Chapter 5
Guided Play: A Solution to the Play Versus Learning Dichotomy

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A fundamental question we face is how to educate twenty-first century children to best prepare them for a world marked by increased globalization and advancing technology. In addition to developing specific academic skills or content, children must learn to collaborate, communicate, engage in critical thinking, and think creatively. They must also have the confidence to persevere if they do not at first succeed. Golinkoff and Hirsh-Pasek (2016) refer to these as the 6C's—crucial competencies if our children are to be effective leaders who can produce significant change in the world (Fisher, Hirsh-Pasek, Golinkoff, Singer, & Berk, 2010; Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009). Are we maximizing children's learning in our current educational systems? If not, how can we design educational opportunities so that every child thrives? Currently, and for centuries, our educational system has been dominated by an approach that emphasizes adult-directed instruction

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delivered to relatively passive children. Yet many theorists support an alternative to direct instruction that privileges a child's sense of discovery through play, such as in discovering learning approaches. Oftentimes, people view these options as mutually exclusive, and for decades there has been sparring between advocates on each side (Hirsh-Pasek & Golinkoff, 2011). In this chapter, we consider two core evolutionary perspectives and offer a rapprochement through what we call *guided play* (Fisher et al., 2010; Hirsh-Pasek & Golinkoff, 2011; Weisberg, Hirsh-Pasek, & Golinkoff, 2013). With this "best of both worlds" approach, we maximally promote key cognitive and social skills necessary for success in this global era.

The Education Problem in the US

The United States' education system has consistently fallen behind in international rankings when compared to other industrialized nations. Lags in mathematics performance, for example, appeared as early as the first international assessments in 1964 (Husen, 1967). The 2012 Program for International Assessment (PISA) offers a case in point. Of 34 industrialized nations in the Organisation for Economic Co-operation and Development (OECD), the US was ranked 27th in mathematics, 20th in science, and 17th in reading (OECD, 2012). In mathematics, the US performance is below the OECD average, comparable to the performances of countries such as the Slovak Republic and Lithuania. The United States also slipped to 13th among 25 OECD countries with comparable data when comparing the number of students attaining a college degree (OECD, 2012).

Concerns about American global competitiveness and about the wide gaps between low- and middle-income children within the country spurred the passage of No Child Left Behind (NCLB, 2001). The law offered a sweeping attempt at educational reform that would focus new energy around a narrowly construed curriculum largely focused on reading and mathematics to the detriment of other subjects. Its implementation left something to be desired, as well. It was interpreted as requiring repeated testing of material taught in a highly directed way (Miller & Almon, 2009; Singer, Golinkoff, & Hirsh-Pasek, 2006; Sunderman, Tracey, Kim, & Orfield, 2004). The relatively new Common Core was designed to expand that focus to *how* children learn as well as *what* they are expected to learn. Yet, even with this advance, in practice, this new initiative is largely NCLB 2.0 with a narrowly construed educational focus. Teacher practices remain dominated by worksheets, rote-memorization, and dry review of procedural skills without the development of associated conceptual understanding (Hirsh-Pasek et al., 2009).

Data from over 200 kindergarten classroom teachers in New York and Los Angeles revealed that approximately 80 min per class day were spent on literacy instruction and 47 min on mathematics instruction, with children spending fewer than 30 min per day in free play (Miller & Almon, 2009). The teachers also reported devoting an average of over 20 min a day to standardized testing and preparation for tests. According to Elkind (2008), a leading scholar in the value of play, this reduction in playtime and increase in academic study time has resulted in a loss of up to

8 h of free, unstructured play time per week. The new age of early education mounts a false dichotomy between play and learning that forces teachers to choose between letting children play and teaching academic content (Kochuk & Ratnayaka, 2007; Viadero, 2007). Play has become a "4-letter" word (Hirsh-Pasek & Golinkoff, 2003).

The Existing Dichotomy: Play Versus Direct Instruction

This divide between play and academic learning represents a deeper, fundamental debate about *how* children learn, and it is here that evolutionary perspectives can be most informative. On the one hand, scholars like Peter Gray (2011, 2013, this volume) emphasize that young children have a propensity to learn from self-directed play and exploration (see also Bjorklund & Beers, this volume). On the other hand, David Geary's work (Geary, 1995, 2007a; Geary & Berch, this volume; Sweller, this volume) reminds us that playful, discovery learning will only take us so far. Such approaches to learning may prove optimal for "biologically primary" skills, which are those that serve an evolutionary function and are found across all cultures. One example of a biologically primary skill is numerosity, or children's sensitivity to the relative magnitudes of collections of items (Feigenson, Dehaene, & Spelke, 2004). In contrast, discovery learning approaches will surely fail to help children learn "biologically secondary" skills, which are only found in some cultures and vary based on schooling and instruction. The complex arithmetic of simultaneous equations is an example of secondary skills, which Geary (1995, 2007a) argues cannot be learned through free play alone.

The arguments made by both Gray and Geary are backed by a rich body of data that contribute to our current understanding of educational curricula and—importantly—pedagogy. Gray's research starts with the premise of understanding how children learn in 'the wild,' positing that, in hunter-gatherer societies, humans evolved to learn largely through free play (Lancy, this volume). Driven by inborn instincts and drives, children are naturally curious and playful, which enables them to learn and adapt to their environment. In the hunter-gatherer model of education, adults did not direct children's education, but rather children were left to play and explore in their own ways. Gray notes that free play, in particular, with activities that are chosen by children and self-directed rather than adult-directed best promotes rich social, intellectual, and emotional development. The self-directed element of the learning that occurs in the context of free play is crucial in this view. Gray argues that progressive educational theories, such as constructivism, still place the adult in charge of children's learning, as teachers attempt to drive play and exploration within the context of an established curriculum. In his view, children are capable of successfully directing their own education, and schools should embrace this hunter-gatherer model:

> Today when most people think of *education* they think of schooling … they think of education as something done *to* children *by* adults. But education long predates schooling, and even today most education occurs outside of school … Today, in the minds of most people, the onus for education lies with adults, who have the responsibility to make children acquire

> certain aspects of the culture, whether or not the children want to acquire them. But throughout human history the real onus for education has always laid with children themselves, and it still does today (Gray, 2013, p. 113).

Geary's (1995, 2007a) evolutionary perspective similarly recognizes that free play is important and emphasizes children's natural biases to engage in play that will support development. He argues that free play is most effective for building on preexisting, evolutionarily based cognitive skeletal structures to enhance skills that are biologically primary. Geary (2007b) states that:

> For young children without an extensive base of secondary knowledge, capitalizing on primary forms of learning might be particularly useful in the beginning stages of learning a secondary domain (p. 184).

However, in contrast to Gray (2011, 2013), Geary describes important limitations to older children's learning through free play. Specifically, Geary questions whether play is effective in teaching biologically secondary abilities (Geary, 1995, 2007a). Acquisition of biologically secondary cognitive abilities is slow and effortful, requiring deliberate instruction and practice (Sweller, this volume). Geary's view is that formal direct instruction is the most effective approach to promoting these secondary, culturally based, cognitive skillsets.

By way of example, Klahr and Nigam (2004) studied third- and fourth-graders' developing ability to properly isolate variables when designing a scientific experiment. Klahr and Nigam found that children who received adult instruction and modeling about experimental design showed greater improvements than children who explored similar materials and practiced experimental design by themselves. Discovery learning through free play simply offers too many unconstrained possibilities and can lead young minds down a garden path of irrelevant foci. Geary recognizes that adult guidance is needed, and he concludes that direct instruction is the effective choice.

Proponents from both Gray's (2011, 2013) and Geary's (1995, 2007a) evolutionary perspectives support Bjorklund's (2007) statement that, "Children did not evolve to sit quietly at desks in age-segregated classrooms…" (p. 120). The question before us then is how we can deliver rich curricular choices while maintaining a playful learning environment that moves towards a learning goal. The evolutionary perspectives of Gray and Geary together suggest that free play is an effective and natural activity through which children gain important knowledge and skills; however, there are limitations to what children can learn through the type of free play that Gray advocates.

We argue that the relative effectiveness of free play is diminished when we, as the adults in children's lives, have a learning goal in mind. In those cases, we cannot depend on children to naturally—and in a timely fashion—encounter the requisite educational experiences that development of the targeted skills requires. Yet, the formal direct instruction that Geary recommends for biologically secondary skill acquisition might not be the best approach, either. Perhaps there is some way to capture the best of the playful, discovery approach to learning while still having a key role for adults who subtly guide children through a learning space.

In this chapter, we argue that it is time to embrace a position that incorporates Gray's (2011, 2013) and Geary's (1995, 2007a) insights into an approach that respects both the benefits of free play and the value of direct instruction. In this piece, we shed the false dichotomy that has developed between play and learning. Such a position respects the need for a well-defined learning goal that is quintessential to Geary's discussions of the formal instruction of secondary abilities, while leveraging the agency, openness, and exploration that are core to Gray's position and inherent to childhood (Gopnik, Griffiths, & Lucas, 2015; Hirsh-Pasek & Golinkoff, 2011). The debate between self-directed play and direct instruction can be replaced by an approach that incorporates elements of both pedagogical styles, which we describe as *guided play* (Fisher et al., 2010; Hirsh-Pasek & Golinkoff, 2011; Weisberg, Hirsh-Pasek, & Golinkoff, 2013). Guided play can serve as a useful blueprint for how we can help children acquire the skills that are important in the modern world while simultaneously respecting the need for active, child-centered exploration.

What Is Guided Play?

Together with free play, guided play falls under the umbrella term of *playful learning*—a whole-child pedagogical approach to the promotion of academic, socio-emotional, and cognitive development (see Fig. 5.1) (Fisher et al., 2010; Hirsh-Pasek & Golinkoff, 2011; Resnick, 2004; Weisberg, Hirsh-Pasek, & Golinkoff, 2013; Weisberg, Kittredge, Hirsh-Pasek, Golinkoff, & Klahr, 2015). To best understand guided play, it is useful to contextualize it by considering, first, how "play" is typically defined and, second, how guided play differs from other approaches to children's learning.

Theorists traditionally view play as a fun, flexible, and voluntary activity without extrinsic goals that involves active child engagement and often incorporates make-believe (Fisher et al., 2010; Johnson, Christie, & Yawkey, 1999; Pellegrini, 2009; Weisberg, Hirsh-Pasek, & Golinkoff, 2013). Guided play maintains most traditional elements of play, especially the enjoyable and engaging nature and the child's own agency, but adds a focus on the extrinsic goal of developing children's skills and knowledge.

There are two key dimensions to consider when defining guided play and how it differs from other pedagogical approaches (see Fig. 5.1). When an adult enters a situation with a particular learning goal in mind, there are varying degrees to which the adult might constrain the child's environment to promote the educational goal (as illustrated by the horizontal arrow in Fig. 5.1). Second, there is the degree to which the adult controls the moment-by-moment flow of the child's activities within that environment (as illustrated by the vertical arrow). The free play subtype of playful learning most clearly exemplifies both the lack of constraints from an adult's designated learning goal and the child's complete agency within that unconstrained atmosphere. This is the type of learning opportunity that Gray (2011, 2013) strongly promotes. Free play is part of playful learning because children can and do learn from such activities. During a child's free play, especially with other children, exploration of objects or pretend play provides opportunities to practice various skills (Fisher et al., 2010; Pellegrini, 2009; Singer et al., 2006; Pellegrini, this volume), such as mathematics and spatial skills (Ginsburg, Pappas, & Seo, 2001; Wolfgang, Stannard, & Jones, 2003), language and literacy skills (Pellegrini & Galda, 1990;

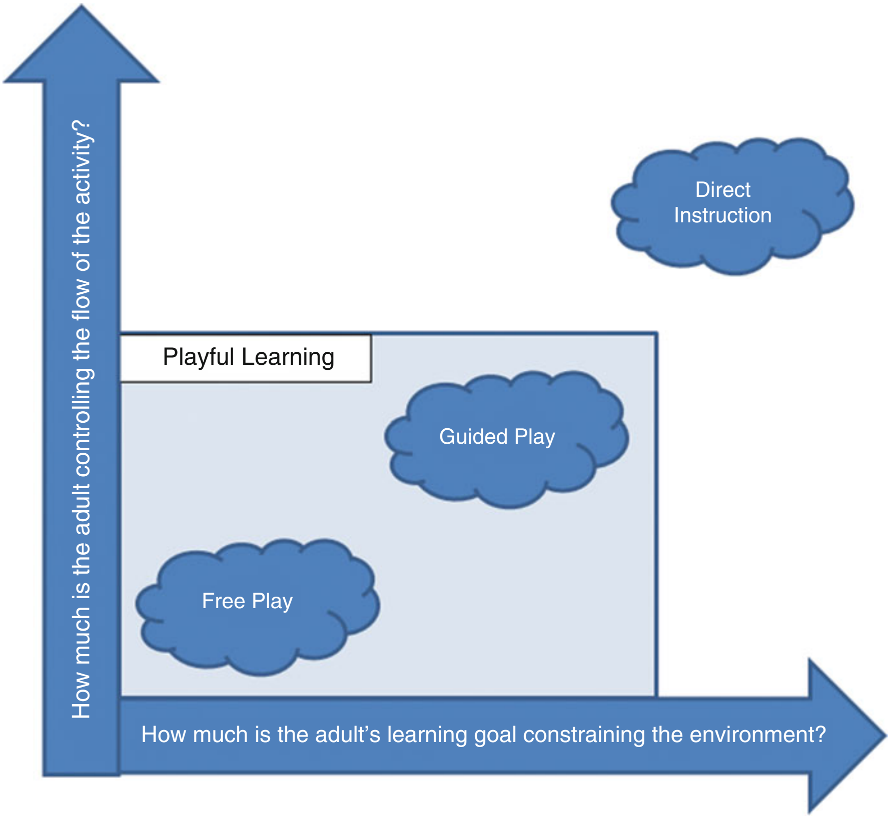

Fig. 5.1 Conceptualization of guided play and other approaches to children's learning

Weisberg, Zosh, et al., 2013), and socio-emotional skills (Lillard, 2001). However, it is difficult to predict which skills and knowledge will develop from free play, with the content depending on children's whims and their chosen play environment.

When an adult has a particular learning goal in mind, it is risky to assume that children will naturally stumble upon just those experiences that support that learning goal within the context of free play. Instead, the adult can provide goal-oriented scaffolding through guided play, the other playful learning approach. In guided play, the adult increases the likelihood of the child achieving the designated learning goal by constraining the environment just enough to help ensure that the child engages with relevant materials and encounters relevant experiences. Children still have choices and agency, but these choices are framed by the adult in service of the learning goal. A study by Morrow and Rand (1991) showed that teachers' support was especially effective for increasing children's literacy play when the teachers gave children initial guidance and modeled the use of literacy-related materials instead of simply providing the same items without suggestions. The Montessori educational approach, which often leads to better academic and social outcomes than do other educational styles, embraces adult guidance for how to play with objects to promote a learning goal (Lillard, 2013). Such guidance can be highly effective and can maintain many of the essential ingredients of play.

Besides providing relevant materials and initial suggestions about their use, adults can also join the child's play and act as a coach during guided play, asking provocative questions or making comments during play that help ensure children's exposure to ideas and information relevant to the learning goal (Fisher et al., 2010; Weisberg, Zosh, et al., 2013). A common illustration is with puzzle assembly. When a child struggles to fit an upside-down puzzle piece into position and an adult suggests that the child try rotating the piece, the adult is scaffolding the child's attempt. By simply observing what a child is doing and saying phrases such as, "I wonder what would happen if … " or "There could be other ways to [do that], too!" (Kittredge, Klahr, & Fisher, 2014; Weisberg et al., 2015), an adult suggests a possible next step to the child without taking control of the activity. The guided play challenge is to provide gentle support so that even though the choices are limited, it is still up to the child which direction to pursue.

That maintenance of child directedness, even when an adult is helping to shape the experience based on a learning goal, is a key difference between guided play and other approaches, such as the direct instruction Geary (1995, 2007a) advocates for secondary skill acquisition. In direct instruction, the adult's learning goal very much constrains the learning environment, which is what Geary argues is often necessary to ensure the child focuses on the desired content. However, in some circumstances, such directive adult involvement can reduce children's playing, exploring, *and learning*. Bonawitz et al. (2011) found that children who were explicitly taught about one specific causal property of a novel toy learned about that property, but did not discover other relevant properties that had not been demonstrated for them. In contrast, children who had not seen any demonstration explored the novel toy more thoroughly and discovered more of the causal properties in the process. Therefore, it can be counterproductive for an adult to lend too much directive support.

Thus, there is a delicate balance between maintaining child-directedness and providing sufficient guidance to promote achievement of a given learning goal. In Alfieri, Brooks, Aldrich, and Tenenbaum's (2010) meta-analysis of 56 studies, more learning occurred through approaches involving guided play (or what the authors called "enhanced discovery learning") compared to direct instruction or free play. Adults should function more like coaches than like directors; directors intrude more on children's autonomy. In the puzzle example, if the adult proceeds to dictate to the child where to put each of the pieces or in what order they should be placed, the child no longer has any control over the direction of the activity. This tips the scale away from child-directedness and towards the child passively following instruction (or quitting entirely!), even though the child is physically active. With a good coach, however, who asks questions (*Do you think that green piece belongs in the middle of the red ones?*) or obliquely suggests a strategy (*Hmmm … would it be easier to find the flower in the picture first?*), guided play offers a promising pedagogical approach that challenges children to think and not just carry out orders.

Principles for Effective Learning

The defining characteristics of guided play are consistent with empirical evidence from the large body of research on how children learn best. Individual fields such as psychology, education, and cognitive science have merged and evolved into the newer interdisciplinary Science of Learning, which aims to understand the mechanisms that fuel effective learning and how to design learning environments accordingly (Bransford, Brown, & Cocking, 1999; Chi, 2009; Marcon, 1999; Meltzoff, Kuhl, Movellan, & Sejnowski, 2009). We are therefore well-positioned to make evidence-based decisions about how to educate and equip our children with the skills needed for success in the twenty-first century. We presented a more comprehensive introduction to the Science of Learning field elsewhere (Hirsh-Pasek, Zosh, et al., 2015), and many authors have promoted this type of approach to formal education (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010; Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Mayer, 2011). Chi (2009) reviewed research supporting a hierarchical framework in which some types of activities are more effective than others for promoting learning: active trumps passive, constructive trumps active, and interactive trumps constructive. Here, with the specific consideration of relations to guided play in mind, we add to Chi's work to briefly synthesize the research that demonstrates that humans learn best when one or more of these four "pillars" are present (Hirsh-Pasek, Zosh, et al., 2015): (1) individuals take an **active** role in the learning environment, (2) they are **engaged**, (3) information is **meaningful**, and (4) learners **interact** in a social context.

Guided play naturally incorporates all four principles for effective learning. The child is actively engaged, and the predominantly child-directed nature of guided play ensures that the child's own interests drive the agenda, within the context of the learning goal. New information is therefore meaningfully related to the learner's existing knowledge and experience. Guided play also aligns well with Chi's (2009) suggestion that the best learning contexts are not just active or constructive, but also interactive. Through guided play, adults follow the child's lead while also providing targeted learning experiences. The teacher can provide high-quality social interactions that are contingent and adaptive by commenting on children's experiences, asking open-ended questions, or by co-playing and exploring learning materials with children. Thus, all four pillars can be achieved through guided play, which explains its effectiveness. We briefly elaborate on each of the four pillars and illustrate their importance through examples from our own research.

Active Versus Passive Learning

The notion that "learners are not empty vessels waiting to be filled" (Sawyer, 2006, p. 2) but that children learn through active exploration and participation in their environment dates back at least to the days of Piaget and Vygotsky. Since then, our approach to education has increasingly embraced the view of learning as knowledge construction rather than response or knowledge acquisition (Mayer, 1992). This approach is consistent with seeing children as mini scientists who form, test, and adapt their concepts of the world based on personal experiences (Gopnik, Meltzoff, & Kuhl, 1999). Just as adults learn better through active rather than passive engagement (Leopold & Mayer, 2015; Mazur, 2009), children benefit from being actively involved in their own learning (Chi, 2009). Rather than settling for the less reflective regurgitation of acquired knowledge (*knowledge telling*), educational environments should demand higher-order cognitive processes involved in "knowledge transforming" (Bruer, 1993).

This active involvement is not physical but "minds-on" activity, in which the child is cognitively engaged with the material (Hirsh-Pasek, Zosh, et al., 2015). While active engagement can occur during free play, adult scaffolding in guided play can also effectively support this type of minds-on involvement. Multiple studies show that children learn more from science museum exhibits when they engage in question and answer dialogs or other relevant commentary during their visits than when they are more passive (Borun, Chambers, & Cleghorn, 1996; Haden, 2002). Similarly, children learn more about chemistry when they draw relevant illustrations while learning than when they simply read about concepts or read and study preexisting, associated images (Schwamborn, Mayer, Thillmann, Leopold, & Leutner, 2010; Zhang & Linn, 2011). This phenomenon applies to other academic subjects, as well. For example, children show greater vocabulary gains from book-reading sessions when readings include question-asking and children's own use of the words than when children are passive listeners (Sénéchal, Thomas, & Monker, 1995).

One way of being "minds-on" active is to engage in cognitive exploration, which is an important hallmark of the relatively long childhood in humans compared to other species (Gopnik et al., 2015). Gopnik and colleagues recently argued that, with early neural plasticity and flexibility, children are especially well-positioned to approach learning with open-minded exploration. These authors draw a parallel to computer science's process of simulated annealing (a term borrowed from metallurgy) in which initial "high-temperature" searches consider a broad field of possibilities, and then "low-temperature" searches focus on narrower, more likely subsets of options. The authors write, "Childhood may be evolution's way of performing simulated annealing" (p. 91) in that young children approach a problem by considering a very broad array of possibilities and then, with age, use their increased experience and knowledge to focus on narrower ranges of the most likely possibilities. Pedagogies, such as playful learning, that invite children to be cognitively actively engaged capitalize on this exploratory and fluid thinking that comes naturally to young children.

One illustrative example of the impact of the *active* pillar can be found in research from our laboratories investigating children's learning about the criterial properties of geometric forms (Fisher, Hirsh-Pasek, Newcombe, & Golinkoff, 2013). In this study, children were randomly assigned to one of three conditions. In one condition, the experimenter and child pretended to be detectives trying to discover the defining properties of shapes (e.g., what makes a triangle a triangle?). Using *guided play*, the experimenter asked questions and offered suggestions, and the child was actively involved in the discovery process. In the second condition, the experimenter-turned-detective enacted a discovery process using more *didactic instruction* while the child passively watched. Children in the final condition were given an opportunity to *play freely* with the same materials, without any adult guidance or involvement. At test, children were asked to categorize shapes. Children in the guided play condition correctly identified both canonical (e.g., equilateral triangle) and non-canonical (e.g., scalene triangle) versions of the shapes, demonstrating a greater understanding of the shapes' defining properties than children in the other two groups showed. The superior learning from guided play, especially compared to didactic instruction, provides support for active learning.

Additional support for active learning comes from our Read-Play-Learn intervention project (Dickinson et al., 2016; Toub et al., 2016). This iterative series of studies investigated the use of shared book-reading and associated play activities for facilitating vocabulary development in preschoolers from low-income families. After hearing new vocabulary words via shared book-reading, children engaged in guided play with book-related toys (Toub et al., 2016). An adult incorporated vocabulary review into the children's play by using the words and asking children closed- and open-ended questions about the words. As reported by Ilgaz, Weisberg, Hirsh-Pasek, Golinkoff, and Nicolopoulou (2013), children learned more vocabulary if they answered more of the adult's questions about the words during the play, even though the frequency of the adult's use of the words was unrelated to children's vocabulary gains.

In another study showing that children learn new words better when they are actively involved, Zosh, Brinster, and Halberda (2013) presented 3- to 3.5-year-olds with images of novel objects. In the Instructional condition, the experimenter explicitly told children the label of a depicted novel object (e.g., "This is a dax"), and children simply watched and listened. Children in the Inferential condition, however, were more actively engaged in a minds-on manner: the adult showed them the image of the novel object alongside a known object and provided a novel label (e.g., "Can you point at the dax?"). This required children to use an active process of elimination to make the connection between the label and the novel object. Although children in the Instruction condition spent more time looking at the novel object during the learning period, children in the Inference condition showed better retention of the novel object names. This finding further supports the argument that children learn words better when they are actively involved—cognitively active—in the learning process.

Engaged Versus Distracted Learning

The second principle for supporting effective learning indicates that environments should promote on-task engagement and should not provide distracting elements. Multi-tasking is extremely difficult, even for adults (Watson & Strayer, 2010), and learning is most effective when an individual can focus on relevant information and disregard extraneous information (Mayer, 2014).

The evidence for this pillar plays out in two very distinct literatures: one focused on the role of distractions and learning and the other focused on cognitive processing load or cognitive load theories of memory (Cognitive Load Theory (CLT); see also Sweller, this volume). The distraction literature is very straightforward. Children learn best in environments where there are fewer distractions. In a number of laboratories, researchers found that children learned fewer letters, labels, or facts from books that had manipulative features (e.g., flaps, pull-tabs, pop-ups) than from similar books without those features (Chiong & DeLoache, 2012; Tare, Chiong, Ganea, & DeLoache, 2010). Even decorations on classroom walls can be distracting (Fisher, Godwin, & Seltman, 2014), at least when they are novel (Imuta & Scarf, 2014).

We found parallel results in our work on children's learning through books with varying degrees of extra features (Parish-Morris, Mahajan, Hirsh-Pasek, Golinkoff, & Collins, 2013). In one study, parents read books with their 3- or 5-year-old children. Half of the dyads were randomly assigned to read electronic console (EC) books, the precursor to books on tablets. The console enabled children to activate a pre-recorded story narrative, sound effects, or music or to play associated games. The remaining dyads read traditional books. While books were matched on elements such as story complexity, words per page, total pages, and characters, the book-reading experience significantly differed based on condition: parents reading traditional books said more things that related to the story and made fewer comments about children's behavior than parents reading EC books. Story-related utterances included "distancing prompts," which connect the story to children's own lives or require them to make inferences beyond the story's text. Such prompts are key elements of dialogic reading and are known to promote children's language development (Zevenbergen, Whitehurst, & Zevenbergen, 2003). The behavior-related utterances often redirected children's attention away from the buttons and back to the story. Thus, children and their parents reading a traditional book were more engaged with the story and less distracted.

To see how these differences in engagement and distraction related to children's learning, Parish-Morris and others from our lab (2013) conducted a second study. We tested children's story comprehension after the dyadic reading of a traditional or EC book with the same characters. Although 5-year-olds in both conditions performed at ceiling, 3-year-olds in dyads who read the traditional book showed significantly better story comprehension than those who read the EC book. More specifically, use of traditional books promoted more accurate responses about the content and chronology of the story, which depend on a deeper understanding of the story narrative. Putting these two studies together indicated that 3-year-olds learned better when they were reading traditional books, which facilitated greater engagement and less distraction than the EC books.

In another line of research relevant to the value of engagement versus distraction, we explored how well children can learn new words when their learning experience is disrupted by an unrelated event (Reed, Hirsh-Pasek, & Golinkoff, 2016). In a within-subjects design, mothers taught their 2-year-old children two novel words that labeled specific actions (e.g., *blicking* = a particular style of bouncing an object on one's knee, which was demonstrated for mothers in advance). Each word-learning "lesson" lasted approximately 60 s, and mothers completed two lessons per session. For one of the words, the interrupted condition, the experimenter interrupted the mother with a 30-s cell phone call after 30 s had elapsed. Mothers were then given the final 30 s to continue the lesson. For the second word, parents did not receive a cell phone call until the entire 60 s had passed. The order of the two conditions was counterbalanced across dyads. Subsequent preferential looking data indicated that children learned the novel words when they were presented without interruption, but did not learn the words delivered in the disrupted sessions. This study emphasizes the importance of consistent engagement without distractions if we want to achieve optimal learning. Even after controlling the total amount of time mothers engaged in teaching, the distracting break in the mother–child interaction interfered with the child's learning.

In part, the distraction literature concerns whether children can suppress information that is not relevant to the task. The distraction findings also speak to CLT, an educational theory anchored in an evolutionary framework that argues that the processing of biologically secondary knowledge requires a large information store that can be hindered by the limited capacity of working memory (Sweller, 2004, 2007, this volume). According to CLT, instructional practices should be designed to reduce the load on students' working memory. This is especially important to keep in mind in early childhood, as the development of working memory occurs gradually with continued improvement through adolescence (Gathercole, Pickering, Ambridge, & Wearing, 2004). Teaching practices should not tax children's working memory capacity. Interestingly, the meta-analysis by Alfieri et al. (2010) suggested that guided learning involves greater working memory demands than does direct instruction. Thus, there is a paradox in that guided instruction approaches can lead to deeper learning, but at the same time they can add counterproductive memory processing.

There is also some debate as to whether discovery learning leads to deeper learning. Kirschner, Sweller, and Clark (2006) find that problem-based instruction places heavy demands on the limited capacity working memory system, especially when dealing with novel content information, which in turn leads to *poorer* learning. Their conclusion is that teachers should provide direct, explicit instruction when teaching new content and skills to students (Kirschner et al., 2006). However, before jumping immediately to the use of direct instruction, there might be ways to circumvent the memory load problem. For example, one way to reduce working memory load might be to link new information to previously learned concepts or other relevant experiences and observations. Indeed, this relates to the pillar of learning that emphasizes making meaningful connections, which we address in the next section.

These disparate findings underscore the need for further research that specifies those contexts in which discovery versus direct instruction might be optimal for learning a particular content area or goal. Even at this point, however, we know that consideration of distractions and of working memory load will be key to designing appropriate guided play activities. To that end, we propose that guided play, when structured around the pillars of effective learning, can be implemented in a way that reduces both extraneous detail and the demands on working memory.

Meaningful Versus Unrelated Learning

A third feature of many highly effective learning environments is that they highlight connections between new information being acquired and preexisting knowledge or personal experience. Learning individual tidbits of information is not as valuable or long-lasting when done in the absence of the identification of similarities, differences, and other meaningful relations among such tidbits (Ausubel, 1968; Bransford et al., 1999; Shuell, 1990). Consider a child who knows about different kinds of dinosaurs. Once the child understands that there are various meaningful groupings, e.g., herbivores versus carnivores or bipedal versus quadrupedal, she can more quickly understand the features of a new dinosaur as she learns about it. Chi's (2009) framework of learning recognizes the construction of a mental model as an important part of the learning process. Similarly, Gray (2011) argues that environments that foster individuals' thoughtful consideration of new information rather than mere memorization of facts are most supportive of "educative instincts." These instincts, retained through natural selection, are the characteristics that drive people "to observe, explore, and practice essential elements of the culture that surrounds them" (p. 29). Education is therefore best achieved by leveraging natural inclinations to engage in personally relevant and meaningful activity. New material can be made more relevant and meaningful by highlighting for students how that material connects to real world phenomena and to their existing knowledge. More research is needed to confirm our impression that children learn better when they find the connective tissue between the new material and knowledge from their past learning or other experiences and observations about the world.

Meaningful connections for new information can be facilitated by presentation contexts that are inherently interesting, cohesive, or familiar (Hirsh-Pasek, Zosh, et al., 2015). For example, Hudson and Nelson (1983) found that children recalled more story events when they were part of more familiar narratives such as attending a birthday party versus making cookies. The *meaningful* element can also relate to the *engaged* element previously discussed and can be a motivating reward. Alvarez and Booth (2014) also noted that children were more persistent in completing a boring task when rewarded by causally meaningful information than when they were rewarded by less meaningful information or tangible rewards. When a situation is more meaningful, it is also likely more engaging.

Our work in the Read-Play-Learn series illustrates the superior learning that can occur in more meaningful contexts. In this research, children showed significant gains in receptive and expressive vocabulary knowledge about new words presented to them in the contexts of storybooks and associated play activities (Dickinson et al., 2016; Hassinger-Das, et al., 2015; Toub et al., 2016). In one study

(Toub et al., 2016), after participating in book-reading sessions that involved the introduction of new vocabulary words, preschoolers either played freely with book-related toys or engaged in one of two variations of adult-supported play. In the adult-supported play, adults helped focus the play (e.g., on scenes from the story), used commentary to connect vocabulary words to the story and children's actions, and asked questions about the words. When children played freely, however, meaningful context for vocabulary was only present if the children themselves brought the words into their play. Children in the adult-supported play conditions showed greater gains on receptive and expressive vocabulary tests than children who simply played freely. These findings demonstrate that more meaningful contexts facilitate better word-learning.

In another study in the Read-Play-Learn series (Hassinger-Das, et al., 2015; Toub et al., 2016), adults presented new words to children during book-reading and then reviewed the words in one of two ways. For half the words, adults supported children in promoting meaning-making by incorporating the words into children's guided play and asking open-ended questions about the words. For the other half of the words, children played a picture card game. This activity promoted minimal meaning-making because children merely associated words with pictures that depicted the meaning; the game did not address relations between words and the story or children's lives. When tested, children were significantly better able to express the meanings of words that were reviewed in guided play than the meanings of words that were reviewed in the picture card activity. Not all kinds of activity promote meaning-making or learning equally.

Play with board games offers another example of how meaningful, play-based approaches can support word learning. Researchers such as Ramani, Siegler, and Hitti (2012) have found that number-related board games can facilitate mathematics development, and our similar work explores games as a vehicle for preschoolers' vocabulary development. We used a book-reading activity similar to those used in the Read-Play-Learn project and coupled it with a board game (Hassinger-Das, Ridge, et al., 2016). After presenting vocabulary words in the book-reading context, the adult led children through a board game involving the words. The game was similar to *Snakes and Ladders*, and children moved their pieces across the board, periodically landing on squares that required them to review a vocabulary word from the storybook by answering the experimenter's scripted questions about the word. Questions either prompted children to recall elements of the story or stimulated them to think more deeply and make inferences or predictions. Game play only continued once a child answered correctly, either independently or with experimenter scaffolding. Therefore, the meaning of the words gained personal significance as part of the game's process. In a control condition, other children played the same board game without the integration of vocabulary review. For those children, words were reviewed separately so that children experienced a similar amount of word exposure, but in a context that was meaningful only in relation to the book. Results from pre- and post-intervention vocabulary tests indicated that children who played the integrated version of the board game gained more receptive and expressive knowledge of words than did children in the control condition. Making the words part of a fun game gave children a reason to remember them.

Our final illustration of the importance of meaningful learning contexts is a study on parent–child block play, with children ages 3- to 5-years old (Ferrara, Hirsh-Pasek, Newcombe, & Golinkoff, 2011). All parent–child dyads played with the same block set, but were randomly assigned to one of three conditions. In one condition, the only instruction was to play with blocks as they would at home. In the guided play condition with more adult scaffolding, dyads were instructed to collaboratively use the blocks to build a garage or a helipad based on step-by-step photographs. Dyads in the third condition were instructed to play freely with a preassembled garage or helipad. Based on video footage, we calculated the proportions of parents' and of children's spatial language—references to location, shapes, or dimensions, for example. Parents in the guided play with more adult scaffolding condition used significantly more spatial language than parents in the other two conditions. Similarly, children playing freely with blocks did not use as much spatial language as children building a garage or helipad through guided play or children playing with preassembled versions. Overall, free play with blocks was less effective for getting parents and children to vocalize about spatial relations and properties. Although this study did not test children's gains in spatial skills, other longitudinal work (Pruden, Levine, & Huttenlocher, 2011) and experimental research (Loewenstein & Gentner, 2005) suggests that exposure to and personal use of spatial language facilitates spatial skills. Thus, one way meaningful contexts relate to learning is by facilitating adults' and children's use of relevant language.

Interactive Versus Solitary Learning

Our fourth and final pillar of effective learning emphasizes the importance of socially interactive learning experiences, which is compatible with Chi's (2009) hierarchical framework highlighting "interactive" as the most effective characteristic of learning environments. Evolutionary perspectives differ in their emphasis on social interaction and collaboration within learning experiences. Some perspectives suggest it is likely that learning through social interaction was shaped by evolution (Herrmann, Call, Hernandez-Lloreda, Hare, & Tomasello, 2007). According to Gray (2011, 2013), hunter-gatherer children benefit from age-mixed play, in which older children can explain concepts to younger children. While serving as models for younger children to emulate, older children can also benefit from the creative and imaginative activities of younger children. From Geary's (2007a) perspective, too, social imitation and other learning within social contexts can be beneficial for the development of primary skills; however, once again, he emphasizes that socializing with other children is inadequate for mastering abstract concepts and skills (e.g., solving linear algebra problems). Direct or explicit teacher-delivered instruction is required for such biologically secondary skills, he argues.

In response, Berch (2007, 2013) claims that teacher-directed forms of instruction are not the only way that children can acquire biologically secondary knowledge and that students can attain such skills by socializing with their peers and engaging in cooperative learning and problem-solving activities. Berch (2007) cites evidence that structure and scripting of activities increases the effectiveness of cooperative learning; however, the guided play approach balances the benefits of social interaction with the aim of maintaining child-directedness and in-the-moment freedom within limited constraints. The benefits that older students gain from truly collaborative learning have been pointed out elsewhere (see Johnson, Maruyama, Johnson, Nelson, & Skon, 1981, for a review), and adult scaffolding can help facilitate such interactive learning.

Several examples of the role of social interaction in learning have emerged in the literature—starting with infants and language development, which is basic to all further learning. According to Kuhl's "social gating" hypothesis, the computations that are involved in language learning are "gated" by the social brain (Kuhl, 2007). Indeed, the linguistic input that children experience from the social environment (e.g., by parents, teachers, and peers) is positively associated with language learning. To elaborate, both the quantity (Hart & Risley, 1995) and quality (Golinkoff, Deniz Can, Soderstrom, & Hirsh-Pasek, 2015; Hirsh-Pasek, Adamson, et al., 2015; Rowe, 2012; Goldin-Meadow et al., 2014) of parental communicative input is associated with childhood language growth.

It is not merely the presence of a social partner that is important for learning, but engagement in high-quality social interactions that are contingent and adaptable (Tamis-LeMonda, Kuchirko, & Song, 2014). Infants and toddlers learn less when information is presented via television compared to live face-to-face interaction, a phenomenon known as the video deficit effect (see Anderson & Hanson, 2010 for a review). Troseth, Saylor, and Archer (2006) tested the role of social contingency in the video deficit effect by having toddlers participate in an object retrieval task. Children were more likely to follow directions to find a hidden toy when someone instructed them face-to-face versus when the same person instructed them via video. However, when the person instructed children via a contingent interaction through closed-circuit video, children successfully found the hidden toy (Troseth et al., 2006).

Recent research from our laboratory extended upon these findings. Roseberry, Hirsh-Pasek, and Golinkoff (2014) exposed toddlers to novel words in one of three conditions: socially contingent live interaction, socially contingent video chat, or a yoked video using a non-contingent pre-recorded video of the experimenter video-chatting with another child. Toddlers learned novel words from both the live interaction and the video chat conditions better than the yoked video condition. These results suggest that the video deficit effect is not driven by the digital delivery itself, but by the non-contingent interaction that children typically experience in that context.

These lessons go well beyond infancy to the importance of learning in the social nexus of the classroom. Research by Huttenlocher, Vasilyeva, Cymerman, and Levine (2002) notes that the language that children hear spoken by their teachers is linked to language outcomes. Specifically, teacher language related to growth in 4-year-olds' comprehension of complex syntax over the course of the year. Peer interaction also has tremendous impact on both expressive and receptive language achievement during the pre-kindergarten year (Mashburn, Justice, Downer, & Pianta, 2009).

Guided Play as a Middle Ground: A Recapitulation

In light of the evidence about how children learn, and equipped with evidence in favor of guided play, we suggest that the long-standing but false dichotomy between play and learning through direct instruction should be discarded. Children learn best when they are **active** (not passive), when they are **engaged** (not distracted), when the information is **meaningful** (rather than disembodied or disjointed), and when an activity is socially **interactive** (Hirsh-Pasek, Zosh, et al., 2015). These four characteristics emerge in playful environments, making playful learning an attractive option. Guided play offers a particularly promising approach (Weisberg, Hirsh-Pasek, & Golinkoff, 2013) that embraces these four pillars and should be integrated into early education to promote children's learning and development from a young age.

The short- and long-term benefits of early childhood education programs are incontrovertible (Barnett, 1995; Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001). Children's emergent mathematical and literacy skills serve as important early predictors of later school achievement (Duncan et al., 2007; Whitehurst & Lonigan, 1998). The question before us is how we can best achieve these ends and how evolutionary perspectives can assist us in deriving the best education for all.

Gray (2011, 2013) advocates capitalizing on children's educative instincts and associated exploration as he promotes a hunter-gatherer model of education that emphasizes the importance of free play. He argues that children are capable of directing their own education and should be allowed to do so. Geary (1995, 2007a) also describes the natural biases that lead children to learn many essential and basic abilities through organic play. However, Geary (1995, 2007a) argues that there are limitations to the power of play for learning; children cannot learn biologically secondary skills through such activities alone.

We have reviewed evidence that suggests that free play is not the best approach for promoting specific educational outcomes, such as knowing how to identify a particular geometric form (e.g., a triangle) or learning a particular set of vocabulary words (Fisher et al., 2013; Toub et al., 2015). There are simply too many degrees of freedom in free play for children to notice what they are supposed to learn. The research findings are clear that, although free play has many benefits and helps support children's social and self-regulatory skills (Fisher et al., 2010; Singer & Singer, 2005), guided play trumps free play when there is a specific learning goal in mind. On the other hand, the role of the adult need not be as directive as Geary's (1995, 2007a) preferred style of formal instruction would suggest. The research findings reviewed in this chapter support the assertion that when there is a clear learning goal, we must constrain the learning possibilities and help young children focus on the most relevant content. However, one can choose to constrain the learning environment and assist in the learning of secondary skills through guided play rather than direct instruction. As noted by Weisberg, Hirsh-Pasek, and Golinkoff (2013), with guided play, the adult constructs the environment in a way that facilitates discovery of the learning dimensions. “[T]eachers might enhance children’s exploration and learning by commenting on their discoveries, co-playing along with the children, asking open-ended questions about what children are finding, or exploring the materials in ways that children might not have thought to do” (Weisberg, Hirsh-Pasek, & Golinkoff, 2013, p. 105). Use of such scaffolding techniques like dialogic inquiry and heightening engagement helps direct children’s attention and exploration and facilitates their “sense-making” processes, all of which are key elements that underlie the effectiveness of guided play (Fisher et al., 2013). Guided play thus preserves the best of both Gray’s and Geary’s positions and asks how they might work in tandem to optimize the learning of primary and secondary skills. Merging insights from Gray and Geary’s evolutionary perspectives, guided play combines the emphasis on child exploration with the guidance of a goal-oriented adult.

The weight of the evidence forces us to conclude that guided play can offer a preferred middle ground between free play and direct instruction (Fig. 5.1). Guided play presents an evidence-based, pedagogical sweet spot with a careful balance between constraining the learning environment and scaffolding an activity versus respecting children’s agency as they direct their play. As a child-directed activity that maintains the enjoyable nature of play within the context of an adult’s developmentally appropriate, contingent, scaffolded, and goal-directed support, guided play naturally uses mechanisms that foster strong learning (Weisberg, Hirsh-Pasek, & Golinkoff, 2013). As we have argued elsewhere (Weisberg, Hirsh-Pasek, Golinkoff, & McCandliss, 2014), guided play can also promote in children a positive approach to learning (through *mise en place*), rather than promoting a view of learning as an unpleasant and unenjoyable experience (Resnick, 2004). All these characteristics make guided play a promising approach to learning.

Conclusion

The US education system has been mired by reforms that have unintentionally pitted rich curricula against age-appropriate pedagogy—learning versus play. It is time to re-examine issues of educational reform in terms of the rich literature available in the learning sciences and evolutionary psychology. When we do so, we quickly realize that children learn best when they are active, engaged, learning meaningful material, and in a social context. These ingredients emerge in play. But, as Geary so rightly notes, play alone will not be sufficient to help children learn biologically secondary information like simultaneous equations or even literary inference. Adults must provide scaffolding to constrain the potential interpretations and possibilities. Here we offered evidence from early childhood studies that children can both be masters of their learning and navigate through a constrained learning space that elevates their performance toward a learning goal. Guided play thus offers a new pedagogical approach that is antithetical to many current educational practices. It is, however, consistent with both findings in the science of learning and a blended evolutionary theory on how children learn best.

Future Directions

We propose five main questions about guided play to address as we move forward (see Table 5.1). First, how is guided play best operationalized? Second, what are the long-term impacts of guided play on academic and social outcomes? Third, in what

Table 5.1 Key questions and directions for future research on guided play

Key question	Future direction
How is guided play best operationalized?	We need to determine the optimal balance of adult-led guidance and scaffolding without intruding on children's autonomy in the learning experience
What are the long-term impacts of guided play on academic and social outcomes?	There is some evidence that children who experience playful, child-initiated preschool programs, compared with direct instruction or a combination approach, show better social and academic outcomes in sixth grade (Marcon, 1999, 2002). More work needs to explore the potential long-term benefits and knowledge transfer gained through playful learning, and guided play in particular
In what cases is guided play more (or less) effective?	One consideration is age. Since most existing work focuses on young children, we need to examine whether guided play relates to cognitive and social outcomes in older children and adults. Also, distinctions between procedural versus conceptual learning or novel versus familiar material might have implications for pedagogy, given concerns about the working memory load of guided play
How can we best train teachers (and parents) to adopt guided play pedagogical approaches?	It takes mastery to weave tidbits of content related to learning goals into play in meaningful ways without usurping children's agency. Teachers in the Read-Play-Learn project had difficulty juggling both the specific vocabulary review strategies and the guided play style that we sought to achieve (Toub et al., 2015). What type of support do teachers or parents need to comfortably and effectively implement guided play approaches? In addition, Geary's (1995) emphasis on direct instruction is based on universal education and a practical concern about the feasibility of individualized instruction. How can guided play be implemented in large classroom settings?
How do we best disseminate this information?	Unfortunately, many policymakers operate under the false belief that adopting rigid curricula and standardized assessments is the best way to gauge student learning (Miller & Almon, 2009). We must inspire parents, educators, and policymakers to embrace guided play as a favorable alternative and better communicate with these stakeholders about the merits of guided play

cases is guided play more (or less) effective? Fourth, how can we best train teachers (and parents) to adopt guided play approaches in their interactions with children? Lastly, how do we best disseminate this information? Our collective pursuit of answers to such questions will help us clarify and maximize the benefits of guided play as a pedagogical approach to add to our active repertoires.

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