the routines
surrounding the daily activities (i.e., washing her hands, sitting on the carpet, choosing a center, singing the welcome song).

Although she is eager to play with her peers in the morning, she is a slow starter for the structured routines of the classroom. Amy appears tired and sluggish and rarely smiles. Her affect is flat early in the day, but she seems to brighten after the whole class instruction when the activity is not so structured. During the whole class instruction, she typically sits in the middle of the group or in the back. Her disposition fluctuates daily between paying attention to the story and being preoccupied with what is going on around her. Amy is highly distractible and rarely raises her hand to answer questions posed by the teacher although she frequently interjects comments about her experiences. She can be disruptive during whole class instruction and requires frequent redirection from the teacher because she makes noises or repeats a word or phrase accompanied by laughing and restless nonverbal behavior (i.e. rolling on the floor, touching a peer’s hair, playing with her shoes).

Amy’s verbal and nonverbal behavior is spontaneous, and if she is receiving attention for her inappropriate behaviors, they seem to escalate. She can become quite silly and at times it negatively impacts the behavior of her peers. She enjoys looking at the pictures in the book, but never asks any questions. If she cannot see the pictures, she is even more detached from the activities and her behavior deteriorates. If she is engaged in the story, she is not affected by any negative influences of her peers; however, when not engaged in the story, she will pick-up on the behavior of peers and join in causing a greater disruption to the activity. On the occasion that she requires redirection from the teacher or an aide, Amy is able to change her behavior independently, that is she does not require
any physical assistance and never needs to be removed from the activity for a time-out to regain control of her behavior.

She is very adept at choosing her desired center activity; she will generally go to the art center or the journal center. When she chooses the journal center, she is resistant to following the format of the center. They have to interact with the teacher to complete a sentence and then draw a picture and tell the teacher about what they have drawn. Generally, her sentence completion portion of the activity does not make sense in the context of the sentence. Her drawing is not consistent with her sentences, and she refuses to discuss the drawing afterward. It appears that her only reason for choosing the journal center is to draw the picture. Whether she is at the art center or the journal center, she very rarely interacts with her peers, and if she does, it is in a pretend or animated manner. Amy is able to work side-by-side with her peers and follow directions; she shares the materials but will become agitated if a peer forces her to interact. Her tolerance for peer interaction in a structured activity is low; she will typically leave the center and move to a less busy center. For example, Amy will move to the dramatic play area if there is one other person there, but if two or more peers attempt to join and try to pretend-play, she will immediately leave that center. It is not uncommon for her to leave her initial center activity and just wander around the room watching her peers but not really participating in any center because there is simply too much activity.

When she does interact with her peers, she has a good sense of social norms, and the other children seem to like her; however, she does not initiate any positive interactions with her peers. In fact, it is common for her to be a lead in negative and disruptive behaviors. The one thing that she does consistently is watch and listen to her peers and
then pick-up on a word or phrase that she becomes focused on. She will repeat the word or phrase even if it is not relevant to what is going on. It is not uncommon for her peers to follow this behavior which results in a lot of laughter and other silly behaviors. For example, if a peer is talking about snow, she will say, “snow buggers” repeatedly and laugh uncontrollably. Another time a peer was talking about standing on a ladder, and she began to repeat “ladder badder poopy badoopy.”

During the individual interviews, she immediately was receptive to the individual attention and was able to be more focused and serious in her responses as compared to her irrelevant comments during whole class and center activities. Her affect was much brighter, and her animated personality persisted. Amy did continue to have difficulty staying on topic but resorted to baby-type talking when her comments did not make sense. The feeling was that this was due to the fact that a lot of her interactions at home were with her baby brother, and she was mimicking his language. Contrary to other interactions with authority, during her individual interviews she asked many questions of the researcher in relationship to the story or the theme as well as taking many of the questions that were directed to her and turning them around and asking the researcher. For example, when asked “What is your favorite type of weather?”, she responded, “I like hot and sunny weather. What is your favorite type of weather?” When asked, “What do you think it means to follow the rules?”, Amy responded, “When you follow what your mommy and daddy tell you it is so you don’t get hurt and you don’t get in trouble like Max did. What rules do you like?”

During the individual interviews she proved that she can be extremely motivated by rewards. Her attention span was much greater than in any other context and needed very
little redirection to stay on task; she excelled particularly well with the individual activities such as sequencing of activities cards, making objects with play-dough, coloring and discussing her monster, and making the family tree. She takes great pride and enthusiasm in her projects, and she was not as stubborn about discussing them with the researcher. Amy never wanted the researcher to keep her work; she always wanted to take it home to show her parents.

Her participation in the focus group activities was more consistent with her behavior in the whole class instruction and center activities but a little toned down because of the fewer number of peers. Amy was in group 1 and appeared to be less advanced (i.e., language, cognitive, behavior) than the other two members of the group. Amy is more of a negative behavioral influence to her peers, and she tends to mimic her peers’ verbal contributions. It appears that her idea of interacting with peers involves playing and being silly. One main difference is that she tends to be more engaged in the focus group than many of the other contexts, and she continues to pay very close attention to what her peers are saying and doing. Amy adapts well to the rules of the focus groups and had a knack for surprising the researcher. Just when it was thought that she was missing the main idea of a question or a discussion, she would come up with a unique or creative thought that would move the discussion along.

Epistemic Themes

Theme 1: Absolutist level of development. Amy demonstrates absolutist and multiplist levels of development (See Table 10). She never successfully constructs evaluativistic perspectives, even when probed specifically at all four dimensions of knowledge. However, when unprompted, she has primarily an absolutist perspective of
knowledge and knowing. Amy's knowledge is objectively constructed on all four dimensions of knowledge (i.e., simple, certain, source, justification).

Amy's absolutist point-of-view is most frequently demonstrated through her associations to her knowledge of classroom rules and procedures and her family. She spontaneously engages her peers by directing them on the appropriate behavior during different parts of the day. For example, "Hey you guys, you need to be sitting criss-cross applesauce." When linking her prior knowledge with new information, she refers to experiences with her family. For example, "You need to use a tissue. If I do that (picking her nose), my mommy tells me, it's not polite and gives me a tissue to get the creatures out of my nose."

Despite the developmental level, her attention span is extremely limited. She can become distracted easily. For example, she is prone to giggling and joking around. If someone moves around a lot or gets off-topic, she uses that as an opportunity to join in the disruption. She is typically a follower in her ways of knowing and play; in addition to her high distractibility, she mimics her peers. In terms of knowledge, her mimicking is limited to absolutist and multiplist levels of development. Interestingly, if a peer makes an evaluativistic statement, she will not mimic these types of statements. She immediately becomes distracted or disruptive.
Table 10: Amy's Epistemological Matrix

<table>
<thead>
<tr>
<th>Nature of Knowledge</th>
<th>ABSOLUTIST Objective view of knowledge</th>
<th>MULTIPLIST Subjective view of knowledge</th>
<th>EVALUATIVIST Shift of objective &amp; subjective stance when claims are evaluated &amp; warranted.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMPLICITY</td>
<td>Shhh, you need to be quiet now, it is time to listen to the story.</td>
<td>In that story (pointing) Max misses his mommy. I miss my mommy, but I know she comes to get me.</td>
<td></td>
</tr>
<tr>
<td>CERTAINTY</td>
<td>You could make either one. It just depends on what kind of stuff you have to make it.</td>
<td>Only I know what this is. I'm drawing it for my daddy to show him what book I read today. (pointing and facial gestures).</td>
<td></td>
</tr>
<tr>
<td>SOURCE</td>
<td>Max want to go home, that is what is in the story and that's what I think, he goes back home.</td>
<td>If I would build a snowman I would do it like the one in the story. I would make a big snowman and a little reindeer. I would give it eyes, nose, forehead, and hair.</td>
<td></td>
</tr>
<tr>
<td>JUSTIFICATION</td>
<td>I know plants and trees grow outside and not in the room because they don't grow on the carpet. They grow outside and outside of the carpet.</td>
<td>I don't think the forest really grew in Max's room and that could not happen in my room because I have bunk-beds, and I am on the top because I am the biggest between me and my sister.</td>
<td></td>
</tr>
</tbody>
</table>

Theme 2: Simple and certain knowledge are more independent. Amy is able to independently construct absolutist perspectives of simple and certain knowledge. For example, “Families do things together, like hug and that’s how you know they love you.” When probed, she shifts to multiplistic levels in her knowledge related to simple and certain knowledge. When asked, “What does your family do that makes you know they love you?” She replied, “I think we do a lot of things. I always give my mommy and
daddy hugs and kisses in the morning but mostly when I go to bed, I ask my mommy to read me stories and she does. I always miss my daddy but talk to him lots on the phone. I tell him I love him lots too."

As Amy’s absolutistic perspective becomes increasingly more complex, her ways of knowing become increasingly less independent and become more dependent on authority (i.e., books, teacher, peers). The most noticeable pattern here is that she begins to repeat single words and phrases from a character in the story or echoes things that her peers say. For example, when she is asked to compare her family with her friend’s family, she begins to repeat a line from the story that day: “one bear, two bears, three bears (laughing).” At this point, she does not appear to have a conscious understanding of the meaning of what she has said and is unable to elaborate upon any of her prior knowledge or experiences. Due to her limited understanding and lack of coherent contributions, she becomes animated and disruptive.

Another characteristic presented commonly when Amy conveys simple and certain knowledge is her tendency to combine verbal and nonverbal behaviors to emphasize meaning. The more simple and certain her knowledge, the more she relies on her verbal skills, but as her knowledge becomes more complex and uncertain the amount of nonverbal behaviors increase (i.e., facial expressions to emphasize emotions of others, use of arms to draw attention to sizes and shapes, behaviors that correspond to her words, such as marching in place, acting out climbing, running). When she is no longer successful at describing her knowledge using verbal and nonverbal communication, she resorts to mimicking her peers.
When knowledge is complex, she can remain engaged but is dependent on others to stay on-topic. However, when knowledge is uncertain, she quickly becomes uninterested, disengaged, and disruptive. For example, during a discussion with her peers regarding monsters, the discussion shifted to pop culture characters (i.e., transformers and ninja turtles) which she is unfamiliar with. She did not even make an attempt to participate. She became frustrated and withdrawn from the group to the point she requested to leave the activity. Although she is highly motivated by reinforcement, attempts to reengage her failed.

Theme 3: Strong peer influence. Her knowledge and understanding is strongly influenced by her peers; therefore, she is able to articulate more sound absolutist and multipllist perspectives in the whole class instruction and the focus group activities. She is less productive and less motivated during individual interviews and center activities because these activities require her to be an independent thinker. Amy has difficulty concentrating and making associations between prior knowledge and personal experience and new information.

Due to the dependence on her peers, her overriding source of knowledge comes from her peers and other external sources (i.e., teacher, parents, books). In a group setting she verbalizes her sources of knowledge more readily without probing than many of the other child-participants. She equates peers as an authority equal to that of the teacher or her parents. Amy frequently asks peers questions about ideas from the story or their experiences, and mimics their language and behavior. Amy follows their lead and their way of thinking and making associations. With this peer scaffolding she is able to construct knowledge that is consistent with the process of knowing (i.e., source and
justification). For example, she may correct a peer or build on something one of her peers says by saying; “my mommy says...,” “my teacher did...,” or “the picture of the three bears in the story had...” These types of statements were not typically initiated by Amy in an individual or less structured setting.

Although there were source and justification of knowledge demonstrated during individual interviews, the source of knowledge appeared to be internally constructed and included pretend associations that were transferred from another peer. For example, “I want to be just like a princess and wear pretty clothes and walk in high shoes.” The justifications were tangential or unrelated to the topic. For example, when asked about the theme winter, she stated, “I could tell you what my mommy tells be to do in the cold but I don’t want to.” “I think summer is more fun than winter because I just do and I am not telling you why.” These attempts at source and justification during individual interviews could indicate a transition in developmental ability, or it could be more social in nature. Perhaps the researcher did not provide adequate scaffolding or the relationship between Amy and the researcher does not meet her emotional needs thus inhibiting her ability or motivation to demonstrate her epistemic ability.

Regardless of the developmental level or the dimension of knowledge, she has more interest and motivation to continue a discussion when there are others involved. When she is alone interacting one-on-one with authority (including peers), she disengages more rapidly and demonstrates signs of frustration and cognitive overload. Her coping strategies include the following: to become silly, to use echolalia to disrupt the activity, and to begin pretending. Her pretend play is egocentric but modeled after things she has seen her peers do or say. This pattern is the same in a group or individual setting.
Theme 4: Dimension of knowledge associations linked to the stories. Another significant influence on Amy’s dimensions of knowledge are the stories that are read to her primarily during whole class instruction, but also she references stories that she reports her mother reads to her at home. Amy makes connections between herself and characters in the stories she has heard. For example, “I want to be like Max and be the kings of the wild things.” She will also repeat lines from the story to explain her actions. For example, “I will run and leap and have a rumpus.”

When she references excerpts from the book or a character, she is more confident about her knowledge and therefore is more interested and engaged. Simple knowledge becomes more complex; rather than single words, mimicking peers, or making irrelevant phrases, she demonstrates complete thoughts that pertain to the question or part of the discussion. For example, she constructs a more complex thought process by saying, “I know why we have a family. It’s like the tree in the story. It’s our roots.” Amy acknowledges that some knowledge is certain but other knowledge can be more uncertain. For example, “My mommy teach me it is not good to take things that aren’t mine but that girl (pointing) took the bear’s shoes and didn’t get in trouble, I don’t know why she didn’t. Maybe she was allowed.” She is more explicit in stating her source of knowledge when it is something that she associates with a story. She usually will refer to the “story” or the “book” in her responses; for example, “that bridge in the story looks like the bridge I was on a long time ago and it was really big.” Her justification of knowledge is more advanced and coherent when she relates new information to a story. For example, “I think Max did the right thing by coming back home and his mommy was
glad he did because she is smiling in the picture and that means they made up and she wasn’t mad at Max no more.”

In terms of the developmental levels in relationship to her associations toward books, there is no observable pattern. She continues to shift from absolutist to multiplist ways of knowing. The identifiable feature is that she starts off more from an objective perspective and probing her knowledge assists her toward more multiplistic thinking. This is similar to the pattern that is seen when she uses peers as a means of scaffolding her knowledge. The main difference that is observed when she uses the books as scaffolds is behavioral. For example, she remains on-task with little need for redirection, is less disruptive with her language and her behavior, and directs quality questions to the teacher or researcher as the authority, rather than her peers.

Case Study: Carl

Description

Child-Participant #3 is a three-year-and-11-month old Caucasian male. He is a “boy’s boy” as his mother describes him. Carl is an unkempt and untidy boy. His hair is never combed, and his clothes are typically dirty. He wears them inside-out or backwards. He spends a lot of his time in his pretend or imagined world. Although he can respond using his prior knowledge and past experiences, he really chooses to talk from his pretend world. This usually revolves around his girlfriend (a cartoon character) or embellishing an outrageous event (from a movie or TV show) as if it had happened to him or he was directly involved.

Carl is quiet and shy and keeps to himself. He is not a trouble-maker and follows the rules of the classroom. He does not generally volunteer any information, but if he is
asked a question, he will respond in a very soft voice. Affectively Carl is a bit different from his peers. He rarely smiles. His demeanor is serious (uncharacteristically so), and he does not have the capacity or tolerance for the silly animation of his peers. His responses are direct and intense. For example, there are a few girls in the classroom who can become quite playful and giggly in the dramatic play area where he likes to pretend in the kitchen. At one point, his play was interrupted by the girls, and he left the area. When questioned why he left, he responded, “They make me mad, I am really trying to make something and all they want to do is make noise. They don’t do things that matter, they just making noise.”

Carl attends the preschool three days per week for the full day. When asked what he likes best about preschool he replied, “It’s a fun time. We just do stuff and then I go home and do more stuff.” Since his response was on the vague side, some probing about his preschool experiences provided comments such as the following: “These kids are crazy, they are always yelling and screaming,” “I think it is boring a lot, I want to go outside and be doing stuff,” and “I don’t learn nothing I can know from home stuff.” His mother brings him to school, and their separation is interesting. Mom blows him a kiss, and he just runs off to the playground while mom brings his belongings (i.e. lunch, change of clothes, blanket) into the classroom.

Carl gets along well with all of his peers but usually plays with the boys. His behavior outside on the playground is very different from his inside behavior. Outside he is a “wild man,” again as his mother describes him. Carl is active, energetic, and vibrant (i.e., running around, interacting verbally with his peers, pretending). On the playground he is a leader, and his peers are receptive to his pretend playing. In the classroom he is the
opposite. He barely moves (i.e. sits very still in one place for a long period of time), and he is calm and quiet. His play inside the classroom is strictly nonverbal (i.e., sound effects, body and facial gestures). His only verbal interaction is demonstrated when the teacher or an aide asks him a direct question. He will share materials and toys with his peers but never makes an attempt to engage in verbal exchanges. He simply goes on about his playing as if no one is around.

During the whole class instruction, Carl sits “criss-cross applesauce” and claps with the welcome song but does not sing. When it is his turn to say good morning, he does not know his classmates’ names; however, he does accept the help from the teacher and echoes the name for that day. He sits in the back of the group and off to the corner so that he is away from his peers. Carl is always well behaved during the whole class instruction. His attention and eye contact are excellent. Once the story begins he is engaged and oblivious to anything else that might be happening (i.e. people coming in/out, peers not following rules or being disruptive, the camera). Although he does not volunteer responses or ask questions, he does indicate understanding of the story by shaking his head or tapping his nose (a technique used by the teacher to cut-down on interruptions during the story). In addition, he participates by using several types of nonverbal gesturing (i.e., pointing, motioning with his arms, affective facial expressions) that effectively indicate his interest and understanding.

Carl regularly chooses the dramatic play area, manipulatives, or the computer. His attitude toward the center activities is consistent with how he manages himself in the whole class instruction; he is compliant with the rules and procedures, non-communicative, and avoidant of his peers unless they are willing to play without verbal
interactions. For example, he will play alongside his peers in the treasure box (a box of sand with coins and other small toys) because it is a quiet activity in which everyone is sifting through the sand, and he can observe what others are finding. He will also play in the dramatic play center if his peers follow along with his pretend play or if his play is not changed by what his peers are doing. The duration of his time at a center is directly related to the amount of stimulation at the center; the more stimulation the less likely he is to stay at the center. Carl can be found for the longest stretch of time at the computer because he is able to work independently; it is not uncommon to see him talking to himself while his is engaged in one of the activities on the computer. The interesting thing about Carl is when he exhausts one center he will quickly find another center to occupy himself. Whereas many of his peers will wander around the room to see what others are doing, he rarely is interested in what his peers are doing.

The individual interviews were a great opportunity to understand Carl’s way of thinking (i.e., how he makes associations, his sources of knowledge, preference for solitude, serious intensity of his demeanor). He is quite creative and ingenuous in the way he combines his internal imaginary understanding of the external world. He is an only child and does not have access to many friends outside of school. Unlike many of the other children who come to the preschool because at least one of their parents is employed or attends the university, Carl comes to the preschool because he is in the local area. His family rents in the local vicinity which is not a typical neighborhood environment; there are many college students and transient people who come to the city to work. He spends a lot of time alone playing or watching television. His father works 10-14 hours a day, and his mother works from home. On the weekends they spend
quality family time doing outdoor types of activities (riding motorcycles, four-wheeling, camping, hiking) with friends, but these friends have children that are older than Carl.

The individual interviews provided a quiet time to probe his often difficult to understand responses during the whole class instruction. Come to find out he is a sensitive and passionate individual who is driven by his emotions. Many of his seemingly detached imaginary experiences that he links to the stories evolve from very real expectations modeled by his family. Carl is in touch with adult-like behaviors and concerns (i.e., marriage and relationships, the idea of working hard to earn money, following rules and consequences). For example, he says, “I am going to marry Ariel. She is my girlfriend, I love her. Just like my daddy loves my mommy, he makes her feel special.” When asked how he knows this he replied, “I just can tell. She smiles, and she puts special things in his lunch. I am going to do that for Ariel because she is special.” It is never clear if he is aware that Ariel is a character from a cartoon, but the point is that he uses his imagination to understand other adult-like behaviors, especially in relationship to other emotional constructs, such as anger and fear, and adult-like characteristics, such as responsibility and expectations. Arguably, he is not fully cognizant of the types of things that he says in a mature adult-like manner, but the important point is that the associations he makes are relevant and appropriate.

Carl was in group 2, he was not a big contributor, but he did put forth an effort to participate and when he did his ideas were accepted by the group. When he seemed to lack understanding of what was being asked, he would repeat what his peers had said. Focus groups were the only context during the study that it was visibly clear that Carl
was somewhat influenced by his peers. In this format he was a follower, and his insecurities surrounding his knowledge were identified.

Table 11: Carl’s Epistemological Matrix

<table>
<thead>
<tr>
<th></th>
<th>ABSOLUTIST Objective view of knowledge</th>
<th>MULTIPLIST Subjective view of knowledge</th>
<th>EVALUATIVIST Shift of objective &amp; subjective stance when claims are evaluated &amp; warranted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of Knowledge</td>
<td>That was like the monkey in Dora the Explorer.</td>
<td>I seen a real bear once.</td>
<td></td>
</tr>
<tr>
<td>SIMPLICITY</td>
<td>Well, they said I had a nightmare, but I’m not sure. It was kind of funny, and I had to wake-up while I was sleeping. (confused facial expressions).</td>
<td>I know that a lot of cars can drive on a bridge or else my daddy would take us on a bridge.</td>
<td>When we were outside and it was hot, I watered the tomato plants, but they still died because the sun is too hot for them to bake.</td>
</tr>
<tr>
<td>CERTAINTY</td>
<td>Ariel said she will marry me, and we can have our own family.</td>
<td>I think me and Ariel could go to the forest and play with the wild things, but we would bring presents and they would like us better than Max.</td>
<td></td>
</tr>
<tr>
<td>SOURCE</td>
<td>It is bad to take that bear’s shoes. If they knew someone would take them then they would have locked their doors so no one could get in.</td>
<td>I am going to build big buildings like this (pointing) because I am going to make a lot of money and have a house and car and dirt bike. That will make me rich!</td>
<td>There is no way a tree forest can grow in his bedroom like that (pointing) because look (pointing) they have to grow outside in the dirt.</td>
</tr>
</tbody>
</table>

Epistemic Themes

Theme 1: Fluctuates between absolutist and multiplist. Carl demonstrates the ability to move liberally between absolutist and multiplist perspectives of knowledge.

Occasionally, he constructs evaluativistic knowledge but not with much consistency (See

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Table 11). His knowledge is facilitated by his capacity for imagination and pretend; therefore, many of his evaluativistic thinking were dismissed because they did not pertain to the topic. Unprompted, Carl spontaneously constructs his absolutist and multiplist knowledge as simple and certain; however, when he is probed about his knowledge from authority or peers, he demonstrates more complex and uncertain dimensions to his knowledge. His absolutist views tend to deal with the external world, whereas his multiplistic perspectives are typically pretend or imaginary ideas. An absolutist certain view, for example, relates to his personal experiences, "snow is freezing cold, once I put my face in it." A multiplist certain view includes a pretend experience, "I have my own car that me and Ariel drive in and I take her on the bridge and we have to pay to drive on it, that's to pay for the people who run it."

When asked a question, it was common for Carl to reply with one or two words. For example, "My mommy;" "It's wrong;" or "Like him (pointing)." He almost always needs probing from authority or peers to elaborate. However, once he is asked a follow-up question he responses appropriately and in some detail. His simple knowledge responses are generally associated with the book, classroom rules, or personal experiences (real and imagined). For example, "Blackout is black. I am him and he's black;" or "when we come inside we have to first wash our hands and then sit in circle time." Carl's responses are quick and confident. He does not appear to contemplate his thoughts prior to his responses, and once probed he provides a good amount of detail. For example, "I think it because one time me and my daddy were fishing and we had three poles so then we had to thread them but we didn't catch anything with the one pole
so we used the last pole and the fish really like it and we caught them and cleaned them and ate them. We did it all ourself."

Theme 2: Nature of knowledge and source of knowledge impacted by others. When he is in an individual setting, his way of knowing is primarily absolutist, and he generally constructs his knowledge using simple and certain dimensions of knowledge. His responses are sometimes so brief they are difficult to distinguish simple from certain knowledge. When his knowledge is probed in an individual setting, he moves to a multiplist perspective and accesses all four dimensions of knowledge (i.e. simple, certain, source, justification) with ease. However, he can become verbose by incorporating a large amount of imaginary and pretend knowledge within his multiplistic views. Carl does not appear his most comfortable in a one-to-one situation; he does not take a great deal of pleasure in relaying his understanding independently. For example, he remains serious with a flat affect, his animated side is inhibited, and he waits for the researcher or the teacher to initiate the activity or discussion.

Conversely, when he is in a group environment (i.e. whole class instruction, centers, focus group), there is less absolutist thinking and far more multiplistic thinking. Again it appears to be in a somewhat competitive nature with his peers (i.e. he seems to enjoy telling his stories). Also, the multiplistic perspectives appear to be less restricted to the nature of knowledge and more integrated among the four dimensions of knowledge. For example, his comfort level includes moving between the dimensions of knowledge without much intentional probing. Also, in peer group situations, he is more inclined to ask questions of his peers that also prompt responses from all four dimensions of knowledge. Additionally, there are hints of his pretend world but considerably less than
during individual interview time. There is a sense that he understands that it is less socially accepted, and his peers do challenge him on his pretend stories. This peer confrontation leads him to contribute more authentic experiences that are similar to his peers. Therefore, his contributions and associations are realistic and coherent regarding his personal experiences with family and situations that occur with peers in the classroom.

**Theme 3: Combining verbal and nonverbal epistemologies.** Carl’s initial responses are always verbal only but typically quite brief and require some probing from the researcher or the teacher. When he addresses the questions posed to him, he begins an elaboration process in which he combines his verbal language with nonverbal gestures when describing his knowledge. For example, he uses his words but will regularly point toward whatever he is discussing. He also will act out behaviors and emotions to demonstrate meaning in a visual manner. For example, he was describing how he and Ariel would go to see the wild things and have a party. He jumped up and did a dance and pretended to have a wild thing on his back. He twirled around and said “Hooray!”

Although he has good verbal skills, he communicates his way of knowing by using a combination of verbal and nonverbal skills. For example, his affect is normally flat and serious, but often when his knowledge is questioned or probed, he has a way of using facial expressions that add an affective component to his way of knowing information. Also, he uses body gestures to emphasize specific components of his knowledge. Interestingly, he seems to use this type of communication to construct knowledge when he is elaborating about his personal experiences and pretend situations and while talking about his family.
Theme 4: Justification of knowledge at an absolute level versus a multiplist level.

Carl’s justifications for knowledge, at the absolutist level of development, include responses that are more linked to the story or the theme of the week (from a peer). For example, he will use what he hears during whole class instruction or the focus groups to clarify his thinking; “...because it was in the story. Max did a bad thing and got into trouble by his mommy;” or “…because it’s like we talked about getting dressed right for the cold weather, if we don’t has hats and mittens we can get a cold and sick.”

When Carl demonstrates justification of knowledge at a multiplist level of development, he references his own experiences or conceptions related to his family. Both domains (i.e. his experience or family) include more animation and affect from him during his descriptions. For example he stands up from the sitting position and says, “I think we don’t touch other people’s food because when I take the food out of my dog’s dish it can make me sick and throw-up.” He goes on to describe how he feels when he gets sick to his stomach; the whole time he is telling this scenario he is using a variety of facial expressions and body gestures. At the end he says, “I think I will only eat the food on my plates because I can’t play when I am sick and I don’t want to either.”

Case Study: GiGi

Description

Child-Participant #4 is a four-year-one-month-old Caucasian female. She attends the preschool five days per week for a full day. GiGi is dropped off at school by her father and, on a rare occasion, her mother. She is a light-hearted individual who makes everything about the chore of coming to school appear easy. She is bright and cheerful, and she is always smiling. The interesting observation about GiGi is that she is not
drawn to one or two of her peers; she plays well with all of her peers. Her behavior and her disposition are extremely consistent from day-to-day and context-to-context. When her father drops her off at preschool, she knows just what to do and directs her father on what he needs to do, what she is doing, and where she is going (i.e., “Daddy you put the bag in my cubby and I am going to see Mr. I.” or “I am going potty, you wait for me here and we can walk to the playground together.”).

GiGi always appears well rested and alert. She is resilient and adapts to change well. For example, the preschool classroom can be unpredictable, and she is cognitively and emotionally equipped and prepared for whatever is going on that day. She is dressed nicely in colorful clothes that are clean and neatly pressed. Her hair is combed and pulled back away from her face. When she has barrettes in her hair, they match her outfit. When others comment on her appearance, she appropriately thanks them and reciprocates the compliment. GiGi is compassionate and genuine in her interactions with others. When asked what she likes most about coming to preschool, she replied, “I get to play with my friend, I love Mr. I, and we do lots of fun things when we learn.”

While observing her interactions with both of her parents, they appear to be very affectionate (i.e. always saying, “I love you” or “how was your day?”) and attentive to her needs. She has a gentle way about her, but she is very articulate and straightforward with her language. GiGi is aware of her surroundings and oriented to the rules around her. She has a good moral compass in which she can confront her peers about their inappropriate behaviors. For example she says, “You’re not being very nice, it’s not hard to share.” “We are supposed to be quiet and wait for Mr. I to get started.” Her peers are receptive to her direction and her ideas. She has the ability to interact and respond in a
pretend manner but typically approaches things as they appear to her external reality according to the rules. She was never a behavior problem. She raises her hand to talk and uses her prior knowledge and past experiences to contribute in a relevant manner.

During whole class instruction, she independently prepares herself for the story. GiGi is very proud of her knowledge about the rules and procedures of the classroom. She has good eye contact; her affect and disposition are vibrant and receptive to listening and watching. She regularly participates in the welcome song and the question and answer session led by the teacher. She avoids any negative behavior from her peers and, in fact, is a positive influence on her peers. When she participates during the whole class instruction, she uses her words to articulate her thoughts and ideas rather than nonverbal gestures as a way to convey meaning.

The center activities allow her more freedom; however, she continues to follow the rules and procedures. Most days she will choose her own center, but on some occasions she waits until everyone has chosen and allows the teacher to place her in a center. GiGi likes all of the centers and does not appear to have a favorite; her behavior is consistent no matter what center she is in. She is quiet and works independently; her only interaction with her peers during this time is to give them direction about their behavior or the details of the task. For the most part she is engaged in her center, but if she is has to wait for her turn or wait for the teacher, she will discretely observe the activities of her peers in a close proximity to where she is located. She can get back to focusing on her activity whereas many of the children are easily distracted by their peers.

During the individual interviews she was eager to please the researcher (i.e., leaving her center voluntarily, attempting to answer all the questions, never needing any rewards

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for her participation). GiGi was easy to engage in the activities and/or questions; she was inquisitive about the project and asked excellent questions about her involvement in the project. She made insightful comparisons between her behavior and the behavior of her peers. For example, “I bet I am the best one. I never cry or run out.” “I like doing this because we talk more about the story and I get to see the pictures again.” “We are doing this because you want to see how much we know about what we are learning.”

The individual interviews allowed another side of her to shine; she showed more of her ability to tap into a pretend world. GiGi demonstrated a child-like animated disposition, and her favorite phrase was, “I am so silly.” When she was not completely sure what was being asked or how she needed to answer, she would make tangential statements about television shows, toys, and her personal experiences, but they were not always relevant to the question or the topic. She appeared to be relaxed and laughed at her comments, particularly when she was aware they were not relevant. In addition, she demonstrated more nonverbal body gestures to assist her verbal descriptions; this prompted a bit more psychomotor activity (i.e., moving around the room, flailing her arms and legs) and confused expressions (scowling, poor eye contact, talking more softly).

GiGi’s behavior and contributions in the focus groups mirrored the individual interviews much more than the whole class instruction and the center activities. Again, she was more animated, still engaged and articulate but sometimes silly and off-topic. She seemed to enjoy this interaction with her peers more than the other contexts. She was still a bit authoritative but not with the consistency or intensity observed in the other contexts. Here she was more affected by peer’s negativity, primarily when the
researcher’s questions required more cognitive ability or were more cognitively demanding. She continued to be well-behaved and on-task but certainly more animated and playful with her peers.

GiGi was in Group 1; her involvement with this group was interesting in that she was frequently torn between matching her ability with the more articulate boy or diminishing her behavioral capacity to match the more disruptive girl in the group. The more consistent pattern regarding her decisions about the group involvement revolved around her prior knowledge and past experiences that she could associate with the different topics. Her cognitive, affective, and behavior contributions during the focus groups are thought to also be related to her ability to understand what the researcher was asking and the case with which she could understand what her peers were contributing. Therefore, the greater her associations were for the topic or relating to her peers, the more she demonstrated her cognitive abilities; however, when she failed to make meaning from her peers or could not interpret the researcher’s questions, she opted to demonstrate inconsistent behaviors that bordered on disruptive at times.

Epistemic Themes

Theme 1: Multiplist level of development. GiGi demonstrated her knowledge according the epistemological matrix at all three developmental levels and all four dimensions of knowledge (See Table 12).

Overall GiGi’s views of knowledge appear to be at a multiplistic level of development. Her ability to communicate her knowledge was more content specific than dependent on the context. Specifically, she demonstrated more versatility in her ability to shift between dimensions and levels of development if she had more prior knowledge or
personal experiences regarding the topic (i.e. monsters, winter, construction, family). For example, she was able to demonstrate the complexities of her knowledge while talking about the monsters and family themes of the week as compared to her inability to show the same levels and dimensions during the weeks when winter and construction were covered.

Her knowledge was much less affected by the type of setting she was in (i.e., whole class instruction, individual interview, focus group). For example, on the topics that she conveyed her knowledge more thoroughly (i.e., monsters and family), there was little difference between how she responded in a group setting versus how she responded individually. When she had a greater understanding of the content, the context did not negatively or positively impact her ability. When she was unfamiliar about the topic (i.e., winter and construction), it was clear in her contributions that she had limited background knowledge and personal experience. When this was the case, GiGi functioned better within a group environment (i.e., whole class instruction, focus groups). For example, during an individual interview about construction, she did not independently reference the story that had been read earlier; she quickly gave up and said, “I don’t know.” Once the researcher prompted her with a picture in the story, she attempted to make associations but due to the lack of prior knowledge she responded, “Well looks like that big truck is making the building fall down, I’m not sure, I don’t know, I don’t know.”

On the same topic (construction) in the focus group she was not as inclined to give up and she shared her knowledge and understanding. For example, she listened to her peers talk about how the “big machines” are used to “help men make the building bigger.” Then the same question that was asked in the individual interview, “Look at this picture.
Can you tell me what is happening that makes this construction?” GiGi replied, “I am not so sure about astruction, it’s a weird word but A said the big trucks put the building together and up (pointing), so I would say astruction here is that (pointing to the machine) helping them (pointing to the men).” It appears that more self-efficacy to build knowledge exists in group formats for GiGi.

Another observation that began to emerge as a developmental pattern was more noticeable as she shifted between developmental levels rather than between dimensions of knowledge. There was however a pattern for the dimensions of knowledge at the multiplist level. There were two characteristics that were identified as she communicated her knowledge: (a) her choice of communication (i.e., verbal, nonverbal, combination), and (b) the amount of affect used to demonstrate her knowledge. At the absolutist level of development, she only used her words to show her knowledge and used less affect and emotion (i.e., animation, facial expression, body gestures). At the multiplist level, she integrated verbal and nonverbal expressions in which her affect and emotions corresponded appropriately with what she was saying and doing. There was an affective pattern that became clear throughout the study (reported in the next paragraph). At the evaluativist level, she combined her verbal description with less consistent nonverbal behaviors, and the combination of words and gestures appeared to be fragmented and not necessarily in-line (i.e., inappropriate or naïve understanding).

The multiplist level of development was where GiGi functioned from most frequently. There was a distinctive affective pattern that developed at the multiplist level in relationship to the nature of knowledge (simple, certain) and the process of knowing (source, justification). Multiplist simple and certain knowledge and multiplist
justification of knowledge were affectively consistent; that is her words matched her disposition. For example, "I am excited that we are going to talk about this story. I really liked it. The pictures are colored nice and I like the wild things. They don't scare me because I know it is just pretend." Her affect was bright and cheerful; she was smiling and confident with good eye contact. She demonstrated many body gestures consistent with a positive accepting attitude and excitement. However, at a multiplist source of knowledge, she was seemingly more confused about the questions, as well as her answers. It appeared to be a struggle between internal and external sources of knowledge and, regardless of the source, her affective disposition was inconsistent with her responses. For example, when the question was, "How do you know the dogs in the story are mean?", she made eye contact with the researcher, paused for about 15 seconds, then looked at the floor during her response, "I have two dogs and I think they are nicer than those dogs (pointing). I have B & L and I love them and they love me back." Typically when bringing up "love" she would hug herself or smile; in the case of multiplist source of knowledge her affect and emotional gestures were completely inconsistent. Her voice became softer, she did not appear confident or enthusiastic, and she demonstrated a nervous psychomotor agitation (i.e., picking at her shoelaces, twisting her hair), rather than behaviors that complemented her knowledge.

Theme 2: Knowledge is complex and uncertain. Regardless of the level of development, GiGi expressed her knowledge most commonly in terms of the nature of knowledge (simple and certain). This theme appeared to be strongly connected to her familiarity with a topic. When she had limited knowledge and experience (as discussed in theme 1 with group versus individual), she demonstrated knowledge as simple and
uncertain. However, the more background knowledge and past experience she seemed to have about a topic, her knowledge was interpreted as more complex and certain. Although the more her knowledge was probed, she maintained the complexities of her knowledge but shifted to a more uncertain perspective of knowledge. Interestingly, when the simple and certain dimensions were questioned in more depth to uncover the process of knowing dimensions, she was able to link simple and certain knowledge with justification but rarely source of knowledge. The example about the dogs used above to demonstrate inconsistencies with affect would demonstrate this well too.

Theme 3: Source of knowledge weakness. Source of knowledge appears as a weakness in every visible pattern that emerged for GiGi; therefore, it is a theme all of its own. Her lack of ability to demonstrate source of knowledge related to the following areas: background knowledge and personal experience (theme 1 and 2), affective patterns (theme 1), and absence of links to the nature of knowledge (theme 2). Her responses to source of knowledge probing met with many negative cognitive features that are consistent with overload, such as confused expressions, decrease of interest and motivation, disengagement leading to disruptive behaviors, visible frustration (i.e., hands over face, poking the pencil into her leg, walking away), and nervous/anxious behaviors (i.e., biting her hand, twisting hair, darting eyes).

If a source of knowledge question was related to a story that was read in whole class instruction, she was able to identify it as the source of her knowledge. However, when follow-up questions that targeted source of knowledge specifically and were in relationship to a previous statement, she was primarily nonverbal (i.e., shrugging
shoulders, closed eyes, made some silly facial expression). On occasion she might say “I don’t know”, but that was not a standard answer.

Table 12: GiGi’s Epistemological Matrix

<table>
<thead>
<tr>
<th>Nature of Knowledge</th>
<th>ABSOLUTIST Objective view of knowledge</th>
<th>MULTIPLIST Subjective view of knowledge</th>
<th>EVALUATIVIST Shift of objective &amp; substantive stance when claims are evaluated &amp; warranted</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMPLICITY</td>
<td>No, you can only wear your bathing suit when you go swimming, and you don’t go swimming in the winter.</td>
<td>I am not your friend, I am friends with Robin, I like her.</td>
<td>If you go away from your mommy and daddy, strangers can come and get you. But sometimes I get scared because I think I don’t want to be taken away from my mommy and daddy. They make me safe.</td>
</tr>
<tr>
<td>CERTAINTY</td>
<td>They are hiding from their mommy and they are hiding in the snow (pointing).</td>
<td>I wear a hat and mittens when it is winter so I stay warm and I don’t get sick. If I get sick then I don’t want to take my medicine, YUCK!</td>
<td>No silly, flowers and trees can’t grow inside because they need to grow big and tall like me. See I am big and tall (compares herself to a smaller peer).</td>
</tr>
<tr>
<td>SOURCE</td>
<td>In the story his mommy said ‘go to sleep Max.’ (Adds affect in tone and body.)</td>
<td>I have two dogs and I think they are nicer than those dogs (pointing). I have B and L and I love them and they love me back.</td>
<td>Max had a boat outside his window in his imagination; he wanted it so he made it up. He wanted it because he wanted it to go to see his friends, the WT’s. Like I have friends but I don’t want to take a boat to see them, I pretend I drive my car.</td>
</tr>
<tr>
<td>JUSTIFICATION</td>
<td>Sometimes you have to wear your coat because it is cold, like in the winter it is cold and I wear my coat.</td>
<td>I like to sing the hello song because I know all of the kid’s names. You have to watch me do it, sometime I want you to see how I know all the names.</td>
<td>I am making a monster to look like the WT’s and I am going to name it J like my sister and it is going to be so scary but you won’t even know it is scary because then you won’t like it.</td>
</tr>
</tbody>
</table>
Theme 4: Linking the nature of knowledge and the process of knowing. GiGi is an independent thinker and a leader of her peers. Many of the themes presented included responses that were constructed due to follow-up questions and probing by the researcher. This theme deals with patterns that GiGi presented independently within the daily activities of the classroom and spontaneous interactions with the teacher, peers, or the researcher. Her spontaneous statements followed the same general pattern as the probed responses; that is she automatically linked the nature of knowledge and the process of knowing in similar ways whether her knowledge was probed or not. The most common links between GiGi’s understanding of knowledge from a dimensions perspective were between the following: (a) simple and certain, (b) simple and justification, and (c) certain and justification. Again, the source of knowledge is absent even when her knowledge is not intentionally probed. Perhaps her interactions with peers automatically prompt her knowledge in much the same way as with the researcher’s probing questions. It is important to note that the amount of interactions and statements for the automatic connections are much less than the probing exchanges, however the trend was the same. She continually demonstrated that she linked new information to her prior knowledge and past experience by making associations. The associations she relies on are the same despite the setting (i.e. constructed probe or spontaneous interaction). They are family, classroom rules, peers, and characters in the story. These areas are her most common connections to new information and are more accentuated in a group setting.
Case Study: Trudy

Description

Child-Participant # 5 is a three-year-eleven-month-old Caucasian female. Trudy attends the preschool three days per week and is escorted by her mother, who is very involved in what is going on in the Cricket classroom. Their relationship and routine appears to very business-like. Trudy's mother talks with the teacher daily when she drops Trudy off and again when she picks her up. Trudy's mother helps the teacher with organizing parties and special events at the school and regularly brings supplies for the children to work and play with during their center activities. Trudy is an empowered young lady who speaks clearly and directly in a matter-of-fact manner. When asked what her favorite thing about preschool is, she replied; “I think it’s getting ready to go and wearing my pretty clothes and listening to the stories.”

Trudy is alert and well prepared for the day. She is always dressed impeccably in a nice dress and matching shoes. Her hair is always curled and pulled back with matching ribbons. She is very dainty and likes to compare herself to a “princess.” She has a good balance between her pretend and real worlds. She has a knack for integrating the two (i.e. real and pretend) in her interactions with others. Her statements are generally relevant and on-task, but she makes associations to pretend situations, mainly in conjunction with what a princess would do. Trudy is eager to please authority and peers; she is not confrontational and plays well with all of her peers. When there is a disruption or someone is behaving inappropriately, she quietly removes herself from the situation. She is never a behavior problem and does not require redirection; she knows the rules and procedures and acts accordingly. She is proud of her good behavior and ability to follow
rules. For example, she frequently makes statements such as “Look, I am being good, I’m sitting here waiting for my turn.” “They are not being good, look at me, I am being good, I washed my hands before snack.” “I am just like a princess and I know what to do to be good and follow what Mr. I said.”

During whole class instruction Trudy participates appropriately in the welcome song. She knows all of her peer’s names and helps others by telling them the names. She sits right next to the teacher for the story; she clings to every word and focuses on every picture. Sometimes she will stop the teacher and ask a question, but she raises her hand first. When the teacher asks questions before, during, or after the story, she volunteers spontaneously. Her responses are relevant, but she incorporates her imaginary associations with being a princess. For example, “I know a princess doesn’t want to take those bear’s shoes and I wouldn’t take them because they aren’t mine and you should do that.” She is excited about her responses, smiling and using minimal nonverbal gestures to get her meaning across.

During the center activities Trudy chooses art or journal. She is conscientious about her work and handles it with care as she shows the teacher. She is enthusiastic about telling her projects and promptly places them in her cubby to take home. She has no difficulty engaging in a variety of activities and seldom is distracted by her peers. In fact, she appears to be in her own world and will sing and dance while she is working. Trudy talks to the characters she is drawing and has pretend conversations. When asked about her pretend play, she is happy to explain the details from an affective point-of-view. For example, “I am drawing cuddly bear and he said he wants to wear a blue shirt because princesses like blue. They are going to a festival and have a nice time eating and
playing.” She does not engage in spontaneous interactions with her peers during this time unless it is to share materials. She is respectful of others’ space and their work. When she chooses to switch centers, she tells the teacher where she is moving to and what she will be doing there. She is patient with her peers. When she changes centers, she is careful not to disrupt the activity and will observe for a minute to figure out what is happening and how she can blend in.

Trudy’s participation in the individual interviews was similar to other contexts; she was quiet but compliant with the researcher. She is willing to please and frequently would confirm “I am going to be good today.” She is able to follow rules and listens carefully to what is being asked; it is common for her to pause to think before she responds to a question. When she does not understand, she either asks a question or uses a standard “princess” response. She is bright and cheerful although not nearly as animated as many of her peers. She leans more to a serious disposition. Her defense mechanism for not understanding is her pretend scenarios rather than laughing, getting agitated, or being disruptive. Trudy is somewhat motivated by rewards but more often just seeks praise for her work. During the interviews, she demonstrated her curious nature by asking questions and talking about her personal experiences, primarily involving her family.

Trudy was in group 2 for the focus groups; she was the most articulate child in her group and regularly demonstrated her ability to be a leader. The interesting dynamic about her involvement in the group was that there was a boy who could match her tendency for the imagined world, and they developed a unique way of interacting while at the same time staying close to the topic in terms of generalities. They both seemed to
have a passion for seeing things through fairytales, some of which they had heard or some they created. They interacted from an emotional perspective (i.e., love, fear, anger) and had a good understanding of rules that they fall back on. This sense of rules kept them and their pretend world centered on the topic. She would try to engage the other member of their group; however, this was a difficult task and she often would give up and proceed as if he was not there even if he was disruptive.

Trudy seemed to enjoy the focus groups, but perhaps the personalities and talents of the group never seemed to build a cohesive bond because of the differences in their language ability and interests. Despite the disconnectedness of the group, Trudy still managed to build on what others in the group said and tried very hard to make the group a positive experience. Another interesting characteristic which she demonstrated regularly after the focus groups was to offer a summary of what they had discussed. She appeared to always want to recap the discussion so she could evaluate if it was “good” or “bad.”

**Epistemic Themes**

*Theme 1: Fluctuates between absolutist and multiplist level of development.* This developmental pattern is one that has been seen in other child-participants in this study. Trudy fluctuates between absolutist and multiplist levels of development and sporadically constructs knowledge that is evaluativistic-like, in that the process of integrating objective and subjective knowledge is present but the content is at the cognitive sophistication of a preschool-age child (See Table 13). At the absolute and multiplist level, she is able to construct knowledge according to all four dimensions of knowledge. At the evaluativist level of development (like others in the study), she exhibited one
dimension of the nature of knowledge (certain) and one dimension of the process of knowing (justification). Again, there was an absence or weakness in the area of source of knowledge.

Trudy was eager to express her knowledge and did so regardless of the developmental level or dimension of knowledge. At the absolutist level, she initiated her ideas more independently and used a combination of verbal and nonverbal behavior. She frequently compared characters in the story to being a princess. For example she pointed out the similarities and differences between the wild things and a princess. She fluttered her eye, gracefully held her arms extended, and flipped her hair back to assist her representation of a princess. On the other hand, when she was describing the wild things, she crunched her shoulders up to her chin, put a scowl on her face, and lowered the tone of her voice. This pattern was predominantly during individual interviews, in which she stayed close to the topics and dealt more with objective knowledge.

She demonstrated similar verbal/nonverbal patterns at the multiplist level of development. Although she did derive knowledge independently at a multiplist level, it was more related to interactions with her peers during group situations. She was observant and could shift with the flow of the discussion. It appeared that the majority of her multiplistic knowledge was in support of a previous contribution, and she incorporated her personal experiences with her imaginary experiences as she saw them relating to the discussion. The content of her imaginary understanding was different at the multiplist level; she ventured away from external sources (i.e., fact, rules, procedures) and placed herself in the experiences (i.e. internal source of knowledge). However, regardless of her pretend ways, her knowledge was relevant to the topic, coherent, and
creative. For example, “I know when I am a princess the construction people will build me a big palace to live in and I will give them snacks so they have energy to keep working and I will let them have music because I want them to do a good job and be safe at my palace.”

Interestingly, Trudy used her imagination at the absolutist and multiplist levels of development. However, she never explicitly acknowledged real versus pretend at the absolutist level but when she was functioning at the multiplist level she regularly pointed out that she was aware the two realities are different. For example, “I am making a princess going to a big party. Like when I pretend I am a real princess and I dress-up. That’s when I put on a pretend dress but it is a real dress and I pretend it is beautiful.” This pattern has also been seen with other child-participants in this study and seems to be an egocentric subjectivity laced with objective knowledge but not as refined as at an evaluativistic perspective due to the internal and imaginary nature of the knowledge.

**Theme 2: Certainty of knowledge and personal experience.** Trudy demonstrated a developed understanding from a certainty of knowledge perspective which was seen at all three developmental levels. She emphasized her certainty of knowledge using her personal experiences and never appeared to be at a loss for ways to verbally describe her certainty or uncertainty (i.e., “Sometimes,” “I can’t be sure,” “You never know,” “I don’t know but my mommy does”). She elaborated independently or with probing. It is a dimension of knowledge that she always seemed to understand what was being asked. For example, from an absolutist level, she understood that there are classroom rules and procedures that must be followed daily; however, she verbalized that these same rules and procedures vary when there is a special occasion or a holiday.
Multiplistic certainty of knowledge was demonstrated frequently as she described the differences between what she does "for real" and what she does "for pretend." Even though she showed hints of egocentrism at the multiplist level, her understanding of others, in relationship to herself, seemed to exceed the expectations of classical egocentrism. For example, "I think I want to wear beautiful dresses and go see the wild things that way they will know I am special and they would not hurt me. If I have a beautiful dress I don't need to be a scared of them but I know A won't want to wear a dress he would look silly so he would have to think of some way to make them not as scary."

**Theme 3: Patterns for source of knowledge.** Trudy has some characteristic and not so characteristic traits regarding the source of knowledge. There were four dominant qualities regarding Trudy's expressions for source of knowledge: (a) Clearly her source of knowledge was internal, and she seemed to be in touch with the internal nature, at least of her imaginary knowledge; (b) she used the stories as a source and related characters and events from the story to her personal experiences; (c) she did not refer to her peers as any source of authority, nor did she defer questions to her peers, and she does not mimic their language or behaviors that could be construed as peers as a source of knowledge; and (d) she used her knowledge of the rules in the classroom and at home as her sources but, when asked explicitly, she did not identify a source, such as the teacher.
Table 13: Trudy’s Epistemological Matrix

<table>
<thead>
<tr>
<th>Nature of Knowledge</th>
<th>ABSOLUTIST</th>
<th>MULTIPLIST</th>
<th>EVALUATIVIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMPLICITY</td>
<td>Now, that’s two snails. They move slow. And Crickets they move really slow too. Not our class. We move fast but we are really fast. We are not real Crickets. We they go really slow, like this (gesture).</td>
<td>I learned that everyone don’t hit each other and keep my body safe. My knowledge is I think in my head.</td>
<td></td>
</tr>
<tr>
<td>CERTAINTY</td>
<td>You get punished if you’re bad. Sometimes you can get punished when you don’t know.</td>
<td>I am making a princess going to a big party. Like when I pretend I am a real princess and I dress-up. That’s when I put on a pretend dress, but it is a real dress and I pretend it is beautiful (gesture).</td>
<td>Sometimes the bears should be in trouble for not listening to the mom but sometimes it is different. Sometimes I have to listen to my mommy and sometimes I have to do my daddy’s way because I don’t want to get in trouble but it is different.</td>
</tr>
<tr>
<td>SOURCE</td>
<td>My mommy knows how to dress in the winter. She makes me wear a coat and a hat and mittens.</td>
<td>I know everything that’s about penguins. I watched penguins at the zoo, so I know they live in the cold, like bears do too.</td>
<td></td>
</tr>
<tr>
<td>JUSTIFICATION</td>
<td>Those monsters (points to book) are scary because they are scary and ugly. They are growling their teeth and they have big bugging eyes.</td>
<td>I like to dress-up like a princess because my mommy and daddy think I’m so pretty and then I feel pretty and beautiful.</td>
<td>I think the mom should be different because if he’s (Max) so bad and hurts her ears then she could have walked him right up to his room. That’s what my mommy would do to me.</td>
</tr>
</tbody>
</table>

Theme 4: Absolute justification of knowledge requires probing. Another pattern that developed throughout the course of the study was Trudy’s difficulty with absolute justification of knowledge, both during individual and group situations. She was typically quick to initiate a topic and put her knowledge front and center. However, a
reoccurring deficit was in the lack of spontaneity to be able to respond to intentional follow-up questions designed to probe this cell of the matrix. When probed repeatedly with questions constructed specifically using her words to probe this type of understanding, she was able to demonstrate her ability to construct absolute justification of knowledge. For example, most of her absolute simple knowledge was linked to rules and procedures; she knows the rules etc. but had no immediate understanding of why the rules are good from an objective perspective; therefore she resorted to making subjective claims about her knowledge (i.e. multiplist justification).

It was suspected that this pattern is a negative effect of pretending because she has a strategy where everything filters through her imaginary world in which things can be manipulated. Since she was always interested in “being good” and staying “out of trouble,” she was able to manipulate the realities of the objective nature of the rules because they did not apply to her. This rationale was tested during a focus group. There was a hypothetical situation in which the child was resistant to following the rules in the classroom. Then questions were asked as a means to scaffold absolute justification of knowledge responses. Questions were as follows: “What are the rules in the classroom?” “What do you think should happen to the child?” and “Why are the rules so important?” She adapted to the nature of the questions, and what ultimately resulted was that she accommodated her understanding of the information based on her existing knowledge. The change was how she interpreted the rules as they became more subjective and gradually honed in on a very specific way of knowing.

Her overt lack of understanding for the rules that she follows each day was surprising because tapping absolute justification was so prevalent with many of the other children in
the study. It was a puzzle at first and became a challenge. Looking at knowledge through her ways of knowing highlighted the importance of the link between absolute simple knowledge and absolute justification of knowledge. Due to the nature of the study, it was possible to attempt to identify potential reasons for the gap as well as some potential solutions.

Case Study: Jeremy

Description

Child-Participant #6 is a four-year-one-month-old male who attends the preschool three days per week for the full day. Jeremy's parents are divorced, and he lives with his father and two older brothers. He rarely visits his mother. His dad brings him to preschool, and it is very rushed. He walks Jeremy to the corner of the building and pats him on the head and says, "Be good." Jeremy is quiet; he seems to play well with his peers but does not communicate verbally. He is quite shy and has extremely poor eye contact; he is usually looking down at the ground. When someone in authority interacts with him, he will respond, but his voice is soft to the point that it is difficult to hear or understand what he is saying. When he is asked to repeat what he said, he barely speaks; he needs to be directed to look up and speak louder, which he does on occasion when redirected.

When asked what he likes most about coming to preschool, he replied, "I don't!" Trying to make light of his comment and attempting to give him a second chance, the question was asked again; he replied, "the toys." When asked which toys he liked best, his reply was nearly nonverbal, "them" as he pointed to the dramatic play area. His reaction to the individual attention was a surprise because he did very well on the
prescreening assessments for receptive and expressive language and cognitive ability, and he passed the false-belief task. Despite the conflicting impressions between the observations of him within the classroom context and his assessment scores, Jeremy seemed like a desirable candidate for the study.

During the whole class instruction, his behavior was always appropriate. Jeremy would come in from outside, promptly wash his hands, and sit in the circle quietly waiting for the story to begin. Although he was one to follow all of the social and behavioral rules, he was not one to follow the procedures. For example, Jeremy never once participated on the good morning welcome song. While everyone else was clapping and singing, he was pulling on his shoelace, staring outside, or lying on the floor practically asleep. Interestingly, Jeremy was not a behavior problem, so neither the teacher nor any of the aides ever attempted to engage him during the course of the study. He would usually sit off to the side or in the very back of the circle. He vacillated from day-to-day in terms of looking at the pictures during the story and actually sitting with his back to the teachers and his peers. Again, when he had his back turned, no one ever addressed his behavior. Occasionally, on days when Jeremy was paying attention and appeared to be more alert, the teacher would ask him questions about the story; however, he would speak so softly that no one could hear him, and the teacher would say, “Thank you Jeremy. That’s very interesting.”

During the individual interview activities, it was quickly noticeable that for the purpose of the study that these sessions would be for relationship building more so than identifying epistemologies. First, he never made any contributions during the whole class instruction, so there was no individual questioning to construct for him personally.
However, some attempts were made to ask follow-up questions about what his peers or the teacher had said.

*Epistemic Themes*

Table 14: Jeremy’s Epistemological Matrix

<table>
<thead>
<tr>
<th>Nature of Knowledge</th>
<th>ABSOLUTIST (Objective view of knowledge)</th>
<th>MULTIPLIST (Subjective view of knowledge)</th>
<th>EVALUATIVIST (Shift of objective &amp; subjective stance when claims are evaluated &amp; warranted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMPLICITY</td>
<td>Yes, no wild things.</td>
<td>Look, that momma bear is hugging the baby bears. I like hugs, my daddy gives me hugs too.</td>
<td>When you don’t follow the right way, you get lost because once I go lost and it was no fun. The bears maybe have fun getting lost because they know about the forest.</td>
</tr>
<tr>
<td>CERTAINTY</td>
<td>We have to get ready for the story first and to get ready for the story you sit like this (gesture).</td>
<td>I am afraid of monsters but Max has them as friend but not me. My mommy keeps me not be scared.</td>
<td></td>
</tr>
<tr>
<td>SOURCE</td>
<td>Some of them are purple and some of them are green but some are black (pointing). Look can you see, they are like Transformers.</td>
<td>I like the wild thing monsters (pointing) but I am afraid of monsters so I would run real fast. My mommy says there is no monsters (emotion).</td>
<td></td>
</tr>
<tr>
<td>JUSTIFICATION</td>
<td>Those bears will get in trouble because they ran from the momma bear and she will be mad and them bears will be in big trouble (gesture/emotion).</td>
<td>I had it first so he can’t have it because I am still needing it to color Blackout, so it looks like how I want it like on the TV.</td>
<td></td>
</tr>
</tbody>
</table>

*Theme 1: Absolutist and multiplist levels of development.* Jeremy’s developmental pattern shifted primarily between absolutist and multiplist views of knowledge (See Table 14). Most of his knowledge came through in group settings where he needed to
interact with others. Virtually none of his individual interviews yielded any tangible information regarding his level of development or dimensions of knowledge. Therefore all of the themes that are reported come from group involvement (i.e. whole class instruction and focus groups). In addition, within the group contexts, he very rarely interacted or communicated spontaneously, including during the less structured center activities. He needed to be prompted to speak and when he did, his initial responses were objective and simple. For example, when asked, “What do you think the wild things are doing in this picture?”, he responded “Playing.” When asked, “What makes them scary?”, he said, “Wild Things.” When the question was a yes/no question, he responded only with a “yes” or “no” response and offered no elaboration. The outstanding absolutist patterns that emerged are related to simple knowledge and source of knowledge. (For examples see Theme 3 below.)

Absolute certain knowledge and justification of knowledge patterns were more difficult to take hold of because he demonstrated a great deal of his knowledge in fragments and nonverbal gestures (i.e., pointing, shaking his head, shrugging shoulders). He would say a couple of words and gesture; his meaning came across in his way of communicating but the limited language made inferences necessary. His knowledge was strongly dependent on others (i.e. peers, teacher, researcher); Jeremy observed and processed what others were saying, then he echoed the general idea but not the language. For example, someone contributed the idea that monsters are scary; Jeremy grasped onto the idea of “scary” and made fragment sentences and gestures.

He was more articulate and forthright with his multiplist perspectives and conveyed his subjective knowledge by demonstrating much improved language skills; he still used
a lot of nonverbal behaviors, and he clearly had less dependency on others to make his thinking explicit. His multiplist perspectives were more clearly noticeable in terms of all four dimensions of knowledge (i.e. simple, certain, source, justification); that is they were more identifiable with less reading between the lines. Similar to his absolute views, these multiplistic ways of thinking were only conveyed in group settings.

Throughout the course of the study, every occasionally Jeremy constructed a surprising evaluativistic-like statement that was piggy-backed on a statement made by someone during a discussion. These rare but occasional excerpts of his knowledge led to Theme 4 because it appeared that he had the cognitive ability but not the motivation to engage in the activities. This raises an important question that is not so obvious with the other child-participants, which is, how important is emotional disposition in developing knowledge?

Theme 2: New information is generally linked to the books and family and is strongly influenced by peers. When it came to linking new information to existing knowledge and experience, Jeremy had a small repertoire of associations; however, there were identifiable behavior patterns that emerged throughout the study which distinctively identified characteristics that separated each type of connection. For example, his absolutist views of knowledge were primarily linked to the stories read during whole class instruction. His multiplist views included references that link his knowledge to his family, primarily his mother. This seemed a bit contradictory to what was observed and what was known about his home life (i.e. very limited contact with his mother); therefore, this again raised questions regarding sources of knowledge and the emotional component.
to the knowledge of preschooler's. Evaluativistic statements were generated and primarily influenced by others and related to the stories.

Jeremy did not interact verbally with his peers; however, he did appear to listen and watch what his peers were saying and doing in the classroom and during playtime. Although his verbal interactions with peers were restricted by choice rather than ability, he did initiate play on the playground and during center activities. Otherwise, his involvement was awkward and strained but effective because he was heavily influenced by his peer's knowledge.

**Theme 3: Simple/Source of knowledge have distinct verbal/nonverbal patterns.** This theme was most prevalent in the analysis of his absolutistic thinking. Besides being strongly associated to his observations of others, it deals with the ways in which he conveyed his simple and source of knowledge. Absolute simple knowledge ideas began with independently derived nonverbal gestures (i.e., pointing, nodding his head, using arms and legs to demonstrate his words). These gestures were followed by brief simple verbalizations which occurred in a single word which he was able to generate independently or repetitions of the same word or phrase echoed from a peer. For example, when asked “What in the picture makes the monsters scary?” he placed his finger on their eyes and bulged his eyes. When direct probing about their eyes was in progress he repeated, “Eyes,” “Eyes,” “Eyes.” followed by, “Big,” “Big,” “Big.” This was a naïve and gross misrepresentation of his ability to convey his understanding of knowledge and the question. Any attempt to identify depth to his absolute simple knowledge resulted in visible frustration, disengagement, and disruption. A similar pattern exists in absolute source of knowledge; he never explicitly verbalized sources of
knowledge although some sources were embedded in his responses (i.e., the book, family, television characters) or were internal generalized and verbalized (i.e., "need," "want," "have"). Here the verbal/nonverbal pattern was opposite in that he used his words first followed by the facial and body gestures. For example, when asked, "Who are you closest to in your family?", he responded, "My dad, my says." He stopped verbalizing the rest of the thought and placed his hands to his mouth and moved them in an up-and-down motion similar to imitating a duck quacking. Again, if the researcher probed for more information about his source of knowledge, his animated behaviors escalated, he disengaged, and became disruptive.

The reasons for this consistent behavior for simple and source of knowledge at the absolutist level partially led to Jeremy's fourth theme. One reason for the pattern could be related to cognitive or language ability, but this is not likely based on his scores on the prescreening assessments. It could be indicative of a type of cognitive overload; however, when compared to his peers, this could be the case for source of knowledge (i.e. this was a difficult dimension for all of the child-participants) but not so for simple knowledge (i.e. this dimension was not found to be highly challenging for his peers). The other thought for the pattern is the role of affect in developing epistemologies of preschoolers. This rationale seems to fit with the data. Within absolute certain and justification and all dimensions of multiplist levels of development, he could either construct knowledge independently, or he used his peers as scaffolds to aid his knowledge. He did not do either of these patterns for absolute simple or source of knowledge; therefore, these areas received the most amount of follow-up questions from the researcher.
Theme 4. **Negative impact of affect on the nature and process of knowing.** As reported in Theme 3, simple knowledge (within the nature of knowledge) and source of knowledge (within process of knowing) posed the most cognitive and behavioral challenges for Jeremy as a direct result from probing. This included the negative behaviors and other characteristics such as: lack of independent thinking (individual interviews and groups involvement), dependency on peers when in a group environment, frequent repetition, and vast use of nonverbal expressions. This prompted a closer look at his affect and disposition.

What can be seen is that he was consistently sitting away from the group, seemingly disengaged but picking-up information through his observations of others. He was generally quiet and withdrawn with a flat affect. He did not smile or respond with much emotion of animation that was typical of his peers. Jeremy did not spontaneously engage peers or authority and was initially resistant to attempts to engage him. He did not move quickly (characteristic of preschoolers) and lacked energy, interest, and motivation. For example, he never selected center activities; rather he waited for the teacher to appoint a center. All of these behaviors seem to contribute to his epistemological development in negative ways. Interestingly, the teacher never confronted his lethargy or his negative attitude. Throughout the entire study, there was not documentation of a single interaction in which the teacher seemed to be in touch with his social or emotional well-being. In a word, Jeremy appeared to be detached, cognitively, socially, and emotionally.
Individual Epistemic Profile

In this section, the individual epistemic themes are reported as an individual epistemic profile (See Figure 11). These are four of the most common patterns that consistently reoccurred across all six of the child-participants. This is not to say that every child-participant demonstrated the pattern with the same intensity or frequency, but rather collectively these themes emerged contiguously.

Figure 11: Individual Epistemic Profile

**Individual Epistemic Profile**

- **Theme 1**: Patterns of Development
  - Most common Multiplist
  - Followed by Absolutist

- **Theme 2**: Dimensions of Knowledge
  - Link Simple & Certain

- **Theme 3**: Use of Real and Pretend Knowledge
  - Link Simple or Certain & Justification
  - Real= Nature of Knowledge
  - Pretend= Justification

- **Theme 4**: Positive Impact of Peers in the Classroom
  - Peer Scaffolds
  - Impact Motivation

*Individual Epistemic Themes*

**Theme 1: Patterns of Development**

Individually the child-participants demonstrated variability in their developmental levels. The malleability of their epistemologies seemed to be influenced by external
factors such as the content, the context, and peer influences. Therefore, this theme deals with the developmental patterns that emerged despite the external factors. There were 24 (6 participants x 4 themes) possible individual trajectories, from which three distinctive patterns reoccurred across the participants. Two of the patterns were identified multiple times for each participant, and the third pattern was identified at least three times in all but one of the participants.

The first developmental pattern that was found and is the most common trajectory found with this sample was beginning with unprompted multiplist assimilations about their knowledge (See Figure 12). That is they began with observations regarding peers, family, or prior experiences, and follow-up questioning typically resulted in a transition to an absolutist view as they searched for the “right” answer. If probed further, they resorted back to the subjective or multiplistic references. The interesting observation with this pattern was that, although they seemed to have an understanding that there is a “correct” answer, they tended to the urge to find it for a very brief time before they retrieved more familiar knowledge. They were content with their multiplistic ideas and were much less inhibited about integrating their opposing ideas with others. There was a sense of competition among the peers but it did not appear to be competition over the “correct” knowledge as much as competition for voice. They listened and contributed their background knowledge and prior experience as if one was just as good as the other. They were respectful of their peer’s experiences and used them as a source of objective knowledge. This multiplist, absolutist, multiplist trajectory was comfortable for all of the participants and was visible in the way that they made meaning from new information.
The second developmental pattern began with absolutist accommodations of new information taken from the stories, peers, or classroom rules and procedures (See Figure 13). This information was taken as fact and converted quickly to more multiplistic views, in which the new information was linked to existing knowledge or experiences of their own. However, when questioned about their knowledge, they appeared to encounter some doubt and searched for the “right” response (i.e. absolutist). They responded with a scenario from the story or mimicked a peer’s statements. If encouraged to elaborate in terms of certainty or justification, they immediately bailed on their objective sense and fell back on multiplistic ways of knowing. For example, a child-participant’s responses progressed as follows; “Max was bad, he was not nice to his mommy so he get into trouble about his dinner.” “Little kids should not be bad to their parents.” “When I was
bad once like that my daddy put soap in my mouth, not give me dinner but I know I was
wrong for say bad things.” “When Max’s mother brought him food to his room they
made up and Max was not in trouble anymore.” “I think that is good to do.” “Once I
couldn’t sleep when my daddy yelled at me and he had to come and tuck me in again but
then I sleeped right away and it was better.”

The interesting finding with these seemingly ritual or habitual patterns is that they
could be construed as linear (as seen in Figures 12 & 13) if considered in isolation.
However, when looked at over the course of one week or throughout the four week
duration of the study, it becomes clear that these patterns are not linear; they repeated
time after time (See Figure 14). When these two linear patterns are thought of in terms of
circular processes, they appear to be similar. It became clear that the follow-up
questioning process, even though it was based on the child’s own words, was critical in
two ways: (a) how they viewed or understood their prior knowledge in relationship to
new information; and (b) how they conveyed their understanding of their knowledge in
relationship to the type of question being asked.
The third developmental pattern was not as commonly tapped into as the previous two patterns but occurred in most of the participants when probed for specifically by the researcher. The child began spontaneously with a multiplist perspective, then with probing turned more absolutist, and then probed further the participants demonstrated the ability to link their objective knowledge with their subjective knowledge and respond naively evaluativistically. For example when asked, “Where do you think you will find the coins in the treasure box?” One participant answered, “I think the coins are way deep in the bottom under the sand. I found other things at the bottom of my sandbox before
(multiplist).” “Why do you think they are at the bottom?” “Jamie (a peer) was reaching way down, and he got some coins down there (absolutist).” “Yes, he did but why do you think they would be at the bottom?” “Because he did and I did before and because things fall to the bottom (evaluativist). Once my mommy dropped her earring in the toilet and my daddy had to reach all the way to the bottom to get it back to her (multiplist).” At this point there is a return to a multiplistic vantage point. Once they began to link objective and subjective ideas they appeared to be at a loss; this state appeared in conjunction with several observable indicators similar to when adults encounter doubt (i.e., facial expressions for approval, shrugging shoulders, poor eye contact) or cognitive overload (i.e., frustration, putting their hands over their face, wandering around, psychomotor agitation) and they quickly returned to their personal experiences (See Figure 15).

Again, with this developmental pattern, a circular trajectory takes form, in which the participants begin with spontaneous multiplism and are probed through less unfamiliar ways of thinking about information. At a personal threshold that was different for each child, they fell back into their comfort zone. Figure 16 represents this pattern of development in the recursive nature that more closely resembles how the child-participants moved with the researcher through the different levels and helped shape discussions and follow-up questions in a way that really pinpointed their individual zone of proximal development. Within this zone they appeared to be more engaged in the activities, adapted to and demonstrated appropriate social conventions, and were motivated learners.
Theme 2: Dimensions of Knowledge

Dimensions of knowledge involve the nature of knowledge, which pertains to the simplicity and certainty of knowledge, and the process of knowing, which refers to the source and justification of knowledge. There are three patterns that emerged in terms of dimensions of knowledge throughout the study: (a) the way in which simple and certain
knowledge were coordinated, (b) the alignment of the nature of knowledge (simple and certain) with justification of knowledge, and (c) the absence of the child-participants of overt utilization of sources of knowledge.

The child-participants in this study demonstrated an obscure distinction between simple and certain knowledge, so much so that often identical units were coded as both simple and certain knowledge (See Figure 17). When their knowledge was conveyed as simple (i.e., single word responses, such as, “yes”), it was also certain (i.e., “I know”, confident dispositions, good eye contact, enthusiasm); conversely, when knowledge was complex (i.e., integrating new information with prior knowledge or past experiences; observations), they acknowledged that it was uncertain (i.e., “I’m not sure,” “I don’t know, maybe”).

Figure 17: Nature of Knowledge Pattern

In this study the nature of knowledge is the overwhelmingly predominant way the preschoolers constructed their knowledge. The successful integration of new information was seen as complex and uncertain. This harmony between simplicity and certainty of
knowledge was demonstrated regardless of the developmental level; in addition, this was the only pattern that did not have any bearing on the content of the information or the context of the interactions. They continually synchronized these two dimensions of knowledge to the point that they could be considered one dimension that consists of interdependent parts in a definite pattern of organization (i.e., perhaps unpacked too much).

The second dimensional pattern that garnered attention was the integration between simple and certain knowledge and justification of knowledge (See Figure 18).

![Figure 18: Dimensional Pattern #2](image)

The overlapping of simple and certain knowledge from the previous dimensional pattern remained a constant when probing knowledge and understanding for the process

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of knowing (i.e. source and justification). This pattern involved the children linking one or the of simple or certain knowledge or both in alignment with justification of knowledge. For example when asked, “What do you think family means?” “My family is my mommy, and my daddy, and me, and my little brother, and we live in our house, and do fun things, and we love each other, and they keep us safe.” “Why do you think your family is important?” “My mommy and daddy are important because they love me and they help me grow bigger and smarter. Because I have to help my brother too, so he don’t get hurt if he does things that will make him hurt. And you need your family for hugs and kisses and stuff.”

This idea of aligning the nature of knowledge and the process of knowing is another pattern that happened liberally throughout the study and without very much probing. In many cases they spontaneously offered some justification for what they were verbalizing and often it was accompanied by an increase in their nonverbal communication. Using the example in the previous paragraph, this child used his arms to indicate to smaller size of his brother compared to himself; and when he said “hugs and kisses,” he leaned over to the researcher and gave a hug and kiss. When their thinking was more complex or sophisticated, they had a tendency to be more active in their expressions (i.e., facial expressions, body gestures, using items nearby as pretend objects, use of emotional energy to indicate meaning).

The third dimensional pattern that was identified on the individual level was the diminished ability or absence of the source of knowledge. Source of knowledge was the least referenced of the dimensions of knowledge throughout the study by all of the participants. They were less inclined to overtly articulate their sources of knowledge...
independently or when probed although they did regularly implicitly reference sources of knowledge (i.e., internal and external) in their responses (i.e., “mommy,” “daddy,” “the book,” “at school,” “at home”). They rarely answered a direct question related to the source of knowledge, for example, “How do you know the rules in the classroom?” or “How do you know that the momma bear knows the baby bear is hiding in the snow?” When faced with these types of questions, they responded using a combination of certain and justification of knowledge. For example, “I know the mommy bear sees the baby in the snow because look” and then pointed to the picture in the story where the mamma bear is watching the baby bear hide in the snow, and the expression on the mamma bear’s face indicates she knows. Again, there was an increase in the nonverbal indicators of knowledge and understanding or a use of the combination of verbal and nonverbal markers.

When these patterns began to emerge (cutting-off their words and using more nonverbal traits), the books were removed as an anchor to see if they would identify the source of knowledge using their words rather than pointing or using other nonverbal means of identifying how they know. When anchors were removed, they continued to struggle with source of knowledge questions; signs of frustration and cognitive overload emerged and escalated. For example, “How do you know Bob and Karen were friends at the end of the story?” or “How do you know that your mommy and daddy love you?” In both of these instances, the child refused or was unable to respond verbally. There was quick eye contact with a look of confusion, and then no more eye contact, a couple of grunts, arms wrapped tightly around her chest, bottom lip protruding, and shaking her head. In this case no more questions were asked; however, in other similar scenarios
further probing followed, which precipitated the conversation to veer off-task, a brief period of behavioral disruptions, followed by disengagement either physically or emotionally.

**Theme 3: Use of Real and Pretend Knowledge**

Preschooler's knowledge is highly malleable. They transition between real (i.e. external) and pretend (i.e. internal) worlds with ease; oftentimes it can be difficult to keep up with where they are mentally. Working with small children one should be knowledgeable about the pop culture of the age group at the time. In this study the children used that pop culture porthole as a link to their pretend world. Unlike adults, children's pretend world, although internal, is uninhibited and becomes part of the external experiences as they integrate and transfer pretend knowledge to new information in the real world. There are two patterns that emerged from this study in terms of their real and pretend: (a) the nature of knowledge experience and (b) the process of knowing experience (See Figure 19).

The first pattern is real versus pretend in the nature of knowledge dimensions (i.e. simple and certain). This pattern continued to identify the coordination between simple and certain knowledge. Initially, the children tolerated the new information in the format presented to them in the way of the story, activities, their peers, or questions. In other words it was tolerated as it appeared in the external world. In addition, it tended to be developmentally absolutist. For example, "When we are ready to listen to the story we have to sit criss-cross applesauce, that way Mr. I (teacher) knows we are ready for the story to start." However, when probed about the simple/certain knowledge they explained the rule by elaborating into their pretend knowledge. Here they identified
themselves with some pop culture character (i.e., Transformers, ninja turtle, princesses, or a character from the story), but they continued to deal with the topic or question. For example, “Why do you sit criss-cross applesauce?” “I want to be just like a princess and be good like a princess so I can see the pictures and I don’t get into trouble but not everyone is like a princess and they get into trouble with Mr. I (facial expressions and body gestures).” This example illustrates the ability to answer the question in a meaningful way by associating herself with a princess. In addition, it is representative that as knowledge becomes more complex and sophisticated their ability to express their knowledge is scaffolded by their nonverbal ability and the transfer of pretend to real world experiences (i.e., princesses are good and well-behaved and follow the rules).

Figure 19: Dimensions of Knowledge – Real Versus Pretend

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The second pattern deals with how these children used real and pretend occasions as a means of expressing their process of knowing, specifically the justification of knowledge (as the source of knowledge was no different when using pretend knowledge). When the topic was familiar to the child, meaning they had personal experience or background knowledge of the topic, they typically responded in a developmentally multiplistic fashion and used real life scenarios or information. For example, "Why do you think it takes all different types of trucks to make a big building?" "I would need more trucks because they all do different stuff and I would build a enormous (arms) building." As his understanding was probed further, "Yes, but why so many of them?" Adam said, "Well ummm (pause and expressions) it takes so many trucks for that because it is a lot of work and they share doing stuff, like when the Transformers fight, they each have special powers like Blackout (a transformer) kicks good, and Optimus..." In this example, he transferred his knowledge about Transformers to the question about the equipment; he remained on-topic and was able to answer the question in a meaningful way but used pretend resources as a means of making connections between background knowledge and past experiences and new information.

When the children had less background knowledge/personal experiences or were unfamiliar with the topics or did not understand the question (i.e., questions about the source of knowledge), they still attempted to respond. Typically it began using simple and certain knowledge, followed by a way to justify what they knew using some associations or pretend knowledge. Usually this type of response was less meaningful, in that it was off-topic, lacked coherent sense, or was a complete behavior disruption (i.e., singing, dancing, repeating a word from the question). The example from Adam used
above was said in whole class instruction. Later all of the children were asked, “Do you think Adam was right that the trucks are like Ninja Turtles, they all do different things?” They responded, “yes” or “no” and were asked why. These were some of the responses: “Trucks, trucks, trucks, turtles, turtles, turtles;” “Like princesses too because they are pretty and beautiful because they wear different clothes, and go to different parties;” “I think yes but (standing, jumping, swinging his arms, sound effects) and (more gestures) and because trucks will go in there and (sound effects) beat em up and tear em down and (gestures and sounds effects) because they need a lot of em.”

When the responses got to this level and probing justification of knowledge persisted, the characteristics were similar across all of the children. They were clearly beyond their zone of proximal development; they became less motivated and cooperative, disengaged to the point of even walking away from the situation, used strategies to distract the researcher (i.e., engage in a different conversation, ask questions, tell a story), or became behaviorally disruptive (i.e., jumping, banging on the floor, yelling, repeating the same words).

Theme 4: Positive Impact of Peers in the Classroom

Peers could be a positive or a negative influence in the construction of knowledge; both scenarios were observed in this study. However, peers appeared to be positive influence more frequently. They assisted one another in several ways: (a) cognitively, (b) emotionally, and (c) behaviorally. There was a pattern of peer scaffolding that unfolded which appeared to assist the children individually construct knowledge developmentally and dimensionally. The participants did not overtly identify their peers as a source of knowledge; however, they demonstrated various observable ways in which peers
positively influenced their knowledge and knowing. For example, they watched and listened to each other respectfully; this was more apparent in structured (whole class instruction) and semi-structured (focus group) settings as opposed to the less structured settings (center activities and playtime).

Cognitive peer scaffolding was identified when an individual would build on one of their peer's statements or experiences. For example, in the whole class instruction, one student said, "Max had to go to his room for his dinner, and he pretended to go to see the wild things." A participant who rarely contributed during whole class instruction replied, "Me too, sometimes I am bad and I have to go to my room but I pretend to be a race car driver and I win the race with a trophy and I get lots of money." In this case, the boy never responded spontaneously to something that the teacher said and rarely responded when the teacher posed a direct question; however, he frequently expressed his understanding following a peer statement. Peers seemed to provide information that led others to make associations or tap into their background knowledge that the teacher did not seem to promote. For example, during a story about winter in which bears were ice skating (most children had a difficult time with the theme of winter because they lacked experience with snow etc.), a student (Caren) said, "They are skating on the lake, that is ice, once my dad went ice fishing in the cold and got all wet and cold and sick." Later during an individual interview a participant unfamiliar with winter said, "I don't know about making a snowman cuz I never did." Asked, "Can you tell me anything that you know about wintertime?" He responded, "Well, I know Caren's dad went fishing on ice but I only went fishing in the water, do you think the fish in the winter are freezing?"
This instance demonstrates how the child tried to incorporate knowledge from a peer into their existing knowledge.

The children in this study were able to tap into their own emotional place and that of their peers. In other words they frequently made attempts to feel success and accomplishment by helping others, whether it was to keep them engaged/interested, to give instruction, or help them remember a person’s name. They were in touch with the frustrations of their peers and tried to positively promote success in others. For example, “Let me show you a better way, it is easier if you hold the paper this way and you don’t get the stuff all over (smiling, proud)” or “It’s okay if you don’t know. I will help you. See watch me I did this before.” Also, on an individual basis, they wanted to share how they helped someone. One example was, “Did you see Jeremy fall? I fell bad so I showed him where the band-aids are and I told Mr. I he fell and got hurt and because he needed help so I showed him so he would know.”

Children in this study used peer scaffolding as a behavioral tool in order to stay on-task. Often in whole class instruction, center activities, and focus groups, individual participants both gave and received behavioral support from their peers which in turn positively impacted their ability to demonstrate their knowledge and understanding. For example, child-participants would direct others regarding the rules of the classroom, “You have to get ready for the story, look sit like this criss-cross applesauce;” or “It’s your turn, now you try to do it and we will watch;” or “You’re acting like a baby, stop yelling and jumping we are trying to make our journals now;”
Focus Group Epistemic Profiles

Focus Group 1 Epistemic Profiles

Figure 20: Focus Group 1 Epistemic Profile

Epistemic Profile

GROUP 1

Theme 4
Associations = personal experience & minimal use of pretend. Competitive!

Theme 3
Negative impact of probing outside ZPD

Theme 2
Nature of Knowledge & Process of Knowing Influences of pretend when content is unfamiliar

Theme 1
3 Levels of Developmental, patterns vary on content

Epistemic Themes

Theme 1: Three developmental levels, patterns vary based on the content. Group 1 demonstrated all three levels of development (i.e. absolutist, multiplist, evaluativist) (See Figure 21). There was a trend that was identified in how they collectively constructed their knowledge between the pre-instructional and the post-instructional focus groups (regarding the themes monsters and winter) that could be attributed to the content of the focus group. The main difference was that the monster theme tapped into their ability to construct knowledge based on their background knowledge and past experiences. In these instances they resorted to connecting real and pretend scenarios. With the winter theme participants had far less background knowledge, and many had no experiences similar to the stories that were discussed (i.e., snow, shoveling snow, building snowmen, ice
Therefore, the pre-and post-instruction focus groups for winter had the same patterns which mirrored the pattern of the post-instruction monster focus group.

The monster theme pre-instruction focus group began developmentally with a multiplistic perspective; they immediately commanded the group with their knowledge and experiences based on associations of being “afraid” or “scared.” They then moved toward an absolutist view, in which they discussed the differences between real and pretend experiences. They had several ideas that were agreed upon as a group such as: “monsters are just pretend, like in your mind;” “monsters come into your head at nighttime” and “in the dark;” “mommy and daddy keep you safe from monsters but still they are scary;” and “monsters can be nice sometimes if you want them to be.” To this point they were able to be autonomous; they had shifted from multiplism to absolutism meanwhile demonstrating various dimensions of knowledge, primarily simple and certain knowledge. From individual patterns that had been emerging through the week, the researcher probed for process of knowing and evaluativistic thinking. The group was versatile and responded to both frames of questioning (i.e. justification only and evaluativist).

Probing for process of knowing within the pre-instruction focus group context posed many of the same challenges in terms of source of knowledge as seen in the individual settings. However, justification was again actively accommodated through personal experiences, and interestingly the implicit sources used to emphasize their justification for knowing revolved around family, peers, and pop culture (i.e. appropriate use of pretend). For example, “I think that monsters can be nice sometimes because they are
ugly and gross but I have Leonardo and I make him nice because he is a good guy in the
cartoon.”

Probing evaluativism again was met with knowledge from their personal experiences
and incorporated family, peers, and pop culture associations. For example, “I don’t think
that monsters are like turtles, they are like more scarier, and cuz they are nice, they keep
people safe from the bad guys, they beat them bad guys up and they smile and do lots of
nice things, monsters try to hurt me.” Evaluativistic thinking occurred by individuals in
the focus group but more commonly then was generated in individual settings.
Evaluativistic thinking was generated from multiple contributions by members of the
group in which they built on each other’s experiences and constructed group
evaluativistic thinking, again at a naïve level of development based on their associations.
This transcript from the pre-instructional focus group demonstrates group evaluativism:

Adam: “I like monsters; I don’t think they are scary.”

GiGi: “No, I think they can be but not all the time.”

Adam: “Maybe they can be both scary sometimes and not scary sometimes. I think
ya, that’s right (gestures).”

Amy: “Well, if I am by myself in the dark, then I think they could be scaring me but
then my mommy comes to make me not scared no more (gestures).”

GiGi: “Me too (facial expressions), my mommy tells me they are not real and I feel
better but sometimes I can still be afraid of them, unless they are good monsters.

Adam, when don’t you get afraid by monsters (body gestures)?”

Adam: “My mommy and daddy say they not real so I am not afraid and turtles are
monsters and they I’m not afraid of them but I know my little brother is sometimes
and I help him but I am not afraid because sometimes yes and sometimes no (voice and gestures)."

GiGi: “I know they are pretend and that’s not real but I can be frightened (face/body gestures) sometimes (laughing).

This example illustrates how they build on each other’s point of view and knowledge, constantly moving from objective knowledge and understanding about monsters to their more subjective ideas. They acknowledged the other’s ideas and used family and pop culture; also the amount of nonverbal (i.e., facial expressions, animation, body gestures) communications increased.

Figure 21: Group 1 Pre-Instruction Monster Focus Group Developmental Pattern

In the post-instruction monster focus group the children’s spontaneity persisted. They were energetic and eager to engage in the focus group activity. This focus group took a slightly different course because there seemed to be two different processes occurring based on the semi-structured questions; therefore, two patterns emerged as follows: (a) the nature of knowledge (i.e. simplicity and certainty) and (b) the process of knowing (i.e. justification).

The simple and certain knowledge pattern circulates through all three developmental levels; however, the children actively take an absolutist perspective rather than the
multiplistic view they demonstrated prior to instruction (See Figure 22). As identified in the individual and pre-instruction focus group, the child-participants systematically linked their simple and certain knowledge.

They tolerated a fair amount of probing at the absolutist level before they became bored and uninterested. For example, they were asked a question, and each child participated in the discussion based on a single question. By the fourth absolutist question their affective disposition began to deteriorate (i.e., rolling around on the floor, grabbing for toys in the corner, daydreaming).

To maintain organization of the activity, they quickly reengaged in multiplist attitudes and attempts to revisit absolutist perspectives were met with group resistance as identified through their affect and behavior. For example, they were weary of questions such as “What did Max do?”, “Where did Max go?”, and “What were the Wild Things?”

They continued to link their knowledge (i.e. simple/certain) and understanding in a multiplist manner but rather than use personal experiences (internal) they made personal connections between characters in the story and family or peers as a way of making meaning of new information. For example, “Max was bad to his mother, I was bad and my mother...”

However, they were open and competent at engaging in evaluativistic (i.e. simple and certain) types of questions. For example, “What do you think about what Max’s mother did to Max?”, and “What do you think Max thought about his punishment?” They responded hesitantly with their evaluativistic responses. One example is “I think his mommy did that so he would have time to think about what he said but Max felt bad (an idea from a peer in the focus group) but I know he could, she could of let him just eat at
the other table away from everyone instead of him going to his room (his idea), like a
time out (an idea from a peer in the focus group). If she did that, Max would still know
he did a wrong thing and not do it again.” Evaluativistic statements like this one were
constructed by one child in the group but after everyone had contributed their own
individual ideas; additionally, there was always a child-participant who would come up
with a statement that summarized everyone’s ideas in a group evaluativistic-like fashion.

This group evaluativistic process was not guided in any way other than probing for
deeper understanding. They began to become frustrated with the complexity of the
questions; using their words to formulate follow-up questions gave them less words to
use in their responses. The frustration that was observed before the transition away from
evaluativistic thinking was not one of boredom or a lack of interest; rather it was more
• signs of cognitive overload (i.e., facial confusion, long pauses in speech, shrugging
shoulders) and did not have the inappropriate or disruptive behaviors (i.e., wandering
around, singing, laughing). They made attempts to respond, but the content of their
responses began not to make sense. For example, “Lalala, maxy waxy, mommy wammy,
no no no no, be good be good.” Once the group took on this type of ambivalence, they
resorted to their multiplistic subjectivity of personal experiences.

Figure 22: Group 1 Post-Instruction Monster Focus Group
Developmental Trajectory #1 (Nature of Knowledge)
The second pattern that was identified in the post-instructional monster focus group emerged primarily when probing for the process of knowing. The source of knowledge continued to evade the child-participants, even when probing occurred; therefore, this pattern revolves around the justification of knowledge and is identical to the pattern seen in the pre-instruction monster focus group (See Figure 21).

There are some outstanding characteristics regarding the post-instruction pattern for justification of knowledge for both the monsters and winter groups. First, the child-participants did not require much probing for justification at the absolutist or multiplist level of development. They were actively engaged and worked individually and collectively as they collaborated on various ways to respond to questions. For example, they asked each other questions, redirected one another on inappropriate behaviors to keep them on task, and shared their experiences by associating characters from the story and applying them to themselves. Probing justification allowed for the complexity of their knowledge to be highlighted in terms of the depth of associations that they possess regarding a fairly limited foundation of information (i.e. family, peers, pop-culture) that appears to be a repertoire of interconnected events and experiences that was seen in this group only while probing for justification of knowledge. For example, “The monsters in the story have big eyes (eyes bulge), and big scary teeth (show teeth), and big claws (show hands) but when we drewed them we didn’t make them so ugly, see (points to the pictures), because we made them nice (gestures) like princesses and princes so they won’t be so scary when new mommies and daddies come to the Cricket classroom. Like sometimes if it’s too scary (facial) then we won’t sleep and have bad dreams and nightmares and will be so tired but if they are beautiful then when new people who don’t
know will look at our pretty pictures and want to read about the wild things because it looks like fun and funny.”

The second characteristic was that evaluativistic justification required far more probing questions and posed individual and group challenges. For example, repeating each other’s ideas, repeating the teacher or researcher’s ideas, and repeating the text from the story were common responses. Although the group did generate evaluativistic-like justified responses, they were generally mimicked from the story, the teacher, or the researcher, and there was not enough evidence to indicate that they had complete understanding about what they said. On the other hand, this was an interesting finding because they could at least understand the question and respond appropriately whereas with source of knowledge questioning they rarely were able to explicitly identify their sources of knowledge, even if it was modeled for them in the whole class instruction (by the teacher) or the focus group (by the researcher). This indicated that they could not process the source of knowledge questions.

The third characteristic that is associated with justification of knowledge is the obvious inclusion of nonverbal traits, such as facial expressions, body language, and pointing. This appeared to be symbolic of higher order and more complex organization of knowledge. For example, the more challenging the questions, the more they incorporated nonverbal communication. Rather than simply disengaging as was seen in retrieval of the nature of knowledge, they were motivated to continue to convey their understanding. It is as if justification of knowledge takes them to a place that they regressed in their communication skills, but the use of nonverbal cues acted as a scaffold that held their attention longer, or the increase in psychomotor activity allowed them to
stay motivated and engaged to keep trying to make sense. This was seen over and over in examples like the one used above where the child continued adding and adding; this was particularly the case with justification questions because they appeared to be invested and emotionally engaged in what they were saying. They didn’t want to let it go.

**Theme 2: Content matters how they integrate the dimensions of knowledge.** Just as the content mattered in their developmental ability, it appeared to be similar in how they demonstrated their dimensions of knowledge. As reported in Theme 1 for this group, their ability and inability to tap into specific dimensions of knowledge advanced or inhibited, but nonetheless guided, their developmental level. For example, in the monster focus groups, they were more inclined to connect simple and certain knowledge independently without probing. In addition, they automatically linked the nature of knowledge and the process of knowing by linking a combination of the following dimensions: simple and justification, certain and justification, or simple/certain and justification. Linking these dimensions together means that in the same response or within the same idea unit they elaborated upon their knowledge independently. These examples are reflected in the patterns for the developmental levels (Theme 1).
section talks about how the content of the themes varied their ability to link specific
dimensions of knowledge between the monster and winter groups.

The developmental patterns of the pre-and post-instruction group were completely
reversed in the winter groups (See Figures 24 and 25). In the pre-instructional group they
demonstrated significantly less prior knowledge and background experience. They
articulated this deficit, as in the example, “I don’t know anything about snow.”
Therefore, their capacity to generate independent knowledge and associations was
diminished in three ways: (a) The relevance of their responses to the topic was lessened,
(b) they were dependent on others for assimilating and accommodating their construction
of knowledge, and (c) they activated knowledge construction from an objective
perspective. Conversely, the post-instructional focus group lacks the dual patterns seen
in the monster group for the nature of knowledge and the process of knowing. Also, it
was consistent with the pre-instructional pattern seen in the monster focus group. Again,
when looking at the characteristics within the content of their responses, their knowledge
construction was restricted in two ways: (a) Experiences were distantly connected, and
(b) the negative affective and behavioral indicators seen in the monster groups were
exacerbated. It appeared that the opposite patterns occurred due to the subject being
discussed (in this case the theme was winter).
The relevance of the responses, primarily to simple and certain knowledge were more distant to the topic or question when the child-participants lacked the prior knowledge and past experiences to draw upon similar associations. Once they make the associations their nature of knowledge and process of knowing are aligned, so that they used the simple and certain dimensions of knowledge to advance their justification. Without the nature of knowledge foundation, they did not demonstrate justification of knowledge. Therefore, the children in this group identified a topic they thought to be correlated. In this case the tendency was to make connections to the opposite of winter, which was
summer, a topic they know and have experienced well. For example, they changed the topic of the discussion from winter to summer by saying, “I don’t like winter, I like summer, it is nice and I get to play outside;” or “I like what GiGi said, monsters don’t have to be ugly and they could play with us in the summertime because sometimes you need more people to play with.” This latter example demonstrates how they continued to link dimensions of knowledge but in terms of relevance to the topic, they strayed off-topic.

The off-topic pattern does not appear to be an effect of their lack of epistemological thinking but rather a cue that they lack other necessary cognitive constructs that limited their ability to convey their epistemologies. Therefore, they resorted to a pattern of pretend reality; in which they took ideas that are familiar to them, such as monsters (the topic one week prior to winter) and summer, and attempted to make meaningful responses. This type of compensation made their knowledge often less coherent or less relevant, which resulted in disruptive behaviors.

The content matters because when there was a lack of prior knowledge and past experiences the child-participants were prevented from being active contributors within the group. In this way they were removed or detached cognitively and emotionally. In this group the cognitive and emotional disconnect fostered two patterns: (a) behavior disruption and disengagement; and (b) dependence on others as a means of constructing knowledge. The former produced no epistemological pattern; however, the latter was a productive technique that was utilized by the group in both the monster and the winter themes. In both themes, when this pattern emerged, it revolved around one or more of the children not having adequate background knowledge or prior experiences; therefore,
the knowledge was fragmented or absent. A child-participant would build on a statement that activated associations by using the story or peers. This pattern was more prominent when a justification was provided, so that the justification was used by others to formulate a simple/certain understanding that they did not possess or could not verbalize prior. For example, the researcher asked, “Okay so we know that in the winter we wear our hats and coats. Why do you have to wear a hat and coat in the winter?” A child that might ordinarily respond gave nonverbal indications that she was unsure how to respond. Adam responded saying, “Sometimes in the winter you can get sick and get a bad cold, if that happens to me my mommy makes me go to the doctor.” This prompted the quiet and uncertain child to contribute because she had made an association. She said, “Ya, like if I get sick then I have to go to the doctor and get some medicine; that can happen in the winter if I don’t dress in my winter clothes.” This is a simple/certain dimension of knowledge that the child had not had, and she had clearly integrated contributions from her peers. Being able to make the connection among being sick, going to the doctor, and winter gave her the ability to articulate simple/certain and justifications. For example she later said, “That’s why my mommy and daddy make me dress warm to go outside, because they know it is cold and I would catch a cold, they love me so they want to keep me (hugs herself). That’s why that mommy bear was trying to find her babies because they needed to come inside, it was cold, and windy, and snowing outside; they would get sick and sicker.” This pattern of moving away from the topic to formulate a stable foundation provided an opportunity to demonstrate multiple dimensions of knowledge that may not have been tapped due to the unfamiliar topic.
When the children had limited knowledge and understanding of the theme or question, they usually reflected their knowledge first through absolutist attitudes dealing with the story or rules. They naturally touched on the simple, certain, and justification dimensions at the absolutist level before feeling confident to talk about their experiences, perhaps because they did not relate directly. Once they demonstrated competence (i.e. an internal comfort level that was judged by them), they would move on to more multiplistic comments. Regardless, they always seemed to be striving to get to their comfort point whether it was multiplistic, pretend, or disengagement.

Theme 3: There are positives and negatives when probing in and around Zone of Proximal Development. There were positive and negative patterns surrounding this group’s nature of knowledge and the process of knowing that can be identified in relationship to the theory of the Zone of Proximal Development. Many of the examples used thus far indicate some of the positive areas that will be reported in this section. However, there are unarticulated and unforeseen boundaries surrounding the children’s knowledge and understanding that seem a bit counterintuitive.

First, they were capable and productive at conveying past experiences and prior knowledge (i.e. what they know and understand now without assistance or below their zone of proximal development). For example, despite their practical experiences with snow and the winter theme, they associated the idea of winter to what they do know but not with as much ease and confidence as what they have actually experienced that is close to the topic. For example when asked, “What do you know about winter?” One child responded, “Well, I know that it is cold and windy and I can’t wear my shorts, I like the summer and wearing my shorts and swimming.” In this case she made associations to
personal preferences (i.e. what she knows and likes) rather than knowledge related closely to the winter theme. It just so happened that with many of the children in the group the associations occurred in the same manner, in which they drew comparisons to the opposite when they lacked prior knowledge and experience. They demonstrated their command over absolutist and multiplist ways of knowing and the ease with which they linked the dimensions of knowledge.

However, the negative aspect of continued probing the simplicity and certainty of knowledge at all three developmental levels despite their familiarity, or lack thereof, beyond a specific point yielded greater and greater resistance from the group. One might think that because a theme was familiar or interesting that their attention and motivation would endure prolonged investigations of deeper and deeper understanding and associations, but quite the contrary was the case. After a sequence of questions that were below their zone of proximal development the children became bored with the discussion; it seemed no longer interesting or challenging. It became mundane, and their behavior and ability or willingness to convey their knowledge deteriorated dramatically. For example, they would refuse to respond, became disruptive (i.e., laughing, yelling, dancing, jumping), or they disengaged (i.e., playing with other books and toys in the room). This negative impact of belaboring an area that was developmentally below what they found to be challenging did not just impact an individual in the group; it had the potential to take the whole group down. This finding spiked curiosity about the strength of the peers as scaffolds versus continuity of ability between individuals in the groups. Therefore, an idea to formulate a group that had all of the highest performing children to see the following: if they continued to scaffold one another even when pushed to
boredom (as with simple and certain probing) and frustration (as with evaluativistic justification) or if the first child to fold would be able to bring down the momentum of the entire group. These themes will be presented in Group 3.

Second, they were efficient at working collaboratively with others who were assisting them with new information which they could effectively relate to their prior knowledge and past experiences when given an anchor or a scaffold that actively expanded their knowledge and understanding within their zone of proximal development. They listened and observed the teacher, researcher, and their peers to identify information that could be linked to or overlapped with their existing knowledge. They latched on to that information as a tool in their expressive and receptive abilities. For example, one child sat quietly when the discussion about winter began. When asked a couple of simple and certain knowledge questions regarding winter, Adam replied, “I don’t know about snow.” The researcher said, “We are talking about winter and that doesn’t always mean that it has to snow. We live in Las Vegas and we don’t see snow but it is still winter here. What is winter like in Las Vegas?” Adam did not respond, and another child said, “My mommy makes me wear my mittens because it is cold and I have to wear my big coat and sometimes my boots.” After a couple of the children shared their experiences, Adam said, “Well ya, I wear my hat, and coat, and scarf when it is cold but I don’t play in no snow cuz there is no snow in Las Vegas but I think it gets snowy like when the bears played and hided in the snow away from their mommy.”

Initially he was uncertain about how to connect new information with existing information, and his nonverbal communication was consistent with his uncertainty (i.e., hung his head but listened attentively to the discussion, shrugged his shoulder hopelessly,
partially smiling, speaking quietly). After some assistance from others, he coordinated his knowledge with information from others that he could make sense from and personalized it in his own way of making sense and responding to the question. He was persistent and motivated; therefore, he remained appropriately engaged in the activity without frustration or disruption. As long as they believed they were still understanding or felt they had the ability to eventually be successful, they remained engaged and kept trying.

At the peak of their zone of proximal development was where they began to demonstrate a dramatic blow to their level of confidence. Doubt began to appear in their nonverbal demeanor and began to present in their verbal jargon. What seemed counterintuitive about this pattern at the peak of their zone of proximal development was the absence of disruptive behaviors as an indicator that they had reached a threshold. Rather there emerged control that their affective dispositions appeared to have over their cognitive ability. For example, internally they had an emotional sense that was observable (i.e., looks of confusion, shame, doubt, poor eye contact) but at the same time they remained physically part of the activity minus the behavioral distractions seen as a result of boredom when they were being successful (i.e., yelling, squealing, dancing, wandering around).

Third, this pattern involves characteristics from both of the previous two patterns by linking them together. They demonstrated a positive but brief range of engagement in areas that were above their cognitive ability (above their zone of proximal development). Here they demonstrated partial understanding of what was being asked (i.e. having command of receptive language), but they were unable to organize their knowledge or
make appropriate associations in a relevant and coherent manner (i.e. demonstrating understanding using expressive language) with or without assistance. They would remain attentive and engaged insomuch as they would listen to the question, pause to contemplate a response, and make an attempt to respond but would quickly realize that what they were saying did not make sense. This was similar to when they were working within their zone of proximal development. Following this brief attempt to successfully respond, the emotional impact of their failure to understand escalated into behavioral disruption. This was consistent with that seen when functioning for extended periods of time below their zone of proximal development, which seemed to evoke boredom.

Theme 4: Associations related to personal experiences and limited pretend. The child-participants in this group demonstrated a clear pattern that is woven through the previous three themes; that is they were most confident and competent when they could relate new information to their personal experiences or use pretend as a means of taking risks and remaining safe. Many of the examples used to clarify the other themes for group 1 demonstrate clearly this pattern. This theme can be elaborated upon by mentioning that they seemed to have an instinctive characteristic that helped them monitor what they will and will not engage in; they were very savvy about staying within a level and dimension of knowledge that they felt most comfortable. Sometimes it appeared to be a conscious and deliberate manipulation, but other times it appeared to be an innate and unconscious response to feeling vulnerable. Regardless, they repeatedly retreated to multiplistic responses that reflected their personal experiences or their own individualistic pretend realities. For example, when they talked about monsters, they made associations to things that they know about (i.e., Transformers, ninja turtles),
"Monsters are like the same as Blackout, and Optimus Prime, Bumblebee, Megatron, and Cybertron, some people think they are scary but I think they are cool." Then they took their familiar connections and advanced their knowledge from simple and certain to how they know it, sometimes using pretend. For example, "I make Blackout and Leonardo fight and the loser is scary, he looks like this (facial gestures)." In cartoons these two characters (Blackout the Transformer and Leonardo the ninja turtle) would never be in the same cartoon, let alone fighting. He completely made up a pretend scenario to convey what he thought would be scary.

Focus Group 2 Epistemic Profiles

Figure 26: Focus Group 2 Epistemic Profile

Epistemic Themes

Theme 1: Developmental patterns are consistent and not influenced by content.

Group 2 had less malleability in the way they conveyed their epistemologies from a
developmental perspective. They transitioned between absolutist and multiplist points of view. There were two patterns that emerged from this group; they were different between pre-and post-instruction groups but were consistent week-to-week. More specifically the pre-instruction groups for monsters and winter were the same (see Figure 27) and the post-instruction groups had the same pattern (see Figure 28). Therefore, it was thought that the content that was being discussed had no positive or negative impact on their epistemological development.

Figure 27: Group 2 Pre-Instruction Developmental Trajectory

Absolutist → Multiplist → Multiplist

Figure 28: Group 2 Post-Instruction Developmental Trajectory

Absolutist → Multiplist → Absolutist

In the pre-instruction focus groups the child-participants began with an objectively constructed knowledge. For example, when asked “What can you tell me about winter?”, they responded, “Winter is now, when it’s cold”, “cold”, or “rainy.” They demonstrated their knowledge in brief fragmented words or phrases, which were indicative of simple
and certain knowledge. They were slow to respond, and often their words appeared to be labored (i.e. difficult to find) and hesitant. Once they were comfortable with the foundation they had constructed, more multiplistic ways of knowing were produced. For example, “I like winter time; I can be more like a princess and wear my pretty hats and my scarf matches, sometimes when I get dressed-up I feel like a princess and I just walk around but I stay warm.” These multiplistic associations were constructed with more ease; their affect was more relaxed, and they used more animation (i.e. facial expressions and body gestures) to express confidence. Once they had gotten to this level of knowing, it was impossible to get them to move to evaluativistic or absolutist perspectives.

When probing deeper for evaluativistic outlooks, they did not attempt to respond. For example when they were asked questions using their own words, such as; “You said you like winter time. Why do you think you like it better in the winter?” or “Carl said he thinks winter is bad. Why is winter bad?” These types of questions appeared to be too difficult for the group to process, which resulted in behaviors consistent with confusion (i.e., looking away, shrugging shoulders, facial distress). The behavior was not disruptive in any way; they seemed curious and attentive. However, their responses continued to be multiplistic and reflected personal experiences and prior knowledge. For example, their responses to the previous questions were as follows: “I like it better in the winter, it is a good time and I have fun playing,” and “I like winter.”

Attempts to transition back to absolutist attitudes continued to yield multiplistic statements. They wanted to discuss topics that were closely associated with their preferences and could do so at all four dimensions of knowledge in both the monster and winter focus groups. For example when asked, “What happens in the winter that is
different from summer?” a response was, “I know I can jump through the water in the yard. I do it in my bare feet and jump and play and my mommy watches me because no water comes out when it’s cold outside. I’m not allowed when it is cold.” Once they began to share their experiences, any movement away from multiplistic perspectives resulted in resistance from the group in the way of behavior disruptions. For example, they began to roll around on the floor, touch each other, and talk about what they were going to do when they got home.

The post-instructional focus groups took on a slightly different developmental pattern. They still did not demonstrate any type of evaluativistic-like characteristics and maintained the ability to convey knowledge in both absolute and multiplist ways. Again, they initiated the group with absolutist ways of knowing and moved to multiplist points-of-view; however, this appeared to bore them. They were not as content discussing their personal experiences as in the pre-instruction groups. For example, when questioned about their experiences using their own words and scenarios, they began to demonstrate inappropriate behaviors and verbalizations such as repeating words from a story over and over, wandering around the room, jumping, and squealing. Typically, they would respond positively from redirection from the researcher but would want to discuss a story. For example an exchange between two of the children went like this;

Carl: “I don’t want to talk about her stuff. Let’s look at the rumpus in that book.”
Jeremy: “Me either, I want to look too.”
Carl: “That rumpus was fun and they made Max the king of them because they like him and we don’t like to hear about cold stuff.”
Jeremy: “Ya, this is no fun.” He grabbed the book from the table and opened it.
Another instance of this type of behavior occurred the second week, was when a child-participant, wandering around the room, picked up one of the books that had been read during the week and said, “Look, that baby bear liked the cold because remember he sneaked away from his mommy and got in the snow hill so she could not find him.”

The return to absolutist perspectives and wanting to focus on the content of the stories was a curious pattern since they had been so persistent in their need to remain multiplistic in the pre-instructional groups. When analyzed more closely, there could be several reasons for their developmental trajectory: (a) The topic of winter was less familiar or interesting, (b) they had less new information to link to prior knowledge in the pre-instruction group and did not generate it, (c) the members of the group were at significantly different developmental levels and the majority overpowered the group dynamic, or (d) the redundancy of reviewing the storyline helped them link the new information to their existing knowledge so it was more challenging, so they were seeking the more challenging way of knowing. These ideas are important and will be touched on in the overall group results.

**Theme 2: Integrating dimensions of knowledge.** Integrating the dimensions of knowledge in Group 2 occurred in much the same way as was described for Group 1 (See Figures 14 & 15). There are three distinctive patterns that emerged: (a) the nature of knowledge (linking simple/certain knowledge), (b) the process of knowing (linking simple/justification, certain justification), and (c) the absence of source of knowledge. There are two primary differences that presented with Group 2, neither having to do with the actual patterns, but rather the manner in which the patterns occurred. First, there was a much more prominent pattern among the associations that they made to books, family,
and personal experiences. It was more clearly mainstreamed between the dimensions and the developmental levels. Second, the simple and certain dimensions of knowledge initially were presented as more simple and certain rather than complex and uncertain (as in Group 1). An important characteristic appeared in Group 2 that was similar to Group 1, which was the increase of nonverbal communication as their knowledge became apparently more complex and uncertain in nature.

When the patterns for the dimensions of knowledge are looked at for Group 2, there is a precise organization between the dimensions of knowledge and the associations that are linked to each dimension within specific developmental perspectives. When these child-participants contributed their understanding of knowledge from an absolutist point of view, which they did more spontaneously yet with difficulty, they tended to include a combination of associations between the book and their family. For example, “You should never go way from your mommy and daddy, see the mommy bear is worried about her babies. My mommy watches me when I play so she don’t worry,” or “Them monsters are scary but my daddy says they are not real monsters.” They made this same combination of book-family association at the absolutist level for simple, certain, and justification of knowledge. However, when they shifted to a multiplist perspective, the combination of associations dramatically converted to personal experiences and family and was carried out through all of the dimensions at the multiplist level of development. For example, “I know parties are fun, I like parties because one time my mommy and daddy gave me a party and we went to bowling and ate pizza. It was a lot of fun and we played a lot (facial and body gestures). I was not ascared.” These examples show how they coordinated the contextual meanings to convey the understanding of their
knowledge. The next characteristic that was identified has to do with how they shifted through the dimensions of knowledge.

Although the pattern of linking their knowledge was consistent, the structure and stability of their knowledge varied from Group 1, in that this group gradually progressed from simple to complex knowledge and from certain to uncertain knowledge. Also when simple and certain knowledge were linked to justification, they seemed to convert to simple and certain dynamics. It was with probing questions that their knowledge appeared to advance. For example, when asked, “What could monsters do to have fun?”, “Piggy-back rides” was the response. Then with probing, “Yes, piggy-back rides. Tell me about how monsters can have fun doing piggy-back rides,” the responses became more elaborate, in that their knowledge came across as more complex and that there was uncertainty in knowledge. For example, “Sometimes, if monsters play and have fun, I think they would put the girl monsters on their back and spin around real fast like this (spinning) and some of the monsters could do this (jumping and falling) and some other monsters could do this (falling backwards) but if I was a monster I would put Ariel high (arms) on my shoulders, up here (looks up and arms) and we would have fun and laugh because we would be being like monsters having a party because it would be a birthday.” The same type of progression was seen with justification of knowledge as well; initially, their construction of justifications for knowledge lacked evidence and was simple. For example, “Why do monsters have parties?” An immediate response was, “Because.” Persistent probing resulted in this sequence of responses from one of the participants in the group: “Because” “Because, they just do.” “Monsters just have parties because.” “I
think they have a party because they are happy and they want to celebrate, like me I have a party at my birthday and my brother’s birthday too and my mommy and daddy’s too.”

Another important characteristic that developed during analysis of the patterns that were presented for the dimensions of knowledge was the children’s use of tools to communicate their knowledge and understanding. This group demonstrated verbal means of conveying their knowledge when their knowledge was simple and certain; however, as their knowledge and understanding became more complex and uncertain, they began to incorporate verbal and nonverbal means of communicating. Very similar to the previous group, they complemented their words with the use of facial expressions, body gestures, and pointing. They never jointly nor individually generated evaluativistic ways of knowing, but this coordination of verbal and nonverbal communication presented itself more in the process of knowing (i.e. justification) in both the absolutist and multiplist. A great example of this communication process can be seen in Carl’s statement above about piggy-back rides.

*Theme 3: Use of pretend knowledge is dominant.* There was less group cohesiveness within this group; they appeared to be functioning from different levels of interest and personal experiences. However one similarity among the children was their inclination for relying heavily on pretend realities. For the most part they did not have a smooth discourse pattern and took turns talking and answering questions and occasionally responded to one another. Typically, when they were responding to one another, it was based on pretend associations that were made. The following exchanges are examples of how the group excelled when identifying with each other’s use of pretend as a way of making meaning:
Trudy: “When I am having a party I am only inviting princesses. I don’t want to have no monsters or scary people and we will dance beautiful-like (demonstrates).”

Carl: “Ya, that’s a girl party, me and Ariel danced before but not at a party but I would have them Www Things at my party because we would have more fun and I am not afraid so they could be invited too.”

Trudy: “I don’t think that princesses would like to have monsters at my party. We are going to eat little sandwiches and have a tea party (pretending to drink tea).

Jeremy: “No, no, no!!” “Monsters, monsters we want the Wild Things.”

Carl: “Sometimes my mommy and daddy have some parties, and they swing from the trees and give piggy-back rides, and all of their friends laugh but they don’t the monsters come to it because they aren’t real and only me and Ariel know about them.”

Jeremy: “The wild things aren’t real.”

Trudy: “My mommy and daddy have princesses at their parties because they want to and they know the monsters are not real but the princesses can be if they want. I think they have real parties sometimes, and they make big messes and have to clean up. The princesses don’t clean their messes and the wild things made a big mess to.”

They were able to identify with each others’ ways of incorporating the new information with their pretend world. This was an area where they found success and mutuality which was observed in their affective dispositions (i.e., affect became bright, more enthusiastic, more animated, laughing) and level of engagement (i.e., better eye contact, improved listening and observing their group members, asking questions).
Theme 4: Lack of peer scaffolding had a negative impact of the group epistemological ability. The group dynamic present in Group 2; that is, their individual differences (affective ability, gender, interests, social skills, and individual epistemological levels); appeared to have a negative impact on characteristics that might promote their level of group epistemological functioning. The primary deficit appears to be in the way that the group interacted together; they failed to identify with each other on a cognitive, affective, or behavioral level. These peer scaffolding qualities have been identified in the individual epistemic profiles and strongly influenced the productivity of Group 1. Interestingly, these three child-participants demonstrated these very same traits during other group activities such as whole class instruction, center activities, and playtime, so it is curious why they failed to engage in similar characteristics for the focus groups, making it seemingly uncharacteristic that they would not reconstruct a similar pattern within the focus groups. In all four of the focus group activities, they did not meet nor exceed many of the traits that could showcase the flexibility of epistemological development or versatility to access multiple dimensions of knowledge independently without probing questions.

This group was cognitively inefficient in that they did not demonstrate the ability to expand their knowledge and understanding by building on their peer’s contributions or experiences. They utilized the use of pretend far more than they demonstrated the ability to tap into constructing knowledge based on mutual collaborative efforts; therefore, it inhibited their opportunity to retrieve background knowledge and elaborate upon that knowledge. The focus group interaction was fragmented. For instance, a child said, “I like the sunny weather because I can wear my bathing suit and go swimming and not in
the winter.” Immediately following this response, another member of the group said, “The bears have lots of fur to keep them warm in the winter, so they like to play in the snow, we don’t have fur on us.” This example demonstrates how the child-participants in this group were somehow detached from each other; they lacked the spontaneity and mutual interests that may be needed in order to cognitively extrapolate or elaborate upon another’s knowledge. The only attempt that was made to combine their knowledge was when they discussed pretend scenarios and, even with this trait in place, it did not expand nor contribute to their individual or collective epistemologies.

Another mode of peer scaffolding that did not appear in this group was the ability to connect on an affective level. The child-participants were as disconnected emotionally from one another as they could be; however, individually they were so different, from an affective standpoint, that it could have been an unrealistic goal. There was no group motivation nor joining of enthusiasm for each other’s experiences that would suggest their epistemological development or their dimensional knowledge was supported by their peers. In fact, in this group, there was negative affective support. For example, at one point the two young boys in the group teamed up against the girl. They talked apart from one another and on occasion demonstrated inappropriate behaviors such as telling someone to “shut up,” putting their hand over one of their peer’s mouth, sticking out their tongue, and covering their ears while a peer was talking.
Focus Group 3 was methodologically organized in the same way as Group 1 and
Group 2 and included three of the original child-participants. The difference was the
participants were selected by the researcher from the previous two groups based on their
individual and group epistemological thinking and behavior. Therefore, Group 3
consisted of Adam and GiGi (from Group 1) and Trudy (from Group 2). Everything
about these two weeks of instruction and activities was the same, except the themes were
construction and family, and there was no other group to compare to Group 3. The
purpose of coordinating a third group in this way was threefold: (a) methodologically, to
preserve the relationships that had formed between the researcher and the child-

Focus Group 3 Epistemic Profiles

Figure 29: Focus Group 3 Epistemic Profile

Epistemic Profile
GROUP 3

- Theme 1: 3 Levels of Developmental Group Evaluativism
- Theme 2: Patterns of linking nature of and process of knowing
- Theme 3: Peer scaffolding positively impacts epistemological thinking
- Theme 4: More background knowledge disrupts pretend associations
participants and maintain children who were already familiar with the procedures of the current study, in particular the focus group activity; (b) epistemologically, to attempt to probe in more depth their knowledge and understanding from a developmental and dimensional perspective; and (c) socially, to investigate more vigorously the potential influences of positive group interactions on epistemological thinking (i.e., peer scaffolding of cognitive, emotional, and behavioral characteristics).

Epistemic Themes

Theme 1: Three levels of developmental (group evaluativism). Group 3 demonstrated their knowledge and understanding at all three developmental levels; the patterns nearly mirrored Group 1 in many ways. The main difference was that rather than two patterns in the post-instruction group, they had only one for both themes. In this section the themes from Group 3 are presented, along with some characteristics that are noteworthy as compared with the previous two groups.

The first week’s theme was construction. In terms of the child-participant’s familiarity this theme compared more closely to the winter theme and likewise in the developmental patterns (See Figure 30). It was apparent from the pre-instruction focus group that the participants had some understanding of the idea of construction, but the actual word was somewhat foreign. Initially, they were very slow to start; the question was “What do you know about construction?” All eyes were on the researcher; their interest was piqued, but the expressions on their faces noted confusion, curiosity, and hesitation. The same child-participant who had taken a leader role in Group 1 maintained his leader status in Group 3. He began saying, “It’s when people (agitated gestures) and then they (more gestures) and I would (gestures) and karate kick them, like this.”
two girls followed in this string of theatrical demonstrations that appeared to be meaningless. This type of scenario had been anticipated due to the lack of background knowledge and experience in the winter focus group; therefore, the researcher had pictures of construction. The researcher presented the pictures to the group without an explanation of them but said, “These are some pictures that I think show construction. Take a look. Do they help you talk about construction?” Although still unfamiliar with the term (i.e. they had difficulty saying the word), they were now willing and more able to talk about their knowledge of construction. Does the content matter to the developmental of preschooler’s epistemologies? Three characteristics standout about the way this focus group began that may be important later: (a) their willingness to attempt to construct understanding despite their confusion, (b) their behavior was more constructive rather than disruptive, and (c) their epistemological level of development and the parallel characteristics that seemed to promote their ability.

In the pre-instruction focus group, they had some reservations about their knowledge; therefore, they began from an absolutist perspective. Their associations were linked to their personal experiences and peers. Immediately, they began to scaffold one another’s knowledge, both cognitively and affectively. After the pictures were shown and the question was repeated, the group began with the following:

Trudy: “I think Adam showed instruction good like (similar gestures).” “What is going on in the pictures is that these (pointing) big trucks are helping these (pointing) boys in making some house or something. I see trucks like them by where we live and that’s what my daddy says they are doing.”
Adam: “Ya, it’s when big trucks go (sound effects) and they make a really big building like really big (arms out), like a, like a, like Wal-Mart is a huge store. I don’t like when we have to walk all over that store it takes too long and I get tired.”

Trudy: Do you have big trucks where you live?”

GiGi: “Yes, we have all of them; they are same like yellow like them ones (pointing). Sometimes they make too much noise and it is loud and they make dirt all over (gestures). One time I was outside and I got dirt in my mouth, YUCK! I had to cover my mouth and my eyes to keep away from the dirt.

This example demonstrates information about the developmental patterns. It shows the initial absolutist way of knowing, and it also begins to show the transition to multiplist views. Going back to Adam’s initial demonstration, this example shows how the source of knowledge moved from internal to external although the source of knowledge was never fully acknowledged. Also, this example shows many of the characteristics of how peers scaffold each other within the grouping, such as using their peer’s words to help him/her find his/her own words (i.e., “big truck”) and building on the general ideas of peers. Also, they provided emotional support for each other. Also, the use of body gestures and facial expressions surfaced during discussions of more complex cognitive information. In this case the topic was more challenging for them because they were unfamiliar with the actual word construction; however, they did have an understanding of what construction is in an activity sense. Nonetheless they were quite guarded.
Group 3 demonstrated a group-evaluativistic way of constructing knowledge with very little probing. They did so in a relevant and coherent manner. For example the following transcript shows how this unfolded:

Researcher: “When I look at the picture, I see a bunch of different kinds of trucks; can you tell they are different?”
All: “Yes”
Researcher: “How are they different?”
GiGi: “(pointing at the front loader) This one has this thing, I think it goes up and down but this one has this in the back (pointing at the dump truck) and it goes up and down too but only different like, like, like (shrugs, head down).
Adam: “This one (pointing) is a dump truck and I don’t know what that one is but they both carry dirt and dump dirt like on Dora the Explorer. I saw them filling in a hole with dirt and it was like that truck they had it in.”
Trudy: “I watched Dora the Explorer; I didn’t see them trucks with Dora. I see them by where I live all of the time! They are big and heavy and they are way up high.”
Adam: “Well, I think you see the real big trucks, Dora’s are not real trucks but they are suppose to be; they still made a lot of noises and runned over somebody, I don’t think that could happen. If a real truck runned you over I would be (sound and gesture).
GiGi: “Yes, I think you would be (sound and gestures). I think on TV it is only play not for real, I wouldn’t want to get squeezed by them big trucks because then I would miss my mommy and daddy, I don’t want to go to the hospital.”
Trudy: “If you get (sound and noise) I will come to visit you and bring you some stuff that would make you feel better but I won’t bring you a big truck because you won’t want that. Only guys making houses and schools need to have a big truck like them cuz they need it to help and they need money.”

In this example the child-participants collectively introduce the idea of objective facts and subjective thinking in a single thought process and in terms of simplicity of knowledge, certainty, and justification. They also have demonstrated many of the group characteristics that seem to promote this type thinking through group cohesiveness. Ultimately, they returned to a form of multiplistic organization of information. At this point, the multiplistic view was where they chose to continue after a brief length of probing questions. It was the perspective that they referred to most frequently in this and other groups and the developmental level that they articulated with the most confidence and meaning. Also, multiplism was a level that the least amount of pretend information is referenced.

The post-instruction developmental pattern for the construction theme was similar to the pattern seen in the pre-instruction focus group (See Figure 31). There are two characteristics that make this pattern distinctly different from the pre-instruction focus group: (a) The associations are more reflective of the stories that were read throughout the week, peers, and background knowledge; and 2) the amount of statements at the absolutist and evaluativist levels were doubled. Multiplistic perspectives continued to dominate their ways of thinking and understanding but with much less intensity as they seemed eager to engage in more challenging exchanges of information.
As with the developmental pattern theme, there was one additional but distantly related point; the length of time they continued to remain engaged even when challenged by higher order thinking tasks was far greater than had been seen at the individual or group level. The amount of tolerance they demonstrated for probing questions and inquiry about their experiences was noticeably longer; they seemed to be engaged for more extended periods of time, and the disruptive behaviors due to boredom were almost extinct. The verbal and nonverbal behaviors seemed to be more consistent with requiring too much cognitive effort as seen when working in the exterior of their zone of proximal development.
The developmental pattern for the family theme was the same at the pre-instruction and post-instruction focus group (See Figure 32). They demonstrated the ability to function at all three developmental levels and did so without much probing. When probing questions were presented, they were able to respond appropriately. The motivation and emotion that was presented implied that they had a certain amount of competence in their knowledge and confidence in their understanding. This was demonstrated in the persistent positive facial expressions (i.e., smiling, good eye contact, expressions consistent with their words), communication (i.e., more frequent use of their words, less redundancy of what others said, no echolalia), appropriate behaviors (i.e., attentive, curious, sitting still, listening to others), and cognitive indicators (i.e., staying on-topic, relevant to topic, coherent responses).

Figure 32: Group 3 Pre-and Post Instruction
Family Developmental Pattern

Multiplist → Absolutist → Evaluativist → Multiplist

The most important point to make about the developmental pattern that emerged from the family theme was the increase in absolutist and evaluativist ways of knowing. This was identified in the construction theme post-instruction focus group. However, in the family theme this trait was present in both the pre-and post-instruction focus groups. They allowed and tolerated extended probing and, as a result, produced richer and deeper
knowledge. For example, the following question, which was based on one of their statements, “Why do you think we have a mommy and a daddy in our families?” initiated the discussion below.

Adam: “We have both mommies and daddies because it takes two people to make a baby, and they don’t have to be the same color. Like me, my mommy is real white and my daddy is real brown but me I am just a little brown.”

GiGi: “Ya, God made us have mommies and daddies so we would have them to love us and keep us safe and not get hurt. So we would have parents, like mommies and daddies.”

Adam: “Ya like Adam and Eve had a baby boy like me.”

Trudy: “I have a mommy and a daddy because they wanted me and my sister so we would be a family. That was we could go places and do things together like a family. A family can have a small amount (hand) or a big amount (arms). It’s doesn’t matter how many babies you’ll be a family with a mommy and a daddy.”

Adam: “Do you think God makes babies?”

Trudy: “My mommy and daddy made me. I know because they said that is why I am here.”

GiGi: “God makes everything happen that is good. Sometimes some kids don’t have a mommy and daddy that stays with them and that is bad to be away from them sometimes but you would get more toys at Christmas I think.”

Researcher: “Do you know what it is called when kids don’t live with their mommy and daddy all the time?”
This example illustrates the developmental pattern as well as a much deeper level of understanding than in many of the other groups. There could be a number of reasons to support their epistemological performance; these will be discussed in chapter 5.

**Theme 2: Patterns of linking nature of knowledge and process of knowing.** The dimensions of knowledge appear to fall into a pattern in Group 3 that is identical to the patterns identified in the other two groups. They linked simplicity and certainty of knowledge; then they linked justification of knowledge with either or both simple and certain knowledge. For example in this group: “Sometimes when my family does things together we have fun but sometimes we have to be serious, like when we go to the store we can’t touch things or laugh; and we have to stay with my mommy because we will get lost and not find her and someone bad could take us.” This example reflects a combination of simple and certain knowledge with justification of knowledge.

In Group 3, their knowledge appeared to be more complex and uncertain (as in Group 1). They rarely initiated a thought or responded to a question or someone else’s contributions with a simple or certain way of knowing (as seen in Group 2). If they did respond in a simple or certain manner, it was at an absolutist level and revolved around a classroom rule/procedure or some objective fact that was in the story or related to the story. For example, “Miss Mary was their mother.” During times when they spontaneously constructed knowledge evaluativistically or used justifications for their knowledge (or were probed in that direction), there were no signs of simple or certain knowledge but rather the nature of knowledge in conjunction with the process of knowing appeared to be predominantly complex and uncertain. In other words, they perceived knowledge as complex and integrated with their personal experiences, peers,
the story, and family. (In this case this may not have been significant since the topic was ‘family’.) In addition, they acknowledged that knowledge is changing and can be different based on the person, place, and time; they associated knowledge with rules and procedures.

Source of knowledge was a dimension that had been challenging in the other groups and was no different in Group 3. They regularly referred to their family, the book, and their peers in implicit ways and explicitly in their responses. However, when asked a specific source of knowledge question, they did not understand the meaning of the question. For example, “How do you know that your mommy and daddy love you?” No verbal response was given by any of the child-participants in the group; one child responded by wrapping her arms around herself. Others in the group followed her lead, but no could verbalize an internal or external source for their knowledge. Later in a comment the same girl responded to the question, “What does your mommy or daddy do that makes you think they love you?” “I know my mommy and daddy love me because they always give me hugs and kisses; and they tell me they love me all the time. Especially at when I go to bed at nighttime.” Another interesting response that was typical: “How do you know that your mommy and daddy love you?” “Because they do.” Starting a sentence with “because” was common when source of knowledge questions were asked; this indicated to the researcher that they needed or wanted to give a justification for their understanding. This indicated that they had a sense that the answer needed to come from a dimension or way of knowing that would be consistent with the process of knowing. Since they had command of justification of knowledge, in that they could provide evidence of their knowledge and understanding, this was where they felt...
most comfortable and competent; therefore, their answers to source of knowledge were confused with justification of knowledge.

Theme 3: Peer scaffolding had a positive influence on epistemological thinking. The child-participants in this group were intentionally chosen from the six child-participants because of their individual and group epistemological and behavioral productivity. It was thought that, by selecting the children that had demonstrated the greatest capacity to convey their epistemologies and do so within a group using appropriate social skills and positive affective traits, a deeper level of epistemological thinking could be uncovered. This group relied heavily on their peers as scaffolds for their knowledge and understanding. Many of the same characteristics that have been previously mentioned are again mentioned in this section with specific examples unique to this group.

Cognitively peers were utilized as scaffolds when they listened and observed others. These contributions from their peers prompted background knowledge. For example, “Ya, Dora, I have a truck like the one in the book, it doesn’t move up and down though but it’s yellow too and has a place to put the dirt and take it to another place.” They used other’s experiences and elaborated upon what had already been said, as in the following “My mommy makes me breakfast too, like Trudy’s mom. I have to eat it or I can’t play with the dog. Sometime I give some of my food to my dog because I don’t want to eat it. My mommy doesn’t know or I would be in big trouble.” They sometimes did not agree on their knowledge and engaged in a form of argumentation or debate. For example:

Adam: “They build bridges the same as a house. I think with them trucks but a bridge is bigger.”
Trudy: “No, they don’t because a bridge is made in the water, like over water (gestures). How would the big trucks get into the water to make it go across?”

Adam: “But that’s when it’s all done and the trucks are on the ground. Bridges stop people from getting in the water.”

GiGi: “I don’t know, probably you need to have the trucks but maybe other trucks are special. Miss Denise do they have special trucks to make a bridge? Maybe they walk on the water trucks.”

Adam: “I never seen trucks walk on the water. Have you seen them Miss Denise?”

An interesting point about this example is that they conversed a short period before they sought authority, but they were willing and motivated to figure it out. When they couldn’t, they asked questions. This was a characteristic not terribly prominent in the focus groups but was seen in the individual epistemologies profile.

As just illustrated in the previous example, there was a high degree of motivation and self-efficacy for the challenge of discovering new information. All of the child-participants seemed to be equally weighted in their ability to stay interested in the topics and motivated to engage in the task. They did this primarily independently and required no redirections from the researcher. This level of engagement allowed them to generate a positive group disposition in which they laughed and smiled appropriately during discussions and were respectful of their peers by taking turns and making each other feel they had important things to say and encouraging them. The high level of affective engagement deterred the children from veering off-topic. They were focused on the task. In addition, they were mutually invested in the focus group activity which may have
accounted for the extended amount of probing that was tolerated and the increase in other developmental thinking outside of their multiplistic comfort zone.

**Theme 4: Increase in background knowledge and personal experience disrupt pretend knowledge.** This theme has to do with the absence of pretend knowledge. In the other group themes and the individual epistemic profile, it has been identified that a large part of preschooler’s repertoire of constructing knowledge and making associations involves the integration of their pretend world. Group 3 demonstrated quite the contrary experiences; they remained on-task, as attributed to peer scaffolding above, and required no behavior nor cognitive redirection to stay on-task. There was minimal redirection in that the research did interject probing questions which were not resisted by the group as seen in Group 1. Rather their pattern appeared to utilize their background knowledge and past personal experiences to proceed through the focus group. This intensity practically eliminated the pretend associations that might have been thought typical.

On the rare instance that a member of the group contributed a pretend scenario; for example, “Dora the Explorer;” Adam was very quick to say, “That’s not real.” GiGi was another keeper of what was real and what was pretend. For example, she said, “I don’t think mommies wear aprons; I think that is just in the picture. I think when my mommy bakes pies she wears her old sweat pants so if they get dirty then it’s okay.”

As an observation, one of the things that also appeared to keep the participants focused on real-world scenarios (i.e. background knowledge and past experiences) was a degree of non-threatening competition that presented itself in this group. This competition was seen minimally in an earlier group and in the individual profiles but has
Across Focus Group Epistemic Profile

Figure 33: Focus Group Epistemic Profile

Across Focus Groups Epistemic Themes

**Theme 1: Epistemologies are Multidimensional.**

Preschooler’s group epistemologies are multidimensional as seen primarily in Groups 1 and 3. Multiplist ways of knowing were the most common; however, they demonstrated the ability to shift among absolutist, multiplist, and evaluativist with and without probing from the researcher. In addition, they demonstrated a shift between developmental levels when prompted by peer influences. The most reoccurring developmental pattern begins and ends with multiplistic ways of knowing and includes absolutist and evaluativist viewpoints (See Figure 34). Out of nine developmental
patterns, this developmental sequence appears in five group themes (See Figures 21, 23, 25, and 32). A portion of this trajectory was identified in the post-instruction focus groups (monster and winter) for Group 2, that is the transition between multiplist and absolutist perspectives (See Figure 28).

There are distinctive patterns of development that appear within the same theme of the week but between pre-and post-instructional groups. The most consistent developmental pattern that was identified between pre-and post-instruction focus groups was onset of conveying their knowledge. For example, in the pre-instruction group, their knowledge was activated at the multiplist level; however, in the post-instruction focus groups their knowledge was activated at the absolutist level (See Figure 22, 28, 31). This pattern appears to have taken form in the lower epistemological group (i.e., Group 2) and in the groups in which the theme of the week was more unfamiliar to the child-participants (i.e. winter and construction).

A final developmental trend that can be identified in the group themes is the influence that background knowledge and personal experiences played in maintaining the children’s interest or motivation to attend to a topic. This allowed them more time and
patience to investigate their alternative ways of knowing, such as absolutist and evaluativist points of view. This was primarily seen in Group 3, but when comparing Group 1 and Group 2 the same pattern emerges, in which Group 1 had longer duration of time-on-task and greater absolutist and evaluativist substance within their group.

Theme 2: Linking Nature of Knowledge and Process of Knowing.

All three groups demonstrated identical patterns for linking the nature of knowledge and the process of knowing. This pattern existed so strongly that despite the developmental level, the pattern persisted. When associating new information with prior knowledge and past experiences, they linked the nature of knowledge together simultaneously and seemingly automatically. Here they joined the simplicity of knowledge and the certainty of knowledge as if they were one dimension of knowledge. For example, “I know; it’s Max;” In this example the knowledge is simple and certain. However, they also integrate knowledge dimensions when the knowledge was complex and uncertain; for example, “Sometime I think it’s good to follow the rule, like in the Cricket classroom, but sometimes at home I don’t always follow my mommy’s rules.” In this example the simple and certain dimensions are integrated, but the knowledge appears to show complexity and uncertainty. The structure and the stability of their knowledge appear to be operating in unison.

This same simple-certain pattern gets carried over to the process of knowing, or at least with the justification of knowledge, because source of knowledge consistently eluded all of the child-participants in this study. Looking at the process of knowing pattern, whether the knowledge is simple and certain or complex and uncertain child-participants activated their justification of knowledge with the nature of knowledge...
almost as a prerequisite or as a means of arriving at a justification of knowledge. For example, “I have two trucks, one looks like this one (points) and the other one is like that (points). Well, I have lots of trucks but they are all different, mostly I play with the ones like them because they are the biggest and they have parts that move because sometimes when I play I have to have the trucks carry some stuff for me.” This example demonstrates how they linked the three dimensions: simple, certain, and justification; however, there were instances in which they may have used the dimensions in other combinations, such as simple and justification (“Max because that is what his mommy called him.”) or certain and justification (Yes, because that’s what mommies and daddies do because they like to have fun sometimes.

Theme 3: Peers Scaffold Alternative Ways of Knowing.

This was a theme that was cultivated by the researcher when specific characteristics emerged early on in the study between Group 1 and Group 2. Peer interactions and relationships needed to be investigated closely when there were dramatically different findings in the focus groups, specifically their epistemological capabilities. This was particularly of interest because Group 2 actually functioned better (epistemologically) on an individual basis, but even with that impression, when they were investigated individually, it was based on interactions in group settings such as whole class instruction and center activities, so it did not make complete sense that they would regress (so to speak) within the focus groups. Therefore, the group dynamic became an area of interest. Why would they demonstrate weaker potential within the focus group?

What emerged from this question was the foundation of this theme. The interactions among peers within a group could be positive or negative influences on their capability or
willingness to report their knowledge and understanding. There were multiple activities that peers engaged in that contributed to epistemological diversity and depth of understanding. This was thought to be a form of scaffolding or peer scaffolding. In this scaffolding, peers assisted others in their group cognitively, affectively, and behaviorally by using appropriate social skills or social conventions. Group 1 demonstrated positive peer influence in all three categories (i.e., cognitive, affective, behavioral). Alternatively, Group 2 did not engage in several of the characteristics available in any of the categories, and the lack of peer scaffolding created a negative impact on the group’s epistemological functioning. Group 3 was purposely arranged to test the strength of positive peer scaffolding and did show some positive impact. Specifically, the cohesiveness of the group and subsequent peer scaffolding produced a closer glimpse at the absolutist and evaluativist developmental levels and allowed for greater depth of understanding regarding their epistemologies.

In this study three categories of peers scaffolding developed; cognitive, affective, and behavioral; and an example of each follows. Cognitive peer scaffolding occurred most in terms of the children being able to relate to or make associations based on what another child had contributed. This occurred most commonly when the associations could be made to family, peers, personal experiences, rules, and books. Their ability to form associations tended to vary depending on the children’s familiarity with the topic, their personal experiences, or, even in some cases, the mutuality or overlap of their pretend world. When the child-participants were able to identify with their peers they would build on what was previously contributed. They would draw similarities and differences, challenge their peer’s knowledge, offer help in the form of creative ideas, or discuss how
they reasoned about an idea or decision. For example, “I think I am going to make my monster like this because I want it to look like Blackout, he is big and strong and I want to be like him but I think it is good that the girls don’t want to make it like mine because that would be silly because it’s not a girl toy. What are you going to make your monster like?” This example could also be viewed as a form of affective peer scaffolding. He explained his reasoning for designing his monster in a certain way, but he also was positive and supportive of his peer’s lack of interest in wanting to make it similar to his and showed a curiosity about what they will make. Later, during the activity, he did question them about why they chose the colors and template that they chose.

Affective peer scaffolding included constructs such as motivation and interest which, when positively generated, promoted longer engagement in a task, more relevant on-task potential, and more coherent and meaningful exchanges. The child-participants, when positively charged, demonstrated bright, cheerful affect (i.e., smiling, laughing appropriately not out of control or disruptive), and they were relaxed, active, and willing participants.

Behavioral peer scaffolding occurred when the child-participants would gently redirect their peers if they were behaving inappropriately or distracting from the experience. For example, “GiGi you need to come and sit down so we can finish and go to snack.” Also, “If you slide down then he won’t be touching you.” While leaning forward making eye contact with her peer she said, “Stop touching her, you aren’t suppose to touch anyone. You’re being bad.”

The key to behavioral peer scaffolding (more so than the other ways of scaffolding) was that the peer had to be willing to redirect their behavior based on the feedback from
another peer. There were several instances that this behavioral scaffolding backfired due to uncooperative participants. This was the case frequently in Group 2. However, the preschoolers were generally receptive to this technique. In fact there were often times when a redirect from authority (i.e., teacher, researcher, aides) was ineffective, but the children’s redirecting of their peers was acceptable and effective. There is more of a social hierarchy that, although it includes authority, it also includes peers so it works with the preschoolers. (This might be questionable with older children.)

**Theme 4: Relevance and Real-World Experience**

The more relevant the topics are to the group, the more they associate new information to real-world personal experiences and bypass the ambiguity and solitude of their internal pretend knowledge. The themes of the week were designed by the group of preschool teachers at the preschool; on what basis they decided on the topics of monsters, winter, construction, and family is unknown. However, it became apparent throughout the study and the focus groups in particular that the subject matter used in preschool classrooms is more effective at generating epistemological understanding when it is closely related to knowledge or experiences that the children already possess. In this way it gives the child-participants a foundation to work with, as opposed to having to create that foundation.

When a foundation is already in place, such as with the themes of monsters and family, they tended to draw associations fairly quickly, took the initiative in constructing knowledge, and linked new information to prior knowledge to perpetuate understanding. For example, “Maybe if some kids don’t have both mommies and daddies, they could borrow somebody’s. I know kids who have lots of mommies and daddies. I have two

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mommies and one daddy. The one mommy is my step mommy and I share her with a bunch of her other kids. Sometimes they stay with us but sometimes they go see their other daddy. Their other daddy is mine too.” This is a complex situation that this child has a good understanding of, and her peers listen attentively to her because they have experience and understanding of a family. Whereas, when a child goes on about something that the peers don’t grasp themselves and have no interest in, both sides become disengaged. For example, “I don’t know about winter.” It is difficult for the children to become enthusiastic about winter when their experience is completely different from what is being presented in the stories (i.e., snow). It was seen in the focus groups; it was too cognitively and affectively demanding to try to absorb new information and identify associations without foundational knowledge.

Two scenarios were identified as a result of content not being relevant to the child-participants’ needs in order to be able to successfully convey their knowledge and understanding. First, they attempted to formulate a foundation based on what they know. They know that their pretend knowledge can be anything that they want it to be even if it does not make sense. The problem was not simply an individual problem. In this study it was identified in Group 2 how perpetuating pretend knowledge can evoke frustration among members of a group.

The second scenario is a behavioral perforation of the members of the group and was identified as being facilitated by two types of frustration. One was a bit milder and more controllable, in which the children became overwhelmed or frustrated seemingly as in cognitive overload scenarios; The other scenario was where the children were probed beyond their zone of proximal development. In these type of instances the behavioral
consequences that emerged from the group could be modified by adjusting the type of questioning or the degree of difficulty of an activity. If the cognitive load was alleviated, the activity survived with all members still interested and engaged (as seen in portions of Group 1 and Group 2). However, if the situation surpassed the challenge of the participants, then the result was often just disengagement, but other times complete disruption of the group could result. The other more uncontrollable behavioral outbursts were activated by boredom due to lack of interest or failure to challenge the participants. In this situation the group was foreclosed on and could not be salvaged easily (as seen in portions of Group 1 and Group 2). When the child-participants were bored and falling unchallenged, they became completely disruptive.

Therefore, having information relevant to the interests, background knowledge, and personal experiences was the most effective and efficient way to identify the child-participants’ knowledge within a focus group setting. They had a zone of comfort about conveying their knowledge and knowing that was more thoroughly and generously conveyed when the information was relevant to them. In this way it reduced the pretend knowledge they were inclined to resort to for a level of comfort and diminished the potential for them to rely on inappropriate behaviors as a means of distraction and to retrieve their safety net.
Preschoolers’ Epistemic Profile

Figure 35: Preschoolers’ Epistemic Profile

Preschoolers’ EPISTEMIC PROFILE

Theme 1
Level of Development
Multiplist is most common

Theme 2
Construct
Dimension of
Knowledge Pattern

Theme 3
Probing Outside ZPD
Differ

Theme 4
Epistemic concepts can be observed in other ways
* Peer Scaffolding
* Nonverbal symbols

Preschoolers’ Epistemic Themes

Theme 1: Predominantly Multiplist Level of Development.

Preschool children demonstrate their epistemologies predominantly at a multiplist level of development. This was found in the individual and group setting. They are confident and competent at these levels when the information is relevant to them and they can make connections between new information and existing information based on personal experience or pretend scenarios. However, there are distinctive patterns that emerge based on the content of the new information and the context of the setting in which the knowledge is activated or cultivated.
Theme 2: Distinctive Patterns of Linking Dimensions of Knowledge.

This was the most consistent pattern identified in this study. Individuals and groups of preschool children link the dimensions of knowledge into the nature of knowledge and the process of knowing; they do not appear to do this in an intentional or conscious manner. The most identified patterns of linking the dimensions of knowledge were as follows: (a) simplicity and certainty of knowledge, (b) simplicity and justification of knowledge; (c) certainty and justification; and (d) simple/certain and justification of knowledge. The context of the situation did not seem to have relevance in this study for linking the dimensions of knowledge. However, the content of the information appeared to play an important role; that is, the more familiar or comfortable the child was with the content, the more they used the nature of knowledge and the process of knowing. Whereas, the less relevant the topic was, so that they had very limited resources (i.e., background knowledge, personal experience), the more confined they were to the nature of knowledge, and the more cognitively demanding it was to tap into justification of knowledge. In this study the source of knowledge went virtually unattainable in an explicit manner but did appear to exist in guiding preschoolers implicitly.

Theme 3: Indicators of Cognitive Overload When Probing Outside Their ZPD.

The impact of cognitive overload appears to negatively influence preschooler's epistemologies. In this study, while investigating knowledge below their ZPD, it was recognized that the children can become bored and insufficiently challenged in their knowledge ability. When they were probed beyond a point of discomfort to them (i.e. presumably emotionally), they began to lose interest; that is, they maintained a physical presence, but mentally and emotionally they were elsewhere. After a brief period, they
began a course of disruptive behaviors (i.e., jumping, yelling, screeching) followed by complete disengagement, in which they physically removed themselves from the activity. Once in motion this sequence was difficult to salvage.

Probing beyond a preschooler's zone of proximal development can be epistemologically costly but can be diffused if identified quickly and efficiently. In this case, probing higher than the child's ZPD identified specific cues that the children exhibited to indicate their frustration, confusion, doubt, and anxiety. One thing for sure was clear; preschoolers want to be successful in their knowledge. When they have a sense that they cannot be successful, they become overwhelmed (i.e., cognitive overload).

There were many indicators, both verbal and nonverbal, as it was emerging. For example nonverbal cues identified included the following: poor eye contact, facial expressions of shame and doubt, increased tapping any part of their body, restlessness, anxiety, less attention span, putting their hands over their face, deep breathing. The verbal cues identified included the following: repeating the same word or phrase, coming up with nonsense words or sounds, yelling, squealing, saying "I don't know," "I don't care," and other articulations that emphasized their dissatisfaction.

If these cues of distress were acknowledged and the cognitive load was neutralized, then the child regained productivity on the task. However, if the cues were not respected, then the child skipped the uninterested scenario. When the children in this study arrived at this point, two courses dominated as follows: (a) The child became disruptive and then disengaged, or (b) the child skipped the disruptive episodes and simply removed him or herself from the activity. On the occasions when the latter was the case, it was extremely
difficult to reengage those children in a future activity. This was particularly the case with Carl and Jeremy on an individual and group situation.

**Theme 4: Epistemologies Are Promoted Through Peer Interactions.**

This overall theme impacted the individuals' as well as the group profiles. Preschooler’s epistemologies are portrayed most thoroughly at the developmental level and dimensions of knowledge when they are scaffolded by their peers. This emerged as a consistent theme and surprisingly more so than any other authority in the classroom (i.e., teacher, aides, researcher, books). Peers scaffold the epistemologies of preschoolers primarily in positive ways; cognitively, affectively, and behaviorally.

This theme has been reported in great detail in this chapter, but to reiterate, these categories of peer scaffolding were more powerful in being able to understand the breadth and depth of the child-participants in this study. Cognitively, preschoolers depended on their peers to assist in the sharing of their personal experiences and the activation of their prior knowledge; also they utilized them as a resource to test higher order thinking skills such as decision-making, reasoning, critical thinking (i.e., drawing similarities and differences, arguing their point of view). When preschoolers cannot relate to their peers as source of knowledge, epistemic potential is inhibited.

A similar pattern existed in this study in terms of the process of listening and observing their peers. The positive or negative energy that preschoolers produced for a topic or an activity seriously predicted the nature of the individuals within the classroom. For example, when a child was motivated and interested, he/she was inclined to exert that motivation onto their peers. Often with this age group and in this study, the children are receptive to this type of emotional guidance.
Behavioral scaffolding was also identified as a tool that the preschoolers used to help their peers notice their inappropriate or unacceptable behavior. This characteristic was less predictable than the affective or cognitive scaffolding because the child had to be willing and able to change his/her behavior and get back on-task. Although it was less predictable, it was a common denominator in the successful productivity of the focus group activities in this study.
CHAPTER FIVE

DISCUSSION

This study includes case studies for six participants and provides a glimpse into the developing epistemologies of preschool children individually and through interactions with their peers. The themes that are identified come from individual interviews and focus group activities that were precipitated by observing the children’s engagement with others in an authentic classroom environment (i.e., whole class instruction and center activities). This chapter discusses the preeminent themes that emerged from this study as they relate to personal epistemology and child development research. The chapter is divided into four parts: Part 1 includes the most consistent themes; Part 2 discusses the limitations of the study; Part 3 includes implications (i.e., theoretical, methodological, and educational); and Part 4 brings in ideas for future research in children’s personal epistemology.

Part 1 – Themes

The most reoccurring and consistent themes in the current study are discussed in Part 1. There are three individual themes: peers, affect, and pretense. In addition, there are four themes that were characteristic of the children throughout the entire study: multiplism, group evaluativistic-like traits, linking dimensions of knowledge, and
nonverbal epistemologies. Remember, the current study is exploratory in nature; this type of investigation is necessary for the purpose of tapping into an entirely uncharted field of personal epistemology research with a focus on preschool children. Exploring preschooler’s developing epistemologies is difficult because we know virtually nothing about this area of child development. Therefore, the themes that emerged from the current study are viewed as being somewhat similar in the broadest sense of subjective and objective perspectives. Also, the perspectives that the children demonstrate are not intended to reflect perspectives regarding knowledge as described in the research in adult personal epistemology. However, they are meant to represent the children’s knowledge and understanding about a specific theme and their beliefs about the themes. This investigation is intended to document epistemic patterns in preschoolers. The themes discussed in Part 1 appeared more vehemently throughout the study and are thought to have considerable influence in preschooler’s epistemic development.

Peers and the Personal Epistemology Literature.

Peers are present in the classroom and have personal epistemologies that impact each other. Peers collaborate and use each other as a way to scaffold their knowledge and understanding of what they currently know (i.e. assimilate) and what they do not yet understand (i.e. accommodate) until they reach some equilibrium that satisfies their need and desire to know and understand. The influence of peers on personal epistemology development has been proposed in the literature. Bendixen and Rule (2004) included peers as part of an individual’s epistemological environment in accordance with Piaget’s notion that peers are relatively at the same level of power. Alexander et al. (2002) included a comparison of science lessons and found the student-led groups were more
effective in achieving a deeper level of understanding because the instruction was divided into small peer groups. The peers were able to present the information in terms that those students who may have been unlikely to grasp the concepts in a traditional lecture could understand. In the current study, peers used each other to accomplish focus group tasks. This use of peers as scaffolding was identified when an individual would build on one of his/her peer’s statements or experiences. Peers seem to provide information that leads others to make associations or tap into their background knowledge that the teacher does not seem to promote.

The children in this study were able to tap into their own emotional place and that of their peers. In other words, they frequently made attempts to feel success and accomplishment by helping others, whether it was to keep them engaged or interested, to give instruction, or to help them remember a person’s name. They were in touch with the frustrations of their peers and tried to positively promote success in others. Often, the children would doubt their own and other’s knowledge and were faced with the dilemma to accept or reject their own knowledge or the knowledge of others that required them to change their perspective. Bendixen (2000) found that reflection and social interactions are mechanisms of change in college student’s epistemological beliefs. Using much different content but similar processes, the children in the current study sought to change and be changed through their interactions with each other. What strategies do preschoolers rely on to help the process of epistemic doubt that peers instill in one another? How do they acquire these characteristics? How might epistemic doubt and epistemic change promote preschooler’s epistemic development among peers?
Children in this study used peer scaffolding as a behavioral tool in order to stay on-task, which is consistent with Vygotskian theory. Often, in whole-class instruction, center activities, and focus groups, individual participants both gave and received behavioral support from their peers, which in turn positively impacted their ability to demonstrate their knowledge and understanding.

In recent epistemological research, Valanides and Angeli (2008) found that college students excelled in a group over individual performances. The idea of peer mentoring has become popular within social learning theory. Fair, Vandermaas, Beaudry, & Dew (2005) also used peer scaffolding to examine the context of an ongoing community outreach program in which third-grade children are paired with preschool-aged children once a month to do crafts and other activities. The pairs were observed, and the third graders wrote reflective journals on their mentoring experiences and were interviewed at the end. The results indicated that the children did provide age-appropriate and task-appropriate scaffolding in the craft activities. Also, the reflective journals indicated that the third graders’ metacognition was strengthened by their mentor experiences. In the current study, the focus groups were not arranged to be mentor relationships, however, these characteristics emerged in the data analysis from open-coding procedures. Therefore, all of the children were equal but possessing different strengths and weakness, which they appeared to be aware of and utilized to their benefit. It is in each student’s strengths and weaknesses that the collaborative nature of their knowledge sharing and building was able to profit in the end. They conducted themselves naturally in a way dissimilar to the way they interacted with their peers in an unstructured play setting.
The positive characteristics that may be supporting their personal epistemologies are at an advantage within a semi-structured setting in which peer interactions promote more advanced ways of thinking and knowing. This is an important area for future investigations in the field of personal epistemology at all age groups.

_Affect and the Personal Epistemology Literature._

Bendixen and Rule (2004) introduce the idea of an affective component being present in epistemological development of college students; and evidence from this study strongly supports their notion. Their model corresponds with many of the components of conceptual change, in which Pintrich et al. (1993) proposed that characteristics of motivation be more elaborately investigated. Affective characteristics being so explicit in the current study suggests that researching young children’s role of affect in epistemological development could use further exploration. There seem to be different categories of affective contributions from the children in this study and perhaps this is an area that needs some weeding out or disentangling and more fine tuning. A place to begin would be to distinguish between what is affective as being that which can be observed or extrinsically conveyed (i.e., facial expressions, level of engagement, positive/negative interactions, body gestures) versus that which is emotive or more intrinsic by nature and unobservable (i.e., motivation, mood, interest). In the current study these traits are simply identified as affective characteristics; however, it should not go unnoted that they appeared to be of very different origins.

Decorte, Eynde, and Verschaffel (2002) recognized a trend that has occurred in the epistemological research. Despite the fact that student’s attitudes about math could predict their beliefs about math, as research in educational psychology became more
cognitively focused, there was a parting of the sea. Attitudes about math were viewed as an affective construct, and beliefs became a cognitive construct. They further and report that there was a tension in the field, as some considered beliefs about math as affective while others viewed it as more metacognitive. Regardless, the point is that affective roles continue to be a much needed area of investigation in the field of personal epistemology. Beginning some investigations of this sort in the early years of development may contribute to identifying how affective characteristics relate to our beliefs, perhaps assisting with the debate in the beliefs about math.

In a study of student’s epistemological beliefs Schommer (1993) identified beliefs about simple and certain knowledge, quick learning, and innate ability as being strong predictors of, not only cognitive ability, but also, affective responses. Also, Pintrich (2002) points out that research in the field of personal epistemology has shown that more advanced beliefs are related to student’s ability to adapt or change their motivational tendencies although he does not refer to them as affective tendencies. Is this too close to the math debate? If motivation is an affective construct is it less likely to be linked to epistemological beliefs? Does affect have multiple dimensions, one being emotions and another being motivation? How does the field of personal epistemology categorize these constructs? Perhaps, this is an area that should stand on its own, which provides another suggestion for research in young children’s developing epistemologies; what motivates young children to choose some information or knowledge beliefs over others?

Seemingly, affect versus emotion versus motivation could be an epistemic debate all on its own. Valanides and Angeli (2008) define emotion as, “knowledge, experience, event, or activity that is either directly or indirectly emotionally charged, defined by the
learner’s choice of a word, phrase or clause, and/or the presence of a punctuation of unit” (p. 207). The construct of motivation has been applied in various ways to children in terms of learning; for example, some researchers conceptualize motivation in terms of intrapsychic mechanisms, incentives, self-efficacy beliefs, attribution, locus of control, achievement, and goals (Reeve, 1996). However, few of these theoretical approaches have shed light on how young children integrate learning experiences into their own set of values and how this integration facilitates learning and achievement (Pintrich, 2003). Pintrich and Anderman (1994) explain their conceptual model for student motivation as follows: expectancy components (self-efficacy and attributions), value components (intrinsic goal orientation), and affective components (anxiety). The point here is that affect is an important factor, as evidenced in the current study, to the personal epistemological development of young children.

Theory of mind researchers extrapolated the belief-desire reasoning to the area of children’s emotions and found that emotions could predict belief-outcomes versus desire-outcomes (Wellman 1990). In a multi-experiment study, Wellman & Bartsch, 1988) found that in one experiment four-year-old children have some understanding of desire-dependent emotional reactions (i.e., happiness) and belief-dependent emotional reactions (i.e., surprise). However, a comparison experiment showed that four-year-old children used their belief-desire reasoning not only as a way to predict appropriate actions from beliefs and desires but to predict the emotional reactions of other individuals. The difference in the methods was that in the comparison study the protagonist’s reactions could not be easily predicted because the scenarios were constructed so that they could be construed as happy or sad, depending of the context of the scenario. With specific
emotional components linked to children's understanding of belief-desire and that three-year-olds demonstrate very similarly (i.e. they can explain actions and emotional reactions by falling back on their belief-desire mechanism), it seems a likely avenue to pursue from an epistemic stance, especially, since work in the connection between theory of mind and personal epistemology has broken ground (Burr & Hofer, 2002).

Moving a bit further from the personal epistemological perspective but nonetheless an interesting study with children and emotions, Ambert (1994) drew conclusions about the affective nature of the responses young children gave to a question and answer session about family issues based on their level of attachment to their family members, specifically their parents. She claimed that the reason that the children communicated in such an emotionally charged manner had a direct relationship with how close they were to their parents. Also age was significant: the younger they were, the more their attachment to their parents and the more animated, expressive, and engaged they were in the discussion. The age of the children in this study was two years younger than the children in Ambert's (1994) study, but similar findings resulted. GiGi, for example, had one of the strongest relationships with her parents, and she was also the most expressive of the group.

*Pretense and the Personal Epistemology Literature.*

Pretend is a construct from early childhood development literature and does not exist anywhere in the personal epistemology research, mainly because there is practically no research in this area. However, in the theory of mind literature, pretend (i.e. pretense) is rampant (Astington, Harris, & Olson, 1988; Astington & Jenkins, 1995; German &
Leslie, 2001; Leslie, 1987; Sobel & Lillard, 2001; Sharon & Woolley, 2004; Wellman, 1990) and has been for the past 40 years.

Leslie (1987) asserts that the intricate task of having “beliefs about beliefs” (p. 368) places an information-processing overload on a young child; therefore, they retreat to a less cognitively demanding task, which is pretending (which a child begins to do at between one- to one-and-a-half-years of age). An example is a child pretending that an abstract object is more concrete, like a banana is a telephone. This strategy allows the child to then perform more complex and systematic tasks. This is possible, according to Wellman (1990), because very young children are developing a representational system, and it is this system that allows a theory of mind; they are not one in the same. If this is true and the ability to pretend is scaffolding the child’s ability to have theory of mind, then perhaps pretending contributes to a child’s developing epistemologies in the same complementary fashion.

Children’s nature of pretend is closely linked to aspects of social learning theory. Research with autistic children, for example, can demonstrate the significance of pretend play and interactions with peers. Using pretend play and peer engagement are commonly used as intervention techniques to teach autistic children communication skills. Liber, Frea, & Symon (2008) did case studies on three autistic boys in a public school setting. They found that combining play with the assistance of peer mentoring increased the boys’ ability to engage in pretend play independently and among other peers. The boys also demonstrated a generalization of social skills that were learned during the study. Some researchers (Kuhn, Seigler, Damon, & Lerner, 2006) believe that it is difficult to deny that sensitivity to individual differences is part of children’s early social cognition;
others agree by claiming that it is social cognition that distinguished humans from animals (Tomasello, 2007).

A good deal of childhood pretense research is done in connection to theory of mind (Astonishing, 1993; Bruell & Woolley, 1998; Flavell & Miller, 1998; Harris, Lillard, & Perner, 1994). Therefore the question that arises as a result of the many instances of pretend that were identified in the current study is as follows: what does children’s ability to pretend tell us about understanding their beliefs about knowledge and knowing? This is an area that is, again, virgin to the field of personal epistemology and desperately in need of further research.

Musatti (1993) found a specific type of symmetry among young children’s social knowledge and pretending. The common thread, the socially constructed meaning that underlies all pretend activities, is that all children have a need to make pretending explicit. It is not strictly an internal cognitive phenomenon. Is pretending really some form of practice?

Leslie (1988) argued that children’s pretend is the first sign of a system in action and is an innate cognitive mechanism in which “I am pretending” becomes “I think.” An example is the difference between “I am pretending to be a cow” versus “I think that is a cow.” This is where another potential link between personal epistemology and theory of mind may exist, or maybe it is just that we can learn from theory of mind research.

Moving from “I am pretending” to “I think,” Leslie says, is metarepresentational because it is a secondary representation. Meta implies that it is recursive in nature, just like metacognition is thinking about thinking. If young children are capable to demonstrate
metarepresentational thinking, whether innate or socially developed, it is worth investigating from an epistemological perspective.

In this next section more specific epistemological themes are discussed in relationship to the personal epistemology literature and then some of the broader areas that are influenced by the overall themes that emerged through the study as a whole. This includes themes that were present individually and in the focus groups. Themes are discussed as follows: (a) multiplism, (b) group evaluativism, (c) linking dimensions of knowledge, and (d) nonverbal epistemologies.

Multiplism

Most of the child-participants in the current study were dominantly multiplistic thinkers in that they demonstrated subjective orientations of knowledge and knowing. Olson and Astington (1986) found that children by three-years-old demonstrate signs of epistemological thinking; they make references to their own knowledge. For example they say, “I think” and “I know.” Further, Flavell, Mumme, Green, and Flavell (1992) demonstrated that three and four-year-olds do not always attribute false knowledge to others, and that it goes beyond factual knowledge to values, social conventions, and moral rules, which children perceive to be true. For example, the children are told a story about a girl who believes it is acceptable to put her feet on the table. Then, they are asked if the girl thought it was okay to put her feet on the table. The children responded, “No” in most cases, and the four-year-olds did better than the three-year-olds in the study.

Kuhn and Weinstock (2002) claim that four-year-olds begin to recognize assertions as the expression of someone’s beliefs. This, they say, “is a milestone in their cognitive
development” that opens the doors for further achievement in epistemological thinking (p. 126). If this is true, then the current study and other research with preschool children’s personal epistemology can be effective for gaining deeper insights into the cognitive developmental phase and the connection to their epistemic awareness of the nature of knowledge and the process of knowing.

Kuhn and Weinstock (2002) label the assertions of expressions that four-year-olds have as a realist phase of epistemological understanding because they are copies of an external reality. However, the children in this study presented assertions of facts (absolutist); copies of opinions (multiplist); and copies of judgments (evaluativist). In the current study, some of the children did demonstrate the ability, on multiple occurrences, to shift their thinking across all three developmental levels. Often some probing was required, but this was not always the case. Their knowledge was more malleable within a small group environment rather than individually. Kuhn and Weinstock (2002) describe a multiplist perspective of knowledge as being generated by human minds and uncertain. This would characterize the majority of the responses provided from the children in the current study. They talk about the information coming from their mind, particularly when they explain the differences between what they know in reality and what they know for pretend.

When the child-participants demonstrated their multiplistic perspective of epistemological awareness, they demonstrated knowledge at a factual level. This factual level was associated with fictional stories that are read to them during a whole class instruction, and many of these facts are true in reality such as the uses of a dump truck versus a front loading machine, that your father’s mother is your grandmother, and that it
snows in the winter as opposed to the summer. However, they also demonstrated characteristics that apply to the classroom rules and procedures; they were particularly connected to moral rules such as kindness and fairness, guidelines that they follow for safety, and values that they bring with them from home.

There is much about preschooler's multiplistic epistemology that is of importance. For example, in the current study, although the child-participants appear to be predominantly multiplistic, identifying source of knowledge at all developmental levels (even multiplism) was especially challenging. Olson and Astington (1986) also found that very young children had difficulty in this area. The findings in the current study support this; however, there are some differences of opinion in the literature. Kuhn and Weinstock (2002) indicate that young children are realists and that their understanding of knowledge comes from external sources and is certain. There were instances of inferred external sources of knowledge in the current study; however, these sources were not explicitly indicated by the children themselves, and this raises the question of the children's use of pretend and mimicking. What is the reason for the pretend and mimicking behaviors of young children? Is it really related to the source of knowledge?

Burr and Hofer (2002) looked at the process of knowing (i.e. source and justification) and found that young children developmentally progress from a pre-dualistic phase to a dualistic phase, which demonstrates their ability to provide justifications for their responses and a lack of theory of mind development. Overall Kuhn and Weinstock agree with Burr and Hofer that there is a phase of pre-dualistic development; these findings support Chandler & Carpendale (1998).
This study had a bit different findings because all of the children were prescreened and found to have theory of mind ability, and the multiplism in the current study varied from the pre-dualism found by Burr and Hofer (2002); however, simplicity of knowledge and certainty of knowledge were also investigated in the present study. There needs to be more research to understand the developmental coordination of objectivity and subjectivity.

There is another finding from the current study that applies to the children's multiplistic perspectives: egocentricity and egocentric speech. This seems to apply most closely to multiplism because of the subjective way that the children identified with new and existing knowledge. Piaget defined egocentricity and egocentric speech as indicators of cognitive immaturity and indicated that it was a child's inability to account for the perspective of others (Smith, Dockrell & Tomlinson, 1997). However, it was not in this type of context that it emerged in this study and is not described with the same likeness; in fact it is quite the opposite. When egocentric speech or behavior was identified in this study, the children were typically in the midst of collaborating with peers and acknowledging multiple perspectives. The egocentrism observed in this study was demonstrated as behavior that was motivating the children to compete with their peers in a productive manner or speech that assisted the children during their thought process and made some of their thinking visible as they thought about difficult topics. This is more representative of what Vygotsky viewed as private speech (Smith et al. 1997). Vygotsky (1987) emphatically opposed Piaget's notion of egocentric speech, proposing that private speech was not egocentric because it occurred when young children are presented with cognitive obstacles and is representative of their attempt to be self-guiding. Today and in
this study it was related to self-regulation or self-regulated learning. Vygotsky believed that private speech helped children reflect on their own behaviors and played an important role in cognitive development (See review of studies, Bivens & Berk, 1990).

Group Evaluativism

One of the overall themes in the current study was group evaluativism. This study used focus groups consisting of three children, and the topics were integrated with the classroom theme of the week. The combination of these two methods seemed to aid the children’s thinking in that they were topics that the children were familiar with and because the theme was consistently repeated in different activities throughout the week. Thus, the children became more confident in their knowledge and understanding of the topics. The focus groups were made up of their peers; therefore, the setting was familiar to them and building trust within the group was not as complex as it was in an individual interview. Although some of the children demonstrated the ability to construct knowledge from all three developmental levels and all four dimensions of knowledge, this was not a reoccurring theme in the study; however, their ability to demonstrate group evaluativism within the focus groups did reoccur. This epistemological perspective occurred most frequently in the pre-instructional groups in which the topics were familiar to the children outside of the classroom, such as, monsters and family, and in the post-instructional focus groups when the topics were monsters, family, and construction. Remember, that Group 3 was intentionally chosen by the researcher and included the three children that demonstrated the most epistemic potential during the first two weeks of the study.

These three children were those whose individual themes were discussed earlier in this chapter. Also, it is characteristics and themes that they consistently demonstrated
throughout the study that may have contributed to the advanced epistemological perspectives that were generated by all three of the children drawing on their prior knowledge and past experiences. One of the characteristics that may have contributed includes the ability to use peers as a scaffold in every facet of development (i.e., cognitively, emotionally, and behaviorally). These areas were emphasized by these three children repeatedly. They continually built on each other’s knowledge and experience almost in a competitive nature. They listened to each other, often agreeing and disagreeing; they were emotionally supportive, in that they motivated and prompted one another. They all had positive attitudes toward the activities and wanted to learn, and they did not tolerate inappropriate behaviors from their peers, often redirecting negative behaviors and attitudes.

Winsor (2005) found a comparable theme with preschoolers using a similar methodology and a systems approach that will be discussed in greater detail in the future research section of this chapter. Kuhn and Weinstock (2002) address the importance of epistemological understanding in young children and claim that we need to be concerned with the very limited amount of evaluativistic thinking in adults. Perhaps looking closely at how small groups of preschool children interact and communicate their knowledge could be compared to how groups of adolescents might respond in a group environment using a similar methodology. Would we see the same group evaluativism in adolescents and in adults?

Maturation, educational experiences, and life experiences are thought to aid epistemological development, but evaluativistic thinking is rarely identified in adults. This study is not suggesting that a group of preschoolers are more epistemologically
advanced than adults (Hofer & Pintrich, 1997), but that group evaluativistic-like thinking did emerge in the current study in the children’s language and behavior. This was possible because they were using knowledge that was developmentally appropriate, and they demonstrated the ability to construct knowledge that links subjectivity with objectivity.

The preschoolers in this study generated evaluativistic perspectives that dealt primarily with their certainty of knowledge and justifications of knowledge. What is it about certainty of knowledge and justification processes of knowing that could make evaluativistic thinking even imaginable in preschool-age children? Perhaps the window of opportunity for evaluativistic thinking is quite small and includes educational experiences more so than life experience or maturation. What is meant by this is that, perhaps it is the demands made upon students in structured classrooms or learning environments (rather than the duration of education) that promotes this way of thinking, and in the unstructured daily routines of life we are pigeon-holed. This would mean that our inability to think evaluativistically goes deeper than the amount of education and is more a result of societal or cultural ways of life (i.e., how we teach individuals how to think, learn, and solve problems).

Linking Dimensions of Knowledge

The lack of research with young children has made way for researchers to speculate conceptually regarding the beginnings of personal epistemological development. Chandler, Hallet, and Sokol (2002) point out that, regardless of the age, the participants studied thus far demonstrate similar patterns of thinking and seem to have similar starting points. There are five arguments for this phenomenon, and Chandler, Hallet, and Sokol,
(2002) propose three of the five: (a) Early onset suggests that young children have more sophisticated epistemologies than can be predicted based on studies of college students; (b) recursion is conceptualized as a spiral-like development in which epistemological stages continue to occur and reoccur in a cyclic process, rather than in a linear motion; and (c) suppression suggests that prior to entering school and during school children’s advancing beliefs are discouraged which prompts them to suppress their epistemological development until adulthood.

Two other arguments can be identified in the literature: (d) late onset supports the idea that true epistemological development does not begin until students reach higher academic environments, and researchers have been overestimating the ability of young children (Perry, 1970; King & Kitchener, 1994), and (e) domain dependence suggests that early epistemic thinking is dependent on the domain in question. For example, young children may demonstrate multiplistic epistemological perspectives about subjective knowledge (i.e., personal judgments or procedural knowledge), and, on the other hand, not demonstrate objective-type-knowledge (declarative knowledge) until much later (Kuhn & Weinstock, 2002; Mansfield & Clinchy, unpublished). One of these alternatives may be more valid than another, but it is much too premature to make this judgment.

Dimensions of knowledge involve the following: the nature of knowledge, which pertains to the simplicity and certainty of knowledge; and the process of knowing, which pertains to the source and justification of knowledge. There are three patterns that emerged in terms of dimensions of knowledge throughout this study: (a) the way in which simple and certain knowledge are coordinated, (b) the alignment of the nature of
knowledge (simple and certain) with justification of knowledge, and (c) the absence of
the child-participants overt utilization of sources of knowledge.

In this study the nature of knowledge is the overwhelmingly predominant way the
preschoolers constructed their knowledge; the successful integration of new information
was seen as complex and uncertain. This harmony between simplicity and certainty of
knowledge was demonstrated regardless of the developmental level; in addition, this was
the only pattern that did not have any bearing on the content of the information or the
context of the interactions. They continually synchronized these two dimensions of
knowledge to the point that they could be considered one dimension that consists of
interdependent parts in a definite pattern of organization (i.e., perhaps unpacked too
much). When their knowledge was conveyed as simple (i.e., single word responses, such
as, "yes"), it was also certain (i.e., "I know", confident dispositions, good eye contact,
enthusiasm); conversely, when knowledge was complex (i.e., integrating new
information with prior knowledge or past experiences; observations) they acknowledged
that it was uncertain (i.e., "I'm not sure," "I don't know, maybe").

The child-participants in this study demonstrated an obscure distinction between
simple and certain knowledge, so much so that often identical units were coded as both
simple and certain knowledge. For example, at times it was difficult to assess Adam's
simple knowledge from his certain knowledge; they seemed to have a great deal of
overlap, and there was a tendency to link them together. He began with simple and
certain views of knowledge, but, when probed, his knowledge appeared more complex
and uncertain. However, when his knowledge was simple and certain, he was more
affectively and behaviorally stable in his performance. When knowledge shifted to more
complex and uncertain, he became curious and engaged the teacher in a line of questioning. When he made connections to prior knowledge or past experiences, he remained engaged and on-task, but if his questions did not yield advancement in his understanding he became disengaged and disruptive. He did appear to contemplate his responses for a moment, but once beginning he was quite spontaneous. He made strong associations among the classroom topic and instances of play with his friends and interactions based on rules with his family. When he discussed his mother, it dealt with associations that were affective in nature. He regularly compared himself to characters in the stories in terms of their emotional disposition and incorporated experiences he has had with his mother.

GiGi was another good example of linking simplicity and certainty of knowledge. Dimensionally her knowledge was characteristically more complex and uncertain. Regardless of the level of development, GiGi expressed her knowledge most commonly in terms of the nature of knowledge (i.e. simple and certain). This theme appeared to be strongly connected to her familiarity with a topic. When she had limited knowledge and experience, she demonstrated knowledge as simple and uncertain. However, the more background knowledge and past experience she seemed to have about a topic, the more her knowledge was interpreted as more complex and certain. The more her knowledge was probed, she maintained the complexities of her knowledge but shifted to a more uncertain perspective of knowledge. Interestingly, when the simple and certain dimensions were questioned in more depth to uncover the process of knowing dimensions, she was able to link simple and certain knowledge with justification but rarely source of knowledge.
The second dimensional pattern that garnered attention was the integration between simple and certain knowledge and justification of knowledge. The overlapping of simple and certain knowledge from the previous dimensional pattern remained a constant when probing knowledge and understanding for the process of knowing (i.e. source and justification). This pattern involved the children linking one or the other, simple or certain knowledge, or both in alignment with justification of knowledge. This idea of aligning the nature of knowledge and the process of knowing is another pattern that happened liberally throughout the study and without very much probing. In many cases they spontaneously offered some justification for what they were verbalizing and often it was accompanied by an increase in their nonverbal communication. When their thinking was more complex or sophisticated, they had a tendency to be more active in their expressions (i.e., facial expressions, body gestures, using items nearby as pretend objects, use of emotional energy to indicate meaning).

The third dimensional pattern that was identified on the individual level was the diminished ability or absence of the source of knowledge. Source of knowledge was the least referenced of the dimensions of knowledge throughout the study by all of the participants. They were less inclined to overtly articulate their sources of knowledge independently or when probed although they did regularly implicitly reference internal and external sources of knowledge in their responses (i.e., “mommy,” “daddy,” “the book,” “at school,” “at home”). They rarely could answer a direct question related to the source of knowledge such as “How do you know the rules in the classroom?” or “How do you know that the momma bear knows the baby bear is hiding in the snow?” When faced with these types of questions, they responded using a combination of certain and
justification of knowledge. There was an increase in the nonverbal indicators of knowledge and understanding or a use of the combination of verbal and nonverbal markers. When these patterns began to emerge (i.e. cutting-off their words and using more nonverbal traits), the books were removed as an anchor to see if they would identify the source of knowledge using their words rather than pointing or using other nonverbal means of identifying how they know. When anchors were removed, they continued to struggle with source of knowledge questions; signs of frustration and cognitive overload emerged and escalated.

There is very limited research in preschoolers' personal epistemology to compare these findings with, and the ones that are in the literature do not have the same amount of in-depth detail to compare adequately. Burr and Hofer (2002) did have a similar finding, that preschoolers do transition between subjective and objective understanding of knowledge; however, the current study details the social and emotional characteristics that support the developmental patterns. The lack of this research is a good reason to pursue it in more depth.

**Verbal and Nonverbal Epistemologies**

So far, there has been discussion about patterns related to developmental levels and dimension of knowledge; however, there is another pattern that, in the end, appears in the developmental patterns and the dimensional patterns and has been alluded to thus far. Throughout the study observations of verbal and nonverbal ways of communication began to take shape; initially it was noticeable as indicative of developmental shifts but later was observed in the transitions between dimensions of knowledge as well. The three patterns were as follows: (a) verbal only, (b) nonverbal only, and (c) a combination
of verbal and nonverbal communication. Is this pattern in communicating learned? Is it an early childhood development trait that is somehow connected to early language development? Is it linked to affective dispositions (i.e., interest, attachment)? Is it a characteristic that is a result of excitement and increased psychomotor activity? Could it be that children incorporate this as a tool to assist them in conveying their knowledge and understanding? These are all compelling questions that make this area fertile for investigation because it is right on the surface, so not much digging is required; however, it is an impression that it may very well be a complex trait to decipher.

As a case specific example, and by no means was this identified in all of the participants, GiGi was the child who was the most intrinsically affective while demonstrating her knowledge. At an absolutist level she was primarily verbal in the way she conveyed epistemological thinking. When communicating multiplistically, she maintained a large part of her verbal ability and incorporated appropriate levels of nonverbal expressions, and animated perspectives. At an evaluativistic level the nonverbal had overridden the verbal; and at times she was even completely nonverbal. The nonverbal instances typically occurred when the cognitive load of the questions or the information was far above her ability level, with or without assistance. GiGi demonstrated more nonverbal body gestures to assist her verbal descriptions; this prompted a bit more psychomotor activity (i.e., moving around the room, flailing her arms and legs) and confused expressions (scowling, poor eye contact, talking more softly).

There is no investigation of the ways in which children, adolescents, or adults communicate their epistemologies or investigations of how individuals behave when they
report their epistemological beliefs. This was an interesting realization, considering that one of the central components of most researchers’ recommendations for future research indicates that we still do not know how individuals know what they know. It seems that our behavior is, in many ways, how we wear our thoughts on our sleeve. For example, often we do not have to ask someone if they like asparagus; we can just tell by their behavior.

Although behaviorism is not the paradigm of the time, it once was held in the highest regard in this country; portions of the theories continue to be recognized in certain fields. However, we fail to watch what people are not saying. One of the perspectives in family therapy is to ask questions, not for the purpose of hearing what the individual says but, rather, to watch how they behave and listen to what they tell you with their body. This perspective seems to apply to research in young children because they say a lot with their nonverbal communication. Surely the argument is that the inferences would be purely subjective and not proven as true; however, one of the methodologies that will be discussed later is observation. With sound observation skills, reliable methods, and rigorous data analysis, perhaps legitimate and useful information could be used to generate more empirically-based research, but it must begin somewhere.

Doherty-Sneddon’s (2003) book, *Children’s Unspoken Language*, magnifies a topic that has been largely underestimated or overshadowed by child development’s preoccupation with language development. This book goes from infancy to middle childhood, well after early language development. The central focus of the book is to present nonverbal behavior as a critical part of children’s communication skills. She provides a portal with which to more clearly see many of the social, emotional, and
cognitive development that was present through the current study and is referenced throughout this discussion. The important part of the book is that it makes a practical attempt to teach adults how to interpret and respond appropriately to hidden meanings in children's nonverbal behaviors that are commonly overlooked or misinterpreted. She describes four nonverbal channels: hand gestures, eye gaze, facial expressions, and touch. Doherty-Sheldon's own work is in how gaze aversion can be used as a reliable index of children's readiness to learn something new within their zone of proximal development. This would be a good reference to assist researchers with a starting point.

An account of the children's communication patterns was acknowledged; however, as was the case with the affective characteristics, in-depth systematic analysis of possible underlying meanings was conducted. In the future it may be that the data is reanalyzed to include more in-depth looks at both the communication themes and the affective themes. There were a few ideas that came to mind during the data collection as the children continued to demonstrate the combination of verbal and nonverbal behaviors. I will share them as things to think about in future research of nonverbal communication specifically: (a) Nonverbal behaviors seemed to label, make, or punctuate their words; this seemed to be a way to gain acceptance from their peers; (b) when they received acceptance from their peers, the child has more likely to make a claim, to "know;" (c) the more a child claimed, "I know," the more children listened and watched that individual; generally, these children were the leaders in the group; and (d) in terms of the patterns of communications, peers were active as judge and jury or organized an epistemic court as to the right or wrongness of the individuals knowledge or experience.
Part 2 - Limitations

Methodology

Qualitative Research Considered Too Subjective

The current study is a qualitative research study, and some would argue that it is a purely subjective account of the researcher's point of view, rather than empirically-based evidence (Boyd, 2001; Denzin & Lincoln, 1998; Munhall, 2001). Thomas Kuhn (1962) introduced the term “paradigm” and the social sciences have debated quantitative versus qualitative research for decades. Nevertheless, many other psychological researchers questioned statistically-based research in favor of qualitative research (Merriam, 2002). They argue that statistically-based research is invalid because it ignores context and concentrates on tiny parts of phenomena rather than on the phenomena as a whole. They also argue that quantitative research assumes a unitary reality, which does not exist, since researchers’ perceptions of reality are influenced by their individual perceptions and predispositions.

These criteria, however, are based on debatable assumptions. For example, the traditional scientific method concept of reliability has been rejected by many qualitative researchers in part because some types of reliability require repeated observation; qualitative researchers say this “is impossible” (Lincoln & Guba, 1985, p. 186). They have proposed a qualitative analog to reliability in the following terms: “dependability,” “trustworthiness,” “credibility,” “transferability,” and “confirmability” (Lincoln & Guba, 1985, p. 193). This requires researchers explain how changes in context produced changes in observations. However, claiming that repeated observation is impossible does not demonstrate that the traditional psychometric concept lacks utility, even if repeated
observation is in fact impossible. Furthermore, requiring researchers to explain how changes in context produced changes in observations raises the psychometric issues of reliability and validity. The current study attempted to address these issues in the design, data collection, and analysis phases of the project.

Lincoln and Guba (1985) assert that distinctive qualitative and quantitative research paradigms do not exist because there are many research methodologies defined as qualitative which differ in underlying perspectives. However, qualitative research still is equated as being a “naturalistic and interpretive” research paradigm (Lincoln & Guba, 1985, p.21). Qualitative researchers have developed major paradigmatic research positions that reflect the complexity and rigor of qualitative research: positivism, postpositivism, critical theory, constructivism, and participatory (Denzin & Lincoln, 2005).

The current study is a case-study design which is depicted as congruent with one of the paradigms, with specific philosophical underpinnings and is associated with distinct research methodologies that have been developed by scholars (Denzin & Lincoln, 2005). However, despite the evidence resulting from qualitative research, it continues to be criticized for lack of rigor (Denzin & Lincoln, 1998). Silverman (2000) discusses approaches to evaluating the rigor of qualitative research (i.e., field notes, interrater coding, deviant case analysis, contextualizing data). This research adhered closely to the guidelines of qualitative research from the research design through the data analysis procedures.

Creswell (1998) defines a case study as, “An exploration of a bounded system or a case over time through detailed, in-depth data collection involving multiple sources of
information rich context” (Creswell, 1998 p. 61). This study involves multiple cases and multiple sources of data. Creswell (1998) and Merriam (1998) also recommend using multiple instances or events as a means of gaining a more in-depth perspective, particularly with young children. Using case study analysis in terms of individuals and groups provided a systematic way of looking at specific phenomena, collecting data, analyzing information, and reporting the results (Ellet, 2007). As a result, the researcher gains a sharper understanding of why and how the instance/s have occurred and what might become more important or worthwhile to research in the future. Case studies lend themselves to both generating and testing hypotheses (Merriam, 1998). This was especially important to the current study because research into very young children’s personal epistemologies is new and still exploratory; therefore, the case study design assisted in keeping the individuals and characteristics about them independent and organized until it was time to integrate them for analysis.

Methodology Considered Leading

Another benefit of the case study design was that it allowed for data collection to occur in an authentic learning environment. None of the daily activities were altered but rather were elaborated upon to get a more in-depth perspective of the thinking patterns of the children.

The constant comparative method is recommended in case study research. Bogdan & Biklen (2003) provide steps for using this method, and they were slightly adapted to account for the multiple levels of analysis that were required to thoroughly use the epistemic matrix and also to account for the multiple data sources. Using the constant comparative method contributed incredibly to the rigor of this research. It required that

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data was reviewed multiple times during data collection and again during data analysis. During data analysis, the data was analyzed at multiple times, according to multiple processes (according to the epistemic matrix), and for multiple weeks. During data collection the data was evaluated to construct more specific inquiry for follow-up interviews and peer focus groups (Corbin & Strauss, 2007).

Case studies are socially-constructed research approaches situated between concrete data collecting techniques and methodological paradigms and function as a tool that can assist in theoretical development as is necessary for investigating children’s epistemological development (Charmaz, 2006; Hancock & Algozzine, 2006). In hindsight, this was the best possible method for this type of research. One of the major themes that resulted from this research was that preschooler’s personal epistemologies appear to flourish when they are socially-constructed. According to Bogdan & Biklen (2003), “If you want to understand the way people think about their world and how knowledge is formed, you need to get close to them, to hear them talk, and observe them in their day-to-day lives” (p. 32).

Conducting a case study provides an opportunity to utilize the researcher’s background knowledge and previous experience to capture the “essence” (van Maanen, 1988, p. 78) of the child’s subjective voice. The role of the researcher in the current study was to become involved in the children’s “conceptual world” (Bogdan & Biklen, 2003, p. 55) and to gain a deeper understanding of their experiences and the meaning of these experiences.
Participan ts and Measurement

Small Sample Size

The current study had six child-participants and three focus groups. This small number of participants makes generalizability difficult (Creswell, 2003). There are several reasons for having such a small sample size. Probably, the biggest reason is that generalizability was not the purpose of the study. Researching very young children's personal epistemologies has not been done in-depth; primarily this research is based on speculation with only a couple of published research studies (Burr & Hofer, 2002; Moschner, Anschuetz, Wernke, & Wagener, 2008). Therefore, this research with children is exploratory. Bogdan & Biklin, (2003) recommends qualitative case studies to accomplish in-depth investigations of this nature. Another reason a small sample size was chosen was due to the delicate nature of researching very young children. Building a relationship as a priority (Flavell, Green, & Flavell, 1995) takes individual time and a focus on the needs of the children. A pilot study was conducted (Winsor, 2005) to assist in perfecting the design for the current study. The pilot used 28 students in the Cricket classroom, and it was simply too many children to conduct such a detailed and complex investigation.

Participants' Ethnicity and Socioeconomic Status

Although the study was conducted in a public preschool that included children from diverse cultural and socioeconomic backgrounds, the child-participants in the study are primarily from white middle-class backgrounds. This was not an intentional choice, but very simply a decision based on prescreening assessment results, children whose parents would consent to the research study, and children who were consistent about attending
the preschool on a regular basis. For reliability and validity of the study, it was important to have willing and consenting children and parents. In addition, it is important to have all of the participants exposed to the same procedures (Creswell, 2003). For example, if a child is not present for a day during whole class instruction, he/she misses the story, plus an individual interview to follow-up with the story and his/her peer's contributions; therefore, the child misses a critical piece of the study going into the Friday focus group. This makes the data less reliable and valid because of the gaps created from when he/she was not present in the classroom.

Child-Participants’ Age

Limited research. As mentioned earlier, researching very young children’s personal epistemology is strongly supported in the field (Burr & Hofer, 2002; Haerle, 2005; Kuhn, 1991); however, it is not a staple in personal epistemology research to date. This alone makes this type of research quite difficult and challenging. In contrast, child development researchers have been investigating children for centuries and have a significant amount of guidance (Astington, Harris, & Olson, 1988; Flavell, Green, & Flavel, 1995).

Limited cognitive ability. Despite the tremendous support in the field, there are skeptics who question the cognitive ability of three- and four-year-old children in terms of having or being capable of communicating personal epistemologies. Perry (1970) and Kitchener (1994) concur with this perspective, believing that true epistemological development begins during the college years. This epistemological perspective is known as “late onset” (Burr & Hofer, 2002, p. 206) and claims that researchers have incorrectly assumed that other cognitive constructs that develop in early childhood can predict
epistemological development, thereby under estimating the epistemic ability of very young children.

Preschoolers may have limited cognitive ability as compared to adult cognitive ability, but they demonstrate distinct characteristics that perhaps foreshadow adult thinking in a number of cognitive developmental areas. Knowing more about children’s cognitive and metacognitive abilities as they relate to their developing epistemologies can be useful if they are perceived as contributing factors to their beliefs about knowledge and knowing. For this to be cultivated, their behaviors and interactions need to be investigated in-depth.

*Questioning what is being measured.* There may be a question in the minds of some scholars as to whether what is being measured is really beliefs about knowledge and knowing or rather their knowledge about a specific topic (i.e., monsters, winter, construction, family). This study looked closely at the children’s words and behaviors to identify the underpinnings of their knowledge; these topics were used as tools to identify how they construct their knowledge from an epistemological perspective. It is true that preschoolers do not demonstrate verbal ability to identify their belief about knowledge although they do attempt it; however, they can and do demonstrate overt language and behavior that conveys an implicit belief about their knowledge and ways of knowing. For example, they are compelled to try to provide information even when they do not know. This can be viewed as the belief that successful knowledge comes from hard work and effort. They constantly link new information to prior knowledge and past experiences which is consistent with thinking or knowing that successful knowledge is complex. This study has provided numerable instances of evidence that support how
very young children demonstrate at least the use of beliefs about knowledge and knowing even if not the ability to articulate it overtly.

Part 3 - Implications

Theoretical Implications

The findings from this study offer new and innovative theoretical significance; themes that emerged throughout the study suggest that preschoolers demonstrate identifiable epistemological patterns according to developmental levels and dimensions of knowledge. However, there need to be further investigations of this type to make clearer distinctions between adults’ and children’s epistemic development. This may require adapting the current terminology within the adult personal epistemology literature to be more fitting for the epistemic experiences of preschoolers. These themes are discussed now: (a) Future research with very young children can be productive and informative for the direction of gaining knowledge about early onset of personal epistemology; (b) it serves as a beginning look into aspects of epistemological growth and may help us understand developmental issues such as recursion (Chandler, Hallett & Sokol, 2002); (c) combining developmental levels and dimensions of knowledge provides a more detailed perspective of epistemological development; (d) the epistemic impact of social and behavior indicators of children’s Zone of Proximal Development can be understood; (e) the moral development and social conventions may parallel preschooler’s epistemology; (f) it supports how a systems approach can impact epistemic ability; and (g) knowing more about early onset of personal epistemology can assist in clarifying the
role of epistemology in other cognitive constructs such as metacognition, motivation, self-regulation, and self-efficacy.

*Insights into Early Onset*

Maybe young children are more epistemologically gifted in their reasoning ability than has been assumed by the researchers in the past (Baxter Magolda; 1992; King & Kitchener, 1994; Perry, 1970). Chandler et al. (2002) and Burr and Hofer (2002) show that perhaps there is a multiplist-like epistemic stage prior to absolutist perspectives. King and Kitchener (1994) looked at students from high school to college and determined that the cognitive measures used with adults to identify epistemological beliefs are too complex, causing younger participants to struggle to understand them. Little-by-little the age that researchers are identifying epistemological beliefs in is decreasing (Burr & Hofer, 2002; Carpendale & Chandler, 1996; Chandler & Lalonde, 1996; Kuhn, Cheney, & Weinstock, 2000; Mansfield & Clinchy, 2002; Moschner, Anschuetz, Wernke, & Wagener, 2008). There is much to be learned about the early onset of epistemological development, and we need to get clear about the underlying cognitive mechanisms that differentiate an epistemic stance (Chandler et al., 2002). Even if researchers in the field of personal epistemology or early childhood cognitive development have their doubts about whether the findings with very young children are truly epistemological, given the recent trends in the adolescent epistemic research, it is necessary to be actively pursuing research with younger children as a way to get more breadth and depth in our understanding of cognitive mechanisms.

The current study suggests that researching preschooler’s personal epistemologies is productive and informative for gaining knowledge, which supports the early onset
argument. It supports findings that young children have the capacity to demonstrate epistemologies at a developmental level and a variety of dimensions of knowledge. They demonstrate individual epistemologies that shift between absolutist and multiplist perspectives of knowledge. The multiplist phase could be consistent with Burr and Hofer's (2002) of a new pre-dualistic phase. However, further research is needed in this area to clearly identify it in either direction. Another finding that seems to overlap between the current study and Burr and Hofer (2002) is the essence of egocentric subjectivity that the children presented, and more research is needed in this area to more clearly identify the origin of this characteristic. Burr and Hofer (2002) identify egocentric subjectivity as paralleling Piaget's notion in that it corresponds to a lack of cognitive maturity; however, in the current study, it was viewed as more matching with Vygotsky's developmental theories and appeared to contribute to advancing the children's ability to think epistemologically.

In the current study one of the group findings that stands out in the research of children's epistemologies and contributes to early an early onset argument is the idea of group evaluativism. Pre-instruction and post-instruction focus groups were conducted based on the whole class instruction as a way to simulate more in-depth discussions. With a smaller number of children, everyone was able to speak, and the researcher could ask more probing questions. Because of the fewer behavioral disruptions, there was more of a focus on a specific epistemological area specific to the individuals. More importantly, the focus group activities allowed for a closer investigation of the interactions between the individuals and their peers. This resulted in evidence that, collectively, supports that preschool children were able to construct an epistemological stance consistent with
evaluativism or naïve evaluativistic-like. In other words, as a group, they were able to stay on the same topic and shift between the objective and subjective while contributing justifications of their understanding.

Information on Recursion

Recursion is a developmental pattern that suggests individuals are exposed and re-exposed to the same epistemic issues at different milestones in their development (Boyes & Chandler, 1992; Chandler, 1987). This type of pattern represents a trajectory that is more spiral in that similar patterns are repeated numerous times throughout lifespan development. This is opposed to a linear trajectory in which a specific epistemological course is taken from start to finish and not repeated as in Piaget's Stages of Cognitive Development. In a linear trajectory an individual must satisfy the requirements of one stage before being able to successfully move to the next stage of development. This would not be the first time that a recursive pattern in cognitive development has presented itself. Several researchers (Boyes & Chandler, 1992; Chandler, 1987; Eckensberger, 1983; Overton, 1998; Zelazo, 1999) have found that children construct and revise “mental models” several times (Overton, 1998, p.111), and Kuhn (1989) compares children to scientists in her explanation (p. 678).

Knowing more about the early onset of children’s personal epistemology can contribute to a recursive trajectory theory. There are other developmental patterns and trajectories that can be informed or argued against with more information from children’s epistemological development such as late onset, suppression, or domain-specific versus domain-general trends in epistemological thinking. This is an area that the entire field could benefit from in terms of lifespan development.
Integrating Dimensions and Development to Improve Models

Until recently there have been two separate ways of looking at personal epistemology; one way is through developmental levels (i.e., absolutist, multiplist, evaluativist) (Baxter Magolda, 1986; Belenky et al., 1986; King & Kitchener, 1994; Kuhn, 1991; Perry, 1970), and the other is through dimensions of knowledge (i.e., simple, certain, source, justification) (Hofer, 2004; Schommer, 2002; Schraw, Bendixen, & Dunkle, 2002). There is a variety of research that has begun to disentangle the dimensions of knowledge including epistemic cognition (Kitchener (1983), epistemic reflections (Baxter Magolda, 1992), simple ways of knowing (Belenky et al., 1986), personal epistemology as theories (Hofer & Pintrich, 1997), as resources (Hammer & Elby, 2002, 2003), adding beliefs about learning (Schommer, 1990, 1991, 1993), argumentative reasoning (Kuhn, Cheney, & Weinstock, 2000), and epistemic doubt (Bendixen & Rule, 2004).

Integrating the levels and dimensions of knowledge in the form of a matrix (i.e., three developmental levels and four dimensions of knowledge resulting in twelve very specific cells) allows for more fine-grained perspectives. On the other hand the matrix could provide information that suggests that some of the dimensions are more similar to one another. For example, the children investigated in this study appear to use simple and certain knowledge together, rather than as two separate dimensions of the nature of knowledge. When they are asked simple knowledge questions, they respond with simple and certain knowledge responses and vice versa.

Another interesting finding in this study is that, regardless of the developmental level of the question, the children have difficulty explicitly stating their source of knowledge.
Gopnik & Graf (1986) found that three-year-olds have difficulty in identifying and remembering their sources of knowledge even when given explicit training in identifying sources of knowledge. Wimmer, Hogrefe, and Perner (1988) found similar results but further found that the children had difficulty stating the sources of their beliefs, whether they were their own beliefs or someone else’s beliefs.

Researching young children’s personal epistemologies from a developmental perspective as well as considering the dimensionality of their knowledge and knowing will contribute to the depth and breadth of the literature regarding the nature of knowledge and the process of knowing overall. This line of research could also be useful to researchers in child development and cognitive development as well.

The epistemic impact of indicators of children’s Zone of Proximal Development.

The zone of proximal development (ZPD) is a sociocultural perspective from Vygotsky’s theory of cognitive development, commonly referred to as sociocultural theory (Wink & Putney, 2002) because it maintains that how we think is a function of both social and cultural influences. In this theory, there is a difference between what children can do on their own and what they can do with assistance. What the child can do with assistance from others is referred to as the zone of proximal development. According to Vygotsky (1969), children with greater zones of proximal development can usually experience more cognitive development when information or instruction is aimed just above the lower limits of their zone of proximal development.

The zone of proximal development was clearly identifiable in the current study through the children’s verbal responses and nonverbal behaviors. The children in this study explicitly guided the researcher to their appropriate zones. This may be best
explained with an example. When a question was asked that was below their zone of proximal development (what they can do independently), they could easily respond and did so spontaneously and appropriately. When questions remained below their zone of proximal development for extended periods of time, or if questions of the same caliber were repeated but in a different way; the children would begin to show boredom and eventually cause behavior disruptions. When the questions or the discussion was just within the lower limit of their ZPD, they were interested and engaged, which meant the data was rich with epistemological perspectives, and the activity was epistemically productive. However, if the line of questioning was at the top of the ZPD, the children demonstrated completely different behaviors that were more consistent with cognitive overload. They would attempt to respond, but often their responses did not make sense, or the child retreated to a form of pretend knowledge that might or might not be coherent but not relevant to the question. They would demonstrate many signs of cognitive overload such as, facial expressions of confusion and frustration, and body gestures like putting their hands over their face, banging on the floor, and nervousness and shame. However, they would continue to be actively engaged and motivated until the breaking point. The peak of this experience did not, however, end in disruptive behavior, but rather just disengagement, wherein the child would just walk away or begin to daydream. On the other hand, when the questioning was above their ZPD, there was a brief instance of confusion with no attempt to engage, followed by the disruptive behaviors. In this way the children were aware and communicative regarding what they could do alone, what they could and would do with assistance from their peers or the researcher; and what they could not and would not attempt with or without assistance.
Vygotsky’s sociocultural theories of cognitive development are making their way into the field of personal epistemology. Bendixen & Rule (2004) propose support for personal epistemology to investigate more social and cultural domains that may relate to an individual’s developing epistemologies. Baxter Magolda (2008) calls it a Learning Partnership Model that portrays knowledge as complex and socially constructed. Muis, Bendixen, & Haerle (2006) developed a culturally inclusive model of epistemic beliefs while others are exploring additional sociocultural aspects of epistemological beliefs (Tabak & Weinstock, 2008).

Cognitive change takes place in the zone of proximal development. Newman et al., (1989) liken it to a “construction zone” (p.304). Adults are most commonly thought of as the developing child’s support system, but some of the findings in the current study suggest that peers can also provide a support network for work within the zone of proximal development. How do the roles of adults and peers resemble one another, and how are they different? This will be discussed in future research in terms of the student/child-teacher relationships involved in learning. It is within these relationships that the cognitive processes of children develop and change. Many of the sociocultural themes that were identified in the current study and the application of Vygotsky’s theories begin to be consistent with the Process Model of Epistemic Belief Change (Bendixen, 2002).

Preschool children experience a large amount of social development, going from home to a learning environment for the first time, making friends, following new rules, and generally discovering a world away from their family. Due to the recent trend in personal epistemology research to embrace and apply Vygotsky’s theories, researching
preschooler’s developing epistemologies is fertile ground. Therefore, centering young children’s developing epistemological perspectives around the ZPD is an inviting link.

_Moral development and social conventions_. Moral development is the process through which children develop proper attitudes and behaviors toward other people in small (classroom) or large (society) environments, based on social and cultural norms, rules, and laws (Snowman, McCown, & Biehler, 2009). Research suggests that moral judgment and reasoning is impacted by social characteristics (Turiel, 1994) and peer relationships (Kruger, 1992; Tudge & Rodgoff, 1989).

Bendixen, Schraw, & Dunkle (1998), Schommer (1993), and King & Kitchener (1994) using different methodologies found that moral reasoning and moral judgments are related to college student’s epistemological beliefs independent of social and cultural processes, but recommend further researcher in this area.

Hoffman (1987) links social and moral awareness to the influence of parents. This relates to this study in that Adam and the other child-participants (despite levels of development and dimension of knowledge) consistently and frequently made associations between new information and their parents and/or family in relationship to rules or personal experiences. In addition, they verbally demonstrated their knowledge of rules in relationship to making decisions and solving problems. The limited research with young children has not made a connection between moral development and epistemological development.

Kohlberg & Hoffman (2003) explored the nature of moral development, social behavior, and human interconnectedness. Piaget (1932) wrote about the potential productivity of peer interactions in relationship to cognitive and moral development.

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Specifically during concrete operations in very young children, he said it was their egocentrism that posed the most challenging hurdle to advance to an operational mode of thinking and knowing. Thinking at the operational level requires decenteration, which is the ability to take into account multiple points of view. In terms of epistemological thought, Chandler et al. (2002) sides with Piaget's perspective, particularly on the topic of recursion. They liken it to “wholesale” versus “retail” epistemic development (p. 162), in which, during formal operations (adolescence or even as young as 6 or 8), epistemic ability is possible because they experience the disturbing awakening that mutual knowledge or epistemic community (Rescher, 1980) no longer exists; Chandler (1975) calls it "epistemic loneliness" (p. 229).

Smith (2004) proposes a “developmental epistemology” (p. 176), in which causal psychology (CP, or for the purpose of applying it to personal epistemology, objective perspectives) and normative epistemology (NE, or subjective perspectives) become parts of the same phenomenon. In that, CP is an empirical account of facts, and NE is the study of norms. Developmental epistemology maintains the empirical, observable, and measurable facts, but views norms as “normative facts” (p. 176). In this way there is a human (i.e. qualitative or normative) component to an individual’s thinking that can be causal or non-causal in terms of values and beliefs based on their experiences and cultural roots. In this study, culture is not limited to ethnicity, but, rather, it is used broadly to include the children’s areas of interest, such as pop culture. For example, when a child-participant in the current study made an association with another individual due to a mutual personal experience or expounded their knowledge, this is, according to Leslie
(2004), a normative fact and not necessarily causal in nature; in that their experience is a subjective one but a statement of fact nonetheless.

Smith (2004) says, and I concur with this line of thinking, that these individual convictions are "central to human minds in action in social worlds" (p.177). This means that an individual's subjective knowledge is critical because we are continually absorbing information as we interact with objects and other individuals. It is these normative experiences by which we determine how we will link or file new information (i.e. construct a schema). By engaging in this process, our objective and subjective realities become enmeshed or, maybe, dependent on one another. Perhaps it is much later, in early adulthood, that we begin to unpack the knowledge and make decisions about knowledge based on a different set of criteria as our needs, desires, and motivations in life change. This way of thinking about children's developing epistemologies makes perfect sense; Chandler et al. (2002) talks about clearly stating epistemic criteria and the cognitive mechanisms that underlie epistemological beliefs. In working with young children, it may be essential to consider the broadest facets of their experiences to effectively investigate their epistemic development.

In this study there are several causal and normative occurrences of knowledge. In Adam's case, the momentum of social interaction perpetuated his engagement and adaptation to multiple social conventions. Social conventions are congruent to social norms or socially accepted rules or procedures (Piaget, 1932). Knowing and abiding by the social conventions of his peer group provided him a foundation of knowledge and confidence to be the leader of his peers. For example, he often was directive with his peers; "Hey, you need to sit down and get ready for the story, go wash your hands and
come sit in the circle;” or “It’s easier if you do it like me, watch me. You have to put the paper scraps in this container and the markers go in here.” This example conveys his knowledge of social conventions that do not get interjected voluntarily on an individual basis. Further, Adam seemed to take pride in his knowledge of the social conventions within the classroom, and this feeling of empowerment in a peer setting began a wave-like process, in which his knowledge was more explicit and linked to his prior knowledge. For example, there were distinct differences in the way that he thinks about social conventions as opposed to moral judgment in the classroom. For example, he understood the instability of social conventions as being more situational and context-specific (Nucci, 1982); “Sometimes we have to be quiet, that’s the rule but sometimes we don’t have to be quiet because it’s a party or playtime, so then it’s okay to not use our inside voices.” On the other hand, he demonstrated the stability of other rules that exist because of safety or fairness (Turiel, 1983); “Hey, don’t touch her; I will tell Mr. I. You know we shouldn’t touch our friends like that;” “Why not?” “Because it is never allowed unless we ask to give somebody a hug because it could bother the person and they don’t like it or if we hit too hard then we could hurt them and they would feel bad and cry. Once I hit Kyle on the playground and he fell down and bled, he cried and I got into trouble. So, I never touch people, they don’t like it.”

The themes identified in this study suggest that young children do have a strong sense of communal knowledge, but at the same time, the themes would strongly contrast the beliefs of Chandler et al. (2002) that young children are incapable of having epistemic isolation or that the criteria for their knowledge cannot be viewed or understood in advance or cannot be viewed in from multiple perspectives. Young children demonstrate
various facets of a pretend nature that speaks to Chandler et al.’s (2002) epistemic loneliness, and they do demonstrate multiple ways of knowing what they know and how they know it based on the content and context of the environment. Perhaps the biggest argument that may not be demonstrated by the investigations of this study is the children’s ability to know the criteria for their knowledge in advance; however, this study should raise some doubt about the accuracy of such thinking, primarily because the children do appear to demonstrate criteria for their knowledge by use of justifications of knowledge and retreating to a way of pretend knowing in which they practice their criteria in a non-threatening manner, as an epistemic shield of sorts.

This study focuses on what is in the minds of preschoolers and does so by observing their interactions with their peers and listening to their words. Without considering the empirical in conjunction with the normative aspects of their knowledge, they would appear epistemologically obtuse. Vygotsky (1994) likened this way of thinking to biology and culture; he believed that knowledge starts with external experiences that individuals are exposed to within their cultural context. In this study the cultural context is the classroom environment. Kant (1933) believed the same way; knowledge is due to experiences but not necessarily derived from an individual’s experiences. In fact, this perspective about knowledge can be traced to Aristotle’s theories of knowledge. Aristotle’s theory enumerates the possible causes which fall into several wide groups, amounting to the ways the question why may be answered. Aristotle had his own approach to the scientific method in terms of understanding knowledge; he factored in what he called “the essence” (Audi, 2001, p.648) of a person. He thought that there were particular qualities about individuals that were also universal. This was in direct contrast
to his teacher, Plato, who thought that the universal and the particulars were polar opposites. This study looks at how preschoolers convey their epistemologies and draws some inferences about why preschoolers demonstrate their epistemologies in the way that they do.

**Systems Approach and Epistemic Ability**

The current study also helps explain the *Dynamic Systems Framework for Personal Epistemology Development* (Winsor, 2005) that was constructed based on pilot research as discussed previously (See Figure 1). It incorporates a system that may impact young children’s epistemological development during the initial exposure to formal learning that occurs at preschool age. The framework integrates relationships between the child and their peers, parents, and teacher. In addition, it considers the relationships among the parent/teacher, the parent/child’s peers, and the relationship between the teacher and the child’s peers. The framework includes cognitive, social, and environmental characteristics. The current study is an attempt to begin looking at the relationship between the child and their peers. In addition, there were several themes that emerged from this study that support the presence of cognitive, social, and emotional characteristics that influence preschooler’s epistemological thinking.

The *Dynamic Systems Framework for Personal Epistemology Development* addresses the child as the center of the system. First, the framework considers the cognitive processes of the child as he/she develops a theory of mind. According to current research a child develops a theory of mind, but there is ongoing debate regarding the early onset of personal epistemological development perhaps being in process prior to theory of mind;
however, more research is needed. The framework also incorporates the child’s language, affective dispositions, social behaviors and interactions, and the environment.

Preschoolers’ Personal Epistemology Connecting with Other Cognitive Constructs

The idea of children engaging in private speech as a self-regulating technique (a finding in this study) brings up the topic of children’s ability to think metacognitively. Self-regulating behavior is a characteristic that is guided by metacognitive ability (Butler & Winne, 1995; Perry, Phillips & Hutchinson, 2006; Winne & Perry, 2000; Zimmerman, 1990), and includes planning, monitoring, and evaluating personal progress as well as the motivation to learn. Winne & Perry (2000) demonstrated that self-regulated learners are cognizant of their academic strengths and weaknesses, and they have a repertoire of strategies they appropriately apply to tackle day-to-day challenges.

This type of behavior was identified in the child-participants during this study. For example, this was shown in the repetition of words they were unfamiliar with, repeating other children’s words/phrases, converting to pretend knowledge, and using strategies to stay on a topic or shift to another topic. Dweck (2000) found that self-regulated learners attribute their successes and failure to effort expended on a task or effective use of strategies. Now, this is not to say that these children articulated these types of characteristic; however, their behavior would indicate that their decision-making was based on their attention to a topic and their use of strategies to obtain a position within their comfort level. Both of these behaviors resulted in their success or failure, which they are in-tune with as observed by their external behavior and what might be inferred about their internal awareness through observing their external behavior (i.e., eye contact, facial expressions, body language).
Further, Perry et al. (2006) claimed that self-regulated learners believe that opportunities which are challenging or allow them to practice their learning and develop an understanding of the topic will afford them success. It could be argued that this study helps identify similar characteristics in young children, in that there is a distinction in their behavior when they are bored compared to when they are challenged. When they are challenged within their zone of proximal development, they are more engaged and motivated to be successful. These children wanted to be successful matching a link made in the research between self-regulation and self-efficacy (Pintrich, 2000; Winne & Perry, 2000).

Knowing more broadly and deeply about the developmental process of children’s epistemology will inevitably contribute to the current literature in the field and perhaps provide new and innovative ways to measure personal epistemology. It appears that very young children have the propensity to develop epistemologically; however, we may not set them up for successfully reaching their potential until decades later.

Methodological Implications

One of the problems with measuring adult or even adolescent epistemological beliefs is that there often end up being some discrepancies about what they think, what they know, and how they behave. For example, teachers will often ask their students questions about a topic, only to have the students parrot or copy a response that contains key words from the text because they think that is what they are expected to say. This same phenomenon occurs during epistemological investigations; participants have a notion about how they think they should respond or what the researcher wants them to
say. Even as adults, the instructions or questions may mislead or are misinterpreted by the participants.

One of the benefits of researching young children is that it can assist in the wording of questions for adolescents and adults in terms of how to design specific developmental questions that do not misguide the participants. Children are far less inhibited in their responses even though they have a sense of wanting to please the researcher and of correct and incorrect responses. They do not have a greater understanding of the consequences of their responses to the researcher. In addition, they do not have an excessive amount of knowledge to reference even if they do want to give the researchers the answer they may be looking for. Having the limited knowledge and experience plus the naivety of the larger significance may just work in the favor of researchers because there is less useless information. Children can either answer the questions or they cannot; therefore, some information can be quickly discarded.

This study opens the door for more innovative methods of measuring personal epistemology, primarily because researching young children requires researchers to be creative and think outside of the box. It may just be that controlled experimental studies are not completely successful in research with young children because of children’s needs for familiar situations and building relationships of trust are not incorporated into many controlled experiments. The methods that are used in the current study are discussed in this section as well as additional methodological issues and implications.

*Focus Groups as a New and Innovative Methodology*

Using focus groups is a novel and uncharacteristic methodology for researching young children; however, it was used in the current study and proved to be useful and
effective in tapping into children’s epistemologies. Focus groups are used more with adults in clinical and marketing research and, more recently, have proven to be beneficial with adolescents’ mental health issues (Worrall & Marino, 2008), teen birth (Herman, 2008), and computer game play (Colwell, 2007). Focus groups are also an effective way to address difficult issues and hard to reach populations (Bogdan & Biklen, 2003). Using focus groups in the current study initially came from the pilot research in that the small groups had six to eight participants and mirrored some of the problems that were present in the whole class instruction (i.e., not everyone got a chance to talk, children talked over one another, and controlling their active behavior was difficult); therefore, it was clear that the number of children in a group needed to be less. Three participants could be considered a focus group, so the number was reduced to three and the idea of a central focus was integrated. Three participants of the preschool age in a focus group are conducive to accomplishing the goal without having to be concerned about behavioral issues.

Perhaps focus groups that are directly linked to classroom instruction and individual interviews provide very young children with a scaffold to be able to pinpoint early epistemological characteristics and evidence for the early onset of personal epistemological development. Qualitative methodologies such as focus groups can help elaborate on the multidimensionality of the human experience, including personal epistemology.

Videotaping

Videotaping is another methodology that was utilized in the current study that was beneficial in several ways: (a) It allowed for review of the data multiple times, (b) it was
possible to make an individual file for each child by copy/pasting the clips for each
individual together so they could be viewed together, (c) it was possible to choose a brief
clip of a child and show him/her the responses as an anchor to a line of probing questions
(in this way the child’s memory is refreshed about a certain way of thinking), and (d) the
children were attentive to the video; it was engaging and fun for them. Another huge
asset of videotaping is that the researcher can be observing other activities or other
children simultaneously, and this leaves time to take field notes and complete
observational checklists and still have the opportunity later to review activities that may
have been overlooked in real time.

Use of Constant Comparative Analysis as a Methodology

The constant comparative method is used with research designs that incorporate
multiple data sources (Bogdan & Biklen, 2003) and is consistent with analyzing case
study data (Strauss & Corbin, 1998). This is a complex method of data analysis and
requires persistent, consistent, and simultaneous on-going data collection and data
analysis, so that the researcher can identify preliminary characteristics of the individual
child or group.

Using the constant comparative method assists with the process of classifying words
and behaviors into preliminary categories and subcategories, as well as assists with
documenting particular strengths and weaknesses of individuals and groups. The
constant comparative approach was used to preliminarily analyze the data. This method
involves analyzing data as it is collected and using preliminary findings to shape future
interviews. The intent of this process is to build a conceptual framework that reflects
participants’ experiences and perceptions regarding the research question. Although there
were some preexisting ideas about what some of the participants' experiences might be, there was a deliberate attempt to be objective and allow the children to guide the direction of the questions and the discussion in order to avoid using solely those preexisting ideas. However, the epistemic matrix cells and the developmental theories of child development continued to be guides for the study as well. Therefore, open coding methods (Strauss & Corbin, 1990) to discover the factors, ideas, and experiences that the children perceived to have been important in their lives were a key in the current study (Lindsey, Kurtz, Jarvis, Williams, & Nackerud, 2000).

The constant comparative method is strict enough to be helpful to the researcher in exploring the content and meaning in the data, but it is not saddled with so many strict rules to be too rigid. Glaser and Strauss (1967) talk about guidelines rather than about fixed and constant rules for doing qualitative research, which indicates that guidelines can be used in a flexible and creative way, as in the current study. Using this approach provided a foundation to explore the words and actions of young children and was found to be a useful tool to identify areas of the investigation that may have otherwise been overlooked. With all of the complexities of researching young children and the exploratory nature of young children's personal epistemologies, researching young children needs to be thorough and rise to the expectations of quality research methodologies in the most scientific manner possible.

*Case Study Research in Personal Epistemology*

Case study research is one method that can be helpful in allowing us to understand the complex issue of personal epistemology and add strength to what we already know. Case studies provide elaborate detail and contextual analysis but only of a limited number
of individual, events, or conditions. A case study does not lend itself well to
generalizations or predictions but is quite useful in theory building (Glasser & Strauss,
1967).

Personal epistemology research has historically engaged in interviews or used
quantitative methods. More and more researchers in the field are seeing the advantages
that qualitative and mixed-methodologies research can make in the field. These
methodologies may help answer many of the more challenging questions which plague
the field (Hofer, 2000, Kuhn & Weinstock, 2003; Schraw & Olafson, 2003) regarding the
how and why of individual’s beliefs about knowledge and knowing. Using case studies
in personal epistemology and with children can assist in finding new measures that
capture the questions we still need to answer and identify areas of children’s personal
epistemology that can be the most productive for future research.

*Longitudinal Research in Personal Epistemology Research*

The possibility of informative research with very young children allows for more
longitudinal research in the field of personal epistemology. Starting at such a young age
can provide a broader perspective on lifespan development and personal epistemology
trajectories. Many researchers in the field of personal epistemology recommend the field
engage in more longitudinal work, but up to this point, longitudinal studies are still very
rare (Hofer, 2000, Hofer & Pintrich, 1997; King & Kitchener, 1986; Perry, 1970; Schraw,
2001).

*Educational Implications*

The themes found in the current study indicate that preschool children have the ability
to move between subjective (i.e. more interpretive) and objective (i.e. more factual)
epistemological frames of reference, and it appears to be somewhat domain and context-specific. This finding can affect the overall way in which teaching and learning is viewed. The educational significance of this study and how researching children’s personal epistemologies can have an important role in improving education for all children will be discussed in this section. Knowing more about children’s epistemological onset and development could have a significant impact on the following: (a) early childhood educational curriculum, (b) classroom instructional techniques, (c) teacher education programs, and (d) how parents prepare their children to enter preschool.

*Early Childhood Education Curriculum*

The more valid and reliable our research becomes the more likely administrators and government policy makers of early childhood curriculums will be able to consider and implement the value of personal epistemological development. Gaining more knowledge in children’s personal epistemologies stands to impact early childhood curriculums but also can guide the current effort to implement preschool standards across the U.S (Martin & Loomis, 2007). The National Association for the Education of Young Children (NAEYC) oversees that national, state, and local education facilities follow strict guidelines in order to obtain funding for their programs. The problem is that each state has different laws regarding early childhood education. For instance, kindergarten is not mandatory in every state; only 41 states require that local school districts offer half-day kindergarten, and nine states require the districts to offer full-day. More alarming than that is that only 14 states in the US require children to have a kindergarten experience prior to entering first grade; two of those require a full-day of kindergarten (NAEYC,
Further still, in 2006, only 43% of all three-year-olds attended a preschool program, and in the same year only 59% of all four-year-olds attended preschool.

This should alarm us in that far too many children enter school unprepared. When they begin unprepared, children begin behind and continue to fall further and further behind. The government, educators, and parents should be informed about what it takes to enter school ready to succeed. Knowing about very young children's epistemic development can contribute to other cognitive domain-specific tasks such as improving school performance, raising math and language abilities, sharpening thinking and attention skills, reducing special education placement, and lowering the school drop-out rate. More broadly, the more successfully we educate individuals, the less crime, poverty, mental health issues, dependency addiction, and so on we may see.

It is also possible to add to the list the social and emotional benefits of early childhood education. For example, it improves and strengthens peer interaction, decreases problem behavior, encourages more exploratory behavior, and helps adjustment to the demands of formal schooling. Other long-term benefits include savings in tax dollars, increasing lifelong earning potential, achieving better academic outcomes, and lowering the rates of teen pregnancy and incarceration (Galleghar, 2003).

Classroom Instructional Techniques

Perhaps if there was less of a focus on behavioral factors in early childhood teaching and learning we could more evenly weigh the social, affective, and epistemological factors in preschool learning. It appears that very young children have the propensity to develop epistemologically, but we may not set them up for successfully reaching their potential.
How a teacher is trained to teach any grade level is important but especially important in terms of early childhood development. A teacher’s teaching philosophy, teaching technique, communication skills, motivation, and even their epistemological beliefs (Schraw & Olafson, 2002) are paramount in the teaching and learning of preschool children. As has been indicated, a pilot study was conducted using a similar methodology as the current study. The teacher in the pilot was a 22-year veteran of elementary education, four years of which were with preschoolers. It cannot be known for certain if her age, race, sex, experience, or education contributed to her phenomenal abilities and effectiveness with her students and their parents, but she was very knowledgeable about childhood development theory and practice. She regularly and consistently applied critical thinking, problem-solving, and decision-making tasks in her themes of the week. She was consistent in addressing the needs of the students in every capacity. She engaged them in question-and-answer interactions, allowed and encouraged the children to share their knowledge and experiences, and listened to what the children had to say. She positively influenced her students’ personal epistemology; it was truly an incredible experience to be in her classroom.

The current study, on the other hand, was conducted with a teacher who was young, immature, and inexperienced. In fact he was still in the process of obtaining his Baccalaureate degree. It was his first year of running his own classroom, and prior to that he had been a student aide in the same classroom. He was quite hyperactive and egocentric himself. Seldom did he listen to what the children had to say; he quickly dismissed their comments in exchange for keeping order in his classroom. For example, he responded to student comments with, “Oh well that’s very interesting, now go wash
your hands.” He also implemented a behavioral technique during whole-class instruction where the children could not ask questions or make a comment until after the story was read, so he had them remain silent. If they agreed with something or had a similar experience as that in the story, the children were directed to tap their noses. He was pleasant and certainly polite and seemed to try very hard; however, it was difficult to see the rationale behind many of the activities in terms of aligning the theme of the week with group or individual activities. If he was applying cognitive developmental theories to the classroom, they were difficult to identify. He rarely took the opportunity to answer the children’s questions or explain the importance of a topic or activity, and this could have very well affected the students’ personal epistemologies.

Preschool teachers should use instructional techniques (i.e., discovery learning, block and dramatic play, music and moving activities) that are based on educationally sound research and correspond to the multiple dimensions of learning. Very young children are capable of a plethora of cognitive, emotional, social, and physical activities, and preschool instructional techniques should expose children to all of the modalities of learning so that children can discover what they are good at and where their interests fall. Not all children are going to be good at every task, but they need to experience it. Additionally teachers should be aware of each child’s zone of proximal development; this way the teacher will know each student’s strengths and weaknesses. This will allow the teacher to make quality and informed decisions about pairing students for projects and play and have realistic expectations for each individual child.

Most importantly, the preschool teacher should have a teaching philosophy rather than a play philosophy. Teachers should choose activities that incorporate novel
situations that children are familiar with and can relate to. They should be explaining to
the children the importance of topics and activities that they can relate to and understand.

Teaching and learning techniques in the preschool classroom should challenge the
children to think independently and collectively in solving problems, making decisions,
and thinking critically. Above all the teacher needs to engage in active relationship
building between themselves and each child and promote that relationship building
among the peers.

Perhaps the lack of some combination of these techniques speaks to possible
contributing factors that limited the children in the current study in terms of sources of
knowledge. It was expected that the children in this study would have demonstrated their
knowledge about external sources similar to those children in the pilot. This did not
occur, and this could relate to the philosophies and techniques of the teacher. If teachers
are aware of their beliefs about knowledge and knowing and how that relates to learning
with preschool children, perhaps children will be to understand their own beliefs more
intentionally. For this to occur, teachers would need to explicitly cover themes from an
epistemological perspective in the way they ask questions, answer questions, design their
lesson plans, and generally approach teaching and learning.

*Pre-service Teacher Education Programs*

In order to accommodate more cognitively sophisticated children, we would need to
make considerable adjustments to the education of pre-service teachers. Children’s
personal epistemology is important because it provides valuable insights into what
children know and how they learn. The more understanding we have about children’s
personal epistemology the better we will be able to prepare pre-service teachers to enter
the classroom, no matter what level they are teaching. In addition, better prepared teachers will have more solid developmental and cognitive backgrounds and will be more effective and efficient in the classroom. How individuals develop personal epistemologies and the unique relationship they have to learning may assist teacher instruction to follow more closely to theories of learning, hence, bridging the gap between theory and practice.

Teachers need to have an understanding of the importance of child epistemological development, and this may help teachers bring more real-world instruction and assessment into alignment (Schraw & Olafson, 2002). As pointed out earlier, evaluativism is a level of personal epistemology that is not recognizable until later adulthood and is thought to incorporate higher levels of cognition (i.e. metacognition) such as critical thinking, problem-solving, reasoning, and logic (Kuhn, et al., 2002). If we can identify how to cultivate this more sophisticated way of thinking and identify links to epistemological development in early childhood, the results could lead to better understanding of the processes involved in life-long learning. Understanding how very young children can produce evaluativistic thinking as seen in this study is one small step in this process.

*Parental Education about Preschoolers' Preparation for School and Learning*

Currently many states in the US do not have educational standards for preschool children, and in some cases families do not even send their children to kindergarten as it is still a choice in many locations. There is a direct relationship between parents' views about education and learning and how they value education (Laosa, 1978). While we
train pre-service teachers, parents also need to be educated about the effect of early childhood experiences on later cognitive and emotional abilities.

This is a difficult area of educational significance to disentangle considering the broad multiculturalism in today's society. Some culturally shaped early learning opportunities have been found to be more conducive than others to preparing children for success in schools, which are typically not designed with diverse configurations of students in mind. One of the challenges that this poses to early childhood educators, in particular, involves striking a balance between demonstrating respect for cultural differences and preparing children to participate successfully in formal school settings (Prince and Lawrence, 1993). A starting point for addressing this dilemma involves understanding how children's cultural backgrounds affect the skills, knowledge, and expectations that they bring to school.

Culture plays a complex role in shaping children's earliest learning opportunities and experiences in the home. Parents' beliefs about when and how children learn school-related skills, their daily interactions with their children, and the social rules that guide these interactions combine in intricate ways to create what Luis Moll has termed "funds of knowledge" that are based in culture (Moll, Amanti, Neff, & Gonzalez, 1992). However, efforts to specify the mechanisms or dimensions of culture that carry its role in learning are in their infancy. There is a need to advance and include cultural beliefs with beliefs about knowledge and knowing. Culture is a complex and multidimensional entity of human development, generally, and epistemological development, specifically. Culture is described by the Board of Children and Families as encompassing economic,
ethnic, racial, social, structural, and other dimensions that constitute a constellation of
influences on children's early learning opportunities (NAEYC, 2007).

It is critical when examining the research evidence to take careful note of the
investigator's definition of culture and its implications for the results from any particular
study as it has multiple interpretations. A persistent problem in much of this research is
drawing inferences about non-economic dimensions of culture when, in fact, social class
may be the more influential variable (Laosa, 1978). Are differences that are attributed to
children's ethnic backgrounds or immigrant status, for example, more accurately ascribed
to the educational backgrounds of their parents?

Parents are most often motivated in their ambitions for the success of their children
but do not have the insights to help them along the way. It is common for parents to
become less and less engaged in their children's education as they progress. There are
many contributing factors to this, but the largest contributing factor that parents will
report, with the exception of time, is that they do not understand the material their
children are learning followed by an attitude that they do not understand why the material
has to be taught because it has no earthly significance to anything useful in the child's life
(von Wyl, Perren, Simoni, & Bugin, 2008).

Parents are an important part of the developing epistemologies of young children and
an integral part of the Dynamic Systems Framework for Personal Epistemology
Development (See Figure 1) systems. The current study focused on the child's
interactions with his/her peers. The pilot study that was conducted included the parent-
child relationship and the parent-teacher relationship. Some of the findings should
inform educators that parents have an important role in child development and epistemic
development and require some training to inform and empower parents so that they can more adequately prepare their young children for an education and see their role in their child’s education for the full term.

Children’s personal epistemologies research can foster parent’s interpretation of early childhood developmental milestones and transition perceptions away from traditional developmental limitations. Providing parents with a clearer vision of children’s cognitive abilities may help parents better prepare their children to enter structured classroom environments. Perhaps if there was less focus on behavior factors in early childhood teaching and learning, we would be more evenly weighting social, affective, and epistemological factors, as opposed to our finding of predominantly social and affective levels.

Part 4 Future Research

Researching young children’s personal epistemologies is an area that needs a considerable amount of attention. Knowing about the early onset of epistemological thinking will advance research in early childhood development as well as research into adolescence and adulthood (Chandler & Carpendale, 1998; Hofer & Pintrich, 1997). Gopnik, Meltzoff & Kuhl, (1999) found that children younger than two-years-old can use verbal language, watch other individual’s reactions to an object and make their own preference judgment, and show empathy and compassion for others. Therefore it is proposed here that future research in young children’s personal epistemology continue to investigate children individually and their interactions with others. The Dynamic Systems Framework for Personal Epistemology Development (See Figure 1) guides this section of

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the discussion; suggestions for future research which are closest to children’s personal epistemology will be discussed first, followed by some broader issues related to child development in general. Personal epistemology in preschool children is quite exploratory at this point. Future research should include continuing to identify developmental levels and dimensions of knowledge. Many of the findings of the current study build on areas that support future research recommendations from scholars in the field: insight change (Burr & Hofer, 2002), epistemic doubt (Bendixen, 2002; Boyce & Chandler, 1992), and issues of domain-dependence (Hofer, 2000; Paulsen & Wells, 1998; Schommer & Walker, 1995).

**Systems Framework**

Using a systems approach should be considered in future research as this may be an efficient and effective way to tap into a complex construct with a younger population. Schommer-Aikins (2004) also promotes a systems approach although hers centers on the individual’s personal epistemology, and the approach is more domain-specific. In her view, one individual’s personal epistemology would be investigated by a professional or scholar from each domain (i.e., math, science, English etc.) then conclusions could be compared for the same individual across multiple domains. The current study was preempted by a pilot study to help make decisions, and one of the outcomes of the pilot study was a plan for future research in children’s epistemology, called the, *Dynamic Systems Framework for Personal Epistemology Development* (Winsor, 2005) (See Figure 1). It is a compilation of important issues and individuals that may impact children’s personal epistemology development and incorporates other systems approaches (Bronfenbrenner, 1975; Minuchin, 1974).
The Dynamic Systems Framework for Personal Epistemological Development (Winsor, 2005) (DSFPED) is a comprehensive perspective on the influences of young children's personal epistemology. The child continues to be the focus of the system; it centers on relationships that impact a child's thinking about knowledge and knowing, such as the relationship between peers as reflected in the current study, but it also includes the relationships that exist between the child and his/her parent(s) and the relationship between the child and their teacher. In addition, the dynamic systems framework integrates the intrinsic and extrinsic facets of the child's development, in terms of cognitive, social, and emotional characteristics. Preschool children are at a cognitive milestone in terms of the theory of mind (TOM) development and with the recent connections between theory of mind and epistemological development in early childhood; TOM is also a cognitive component of the DSFPED.

Current research is just beginning to identify connections between theory of mind development and epistemological thinking (Bartsch, 2002; Burr & Hofer, 2002; Kuhn, Cheney, & Weinstock, 2000; Mansfield & Clinchy, 2002). Further, researchers have identified a stage of epistemological development prior to an absolutist (dualistic) phase of development (Burr & Hofer, 2002; Chandler & Carpendale, 1998; Kuhn & Weinstock, 2002), and future research needs to progress in a similar direction. However, future research in children's personal epistemology requires more creative methodologies as a means of investigating their cognitive abilities; traditional survey measures used for adult epistemological inquiry are inadequate due to children's developmental limitations such as reading and writing abilities. For example, Burr and Hofer (2002) administered measures for both constructs (i.e. theory of mind and personal epistemology) using
puppets. For the epistemological task, the puppets were used to engage the child using their justifications for knowing to determine dualistic or pre-dualistic levels. They adapted the measure from Gopnik and Graf (1988) and O'Neill and Gopnik (1991), who found that children had difficulty identifying the other’s source of knowledge and tended to favor visual over tactile sources of their own source of knowledge. Therefore, the epistemological task included each child completing two seeing tasks and two feeling tasks. Further, Burr and Hofer (2002) related their finding on the epistemological task to a theory of mind task which was adapted from Lalonde and Chandler (1995). Burr and Hofer (2002) used a misplaced object task and an unexpected contents task, and again, the puppet was used to engage the child in the storyline. Then to better understand the connections that might exist between theory of mind and epistemological beliefs, they repeated a set of false-belief tasks and followed-up with epistemic questions that targeted the child’s source of knowledge and justifications for knowing.

In the current study the props used to probe children’s epistemologies were objects that were familiar to them and were already present in the classroom (i.e., the books read in whole class instruction, puzzles, sequence cards, items from the dramatic play area, etc.) and the line of questioning came from the theme-of-the-week topic (i.e., monsters, winter, construction, family). These were the topics that they were concentrating on in the classroom for the week and, therefore, were familiar to all of the children. Then follow-up questioning was constructed based on the children’s own words and the words of others from the whole class instruction, center activities, and focus groups. More research of this developmentally appropriate caliber needs to continue with preschoolers.
In comparing Burr & Hofer (2002) to the current study, each has a different methodology; however, there are some similar findings. This supports a need for future research to include both structured, controlled and quantitative designs as well as semi-structured qualitative designs situated in an authentic environment. There needs to be continued focus on the subjective and objective views as they demonstrate their ability to understand and shift between the two with ease and confidence.

Investigating the difficulty and/or absence of children’s source of knowledge needs to be addressed. For example, the question of why preschool children have difficulty responding explicitly to source of knowledge questions should be researched. More information is needed based in this area based on the finding from this study and Burr & Hofer (2002). Perhaps a mixed-methods approach to this question could be beneficial. For example, following the story in the whole class instruction, the teacher could ask source of knowledge questions (e.g., how do you know that Max didn’t really go to the forest to see the wild things?). Using the theme of the week, a vignette could be designed, and the children could be asked source of knowledge questions; however, the vignette would need to be a novel scenario that was meaningful to the children and developmentally appropriate. A follow-up individual interview could be done in which children would be asked probing source of knowledge questions about their responses in the whole class instruction and the vignette. In this way the content would be familiar, the contexts would be different, and the questions would be more structured toward the source of knowledge. The children’s responses to the whole class instruction and the vignette could be analyzed empirically, and the content of the probing questions could be a qualitative investigation.
Knowing more about young children's source of knowledge, both internal or external, could provide more insights into internal sources such as private speech, pretense, imagination. This would address how it is that, even though much of children's cognitive development is taking place internally and with limited language development at that age, much of what and how they know seems implicit to an outsider but not so implicit to their peers. Source of knowledge is an important dimension of the process of knowing; researching children's sources of knowledge can inform us about developmental patterns and patterns regarding the dimensions of knowledge. This is an area that requires more research in all each levels.

The use of focus groups and videotaping are detailed in the methodological implications section of this chapter. However, observation was another technique used in the current study that was effective in tapping into children's personal epistemologies. During whole-class instruction the class was observed, checklists were completed, and initial ideas for follow-up questions were generated while the activity was being videotaped. Bogdan & Biklen (2003) recommend observation and field notes because the researcher has the ideas and interactions fresh in their mind. Observational techniques are often used in classroom teaching. Brophy (2006) found that there were many contradictions between teacher self-reports and what was observed. He found several teacher misconceptions and distortions, as well as things that teachers did not report, such as how underappreciated they were by their students. Observation can be a useful methodological tool for identifying what children do not explicitly report. Schraw & Olafson (2002) recommend looking at teacher and pre-service teachers' worldviews.
In the DSFPED focus on relationships, this is an area that would benefit from more qualitative research, such as phenomenologies or ethnographies (VanMaanen, 1994).

The Dynamic Systems Framework for Personal Epistemological Development (Winsor, 2005) extrapolates the social dynamic of the individual and accounts for the importance and need for future research to investigate not only the child's relationships but also the relationships of those individuals that directly impact the knowledge and understanding of young children. To clearly and effectively see the child's interactions with others, it is necessary to explore multiple relationships including the relationship between the parent and the teacher; the parent and the child's peers; and the teacher and the child's peers. This becomes quite a complex task, but interactions may be similar among individuals.

Research should be conducted in the children's authentic learning environment. Researching preschooler's personal epistemologies in their classroom environment can be effective and efficient, particularly in these early exploratory studies. Observing or interacting with children in the environment that they know, feel comfortable in, and with all of the objects that they know and love at their fingertips places them in an environment that they will function their best. It also gave the researcher plenty of opportunities to see more natural interactions and perhaps identify unexpected or unanticipated thinking or behaving. It is more time efficient in that there is no need to lug extensive amounts of materials around in the hopes that one will assist you toward your goal. Having no set up time or controlled environment also takes away from having to bond with an individual child every time the researcher attempts to explore a measure or activity. There is always that icebreaker-time, and preschool children have such short
attention spans. It is much easier for a researcher to blend into the classroom, and the children will automatically engage the researcher when they feel at ease.

As was stated, affect is another construct that is included in the dynamic system approach and is also in its infancy in terms of how it is linked to personal epistemology and future research could address this (Bendixen & Rule, 2004). One’s affective nature is particularly poignant in researching young children’s epistemologies because it is used in how they choose to communicate. Their emotions, interests, needs, motivations, and attitudes get conveyed through their words and their actions and strongly impact their past, present, and future knowledge and understanding. So, what is the epistemic role of affective dispositions? It is widely agreed upon that being a good moral individual is a result of having sound moral judgment and reasoning ability (Kohlberg, 1984; Kuhn, 1991). Moral judgment requires being emotionally attuned to the world (Gilligan, 1982; Kohlberg, 1984), and moral decision-making is related to epistemic beliefs (Bendixen, Schraw, & Dunkle, 1998; King & Kitchener, 1994). The current study uncovered consistent affective characteristics within individual cases and across individuals that appeared to assist the children in adapting their epistemological position relating to the moral knowledge and understanding, both in contexts- and content-specific. For example, when a child had knowledge or experiences similar to a peer or a storyline, they were considerably more interested, engaged, brighter, more aware of their successful account of linking and transferring information; they were more willing to participate and did so with ease, animation, and laughter.

Current research strongly supports an integrated model for personal epistemology (Bendixen & Rule, 2004), and this is also reflected in the dynamic systems framework.
Affect in the DSFPED is reflected as the child’s dispositions (motivation, interests, emotions) and is represented with a broken line to indicate the affective nature of the child is expected to change based on the nature of the interaction. In addition their affect is guided by cognitive and social occurrences.

Future research needs to focus on how the environment impacts what the children know and how they know. This type of social perspective of knowledge is currently accepted in the fields of social psychology and sociology; and termed “social epistemology” (Fuller, 2002, p. 36). The primary difference being that social epistemology involves the social network of the individual, but interestingly, social epistemologists have the same difficulty coming to a consensus about the intricacies of knowledge, just as the personal epistemologists have boundary concerns (i.e., do beliefs about learning predict beliefs about knowledge?). They are two separate domains, but perhaps given the complexities (language, conscious awareness) of tapping into children’s personal epistemologies, it may be necessary to get to the root of personal epistemologies through investigations of social networks. This is linked to Vygotsky (1987) in which children develop from the outside in (i.e., interpsychologically). It is also consistent with Bronfenbrenner (1975) in that ecological systems intertwine externally and become components of the individual.

*Language*

The complex construct of language in terms of childhood epistemic development is critical. Language is a complex concept that has several areas that can be investigated; however, this study utilizes language as a single internal factor because it is thought to be a factor. This study is primarily concerned with the function of language; children use
the same system for representing (i.e. verbal thought) and communicating (i.e. verbal discourse). Future research should focus more on the preschooler's language development more closely and be concerned more with pragmatic and semantic issues. It is in this way that language has been enormously significant in theory of mind (Astington, 1994) and pretend play research (Gopnik & Meltzoff, 1989).

Language is a prominent issue in theory of mind development and a controversial one at that (Astington & Baird, 2005; Baron-Cohen, Leslie, & Firth, 1985; Chandler, 1992; Wimmer & Perner, 1983). Astington & Baird (2005) investigate possible explanations for how children acquire their understanding for theory of mind. Likewise, this stands to be an important component for tapping into and understanding children's epistemic development and could also prove to provide significant information in adolescent and adult epistemic thinking as well. Studying this area in preschoolers is an ideal starting point because they are transitioning from nonverbal to verbal beings and they are experimenting with language and developing linguistic abilities. In the current study there were epistemic patterns that impacted the way the children communicated. Their communication patterns ranged from strictly nonverbal interactions to a combination of verbal and nonverbal to completely verbal. The current study did not look at linguistic patterns specifically, but based on the data transcripts, it is reasonable to think this is an area that requires a vast amount of research that might contribute enormously to the research in child development and personal epistemology.

The current study indicates that other cognitive constructs may be developing during this critical period of development that have links to personal epistemology and these need to be explored as well. For example, when asking children epistemologically

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challenging questions, they begin to present metacognitive characteristics in their behaviors that resemble naïve or perhaps metacognitive infancy. Examples include linking past and present knowledge and personal experiences to new information, making associations with reoccurring sources (i.e., parents, peers, books), self-regulated behaviors (i.e., practicing responses in self-talk, repeating others or the story, making-up scenarios when they do not know), self-efficacy, and motivation. Future research to investigate the cognitive constructs that may coincide with epistemic development should include interactions between the child another component of the DSFPED and include more systematic and structured cognitive task. A mixed-methods approach could be informative, but the qualitative component is critical for getting into the child’s world and better understanding the cognitive processes and how they work together. Cognitive approaches could be complemented by also looking and language, affect, or social factors as well.

Longitudinal Research

Longitudinal studies are deficient in personal epistemology research. Beginning longitudinal research with preschoolers would be an asset to development and provide information about epistemological development over the lifespan (Hofer & Pintrich, 1998). There is plenty that remains unknown about the trajectory of epistemological development that needs to be unpacked, and conducting longitudinal research can contribute to gaps in the literature. An ideal way to begin a longitudinal study to investigate the personal epistemologies of preschool children would be to use the DSFPED and begin with 30 children and their families and follow them through their highest academic accomplishment.
There are a tremendous number of factors to consider when researching young children, particularly in an authentic environment where many of the factors cannot be controlled. For example, it becomes complex when epistemic questioning is based on the words and actions of the children themselves and the teacher’s teaching and learning philosophies. However, the methodology of this study could be replicated. This could be viewed as important starting point for research in children’s epistemic development because as mentioned in the limitations section, “dependability,” “trustworthiness,” “credibility,” “transferability,” and “confirmability” of research provide evidence for reliability and validity which is needed to advance our knowledge in this area (Bogdan & Biklin, 2003, p. 81).

More research with this age specific group of children will help identify which characteristics and themes, like those found in the current study, transfer to children in similar and different types of learning environments. For example, important differences and similarities may be found in different teaching and learning philosophies, (i.e., Reggio-Emilia, Montessori); in different cultural backgrounds (Chen, 2000; Koss & Chioino & Vargas, 1999); with different socioeconomic backgrounds and language ability (Clegg & Ginsborg, 2006); or with learning and physical disadvantages such as autism (Gelfand & Barron, 2005), attention-deficit (Wender, 2001), or physical illness (Ablin, 1997).

Final thoughts

One final thought about preschooler’s personal epistemologies has to do with a response that was received from a child-participant in the current study. The children
were extremely curious and inquisitive about why the researcher was in their classroom, as they are with any newcomer to the classroom. (It really is their domain). They had a number of questions, and as any doctoral student who really believes that young children have capabilities beyond what is known would say I explained, “I want to know what you know about knowledge and other things that are important to you.” Apparently this stuck with one of the children and on the second day of the second week, I asked, “What do you think you know the most about?” The response went like this, “Wow what I know the most about, well, I know about lots of things but I couldn’t tell you about all of them that I know but why are you asking me. How come you don’t know? I know about me but why do you want to know? (40 second pause) What I know about, know about know about, that is so silly, you’re silly, how do you know what you know about know?” I thought it was a great question from a preschooler.
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Knowledge is represented in all levels and across all dimensions of knowledge. Overwhelmingly, a multiplicitous view of knowledge.

The more integrated or complex his knowledge is the more he combines verbal and nonverbal descriptions.

Simple knowledge is more affectively and behaviorally more stable and positive when knowledge is certain. However, when knowledge is uncertain he asks questions, when there is understanding he maintains his positive nature. Otherwise, his knowledge becomes more fragmented and his disposition becomes more negative and unstable.

Nature of Knowledge

Access what is understood and articulates justification.

Stay close to classroom topics.

Simple knowledge is more effective in leading to questions and more internal curiosity.

No sign of external failure but signs of internal conflict i.e., poor eye contact and very quiet, not so animated.

External sources of knowledge typically get interpreted internally and if not engaged, is the result.

"No, my sis no fighting bad." (0-4)

"We have to wear sweaters so can go outside that's what my mommy says." (0-4)

"Um, I didn't only my grades dropped but worried about them staying with you." (0-6)

"It might be interesting to blacken. I think, he knows more about it than me." (0-8)

Nature and process of knowing are complex and connected.

The more integrated or complex his knowledge is the more he combines verbal and nonverbal descriptions.

"But angels live in Heaven, and God, and bugs too, and bugs too," (0-4)

"Sometimes when I'm sick I have to go to the doctor and I get a shot right here (points to arm) then I got hurt." (0-4)

"I don't know." (0-4)

"Because I think it's (disposing)." (0-4)

"I think, so they can go to sleep and have energy to fish but maybe not." (0-3)

"Somebody would steal it and bring them home, and never come back." (0-3)

"I know that everybody don't like each other and keep their bodies safe becase I want to have friends." (0-9)

"ABSOLUTIST" (0-9)

"MULTITRIST" (0-8)

"EVALUATIST" (0-7)

"ADAM RESULT #1:
Knowledge is represented in all levels and across all dimensions of knowledge. Overwhelmingly, a multiplicitous view of knowledge.

Nature of Knowledge (0-23)

Access what is understood and articulates justification. (0-2)

Stay close to classroom topics (0-3)

Simple knowledge is more effective leads to questions and more internal curiosity (0-2)

No sign of external failure but signs of internal conflict i.e., poor eye contact and very quiet, not so animated. (0-2)

External sources of knowledge typically get interpreted internally and if not engaged, is the result. (0-3)

"No, my sis no fighting bad." (0-4)

"We have to wear sweaters so can go outside that's what my mommy says." (0-4)

"Um, I didn't only my grades dropped but worried about them staying with you." (0-6)

"It might be interesting to blacken. I think, he knows more about it than me." (0-8)

Nature and process of knowing are complex and connected. (0-1)

The more integrated or complex his knowledge is the more he combines verbal and nonverbal descriptions. (0-2)

"But angels live in Heaven, and God, and bugs too, and bugs too," (0-4)

"Sometimes when I'm sick I have to go to the doctor and I get a shot right here (points to arm) then I got hurt." (0-4)

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"ABSOLUTIST" (0-9)

"MULTITRIST" (0-8)

"EVALUATIST" (0-7)
Carl Result #1: Fluctuates between absolutist and relativist view of knowledge. Begins with simple and certain responses but when probed can have more complex and uncertain perspectives. (0-2)

Carl Result #2: Complex and uncertainty occurs due to teacher or peer interaction. Certainty evolves from internal or family ideas. Primarily observed within group settings. (0-2)

Nature of Knowledge: (0-12)

Simplicity: (0-5)
- Verbally responds. (0-1)
- Initially single word responses. Requires probing. (0-1)
- Responses in relationship to the book, classroom rules, and personal experience. (0-1)

Certainty: (0-11)
- Adding teacher or peer questions. (0-1)
- Quick and confident with brief responses. Generated from classroom rules or the story. (0-1)
- Multifaceted certainty is mainly internal (imagination) or personal experiences. (0-1)

ABSOLUTIST: (0-5)
- "That was a monkey in Dora the Explorer." Associates the characters from the story to pop culture toys. (0-5)

MULTIPLISIT: (0-5)
- "Yes, I like the hot weather and I like to get hot and it's hot in the summer here." (0-5)

EVALUATIVIST: (0-4)
- "When we were outside and it was hot we watered the tomato plants but they still died because the sun is too hot for them to bake." (0-4)

"Well they said I had a nightmare but I am not sure. It was funny and I had to wake up while I was sleeping." (0-5)
"I have been on a plane but I have not been on a helicopter. I think they are different." (0-5)
"That was a monkey in Dora the Explorer." Associates the characters from the story to pop culture toys. (0-5)
"Yes, I like the hot weather and I like to get hot and it's hot in the summer here." (0-5)
"When we were outside and it was hot we watered the tomato plants but they still died because the sun is too hot for them to bake." (0-4)
Nature and Process of Knowing (0-14)

Source (0-20)

Justification (0-14)

Responses are repetitive. (0-1)

Internal sources are linked to emotional disposition. (0-1)

Verbal + Nonverbal (0-16)

Parents and peers are most typical. (0-1)

Involves classroom rules or personal experiences related to the story. (0-1)

Comparres characters to self. (0-1)

“Some of them are purple and some are green but some are black (pointing). Look can you see? They are like Transformers.” (0-4)

“I like the Wild Things but I am afraid of monsters so I would run real fast. My mommy says there is no monsters.” (0-4)

“I had it first so he can’t have it because I’m still needing it to color Blackout so it looks how I want it, lies on the TV.” (0-2)

“No, he looks like Blackout just like in the TV. Adam has one and I looked at it.” (0-2)

Because.” (0-1)

When probed he will respond using evidence from classroom content or personal experiences. (0-1)

Involves classroom rules or personal experiences related to the story. (0-1)

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ADAM RESULT #2: Simple and Certain knowledge have a strong relationship with his personal experiences with family and peers. Integration of background knowledge and classroom learning.

ADAM RESULT #3: Nature of Knowledge is more developed individually, whereas the Nature and Process of Knowing is represented at a more integrated level. (0-2)

ADAM RESULT #4: Source of Knowledge is clearly shifted from external to internal in nature. (0-2)

Nature and Process of Knowing (0-2)

Accepts what is understood and articulates justification. (0-2)

Combination of sources is how he makes decisions about his behavior and knowledge. (0-2)

Combination of sources is how he makes decisions about his behavior and knowledge. (0-2)

Stay close to the classroom topic. (0-3)

Usually integrates personal experience or family. (0-2)

No sign of external failure but signs of internal conflict, e.g., poor eye contact and very quiet, not so animated. (0-2)

External sources of knowledge typically get interpreted internally and if not, disengagement is the result. (0-2)

Combination of sources is how he makes decisions about his behavior and knowledge. (0-2)

Usually integrates personal experience or family. (0-2)

Combination of sources is how he makes decisions about his behavior and knowledge. (0-2)

Justification (0-21)

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Knowledgeis
repfesenledhall3
developmental levels
andacrossall 4
dimensionsof
knowledge.
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anduncertain,
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{J Certainty {0-17}

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fjMore absolutist
regardingpeersand
classroomrules.
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Q;evaluativisi{o-7}[.

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y
0 Associations
Q Usesimagination I
primarilywiththe
andpretend, (0-1}
bookandlinkedto
personal
experiences."(0-1} I
Q Beginswithinternal
sourceandknksit to
thebook. Uses
Q Whenshedoesn't
m
anynonverbal
knowshew®say"I
cueswithher
dont know"or say
words. (0-1}
"That's s^y"
accompaniedby
facial andbody
gestures. (0-1}

0 Short responsesbut —
canelaboratewhen
probed. (O-I}

0"No, youcanonly
wear your bathing
0
suit whenyougo
swimmingandyou ---------- -isa----------- ».
don't goswWng in
thewinter time."
(04}

Q 'I amnot your
friend. Littlebear
------------ ► hasonefriendand1
amfriendswithR."
{0-3}

Q "If yougoaway
fromyou mommy
anddaddy,
strangerscancome
andget you. But
sometimeI get
scaredbecauseI
thinkI don't want to
betakenaway'from
mymommyand
daddy. Theymake
mesafe," (0-2}

"Theyarehiding
fromtheir momand
theyarehidingin
thesncHv."
(pointing) (0-3}

...

* y
isa

Q"In the story, his|
momsaid, 'goto
isa------------------------- sleepMax.' Uses
manyfacial and
bodygestures.
(0-4}

Q "1wear ahat and
mittenswhenit is
winter soI stay
warmandI don't get
sick. If I get sick
thenI don't want to
takemedicine,
yUCKi" (0-4}

Qf "Nosilly, flowers I
andtrees can't
growinsidebecause
theyneedtogrow
------------ k bigandtail lib me.
See, I ambigand
tall." (cofTipares
herself toapeer)
(gestures) (0-3} |

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JJ "I havetwodogs
andI thinktheyare
nicer thanthose
dogs(pointing). I
have68rLandI
lovethemandthey
lovemeback." (04}

”H‘i' hôilàlMiîit
oitside hi', window
ii'iltrsioij'jnlitMi,
li'jw»r.lodrt soIk.*
iindf it uj), He
w,r,i f*dit because
hewantedtogoto
sechisfriends, The
m : (0-3}


RESULT 3: Makes associations from her internal pretend world to the real world. Family is the only external source of knowledge referenced. (0-2)

RESULT 4: Justifications are limited to Absolutist and Multiple views and occur only when probed. (0-2)

Frequent use of "I can't be sure." "Sometimes" "You never know." "I don't know but my mommy does." (0-1)

Consistently provides a relevant response and makes a connection to her experiences or pretend world but typically acknowledges that there may be other options. (0-1)

Does not seem to be impacted by peer verbal or nonverbal behaviors as a means to respond. (0-1)

"My mommy knows how to dress in the winter. She makes me wear a coat and hat and mittens so I keep warm and safe." (0-4)

"My mamma knows that's about penguins. I watched penguins at the zoo, so I know they live in the cold like bears do too." (0-4)

"I know everything that's about penguins. I watched penguins at the zoo, so I know they live in the cold like bears do too." (0-4)

"I think the moves should be different because if he's so bad and it hurts her ears then she could have walked him right up to his room. That's what my mommy would do too." (0-2)

"I was afraid of the monsters in the W.T because once I watched a scary movie and it gave me really bad dreams and I couldn't sleep good. So, I slept with my mommy and daddy. I don't like those bad dreams." (0-2)

"I like to dress up like a princess because my mommy and daddy think I'm so pretty and then I feel pretty and beautiful." (0-3)

"Those monsters in that book (pointing) are scary because they are scary and ugly. They are growing their teeth and they have big bugging eyes." (0-4)

"I like to dress up like a princess because my mommy and daddy think I'm so pretty and then I feel pretty and beautiful." (0-3)

"I was afraid of the monsters in the W.T because once I watched a scary movie and it gave me really bad dreams and I couldn't sleep good. So, I slept with my mommy and daddy. I don't like those bad dreams." (0-2)

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"I was afraid of the monsters in the W.T because once I watched a scary movie and it gave me really bad dreams and I couldn't sleep good. So, I slept with my mommy and daddy. I don't like those bad dreams." (0-2)