Piagetian and Vygotskian Approaches to Cognitive Development in the Kindergarten Classroom

Yassir Semmar[1] & Tamader Al-Thani[1]

[1] Psychological Sciences Department, College of Education, Qatar University, Doha, Qatar

Correspondence: Yassir Semmar, College of Education, Qatar University, Doha, Qatar. Tel: 974-4403-5171. E-mail: ysemmar@qu.edu.qa

Abstract

Cognitive development is the progression of the ability to think and reason. By contrasting the theories of Piaget and Vygotsky in the field of cognitive development and by examining the value of three elements often found in a kindergarten classroom: peer interaction, pretend-play and computers, potentially valuable classroom practices will be examined especially in the context of technological advancement and socialization practices. Through the investigation of these elements, it will be determined whether a Piagetian or a Vygotskian approach will be more beneficial in the kindergarten classroom. By understanding cognitive development, Qatari preschool teachers will be able to better implement sound methodologies, providing a firm foundation in kindergarten children.

Keywords: cognitive development, early childhood education, pedagogical practices

1. Cognitive Development in the Kindergarten Classroom: Piaget vs. Vygotsky

In the classroom, inquiry learning is a method based on the constructivist approach which perceives learning to be the process of making sense and meaning of new information (Vacca et al., 2006). Both Piaget and Vygotsky were constructivists; however, they held many differing viewpoints regarding cognitive development. Piaget asserted that cognitive development is the process of restructuring knowledge through interaction with the environment. He believed children construct knowledge through interactions with their world, whereas Vygotsky believed that understanding is social in origin (Cole & Wertsch, 1996). Piaget and Vygotsky differ in the way they view cognitive development in children and thus offer different ideas on developmentally appropriate teaching methods. Current thought and methodology in the classroom have been influenced by both theories. Piaget and Vygotsky put forward explanations for children's cognitive learning abilities. In order to evaluate the methodologies developed by educators based on Piaget or Vygotsky, their views and theories must be examined especially in the context of technological advancement and socialization practices that are inherent in today's society.

Piaget, a stage theorist, developed four universal and linear stages of development. For the purposes of this literature review, only his second stage, the preoperational stage, will be examined since according to Piaget, kindergarten children fall into this stage. Piaget asserted that preoperational children do not yet think logically and are just beginning to learn about symbols. As children progress through this stage, they develop language as they struggle to use language to express their thoughts and problems solve (Piaget, 1952).

Piaget believed that children's thinking in the preoperational stage is characterized by: egocentrism, the inability to consider another person's point of view; animism, the capability to attribute life and thinking to inanimate objects; irreversibility, the inability to mentally reverse a sequence of events; centration, the tendency to center on only one aspect of a situation while ignoring others; and the lack of conservation, the belief that two equal quantities remain equal even if the appearance of one has changed (Woolfolk, 2004). Anecdotal evidence based on Qatari preschool classroom observations and conversations that this author had with preschool teachers revealed that the majority of preschool children couldn't understand conservation, viewed things only from their perspectives, and seemed to focus on one particular attribute at a time. Piaget asserted that children progress through the preoperational stage as they either assimilate or accommodate information by resolving conflicts between existing mental constructs and new information that causes them to form new mental structures. This equilibrium, or balance between assimilation and accommodation, is the basis for acquiring knowledge (Martin,

2000).

Piaget's observations about what children couldn't accomplish during the preoperational were challenged during the past several decades (e.g., Gelman, 1990; Wellman, 1990; Au, 1994). Gelman (1998) maintained that children in this developmental period start to reason about abstract topics as well as appreciate that "non-obvious" constructs exist. "Even preschool children make use of concepts to expand knowledge via inductive inferences … Children's concepts incorporate non-perceptual elements from a young age" (p. 11). In the same vein, Case (1993) proposed that children possess central conceptual structures, which are systems of semantic nodules that have a wide domain of application and play a central role in children's cognitive development. Such structures reflect conceptual relations and are acquired through a process that embodies social interaction as well as self-regulation activity. This paradigm, Case asserted, arose from the neo-Piagetian school of thought, "where children's cognitive systems … result from the child's active networking of this experience under the constraints imposed by their general level of development on the one hand and their existing specific structures on the other" (p. 230). More recently, in their innovative overarching theory of of cognitive organization and development Demetriou, Spanoudis and Mouyi (2011) further emphasized that preschool children, usually around the age of 4, begin a journey of differentiating representations from one another and from the objects which they represent. Such dual representations reflect an essential developmental milestone since they afford preschoolers with the opportunity to intentionally use symbols and symbol systems.

Piaget emphasized teaching through discovery, by challenging the child's abilities and using concrete experiences. According to Piaget, ideas and concepts cannot be communicated intact from teacher to learner. Instead, the learner must construct his or her own knowledge that is derived from concrete experience. Piaget viewed the teacher's role essentially as a facilitative one and the teacher must not be coercive or authoritative. Piaget did not view the role of the teacher as important (Piaget, 1952). Piaget observed children and their interactions with their environments. His theory of cognitive development emphasizes that language acquisition is influenced by general cognitive attainments. As children explore their environment, they interpret and ascribe meaning to the events they experience. The child's need to interact with immediate surroundings and to manipulate objects is critical to language and cognitive development. From a Piagetian view, language reflects thought and does not necessarily shape it (Vacca et al., 2006). Case and Okamoto (1996) argued that those conscious "general cognitive attainments" postulated by Piaget do not offer a comprehensive explanation into the dynamics of children's cognitive development. They ascribed equal importance to other processes that are much more specific, associative, and unconscious.

Vygotsky, on the other hand, believed that learning was an active, social process independent of stages of development. He believed that as children begin to acquire language competence, that language stimulates cognitive development. He asserted that children begin to regulate their own problem-solving activities through the act of private speech, or thinking out loud. Vygotsky also believed that children move toward more individualized thinking through social interaction. Vygotsky viewed the role of the teacher to be extremely important, taking a central role to the learning process. Through the use of modeling, and other appropriate strategies, the teacher is able to clarify instruction when the child is confused. Pieces of information are woven into the child's existing concepts. Vygotsky viewed the teacher broadly; a peer or even a tool could serve in the role of teacher (Vygotsky, 1978).

There are two important elements to Vygotsky's view of cognitive development. The first is the zone of proximal development. This is the area between what a child is able to perform independently and the ability to perform a more difficult task with assistance, yet without frustration. When helped through a zone slightly above the student's ability, the student's cognitive ability is allowed to expand. The second element is scaffolding. Scaffolding, according to Vygotsky, is an interactive process by which children are assisted in acquiring knowledge or skills. At first, students need to be led through thought processes and even the process of asking questions. Vygotsky believed that a child's thought process is developed through interaction with an adult. A good teacher gently prompts the student to deepen his or her thought processes through modelling. Through asking questions, step-by-step, the child arrives at an acceptable answer. Scaffolding is extremely important in the classroom, according to Vygotsky. With greater teacher-student interaction comes more learning as the teacher is more aware of what the student knows (prior knowledge) and can attach the new learning to a pre-existing concept (Vygotsky, 1986).

2. Vygotsky and Piaget in the Classroom

2.1 Blocks and Peer Interaction

Although kindergarten classrooms differ from place to place, some common elements do exist. Blocks are a common item found in most kindergarten classrooms. Interaction with the blocks provides children with the opportunity to sort, construct and imagine, in order to further develop their cognitive skills.

Using blocks, Johnson-Pynn and Nisbet (2002) conducted research into preschoolers and peer tutoring. They set out to determine whether preschool-aged children (ages three to five years old) could successfully partake in peer tutoring when given the task of reproducing a picture of a house with blocks, while working in pairs since learning often occurs in a social context. Through exploratory study, it was determined that preschool-aged children were indeed able to participate positively in peer tutoring. It was established that the experts, or those children who had previously received instruction and were competent in the task, did spontaneously help the novices. The experts provided non-verbal assistance, with modelling being the most common form. The researchers also employed positive verbal cues. Through research, Johnson-Pynn and Nisbet established that it did not matter if the expert child was older than the novice child. The results stand in contradiction to their hypothesis and a study previously conducted by Johnson in 1981.

Children are successfully able to assist their peers in the classroom, providing opportunities for cognitive, social and communicative growth. It is thought that the ability to peer tutor has its roots in early childhood (Reasoner, 2003). This study supports a Vygotskian approach since cognitive skills are being developed through interaction with a more competent and knowledgeable person. It also supports a Piagetian view in two ways: one, Piaget emphasized teaching through discovery, by challenging the child's abilities, and using concrete experiences; and two, the students were compelled to work through conflict in order to complete the task.

This study supports the idea that pairing children with differing abilities is beneficial. Teachers are often concerned that the expert would complete the task for the novice and not allowing the novice to grow from the experience. However, several studies have concluded that there is just as much, if not more, benefit for the tutor, since the expert learns about learning (Gartner & Riessman, 2000). Peer tutoring presents an opportunity for experts to advance their problem solving and communicating skills. This study provides encouragement to teachers of mixed-aged classrooms. It supports the notion of providing kindergarten students with activities that they can do themselves and help each other. According to research, teachers are able to rest assured that both parties are learning. While peer tutoring seems like a unique opportunity for children to learn from each other, it also presents a challenge in the context of the local, Qatari preschools because it has not become a "culture" whereby preschool teachers seem to "implicitly" engage in behaviors that cast doubt on the relative merit of such a practice.

2.2 Pretend-Play

Play is another well-established component in early childhood education. An increasing body of evidence is being established to support the connection between cognitive ability and high-quality pretend play (Bodrova & Leong, 2003). Make-believe play allows for the development of self-regulation (Krafft & Berk, 1998). Allowing for peer interaction, pretend play aids in the development of necessary skills that allow children to concentrate, pay attention and be considerate of others. A little over a decade ago, Gmitrova and Gmitrov (2003) investigated the impact of teacher-directed and child-directed play on 51 children in two mixed-age classrooms. The study was conducted in order to assess the value of play on the cognitive and affective behavior of children in kindergarten.

Two approaches to directed pretend play were studied: teacher-directed and child-directed play. Teacher-directed pretend play involved all the children in the class playing together at the same time. The teacher organized and monitored the play continuously while encouraging interaction between all of the children. This was referred to as "frontal play" because it resembled a traditional education style where the teachers play a dominant role. In the second form of play, child-directed, children were encouraged to create groups and play different games according to their own interests. However, in this study, the child-directed play was modified by having the teachers actively participate in the playing process. The teachers began by presenting a lesson to all the children in the classroom. After the lesson, the teachers motivated the children to create play groups. The teachers gently facilitated the play groups and encouraged passive children.

This study supports the thought that pretend play leads to better cognitive abilities. Intense and elongated play periods allow children to use their imagination, along with their cognitive and social skills (Welsch, 2008). This

study lends support for educators that see value in play, yet are being pressured by parents and administration to spend more time on more serious activities. Since there is such value in play, it is important that classroom practices reflect this value and that teachers allow enough time for facilitated pretend play. It is through play that letter recognition, emerging literacy skills and math skills will be better able to develop, providing a firm base for the rest of their education. The study of pretend-play supports a Vygotskian approach. Vygotsky believed that creativity begins with the common practice of objection substitution in play. When introducing pretend-play, it is important for teachers to initiate object substitution as fellow players in order to help compensate for the children's poverty of experience. It is important to choose items that allow for many possibilities, instead of using toys that were made for a specific purpose. Items such as boxes, allow children to express themselves and partake in a dialogue with objects and each other (Capossela, 2000).

2.3 Computer Use

A third element common in most kindergarten classrooms is the use of computers. Over the past few years, there has been a steady increase in the availability of and access to computers, leading to a rapid growth in computer use both at home and school. Children are more and more exposed to complicated technologies, such as computers, I-pads, games and the Internet. They seem to utilize these technologies easily and most of the time more efficiently than their parents. An increasing body of research implies that technology can be both useful and harmful according to the ways children think. Furthermore, these effects do not only affect the surface of the child's thinking but also the wiring of his brain (Wood, Smith, & Grossniklaus, 2001). With the rise of computer use, for instance, there has been much debate regarding the benefits in the classroom. Much of the debate surrounds the cognitive value of computer use, especially for young children.

Using appropriate software may contribute to a child's cognitive development through the development of thinking strategies and logic skills (Clements, 1999). Li, Atkins and Stanton (2006) conducted to determine if computer use in the classroom was beneficial to young children. The researchers discovered that weekly computer use had a beneficial effect and further time may not necessarily show further increases in cognitive development. All preschools in Qatari are mandated by the Supreme Education Council to include developmentally appropriate computer labs (Supreme Education Council, 2008), and while efforts are applauded to have all preschools in Qatar technologically wired, it is imperative to conduct an empirical investigation on how preschool teachers use computers and other technological devices to help promote children's cognitive development most specifically in the preoperational stage.

According to a Piagetian view, computer usage should be limited until children reach the concrete operational stage, or about the age of seven, since preoperational children think in concrete terms and learn through hands-on experiences. People who hold this view believe that computer programs are too abstract and that children should be interacting with concrete objects. However, taking a Vygotskian approach, where a computer is seen as an educational tool, it is thought that computer use is beneficial. The data appears to support Vygotsky's theory of social cognitive development, which considers computers with developmentally appropriate software as physical and cultural tools that expand mental tools among young children. In light of this, teachers ought to choose computer programs carefully to help ensure their students are receiving the most benefit.

3. Conclusion

Kindergarten children are experimenters, explorers and imitators. Children do not internalize knowledge directly from the outside, as if they were downloading information into their brains. Instead they must mentally construct information from inside their heads through interacting with their environment. Piaget fully believed that children should interact with their environment, and it was from this interaction that children best learned. Vygotsky, whose theories center on the social aspect of cognitive development, held that it was through that social interaction that mental constructs were formed. Although Piaget's general framework is useful and set the foundation of modern-day thoughts in cognitive development, much of his theory has been criticized for underestimating children's cognitive capabilities (Siegel, 1993). By building on the Piagetian framework, centered on the value of experience and employing Vygotsky's theories on the value of social interaction, a well-rounded classroom environment that addresses the needs of children can emerge (Simatwa, 2010). Children must be actively involved in order to grow and learn and merely reacting to the environment is not enough, social interaction is necessary as well. In order to maximize the opportunities for the successful integration of Piagetian and Vygostkyian approaches to children's cognitive development in the context of Qatari Preschools, it would be indispensible to assess teachers' attitudes, behaviors, perceptions, and knowledge about the main principles and tenets of such approaches prior to delving into any types of pedagogical and curricular reform.

While Piagetian and Vygostkyian theories have contributed much to our understanding of children's cognitive development and its implications in the context of teaching and learning processes, it is imperative that educators, researchers, and policy makers in the State of Qatar begin to consider more comprehensive cognitive developmental paradigms such as the one proposed by Demetriou and his colleagues four years ago. In their essay, "Educating the developing mind: Towards an overarching paradigm", the authors relied on constructs from the educational and psychological realms to synthesize a unified theory of learning, understanding, and development whose implications are outlined below (Demetriou, Spanoudis, & Mouyi, 2011, pp. 652-653):

1) Educational priorities must capitalize on developmental milestones to make education feel relevant, appropriate, and useful for each phase of life.

2) Organization and presentation rate of material to be learned must take representational capacity and processing efficiency into account in order to make learning possible and powerful at every phase.

3) Eduction must practice, consolidate, and build models for core and mental operators in each specialized structural system because they function as knowledge extraction mechanism.

4) Special attention should be given to the lifting of inference from automatic to analytic functioning highlighting the importance of decontextualization of inference from content to context in the process.

5) Problem solving involves all of the processes above and should be demonstrated and practiced as such.

4. Recommendation for Further Research

There has been little research into the best classroom practices that will enhance and develop the cognitive abilities of preschool-aged children especially in the context of Qatari Educational Reform. Since educators are concerned with cognitive development in children and how it affects academic success, more research should be conducted centering on kindergarten children. This is important as kindergarten sets the foundation for all further educational achievement.

Although "peer tutoring" is relatively a novel concept in the local Qatari culture, especially at the preschool level, it can be a significant component in a mixed-aged classroom and can at times occur spontaneously. It has been shown that peer-tutoring can further cognitive development. Additional research to provide support for the current studies would be advantageous. Is there greater benefit when peer tutoring occurs naturally, when a student sees a need and helps a fellow student complete a task? Or does a more structured, teacher-prompted tutoring session produce greater results?

It would be beneficial to conduct further research into the value of pretend-play. The effect of cognitive development in regard to the amount and duration of pretend-play should be studied. Does pretend-play need to occur on a daily basis or for a specific duration of time to show a favourable outcome? How much teacher involvement should there be? Should certain topics be considered essential? Is there a benefit to role-playing prior to pretend play? Should literature be used as a jumping off point?

Often a major challenge for schools concerned with the best use of children's time in kindergarten is the teacher's ability to provide meaningful lessons and learning activities. The research that would likely best help kindergarten children seems to be rooted in the practical aspect of daily classroom life. Research regarding practical steps that teachers could implement to reflect an environment and curriculum that will aid in children's cognitive development and ultimately their academic success would be best. Research becomes truly valuable when it can be implemented in the day-to-day classroom.

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