The Power of Play in Supporting School Readiness Skills

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Abstract

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School readiness is a term that has come to yield a lot of power over preschool and kindergarten curricula over the past two decades. This shift has led to an increased academic focus, which has often come at the expense of traditional play times. However, the play-versus-academic debate is actually a false divide as evidenced by neuroscience research on executive function skills and socio-cultural research on how play impacts child development. Play creates an ideal context for the important mental development that takes place in the preschool and kindergarten years. This paper reviews the literature in each of these areas and ultimately argues that the conceptualization of "school readiness" should take into account the multiple critical aspects of development during these early years rather than focusing exclusively on academic skills. Based on this new conceptualization, the paper concludes with three key principles for supporting school readiness in preschool and kindergarten classrooms.

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Introduction

Over the past two decades, the nature of preschool and kindergarten has changed. No longer are preschools and Kindergarten the "children's gardens" of years past, dedicated primarily to exploration and play (Bassok, Latham, & Rorem, 2016) (Brosterman, 1997). Increased pressures from testing and accountability measures in elementary school have trickled down into preschools and kindergarten, sparking conversations between teachers, parents, and lawmakers over whether children are "school ready." This term, school readiness, has come to hold great influence over preschool and kindergarten curriculums as states, schools, parents, and educators, try to figure out how to best prepare students for the transition to elementary school (Bassok, Latham, & Rorem, 2016). It is a term, however, without a clear definition, though it has oft been interpreted to mean that students are academically prepared for first grade (NAEYC, 1995; Office of Head Start, 2015). To meet these increased pressures around school readiness, many preschools and kindergarten have increased the amount of time children spend in formal academic settings at the expense of play (Bassok, Latham, & Rorem, 2016). Play, though generally understood to offer opportunities to support social skill and concept development, has been pushed aside for what is often thought to better promote a child's transition to formal schooling-- a focus on developing basic math skills and learning to read (Bassok, Latham, & Rorem, 2016). Preschools and kindergarten around the US, caught between increased school readiness pressures and their traditional roles as places of exploration and play, are struggling to find the right balance between play and academic time. Some states have taken control over this conversation and enacted school readiness measures for children enrolled in public kindergarten, laying out clear expectations for students' academic and cognitive development (Washington State Department of Early Learning; Superintendent of Public Instruction Washington; Thrive

Washington, 2015). Other preschools and kindergarten run the gamut on this academic versus play conundrum, ranging from outdoor play schools exclusively dedicated to exploration and play to schools with strong academic focuses.

As this debate over preschool and kindergarten curriculum continues, new neuroscience research has revealed that ages four and five are highly important years in the development of executive function skills, made of up of working memory, cognitive flexibility, and inhibitory control (National Scientific Council on the Developing Child, 2011). This brief timeframe is when the fundamental neural networks underlying executive function skills are laid down (National Scientific Council on the Developing Child, 2011). The research on executive function skills has increasingly shown how vital they are to success both in school and life (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Jacob & Parkinson, 2015; Diamond, Barnett, Thomas, & Munro, 2007; National Scientific Council on the Developing Child, 2011; Weiland & Yoshikawa, 2013). As a crucial time for the development of executive function skills aligns with the preschool and kindergarten years, this adds a new and significant factor to the debate around preschool and kindergarten curricula and how to best support student transitions into formal schooling. As this research is still novel and ongoing, states, schools, and early childhood organizations are still figuring out how to incorporate this additional information into their missions.

While the question of how to best support student transitions into formal school is a good one, the debate over play versus academics actually misses the mark. An important factor in this conversation is understanding what child development is happening in the preschool years and how this development supports students' later success in school. By focusing too narrowly on either play or academics, parents, schools, and lawmakers are missing how both of these

concepts are actually intertwined in child development. One need not decide between academics and play when trying to support school readiness, as creating opportunities for children to engage in in-depth play is actually the best way to lay the foundation for readiness for school. Play has the potential to support critical aspects of child development, including inhibitory control, symbolic thinking, voluntary memory and behavior, which are all critical components of later success in school.

In this paper, I argue that the benefits of play in preschools and kindergarten are often too shallowly understood, helping to create this play-versus-academics divide in the school readiness conversation. In addition, I contend that too strong of a focus on academic skills in defining school readiness takes focus away from other critical processes of development that are taking place in preschool and kindergarten. To help bridge this play-versus-academics divide, schools, parents, and policy-makers must gain a deeper understanding of what development happens at this stage of development, and how schools can best provide positive support. In addition, I argue that school readiness must become a more encompassing term, one that takes into account all of the development that a child must go through in preschool and kindergarten to fully be ready for challenges ahead. I draw from current neuroscience research around executive functioning and use theory from prominent Russian psychologist Lev Vygotsky and his colleagues Daniil Elkonin, Zinaida Istomina, and Zinadia Manuilenko, to illuminate what development is taking place in preschool and kindergarten and how play is, as Vygotksy says, "the leading factor" of early childhood development (Vygotsky, 1967, p. 7).

In this paper I will examine the roots and current definitions of the term "school readiness," and explore the ways in which it has come to wield influence over education today. I will outline important development that takes place during preschool and kindergarten, including

emerging research on executive function skills and the resulting implications for preschool and kindergarten curriculum and the development of later academic skills. I will use research from Vygotsky and his colleagues to explore early childhood development and how it is best supported. In the final section, I will draw from the executive functioning research as well as that of Vygotsky and his colleagues to make suggestions for how preschools and kindergarten can bridge this tension between play and academics and think more deeply about how to best support a child's readiness for school.

What is School Readiness?

In the past two decades, the term "school readiness" has gotten a lot of buzz. From policy makers to parents and educators, people want to know if the nation's preschool and kindergarten children are school ready. News stories fan the flames of interest, blasting headlines about preschoolers with homework and school readiness gaps between groups of children (Korbey, 2012; Camera, 2016). So what exactly does it mean to be "school ready" and why has the concept become so important? The following section reviews the history of the term "school readiness" from its early roots in the 20th century to its most recent and powerful iterations. Definitions of school readiness from Head Start and the National Association of Young Children will be outlined to highlight how the term has been used to advocate for a diverse range of goals. The section concludes by looking at how a national focus on school readiness has already changed the work of preschool and kindergarten students and has set the stage for debates around the importance of play versus academics.

The History of School Readiness

Early inklings of concern around student school readiness date back to the beginning of the 20th century. Historically, early child education was the domain of women inside the home as

mothers were responsible for teaching young children. Women who could not afford to stay at home often left their children in the care of other women in the community. In the early 20th century, as formal schooling around the United States became increasingly common, and eventually mandatory, concern grew from communities and politicians that the children of poor families would not be adequately ready for school (Bloch & Kim, 2015). To support poor children's transition to formal schools, charitable institutions opened daycares and nurseries aimed at providing care that their mothers were assumed to be not able to offer (Vinovkis, 2005). The focus of these daycares and nurseries was often on remedying the ways in which disadvantaged children were perceived to be lacking, and to instill in the young children the social values of the middle and upper class (Bloch & Kim, 2015). This meant a curricular focus on student moral development, social character, and hygiene (Vinovkis, 2005). These charitable nurseries and daycares were some of the first schools in the United States to focus on the idea of school readiness (a term not yet in use at the time) as part of their mission was to prepare disadvantaged students for a future of formal schooling (Bloch & Kim, 2015).

The mid-twentieth century saw a great change in the role of early childhood education. This change was wrought by three shifting social factors. The first factor was changing views around the idea of IQ. IQ testing grew popular in America in the first part of the 20th century and became a widely used tool to determine intelligence. In its early stages, IQ was believed to be fixed at birth and learning was thus dependent on the maturation of the student (Vinovkis, 2005). This belief in innate ability meant that many people did not see a point to early childhood education as children were expected to fulfill their predestined intelligence as they matured (Vinovkis, 2005). Around mid-century, academics' and policymakers' views around child development began to change and beliefs around IQ changed with it (Hunt, 1980; Vinovkis,

2005). Researchers like Donald Webb, J. McVicker Hunt, and Benjamin Bloom challenged the idea of fixed intelligence, arguing instead that environment made a substantial impact on a child's development (Hunt, 1980; Vinovkis, 2005). They advocated for preschool as an important way to support children's development and help them reach their full potential (Vinovkis, 2005). This shift in perspective around IQ and child development led to greater understanding of the importance of early childhood education.

The second factor contributing to the changing role of early childhood education was the post-World War II baby boom. The late 1940's through 1960's saw a marked increase in the number of births around the nation, resulting in an unprecedented number of young children around the same time that views of child development were shifting. The third changing social factor was the increase in women working outside of the home. Many women had gone into the workplace during World War II while men were fighting in Europe and around the globe. After the war, though many women returned to the home, it became increasingly common and socially acceptable for women to work. These three factors combined created a changed landscape for early childhood education to blossom. With the increased number of young children around the nation, as well as a greater number of working mothers, there became greater need for educating children outside of the home. In addition, with the changing perspective on child development, preschools came to be seen as places where children might thrive before heading off to formal schooling.

This new landscape of early childhood education set the stage for the development of Head Start, the federal government's biggest investment in early childhood education and an organization that spread the seeds of the current debates around school readiness. In the 1960's, though the middle class was booming post WWII, economic disparity began to emerge as part of

the national conversation (Vinovkis, 2005). To help alleviate economic inequities, in 1965, President Lyndon Johnson created Head Start as part of his War on Poverty (Vinovkis, 2005). This new education program was based on the growing understanding of the early years as critical to a child's development (Vinovkis, 2005). Head Start aimed to prepare children living in poverty for school, and ultimately for success, in their education. Like the nurseries and preschools of the early 20th century, Head Start was created to combat the effects of poverty, offering the nation's poor children, as the name indicates, a head start before beginning formal school (Vinovkis, 2005). This mission of preparing children for school laid the early roots for the current national conversation on school readiness.

It wasn't until 1983, however, that the groundwork really began to be laid for concern around school readiness. In this year, a landmark report called *A Nation at Risk* was published. This report used the term "crisis" to define the state of education in America and warned of dire economic repercussions if action was not taken (The National Commission on Excellence in Education, 1983). The result of this bombshell report was political interest in education reform. A few years later, in a 1989 summit on education, President George H.W. Bush and the nation's governors produced a set of nation-wide education goals to be achieved by the year 2000 (Vinovskis, 1999). The first goal of the summit was: "all six year olds ready for first grade" (Vinovskis, 1999, p. 20). This goal was the bell that rang in the national conversation around preschool and kindergarten student readiness for school. Almost three decades later, the language of this summit is still used today – are they ready for school?

Just over a decade after his father set the goal of all six-year-olds ready for first grade, the George W. Bush administration of 2001-2009 pioneered great changes in the education landscape. Federal initiatives such as No Child Left Behind and Good Start, Grow Smart brought

school readiness and early childhood education to the fore of the national conversation (Lehrer & Bastien, 2015). Good Start, Grow Smart was the Bush Administration's early childhood initiative that supported preschool access for low-income students and aimed to increase awareness of the importance of early childhood education. In addition to this early education initiative, No Child Left Behind launched a series of high stakes tests, holding teachers and schools accountable for the failures of their students. Concerns over poor test scores coming out of third grade pushed worries about test readiness down onto teachers and parents of those in younger grades (Bassok, Latham, & Rorem, 2016). These pressures made their way down to preschools and kindergarten, where teachers began to worry about students being academically prepared for first grade, where the stakes of learning had just jumped up (Bassok, Latham, & Rorem, 2016). During this same time, in addition to, or perhaps as a result of, increased pressures from high stakes testing and the federal push to bring awareness to the importance of preschool, there was also heightened investment in early childhood education from families (Bassok, Latham, & Rorem, 2016). Greater numbers of children were enrolling in preschool, and parents were becoming increasingly involved in developing their children's academic skills, even before the start of kindergarten (Bassok, Latham, & Rorem, 2016)

Though the current administration and education policies have changed, the legacy of testing continues on with the Common Core, and worries about whether students are school ready have continued to dominate conversations in schools, homes, and politics. Some states have taken a stand on the issue, creating school readiness benchmarks by which to measure student progress in kindergarten. Many more states are debating how to offer high-quality preschool to best support student development and learning in preparation for first grade.

In spite of a clear cultural desire to increase young children's readiness for formal schooling, there is actually little agreement over what exactly school readiness means or how building it will look in classrooms. Two leading early childhood organizations, Head Start and The National Association for Young Children (NAEYC) both have position statements on school readiness, outlining what they think school readiness means and how to support young children's preparation for school. Interestingly enough, these two organizations take rather opposing stances on the subject, highlighting a tension over the unclear definition of what school readiness means and how to ensure children get there. NAEYC, a nationwide professional organization dedicated to increasing the quality of young children's education, takes a philosophical view of school readiness, promoting ideas such as educating the whole child and meeting each child where they are (NAEYC, 1995). They argue that when thinking about school readiness, the burden should be on the schools to make sure they are meeting the needs of every student, rather than having each student demonstrate they are ready for school (NAEYC, 1995). The NAEYC also argues that the focus of preschool should be on growing all of a child's developmental domains rather than privileging some over others and argues that skills cannot be accurately assessed out of context (NAEYC, 1995). Head Start, on the other hand, takes a much more prescriptive view of school readiness. In a published document of school readiness skills, they outline academic, social, and physical domains and sub-domains that teachers are expected to use to teach, set goals, and assess students. This document sets the framework for each Head Start classroom as the teachers use it to "plan teaching strategies and learning environments, establish school readiness goals, select curricula, select assessments, tailor professional development, and inform program planning, improvement and implementation" (Office of Head Start, 2015, p. 8). While NAEYC pushes back against the idea of a predetermined set of abilities

needed for school success and instead advocates for supporting each child's individual needs and ensuring access to high quality opportunities, Head Start has created a map of desired school readiness skills and set their many classrooms around the country to the task of ensuring each child acquires them. These opposing views on school readiness demonstrate that while the term has captured the attention of the nation, the path to ensuring school readiness is anything but clear.

Changes in Preschool and Kindergarten Curriculum

Over the past decade, the term school readiness has come to hold a lot of power over what happens in preschool and kindergarten classrooms. Though school readiness is not singularly defined, its very existence has led preschool and kindergarten educators to rethink their goals and curricula. For example, it was only in 2007 that Head Start's explicit goal of school readiness was integrated into Head Start's mission. This change was accompanied by a several-year reworking of their overarching performance standards aimed at reaching this new goal, as well as the publishing of their school readiness measures. Individual states and preschool programs may use different benchmarks as their markers of appropriate development, but the very existence of these early learning benchmarks has greatly impacted how we, as a nation, see the work of young children.

Play has long been an important part of the preschool and kindergarten experience. Frederick Froebel, the early 19th century German educator who invented the term "kindergarten" and started a movement of kindergartens around the globe, saw play as an invaluable part of a young child's school experience (Brosterman, 1997). In these first kindergartens, children engaged in active play, singing, dancing, block building, crafting and gardening (Brosterman, 1997). Art and aesthetics were highly influential in the crafts of early kindergartens and learning

by doing was a strong thread of Froebel's pedagogical philosophy (Brosterman, 1997). Though Froebel died in the mid-19th century, his legacy was carried on by his followers, and many of Froebel's kindergartens could be found in the United States and around the globe up into the early 20th century. His pedagogical theories strongly influenced Maria Montessori, and threads of his ideas are still found in popular approaches such as in the schools of Reggio-Emilia (Brosterman, 1997). Like early kindergartens, preschools of the 20th century were also heavily play based. Young children regularly engaged in socio-dramatic play through dress-up, puppets, pretend kitchens and more. Sensory play with water, sand, and other materials like rice and beans was a staple of a preschool classroom. Children learned songs and dances and listened and acted out stories read by teachers. Play was, in fact, the very work of school.

As school readiness pressures have increased for preschools and kindergarten, curricula and teacher expectations have also shifted. This change is evidenced through research comparing kindergarten teacher expectations from the late 1990's and again in 2010. In 1998, 31% of kindergarten teachers surveyed believed their students should learn to read (Bassok, Latham, & Rorem, 2016). By 2010, this number had risen sharply to 80% (Bassok, Latham, & Rorem, 2016). In addition, kindergarten teachers' beliefs around curricula and pedagogy had also shifted, becoming increasingly academic and whole-class oriented, as opposed to child-centered and play focused (Bassok, Latham, & Rorem, 2016). Research also shows that reading and math instruction increased at the expense of science and the arts (Bassok, Latham, & Rorem, 2016). Unsurprisingly, two of the main domains of elementary school testing are reading and math, demonstrating a trickle down link between elementary school testing and preschool and kindergarten content. In addition, time spent in school has also dramatically increased for kindergarteners as the previously common half-day programs have increasingly become full-day

(Bassok, Latham, & Rorem, 2016). Overall, Bassok (2016) and her team argue that the kindergartens of today are similar to the first grades of the 1990's.

As the research from Bassok et al. (2016) has demonstrated, our expectations of kindergarten student work has greatly increased over the past two decades. To meet these increased academic expectations, preschools and kindergartens are less like the play schools of a generation past, and more like academically focused elementary school grades. As preschools and kindergartens become more academic in pursuit of maximizing the school readiness of their students, many schools are wondering what the trade-offs are of play versus academic time. Without a clear answer on the topic, schools are left to fend for themselves in making this decision, negotiating outside pressures like school readiness benchmarks and advocates of free play.

To bridge this play-versus-academics divide, we must have a deeper understanding of the development preschool and kindergarten children undergo and how this development supports their later success in school. Recent neuroscience research around executive function skills offers a way to begin bridging this divide, highlighting important brain developments that take place during the preschool and kindergarten years and how these developments support success in school. Once we have a deeper understanding of this development that takes place in preschool and kindergarten, we can then examine what preschools and kindergartens can do to create environments that best support this development. The next section examines the research around executive functioning, its importance for academics, and its connection to preschool and kindergarten. The subsequent section explores how play is critical to the development of these mental capacities.

Child Development in Preschool and Kindergarten

New Neurological Research: What is Executive Functioning?

Reading on a busy train, amending a recipe on the fly when you discover you are out of an ingredient, or recalling a phone number that was told to you five minutes earlier; these are all tasks that rely on executive functioning skills. Executive functioning is a set of interrelated cognitive skills that allow us to focus, filter out distractions, hold and work with information in mind, switch gears, absorb multiple streams of information, monitor for errors, make revisions in light of new information, and resist the urge to get frustrated (National Scientific Council on the Developing Child, 2011). Executive functioning is made up of three discrete skills- working memory, inhibitory control, and cognitive flexibility- that work together to organize people's thinking and behavior (National Scientific Council on the Developing Child, 2011). Working memory enables people to remember and manipulate several items of information at once, as well as draw on information to make decisions (National Scientific Council on the Developing Child, 2011). Inhibitory control enables people to resist distractions and suppress immediate impulses in favor of more appropriate actions (National Scientific Council on the Developing Child, 2011). Cognitive flexibility enables people to shift perspectives or attention and adjust to new demands or priorities (National Scientific Council on the Developing Child, 2011). Though these processes are partly dissociable from each other, they work together to create executive functioning, the top-down cognitive processes that govern our strategic and goal oriented behavior (Jacob & Parkinson, 2015).

Research has found that executive function skills are vital to flexible thinking and enabling people to operate successfully in rule-governed environments where they self-regulate their own behavior and choose appropriate responses to stimuli (Bierman, Nix, Greenberg, Blair,

& Domitrovich, 2008). Executive functioning also enables people to prioritize and sequence actions, handle novel situations, and create abstract rules (Jacob & Parkinson, 2015). The combined skills of executive functioning guide a person's response to complex tasks (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). In short, executive functioning builds the skills that are the key to academic success.

Why is Executive Functioning So Important for Preschool and Kindergarten?

The National Scientific Council on the Developing Child (2011) calls executive functioning the biological basis for school readiness. While knowledge of academic content is important for school success, engaging in that content is enabled by the brain's ability to control thinking and behavior. This control is enabled by the development of executive function skills. Executive function skills support *how* students learn, making it possible for them to focus, remember, and plan (National Scientific Council on the Developing Child, 2011). Because of this, the National Scientific Council on the Developing Child (2011) names executive functioning as the "common denominator" (p. 5) of all learning and social interaction. These cognitive skills set the stage for engagement in learning and acquisition of academic skills (Blair & Raver, 2015). For these reasons alone, a child's development of executive function skills is critical to their school readiness. Even more important, however, is the fact that the basis for executive function skills, the neurological connections, are laid down in preschool and kindergarten.

While biology and genes give each person the blueprint, or potential, to develop executive function skills, their actual development is greatly shaped by each person's environment, and in particular, their early childhood experiences (National Scientific Council on the Developing Child, 2011). The window of opportunity for the development of executive

functioning is ages three through five, when the majority of relevant neurological connections are forged (National Scientific Council on the Developing Child, 2011). The development of these neurological connections depends greatly on the types of interactions and environments young children are exposed to (National Scientific Council on the Developing Child, 2011). An environment that includes sensitive responses from caregivers, scaffolding from adults in problem solving, individualized support in decision making, child-centered activities, guided exploration of the environment, and order and predictability, will support the growth of the neural connections needed to build executive function skills (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Through these supportive and individualized interactions, children will learn to make decisions and foster key skills in safe and predictable spaces (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; National Scientific Council on the Developing Child, 2011). For children experiencing high levels of daily stress, however, either from their interactions with adults or their environment, growth of executive functioning will likely be delayed or inhibited as the brain connections that underlie executive functioning are also those associated with stress (National Scientific Council on the Developing Child, 2011). Stressful environments and high emotional reactivity, such as living in poverty or sustained experiences with unpredictable responses from adults, inhibit the development of the needed neural interconnections that build executive functioning (National Scientific Council on the Developing Child, 2011). By age seven, the brain circuits underlying executive functioning are already similar to those in adults, though adolescence and early adulthood are spent refining and making these connections more efficient (National Scientific Council on the Developing Child, 2011). This timeline highlights the importance of supporting the development of these executive

functioning skills at a young age as the window to build the needed neural connections is early and brief.

Executive functioning's early development coincides with preschool and kindergarten. This means that these school years offer widespread and critically important opportunities for children to build their executive function skills. This opportunity is especially important for children exposed to stressful environments that could negatively impact their abilities to develop these foundational skills. The results of this crucial period can have a lifelong impact on a person's ability to learn and strategically organize their behavior. For this reason, it is imperative that early childhood education support the growth of executive functioning.

The Relationship between Executive Functioning, Academic Knowledge, and Social Behavior

Studies have found that numerous academic skills are linked to executive functioning (Weiland & Yoshikawa, 2013). Math skills such as composing and decomposing numbers are correlated with working memory (Weiland & Yoshikawa, 2013). Math problems involving numeracy and geometry require students to shift attention between the two elements at hand as well as filter distractions to strategically focus on one aspect of the problem at a time (Weiland & Yoshikawa, 2013). In fact, executive functioning is connected to so many academic skills that it has been more associated with school readiness than IQ or entry level math or reading skills (Diamond, Barnett, Thomas, & Munro, 2007). It enables students to actively engage in the process of learning. Cognitive flexibility equips students to strategically focus, minimize distractions, maintain concentration, and shift attention when needed (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Inhibitory control makes it possible for children to sit still, watch

and listen, and follow classroom rules (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Working memory makes it possible for children to engage with information for chunks of time as well as envision and act on mental models (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). What is becoming increasingly clear from the current research is that executive functioning undergirds all academic skills, enabling students to both engage with ideas and ultimately transfer them to longterm knowledge.

Executive function skills are also believed to support children's social behavior. For example, working memory can help children engage in prosocial behaviors through the ability to draw from a mental template for rule-governed behavior (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). This helps children react appropriately to various social situations as they can draw from previous experiences and class generated scripts to problem solve (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). Successful engagement with peers also requires the ability to self-regulate behaviors and emotions as well as shift perspectives to see from another person's point of view. Students who are able to use these skills are more likely to engage in sustained collaborative play. Collaboration with peers has also been found to extend a child's attention, further developing their working memory (Blair & Raver, 2015). Imbedded in this finding is the implication that students who are delayed in building executive function skills lose out on opportunities to further develop these critical skills. In essence, those who are already at risk have the potential to fall further and further behind.

Studies have also shown that students who are delayed in developing executive function skills experience difficulty adjusting to classroom life and learning problems in elementary school (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). These early experiences of difficulty can lead students to develop negative associations with school and learning that can

impact their engagement in later years of school (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008). These findings further illustrate how for students experiencing delayed or inhibited development of executive functioning, the stuggle to succeed starts at a young age and only further compounds itself. In addition, these studies indicate that true school readiness is much deeper than knowing discrete academic skills like "abc's and 123's." To succeed in school, a child must be able to attend to and engage in the process of learning if they are going to be able to develop and utilize their academic skills in meaninful ways. For the students in these studies, their delayed executive function skills meant they had an inhibited ability to engage in learning and the routines of school. This inability to engage in learning processes ultimately results in lower academic success. Preschool and kindergarten teachers themselves often echo these findings on the importance of executive functioning, ranking skills like self-discipline and attention control as more important for school than content knowledge (Diamond, Barnett, Thomas, & Munro, 2007). So while for many people, school readiness means an increased focus on academic skills, the research and advice of teachers increasingly points to students' ability to engage in the routines and processes of learning as far more important than knowing discrete facts and figures. As executive function skills have emerged as a foundational part of the ability to engage in learning, the question becomes, how do we support the development of executive functioning? From the research, it is clear that this work must happen in preschool and kindergarten classrooms as this is an important window of opportunity for development. The next section uses socio-cultural theory and empirical research to examine how preschools and kindergarten can create classrooms that support student development of inhibitory control, memory, and abstract thinking.

How to Support the Development of Executive Functioning in Preschool and Kindergarten Classrooms

During the twentieth century, prominent Russian psychologists Lev Vygotsky, Daniil Elkonin and others researched and theorized about early childhood development, creating a body of work that bears importance to our question of how preschools and kindergarten can support the development of executive function skills. Vygotsky and his colleagues were socio-cultural theorists who believed that a person's development was highly influenced by their relationships and interactions with the people and culture around them. This belief led them to research how children's environments and relationships with other people affected their development. Though these psychologists were working far before the current neuroscience research on executive functioning was published, their work was prescient of today's findings, as they explored topics like self-regulation, abstract thought, voluntary memory and more. A common theme in their research is that role-play supports a young child in practicing new, critically important mental skills. This focus on play as a form of development will help illuminate how executive function skills and play are intricately intertwined and thus can help bridge the academics-versus-play divide in early childhood education. The following section will be broken up by theme, looking closely at key aspects of executive function that develop during preschool and how play supports their growth.

Self-Regulation and Play

Self-regulation is a skill that, as we saw in the neuroscience literature around executive functioning, is important for children to develop in preschool and kindergarten. Vygotsky also found preschool to be the time that young children develop this skill, arguing that children first practice self-regulation in play before becoming proficient enough to transfer it over to use in

everyday experiences. In everyday situations, Vygotsky posited, a child acts first, with action predominating over meaning. In play, however, he argued that meaning determines action. It is the meaning of the imagined situation that guides how a child will act. In molding their actions in deference to the role they have chosen to play, Vygotsky posits, a child first begins to self-regulate their actions. This first practice in self-regulation is thus child-directed, stemming from child-initiated activities and child-regulated actions. To further understand how role-play shapes actions, we must look at Vygotsky's theory of why children engage in play.

Vygotsky hypothesized that children engage in play (which he defined as make-believe play) to satisfy unrealizable needs and desires. For example, a child may observe an adult driving a car and desire to also drive the car. In reality, this is not an experience that is open to a child, but the child can satisfy this desire through imaginative play in which they use an object as a symbol of a car or steering wheel and act out the experience of driving. Through imaginative play, Vygotsky elaborated, children "play at reality" and act out versions of their world (Vygotsky, 1967, p. 9). A key component of make-believe play, Vygotsky stressed, is that it has rules. These are not rules that are planned in advance, but rather are inherent in the role a child has taken on. To continue our example from earlier, a child pretending to be a driver wouldn't switch between sitting and running freely, they would be compelled to follow the rules of driving, sitting in their driver's seat until they had "parked." In an example from Vygotsky, a child playing at being a mother would follow the rules of maternal behavior, as they understood them to be (Vygotsky, 1967).

A child learns rules very early in life from interacting with their environment and getting feedback from adults. For example, children learn that it may be acceptable for babies to throw food, but for a teenager it is not. These rules that govern behavior also infiltrate play, shaping the

behavior of a child playing a role. If a child plays a teenager in a game of family, though they could potentially throw food as part of the game, it would not fit the actions of their chosen role. Thus, even in a game, children conform their behavior to the rules and expectations they have learned. Vygotsky stressed that these rules inherent in roles are hidden to the child who instead sees play as freedom. But, as Vygotsky pointed out, it is an "illusory freedom," as their actions are still governed by the same rules that govern everyday life (Vygotsky, 1967, p. 10). Because play is seen by children as a form of freedom, however, they engage in it for pleasure, and the pursuit of pleasure creates motivation for play's success even as the children subject themselves to rules that are against their immediate nature. "In play, the child renounces his immediate impulse, coordinating every act of behavior with the rules of the game," Vygotsky explains (Vygotsky, 1967, p. 14). He then offers the example of a child playing a hospital patient. As the patient, the child must adhere to the rules of a patient's behavior: crying, moaning or otherwise acting in pain. As a player, however, the child revels in the game, enjoying the pleasure of her pursuit. For the game to be successful and maximum pleasure to be reached, the player must adhere to the rules of behavior of her role, in this case, the conduct as a patient. Though the child's glee at playing may compel her to laugh or giggle with joy, she must suppress this instinct to appropriately act as the patient and fulfill her role. In the end, following the rules of the game offers greater pleasure than the immediate reward of acting on impulse. Though Vygotsky focused on make-believe play, this principle can be found in other forms of play. Another example of this is in the game freeze-tag. A child who is tagged and must freeze as part of the game may desire to immediately begin running again. This immediate impulse, however, would result in the disintegration of the game. In pursuit of maximum pleasure, (the full

participation in freeze-tag,) a child must suppress her initial impulse in favor of following a rule, which ultimately results in greater pleasure.

To differentiate between the rules of play and the rules of reality, Vygotsky relied on Swiss child development theorist, Jean Piaget. In play, Piaget asserted, the rules are child-directed, rather than imposed top-down from an adult as in "reality" (Vygotsky, 1967). In play, it is the child who determines what her actions must look like and who regulates her own behavior accordingly. Thus, even as a player of the game of hospital revels with glee at her role, she must regulate the expression of this emotion in deference to her actions as a patient. This early practice in self-regulation is thus motivated internally, rather than being imposed from the outside, and the internal motivation ultimately has an enormous influence on a child's development.

Vygotsky argued that make-believe play does not begin to emerge until the age of three as it requires a basic level of self-regulation to be successful. These young children's early make-believe play, he posited, would be fairly simple and the rules governing their behavior would be loose as their capacity to self-regulate is not well-formed. As a child grows and their self-regulation skills develop, however, their play correspondingly develops, with roles becoming increasingly well-defined and the action more complex (Vygotsky, 1967). Daniil Elkonin reinforced and further elaborated on this point about the spectrum of depth in play in his own research.

Like Vygotsky, Elkonin believed that play was a special form of activity for young children that helped prepare them for the rigors of adult life (Elkonin, 2005b). Also similar to Vygotsky, Elkonin argued that the basic unit of preschool play was the role that children took on during make-believe play (Elkonin, 2005a). The role, Elkonin argued, determined the actions and

relationships between players, and props used as well, making it the most critical feature of play. In his work, Elkonin distinguished among types of play, from early object-centered play to well-developed role-play in which children focus on the relationships between their chosen roles, use "role-related speech," engage in logical actions based on their role, and use play props to support the game (Bedrova & Leong, 2015). Elkonin called this relationship-centered play "mature play," and argued that though children begin to suppress their initial instincts in early forms of play, it is not until they progress into mature play that self-regulation is truly mastered. This work toward mature play takes place over several years, as roles and relationships in play become in-depth with practice. Elena Bedrova and Deborah Leong (2008), two researchers who have long studied Vygotsky's and Elkonin's views of play, argue that the other hallmarks of mature play are that it that integrates themes, utilizes objects that bear little resemblance to their imagined use, and spans long periods of time from days to even weeks. As the preschool years are spent practicing this role- and relationship-based play, Elkonin argues it is around ages five and six that the full depth of mature play is usually found. Ultimately, Elkonin's research further elaborates on and supports Vygotsky's theory that play is a critical activity through which children practice and master important skills like self-regulation.

Soviet psychologist Zinadia Manuilenko also studied preschool children's ability to voluntarily control their behavior, and tested his ideas in a series of experiments. His results offer further evidence to Vygotsky's and Elkonin's ideas on the ways in which play can offer the meaning and motivation for students to begin regulating their own behavior. Manuilenko broke his experiments down by age (three though six) and examined when play offered the most support for children to practice self-regulation.

In a lab setting, Manuilenko tasked three to six year olds with standing still in a prescribed position for as long as possible (Manuilenko, 1975). Unsurprisingly, Manuilenko found the three-year-olds were unable to hold still for any amount of time; the four-year-olds lasted an average of two minutes with some evidence of self-monitoring, though they were also found to move at times without recognizing that they had broken position. The five-year-olds averaged holding still for around five minutes and the six-year-olds over twelve. Manuilenko hypothesized from this experiment that starting at age four, children have some conscious control over their own behavior, but it is easily disrupted, especially with distraction. For the four-year-olds, the effort to maintain control took their complete mental capacity. By ages five and six, effortful control was increasingly automatic.

When Manuilenko changed the environment of the experiment, however, he found important differences in the results. When children were tasked with standing still while playing a guard in a game with other children, there was a large jump in holding time for the four and five-year-olds. Even though the game posed many distractions from the other players, the four and five-year-olds were able to hold their guard pose for 4:17 and 9:15 minutes respectively, an increase of around 50% from the lab setting. The three-year-olds were again not able to cope with the task and the six-year-olds maintained a similar hold time to the lab setting.

Manuilenko hypothesized that an important difference between these two environments was the role of motivation. In the lab setting, the children were motivated by wanting to do well and please the adults. In the play setting with peers, the children's desire to do well came from within themselves, from an internal desire to play the role of a guard as they found meaning in the role and its relationship to the other players. This internal motivation led to a dramatic

increase in their ability to consciously regulate their behavior, even with the presence of distractions.

Manuilenko concluded that role-play is an essential condition for the development of voluntary control, particularly in four-year-olds who have not yet developed the mechanisms of strategy and experience to make self-regulation automatic (as was apparent in the six-year-olds). Role-play, Manuilenko argued, provides a needed intrinsic connection between the incentive (the role of the game) and the object of the behavior (standing motionless). Through the role-play, the children were able to see themselves as fulfilling a social function, and it provided the necessary incentive to practice the skill of self-regulation. By age five, Manuilenko posited, children were in a transitional stage. In the lab, they possessed some devices to help themselves from getting distracted that the four-year-olds did not possess (e.g., looking down and away from potential distractions). Even though they performed better than the four-year-olds in the lab, the five-year-olds also benefitted from the role-play as support for voluntary control, as their best time for keeping still was in the game. Six-year-olds were able to control their behavior in a similar manner no matter their environment, demonstrating that they have previously practiced and developed the skill of regulating their actions (Manuilenko, 1975).

Manuilenko's findings echo Vygotsky's and Elkonin's premise that play supports the development of skills that are otherwise out of a child's reach. Manuilenko's results point out that this is especially true for four and five-year-olds, who are just beginning to develop the ability to voluntarily control their actions.

Manuilenko's research also echoes another of Vygotsky's theories about how play supports development. In play, Vygotsky argued, children act in ways that are ahead of their development. This is a connection to Vygotsky's influential theory of the Zone of Proximal

Development [ZPD], which he defines as the space between what a child can achieve on her own and what she can do with support from an adult (Vygotsky, 1987). In this case, instead of adult support creating a space for a child to achieve ahead of what they could do independently, it is play that creates a situation where children act beyond what they are able to do independently. Manuilenko's experiment is, in fact, evidence of Vygotsky's statement that "a child's greatest achievements are possible in play – achievements that tomorrow will become his average level real action and his morality" (Vygotsky, 1967, p. 14). What the four-year-old could do only in play, the five-year-old was already automatizing into their daily experience, and the six-year-old had already mastered. Play thus creates for a child a Zone of Proximal Development, where a child is "always above his average age, above his daily behavior; in play, it is as though he were a head taller than himself…play contains all developmental tendencies in condensed form; in play it is as though the child were trying to jump above the level of his normal behavior" (Vygotsky, 1967, p. 16).

Elkonin also built on Vygotsky's view of role-play as a Zone of Proximal Development, elaborating on the ways in which children are able to propel their development through play. During make-believe play, Elkonin argued, children's motivation is a combination of short-term and long-term goals (Bedrova & Leong, 2015). Children have to negotiate these goals, figuring out in which order to pursue them to create coherent and pleasurable play. For example, in planning a theater performance, the players must first set up chairs and create tickets before the performance can begin. In learning to negotiate these short and long-term goals, children become more intentional in their actions and practice regulating immediate desires in favor of long-term goals (Bedrova & Leong, 2015). In addition, Elkonin argued that in play children also learn cognitive decentering, in which they learn to see from multiple perspectives. This work is done

as children must negotiate multiple roles in a game and establish relationships between roles. To be successful in make-believe play, a child must be able to coordinate multiple perspectives at once, both understanding how their role would act as well as the how the other roles would respond in turn (Bedrova & Leong, 2015). In addition, throughout play children are constantly monitoring each other to make sure they are following the rules. These processes of planning, taking into consideration multiple viewpoints, and self and other-monitoring help a child to build intentional behavior (Bedrova & Leong, 2015). As Vygotsky said, "action in imaginative situation, creation of intention, formation of plans and motives make it [play] the highest form of preschool development" (Vygotsky, 1967, p. 16). This practice in intentional behavior is supported through the Zone of Proximal Development that is created in play.

Vygotsky and his colleagues' investigations into play demonstrate that through adherence to the rules imbedded in role-play, children are first able to practice the self-regulation skills that they will soon be able to integrate into their everyday actions. Play, according to these theorists, is not just a pleasurable part of the preschool experience; it is actually a vital part of developing critical skills such as self-regulation. For these reasons, Vygotsky posits that "play is not the predominant form of activity, but is, in a certain sense, the leading source of development in in preschool years" (Vygotsky, 1967, p. 7).

Abstract Thought and Play

In addition to supporting the development of self-regulation, Vygotsky proposed that make-believe play lays the foundation for abstract thought. Very young children, he argued, connect words to objects and meaning to what is seen. They are very literal and concrete in their thinking. As children grow older, they become able to "sever thought from object," enabling them to think abstractly without needing a concrete object or action to tie to their ideas

(Vygotsky, 1967, p. 12). Play, Vygotsky argued, provides the necessary support for the transitional stage that allows this process from concrete to abstract thinking to occur.

Vygotsky claimed this transition to abstract thinking begins when a child starts engaging in make-believe play. As children act out different scenarios, they integrate props to further elaborate the scene. The use of props represents an early divestment from concrete thinking as the prop is symbolic; it acts as a representative of something else. If a child pretends to drive a car, they may use a chair to represent the driver's seat and a plate to be their steering wheel. If they pretend to talk on the phone, they may talk into a cup or with a banana to their ear. These actions are the first ways that children begin to separate their thoughts from objects. Vygotsky warns, however, that this use of props is not true separation of thought from action as the child still needs to use a substitute to represent the object. He elaborates to say that early in this process children need props that bear semblance the objects they are representing. A child acting out driving would not, for instance, use a stuffed animal to represent the steering wheel. They still need the aid of a lifelike symbolic prop to support their actions. The use of props keeps the meaning of the situation from evaporating. Nonetheless, Vygotsky posits, this use of a symbol is highly important in a child's development. For the first time, a child calls something a "car" or "steering wheel" and does not mean a literal car or steering wheel, but "mentally sees the object standing behind the word" (Vygotsky, 1967, p. 13). As children grow, these substitutions become more flexible, bearing fewer similarities to the imagined object (Berk, 1994). Eventually, children are able to act without the use of objects at all, holding an idea of something in their minds without the need for support from a symbolic object. Vygotsky argued that this lays the groundwork for the abstract thought that will be required of children in their school years (Berk, 1994).

Elkonin elaborated on Vygotsky's hypothesis about children's use of symbolic objects. Elkonin contended that in play children use symbolic objects in two ways. The first, like Vygotsky's proposition, was for representation of an object. The second is a symbolic representation of roles (Bedrova & Leong, 2015). Young children, before they begin engaging in collaborative make-believe play with peers, use symbolic objects to represent other roles in their games (dolls, stuffed animals and other figures). Eventually, children need less support from symbolic objects and move to engagement with other children (Bedrova & Leong, 2015). This progression in the use of symbols is part of Elkonin's theory of the path of cognitive development, ranging from early object oriented actions accompanied by a child's private speech (spoken aloud) to mental actions that take place without the need for external speech or action (Bedrova & Leong, 2015). Play, in both Vygotsky's and Elkonin's theories, offer a critical means of progressing along this path of development from concrete to abstract thinking.

This practice of divesting action and thought from the concrete is akin to the executive function skill of cognitive flexibility, which enables children to hold mental models and engage in multiple flows of information at once. As preschool and kindergarten children imagine different situations and represent their ideas and actions symbolically, could this help to develop cognitive flexibility? More research is needed to answer this question, but Vygotsky's premise that play is a leading factor of development in preschool makes a compelling case that this executive function skill, too, may be supported.

Memory and Play

As the neuroscience literature on executive functioning has shown, working memory is another skill that's basis is laid during the preschool and kindergarten years. Years before the publishing of this research, Soviet psychologist Zinaida Istomina (1975) undertook a research

experiment to examine the development of voluntary memory in preschool-age children. Using both a lab and social play setting, Istomina tasked children between the ages of three and six with remembering a list of words. He not only counted how many words children at these different ages were able to remember, but noted any strategies they used to remember the words and the conditions under which they were most successful. Similar to Manuilenko's research on preschool children's voluntary behavior, Istomina (1975) found that play situations had an extraordinary effect on the children's ability to remember the list of words, particularly for the four and five-year-olds. His results also echo Vygotsky's and Elkonin's theory that play provides a pivotal environment for young children's development to thrive.

Istomina set out to discover the age at which young children begin to voluntarily remember and the conditions and strategies that support them in this process. The first setting, the lab, consisted of an adult and a single child and the task to recall as many words as possible from a list recited by the adult. The second environment was a play setting that included several adults and children. In this situation, one adult played "school" with several children. In the role of the teacher, the adult would task one child with going to the store to pick up supplies for the school. The store was a short walk away and consisted of another adult as the "manager" and children playing a guard, cashier, and other related roles. The child tasked with going to the store had to give a permission slip to the guard to get in, and then met with the "manager" to recite the items needed for the school. The manager then noted how many words the child recalled from the original list.

Three-year-olds, both in the lab setting and in the play setting, were more or less not able to complete the task. Istomina (1975) found that in both cases they were excited to try, but were unable to comprehend the task at hand and often did not listen as the list of words was recited.

He concluded that when tasked with going to the store, the three-year-olds understood the role as going into the store and back, but didn't perceive the process of picking up supplies. Usually, when arriving at the store, the three-year-olds wanted to play one of the roles in the store and did not remember that they had items to pick up. Istomina (1975) hypothesized that three-year-olds were too caught in the moment to have voluntary and purposeful recall.

Four-year-olds, on the other hand, benefitted greatly from the play setting, doubling their capacity to remember items from the list, from an average of 1.5 words (in the lab) to 3 words. They were able to listen to the words given and understood the purpose of the errand. Most often, the four-year-olds' strategy for better recall (if they used one at all) was hurrying to the store as quickly as possible, trying to eliminate time between hearing the words and reciting them (Istomina, 1975). This finding was also supported through the observation that many four-year-old children tried to evade the guard who asked for their permission slip to enter in an effort to eliminate extra time and distractions.

Five-year-olds were found to be in a transitional stage of voluntary recall. In the lab setting, they averaged a recall of 2 words. Like the four-year-olds, they still benefitted from the play situation with an increased average recall of 3.2 words. On average, the five-year-olds also used more sophisticated recall strategies than the four-year-olds such as reciting the words listed after they heard them or asking the researcher to repeat words. These same strategies were found to be even more prevalent in the six-year-olds who averaged 2.3 words in the lab and 3.8 in the play setting, suggesting that they, too, benefitted from the play setting as support for voluntary recall.

Istomina concluded that voluntary memory begins in middle preschool, around the age of four to five. He also determined that the transformation of these processes is dependent on the

motivation of the child. In the lab setting, the motivation was set by the adult, and though the children were eager to please, they ultimately all fared worse. In the play setting, they were motivated by their own goal of participating in the meaningful setting that they were a part of. This conclusion was reinforced by a third experiment that Istomina conducted where he had the children "practice" recalling, both in the lab and in the play setting, essentially through having the same children repeat the experiments multiple times. The practice runs helped the four to six-year-olds increase their recall in both the lab and play environments. Practice in the play setting for the four-year-olds, however, doubled their average score over what they achieved with practice in the lab setting. The four-years-olds increased their scores in the lab setting with practice by 33%. In the play setting, with practice running the errand, they increased their score by 62%. This drastic increase in the play environment as opposed to the moderate increase in the lab was not true for the five and six-year-olds, who increased their scores by relatively similar amounts in both settings. The increase for five-year-olds was 66% in the lab and 87% in play, demonstrating some weight towards practice in the play environment better supporting voluntary recall, but was still far from the large increase that was found for four-year-olds. For-six year-olds, the increase in recall was 107% in the lab and 112% in play, demonstrating that practice in either setting provided similar levels of support.

The differences in the percent increase between the lab and play setting are important, Istomina hypothesizes, because it shows that the four and five-year-olds increased their understanding of the *meaning of their roles* when they were sent to the store multiple times. After being asked to remember items for purchase and finding at the store they could only recall a few of the words, the four and five-year-olds began to more deliberately listen and learn the words as they heard them from the experimenter, thus more consciously increasing their

voluntary memory. With practice in the play environment, their motivation to remember the words was increased, prompting them to work more actively on their voluntary memory. Six-year-olds, on the other hand, didn't have a change in how they perceived their role or their motivation to succeed; they already had a good understanding of this. With practice, they increased their ability to recall words through use of more advanced recall strategies. This is shown by the fact that their improvement scores for both the lab and the play setting were essentially the same. Though the six-year-olds' recall increased by far the most of all ages, Istomina argues that it is the difference between the results in the lab and play environments that truly offers the insight into how voluntary memory is established.

From these findings, Istomina concluded that "play is an especially important factor in developing voluntary memory and recall" (Istomina, 1975, p. 58). He also noted that an adult request is not sufficient motivation for a child to consciously work on their recall. For young children, the motivation to engage in a new skill comes from social relationships where they find real meaning in their roles and interactions. These social relationships and roles are not just those found in "reality," but are easily found in play settings, where children use make-believe play to explore the roles and relationships of adults. Elkonin wrote extensively on this subject of why children engage in role-play, highlighting that role-play is a way for children to make sense of a situation and engage in aspects of adult life that are not yet available to them. In essence, through play, children are working out what it means to be an adult (Elkonin, 2005d). This is why it is common to see young children perform mock marriage ceremonies or engage in elaborate recreations of restaurant experiences. Through recreating experiences that have struck them as interesting or important, they are able to manipulate and work through the experiences as their own (Elkonin, 2005c). As play is a reflection of a child's lived experiences, the wider their

experiences, the broader the themes of their play. Play, Elkonin ultimately concludes in his research, is social in nature and content (Elkonin, 2005b). In addition, he argued that play fundamentally looks forward, not backward, offering children a chance to engage in the complex roles and relationships that will be expected of them in the future (Elkonin, 2005d).

Istomina built off this point of Elkonin's to advance the idea that through role-play a child is exposed to demands on them that they have not yet experienced in real life (Istomina, 1975). To fully understand the meaning of the demand, they must assimilate it into their own experiences and learn what it means for themselves (Istomina, 1975). The four- to five-year-olds in his experiment had not yet experienced the demand to voluntarily recall information. They made meaning of this demand and why it was important through the experience of running to the store for supplies. In Elkonin's view, this playing at school and store provided the children with the opportunity to work out what it means to run errands and be responsible for bringing the items back for use by a group (the school). In this role, the children experienced new demands on their cognitive abilities, and worked on new skills in a meaningful way. Ultimately, both theorists conclude that play provides the scenarios through which children can explore and assimilate new roles and demands.

Play and Executive Function: Bridging the Academic Versus Play Divide

The development of self-regulation, abstract thinking, voluntary memory and behavior parallel the executive functioning skills of inhibitory control, cognitive flexibility, and short-term memory. The Soviet psychologists based their research on socio-cultural theory, while executive functioning relies on neuroscience research, but the results are strikingly similar. Both support the conclusion that preschool and kindergarten are a critical time to develop these new mental skills that will be soon be required of children to engage in more meaningful and complex

behaviors. While the neuroscience research outlines the importance of these skills for engaging in academics and promoting school success, the socio-cultural research makes a clear case for play being an important context for these skills to develop. Combining these two sets of research, it becomes increasingly apparent that schools do not have to choose between time for developing academic skills and time for play. In pursuing play, children are actually motivating themselves to work on vital mental skills that will allow them to engage in learning in meaningful ways. The work they are doing may not show up on checklists of academic skills, but by engaging in play, the students are building a foundation. They are building a foundation of mental skills that by age six they should have integrated into their everyday capabilities, enabling them to engage in increasingly complex academic and social demands.

Istomina touches on this point in his conclusions of his experiment on voluntary recall. He lays out his thoughts on school readiness (back in 1975, long before the current school readiness debates), highlighting that preschool is the time where children ready themselves for the demands of school. These demands are not only habits, skills, and knowledge, he posits, but also mental qualities. A child must have control over their mental processes, such as the ability to concentrate, recall, and control their motor functions, to be successful in school. These processes are involuntary in young children, he points out, but must be restructured to become voluntary in preschool.

Both Istomina and Manuilenko found that the critical time when play supported the growth of voluntary control over memory and behavior was ages four to five, the same ages when the neurons underlying executive functioning skills are formed. If these two core executive functioning skills, working memory and inhibitory control, are supported by make-believe play as Istomina and Manuilenko found, it is essential that preschools and kindergarten make time for

play in their classrooms. The development of these mental processes is crucial to children's success in school and beyond.

As the debate over how to support school readiness continues to ensue in the United States, we would do well to take a page from the Russian's handbook and begin to think more broadly about what school readiness really means. It is understandably tempting to try and measure school readiness through concrete quantitative measures like discrete academic skills (such as measures of reading and math ability). Armed with the power of data, we can quantify how much academic knowledge our students have and thus claim that they are more prepared for the academic demands of school than in years past. However, devoting more time in preschool and kindergarten to formal learning rather than exploration and play can have unintended consequences. It could, in fact, undermine the very goal these formal learning times set out to achieve: preparing students for the demands of formal school. The research from executive functioning and socio-cultural play makes a strong case for considering school readiness from another angle: developing the mental capacities and skills needed to engage in complex learning processes. With this goal in mind, teachers and schools can focus on examining the mental development that is already taking place in their classrooms and create opportunities to further student development of executive function skills. In the next section I propose three principles for preschools and kindergarten to consider when contemplating how to achieve school readiness among their students: 1) Recognize the work of play; 2) build opportunities for hands-on exploration; and 3) create opportunities for collaboration. I use my own broader definition of school readiness --developing the mental capacities and skills needed to engage in complex learning processes-- here as the goal for these principles and exampled activities.

3 Key Principles for Supporting School Readiness in Preschool and Kindergarten Classrooms

Principle One: Recognize the Work of Play

Many early childhood educators understand that play is a valuable pursuit for children to engage in. Teachers often talk about the social-emotional skills students work on during play times, such as learning to work with others and solving problems as they arise. Many educators also understand that play offers valuable opportunities for students to explore their worlds and engage in concepts (like gravity, force, motion,) that will later be named and explored through formal school. With the current pressures to increase the academic content of early learning in support of school readiness, however, the value of play needs to become more explicit and more deeply understood by educators, parents, and policy-makers alike. For the teachers who do advocate for play in the classroom, they can often find themselves facing pressures from parents or administrators to bring a more skill or academic focus to the school day. Gaining a deeper understanding of the importance of play in children's mental development can support teachers and other play advocates in engaging their community in conversations over how to balance play and academic times.

Recognizing how play supports children's development should help ease some of the pressures to eliminate it from the day in favor of more academic activities. Free play and make-believe play should no longer be seen as relief from the "work" of school. Recognizing that play has a strong impact on children's development can help shift attitudes away from play as "a break from learning" to play recognized as part of the work of school, of children readying themselves for formal learning environments. The ultimate goal is for educators, parents, and policy-makers to understand and appreciate that play is actual work for children.

Though this paper focuses mainly on the value of make-believe play in supporting mental development, it should be noted that the benefits of play extend beyond these boundaries. Play of all sorts-- building, sports games, dolls, puzzles, water play, board games, sensory tables, story telling, etc.-- builds children's critical thinking, concept development, and language ability in various ways. For example, matching games such as Memory, or music games like The Freeze strengthen children's executive function skills as they promote children's memory and self-regulation skills. Other games that require planning, self-regulation, and reflection have shown promising results in support of executive function development as well (Center on the Developing Child, 2014). Through play with blocks, children have been shown to engage in mathematical concepts like composing and decomposing numbers and shapes (ex: how ten is built of five two's or a hexagon can be built of six triangles) (Noelle Parks & Chang Blom, 2014). Through block play, children have also been shown to organize and classify blocks by various attributes, build visuospatial relations and reasoning, explore symmetry, measure, count, and reason in 3-dimensions (Kinzer, Gerhardt, & Coca, 2016). As children explore blocks and the space around them, they "think mathematically as they compare, quantify, and explore space and shapes" (Kinzer, Gerhardt, & Coca, 2016, p. 390). Other activities, such as puzzle play and doll play, have also been shown to make use of mathematical strategies and concepts. In solving puzzles, children use "part-to-whole" strategies, where they use the image on the smaller piece to reason where it would fit in the whole picture, building visuospatial skills in the process (Noelle Parks & Chang Blom, 2014). In doll play, children engage in proportional reasoning as they identify the correct sized clothes (out of many sizes) for their dolls as well as fold clothes along a line of symmetry and fold blankets in halves and fourths (Noelle Parks & Chang Blom, 2014).

Play also supports children's language and literacy development. Through narrating their play, children practice and build their sense of narrative, try out new vocabulary, and build literacy activities into their play (Nicolopoulou, McDowell, & Brockmeyer, 2006). A common example of this is when children play "restaurant." In recreating a restaurant scene, children often write up a menu or take each-others order, building early literacy practice (sounding out words, identifying letters etc.) into their play. Storytelling play is also commonly found during building activities where students weave stories around their constructions and the animals or people that live in them. Recent research has shown rich language use during play has an impact on later literacy development (Christie & Roskos, 2006). Children who engaged in pretend talk during play were more likely to score higher on vocabulary and narrative production assessments, and another study found that the number and variety of words used in play were positively related to language measures in kindergarten (Christie & Roskos, 2006). Overall, play in early childhood has been found to contain important components of language and literacy (oral language, phonological awareness, print knowledge, background knowledge) that are linked with literacy achievement (Christie & Roskos, 2006).

Play offers innumerable opportunities for children to grow mentally, academically, and socially. While this paper focuses primarily on the mental capacities that are developed through play, but there is increasing research that points to the myriad of other ways that play also supports children's learning. Just a few examples are touched on here in principle one. As preschools and kindergarten continue to re-evaluate their curriculums, it is important for teachers, parents, and policy-makers to remember that play offers deep learning opportunities beyond what easily meets the eye. Play builds the mental skills that are later needed to engage on complex learning processes. Increasing evidence also points toward play building critical

thinking, concept development, and language skills. In the classroom, teachers must be able to recognize the way child development is embedded in everyday play. When teachers can recognize the skills and developments students are working on through play, they can seize opportunities to extend learning and create hands-on activities that target specific skills or development, which brings us to principles two.

Principle Two: Build Opportunities for Targeted Hands-on Exploration

The academic pressures seeping into preschool and kindergarten aren't going away any time soon. While I argue that play is critically important to keep as part of preschool and kindergarten curricula for student mental development, I also believe there are engaging and hands-on ways to target specific skills that a teacher may want to grow. These sorts of activities can parallel play in their approach to learning, while still being goal-specific. A wonderful example of this comes from Jessica Shumway (2013) in an article she wrote for the National Council of Teachers of Mathematics. She argues that building and manipulating mental representations of two- and three-dimensional objects is a critical skill for jobs such as engineering, architecture, and graphic design, and that children should begin practicing these skills at a young age. In her article, Shumway (2013) details a multi-day block activity she designed specifically to enhance students' spatial reasoning. Over the course of several days, students free play with blocks, recreate a block bridge from a photo, read a story about building bridges to give some context to the activity, design their own bridge through drawing a blueprint, build from their blueprints, and finally, reflect on the process of what went well and what could have gone better. Shumway (2013) agues that this activity supports flexible thinking (an important executive function skill) in two- to three-dimensions and creates opportunities for students to build mental models and visualize the movement and transformation of shapes. This

activity also provides opportunities to discuss symmetry and geometry and other mathematical concepts.

Activities such as these can target specific skills identified by the teacher as important to grow and use many of the strengths of free play to create a meaningful learning experience. For instance, this multi-day block activity allows children to engage in hands-on exploration of a concept, which creates much higher engagement in the students than more passive modes of learning. This activity also builds in student initiative and creativity, but aims it towards a specific goal. In this case, the bridges the children designed all looked different as the students used their own unique ideas to create their designs, but ultimately, all the of the children worked on the same visuospatial skills, even as the finished products looked diverse. This sort of hands-on activity also creates a meaningful context in which students can practice important skills. In Shumway's activity, learning about bridges came in multiple contexts—though books, building, and designing etc.—which allowed students to think more broadly about bridges. They learned to see their importance in transportation, as well as experience some of the difficulties in designing a successful bridge. Nesting skill or concept work within meaningful contexts such as this, combined with active hands-on learning, not only builds student motivation to participate, but also helps students transfer ideas across contexts, working on that important executive function skill of cognitive flexibility.

As teachers continue to face pressures to incorporate more academics into their classroom, it is important they do so in ways that engage children in thoughtful, meaningful, hands-on learning that builds students' ability to engage in complex learning processes. Educators can draw from the strengths of free play (i.e., hands-on engagement, student initiative, creativity, and multi-disciplinary contexts) to target skills and concepts that they want students to

learn. Harvard's Center on the Developing Child offers both education and an activities guide for supporting students' development of executive functioning through hands-on and interactive activities (Center on the Developing Child at Harvard University, 2014). This resource could be helpful for schools in developing their curricula as well as educating their parent community around the importance of executive function skills.

Principle Three: Create Opportunities for Collaboration

The third principle rests on Vygotsky's idea of the Zone of Proximal Development [ZPD]. As was discussed in the section "How to Support the Development of Executive Functioning in Preschool and Kindergarten Classrooms," the ZPD is the space between what a child can achieve independently and with support. Vygotsky's theory of ZPD has become popular with educators over the past few decades, but it is mostly used to talk about how teachers can offer individualized support for their students within their unique ZPD's. As was found in Manuilenko's (1975) and Istomina's (1975) experiments, play also creates a ZPD for students, as children were found to be able to achieve more within the context of group play than they could independently. While teachers should keep working to individualize their support to each student's ZPD, they should not overlook the importance of group work as an important source of growth for students. An example of what this can look like comes from my own classroom.

Several years ago, I had a student who loved to build with Goldiblox, a set of engineering blocks that come with visual directions for how to build constructions like a parade float or a fair dunk tank. This student struggled, however, to accurately follow the picture directions that would result in the desired construction. When she worked independently, she would complete a construction that was similar to the showcased product, but it would not quite work the way it was designed to (the float wheels wouldn't turn or the platform on the dunk tank wouldn't drop).

When this student worked on the Goldiblox construction with her peers, however, the small group was able to accomplish together what she could not on her own. Each student contributed their varying abilities in visuospatial relations and paper to block transference, ultimately working together to build a completed dunk tank or float. The student who struggled was supported by more knowledgeable peers who helped her understand and complete the construction. Her peers modeled for her strategies that she could use when trying to build with Goldiblox. This happened during class free play and was completely student initiated. It had, however, real implications for the struggling student's ability to build visuospatial relations and problem solving strategies. Student collaboration offered support, in the context of group play, for the students to hone and deepen these skills. These group contexts, as Istomina (1975) and Manuilenko (1975) found, are so powerful because they create motivation for a child to persevere in the face of difficulty. The context of the play, combined with the reinforcement from social interaction, create powerful learning opportunities for children to engage in and pursue new or complex skills. Throughout the day, teachers should build in opportunities for student collaboration, both in free play and targeted exploration, so students can support and learn from each-other.

Conclusion

School readiness is a term that has come to wield much influence over preschool and kindergarten curricula over the past decade. Preschool and kindergarten are increasingly academically focused to meet the rising pressures of school readiness benchmarks. This has created a shift away from the more play focused curricula of the past to more skills focused work. In addition, new neuroscience research has revealed the importance of the preschool and kindergarten years for laying the foundation for executive function skills, which are critically

important to children's success in formal schooling. These changes have left many schools wondering how to negotiate traditional play-based activities with the changing pressures around preparing students for formal schooling. I argue that this play-versus-academic debate is a false divide, as executive function skills development provides a much stronger base for children's later engagement and success in learning than discrete academic skill work. The research around executive function parallels much of the mid-twentieth century socio-cultural research from Russian researchers around how play drives mental development in young children. Through combining these two lenses, I argue that creating spaces for play to thrive in the classroom actually supports the development of mental processes that are critical for children's later success in school. I also argue that educators, parents, and policy-makers must develop a deeper understanding of the ways in which play can support child development so that they can recognize and seize opportunities to further this important mental development. Finally, I contend that the term school readiness is often used too narrowly, as it tends to focus on academic and cognitive skills a child should grow. I believe school readiness should be more broadly defined as developing the mental capacities and skills needed to engage in complex learning processes. With this definition, play offers innumerable opportunities for children to build school readiness.

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