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Play-based learning

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Synthesis

How important is it?

Play-based learning is a pedagogical approach that emphasizes the use of play in promoting multiple areas of children's development and learning. Free play and guided play are two types of play-based learning. The former is child-directed and internally motivated, while the latter is supported by adults and geared at a specific learning goal. Although play is a legitimate right in early childhood and one of the most natural pathways to exploration and learning, young children today are having fewer opportunities to play both at home and in school. The increased emphasis on school readiness has led early childhood programs to prioritize structured activities and testing at the expense of physically active, and play-based learning. However, this traditional learning approach has not necessarily proven effective, as it was found to reduce children's motivation to learn, and to negatively impact their attention and behavioural regulation. Considering that children learn best when they are mentally active and interact with materials in a meaningful way, play-based learning should become an inherent aspect of their home and school environment.

What do we know?

Play-based learning impacts the development of children's social and cognitive abilities, and academic skills. There is increasing evidence that free play and guided play contribute differently to these developmental outcomes. Free play appears to be especially beneficial for the development of social competence and self-regulation. For instance, make believe, a form of free play, allows children to problem-solve in the face of conflicts, to inhibit their impulsive behaviours, to express their emotions, to follow social rules, and to support the emotional well-being of others. *Tools of the Mind* is an example of a preschool program that was specifically designed to improve children's self-regulation skills through make-believe play.

Relative to free play, guided play appears to be more influential in the acquisition of academic skills. By structuring the environment, incorporating learning targets, and/or modifying pre-designed games, parents and educators can enhance young children's learning opportunities. In fact, mathematical concepts, such as numeracy, classification, and spatial/temporal relationships

can all be learned through adult-supported guided play. *Building Blocks PreK* is an example of a curriculum that relies on games and playful activities to foster the acquisition of basic math operations.

In spite of the many benefits associated with play-based learning, educators are often unclear about how to provide such opportunities in school, and how to assess the learning that occurs through play. The lack of formal training and increased pressure to achieve the prescribed learning outcomes may partly contribute to these challenges. Finally, it is important to note that children around the world do not have equal opportunities to engage in play-based learning. Relative to children from higher socio-economic backgrounds living in the United States, children from lower income communities in this country are more likely to engage in leisure activities (e.g., digital media) then to participate in outdoor activities, and/or playful activities with adults. The differential access to play-based learning may, in turn, perpetuate the achievement gap among children from different cultural and socio-economic backgrounds.

What can be done?

Given the increasing number of young children who are active users of technological devices, parents are highly encouraged to monitor the amount of time children spend on digital media and the types of games they play on them. Ideally, there should be a balance between the amount of digital play and more traditional playful activities, such as make believe play or outdoor activities.

In order to promote play-based learning opportunities, parents and educators may wish to structure the environment ahead of time. By providing a range of toys (e.g., wood blocks, arts and crafts, puzzles, books, costumes), children would be more likely to create pretend play and explore new possibilities. In addition to setting up the learning environment, parents and educators are encouraged to allow children to freely choose their actions while still providing subtle guidance in order to ensure they explore the right aspects of the environment and/or game to reach the learning goals.

The field of play-based learning is relatively new and more research is needed to determine the levels of adult guidance necessary to (a) promote developmental and academic learning, and to (b) meet the needs of children coming from different backgrounds. Research documenting effective ways to assess play-based learning in the classroom is also warranted. In the meantime, policy makers could support the legislation that promotes the integration of play-based learning

in school. They are also encouraged to fund campaigns to promote public awareness around the need for play-based learning in early childhood education.

Defining Play-based Learning

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Introduction

Since the early 2000s, there has been a shift towards recommending the use of play-based learning in early education curricula across several different countries, including Canada,[1] Sweden,[2] China[3] United Arab Emirates,[4] and New Zealand.[2] This paper introduces some of the key issues surrounding the pedagogy of play-based learning, including defining types of play, perspectives and recent findings regarding the benefits of play, and discussions regarding the role of the educator in play to facilitate learning.

Subject

Play-based learning is, essentially, to learn while at play. Although the exact definition of play continues to be an area of debate in research, including what activities can be counted as play,[5] play-based learning is distinct from the broader concept of play. Learning is not necessary for an activity to be perceived as play but remains fundamental to the definition of play-based learning[6] Within studies that have examined the benefits of play-based learning, two different types of play have been the primary focus: free play, which is directed by the children themselves,[7] and guided play, which is play that has some level of teacher guidance or involvement.[8]

Free play is typically described as play that is child-directed, voluntary, internally motivated, and pleasurable.[9,10] One type of free play frequently endorsed is sociodramatic play, where groups of children practice imaginative role-playing through creating and following social rules such as pretending to be different family members.[11] On the other hand, the term guided play refers to play activities with some level of adult involvement to embed or extend additional learning opportunities within the play itself.[12] A range of terminology has been used to refer to types of guided play activities (e.g., centre-based learning,[13] purposefully framed play[14]); however, one distinction that can be made is who has control over the play activity: Some activities are described as teacher-directed, such as intentionally planned games,[15,16] while others are described as mutually directed, where teachers get involved without taking over or transforming

the activity so that both teachers and students exercise some control over the play.[17,18] One example of teacher-directed play is the modification of a children's board game to include actions that practice numerical thinking and spatial skills,[19] while one example of mutually-directed play is a teacher observing students acting out a popular movie and suggesting that the class make their own movie, which leads to creating and writing a script, researching relevant topics, and practicing different roles in a collaborative manner.[20] This distinction between free play, mutually directed play, and teacher-directed play is useful for examining the growing body of literature on different types of play-based learning.

Although the hypothesis that play fulfills a fundamental role in child development has been contested,[21] there is a growing body of evidence in favour of the use of play-based learning to support multiple areas of development and learning. However, there is also a lack of agreement among both researchers and educators regarding the role and value of different types of play in the classroom.

Research Context and Results

Examinations of play-based learning in early education tend to be approached from two differing viewpoints: one focused on the benefits of play for developmental learning[22] and one focused on the benefits of play for academic learning.[23] Developmental learning includes areas such as social-emotional skills, general cognitive development, and self-regulation abilities. Articles focused on the developmental benefits of play-based learning have frequently endorsed the important role of child-directed free play in the classroom. These researchers have highlighted concerns regarding decreases in free play time due to an increased focus on meeting academic benchmarks through teacher-directed instruction.[24] For example, it has been proposed that children construct knowledge about the world and practice problem solving skills during times of child-led exploration at different play centres.[25]

Some studies have found that students engage in more effective problem solving behaviours in child-directed play conditions than in more formal, teacher-directed settings.[26,27] Child-directed play with peers has been highlighted as an important endeavour for children to develop social and emotional competencies, such as leading and following rules, resolving conflicts, and supporting the emotional well-being of others.[22] Providing children with opportunities to negotiate and follow rules during play has also been connected to the development of self-regulation skills.[28] Many developmental learning benefits have been linked to child-directed free

play contexts where educators take on an indirect or passive role, such as one who observes or prepares the environment to encourage free play.[29] Alternatively, research focused on play and academic learning has examined how play-based activities impact student learning in academic subject areas such as literacy and mathematics. These researchers tend to promote the use of mutually directed and teacher-directed play activities to support academic learning, where educators take an active role in the play such as leading pre-designed games, collaborating with students, and intervening in child-led play to incorporate learning targets.[15,30,31] Proponents of play-based learning for academic growth have argued that play-based strategies can be used to teach prescribed academic goals in an engaging and developmentally appropriate manner.[31,32] From this perspective, free play alone is often considered to be insufficient to promote academic learning, and so active teacher involvement in play is critical.[15]

Recent research has supported this type of play-based learning for academic development. For example, students in classrooms following a play-based kindergarten math curriculum that implemented teacher-directed math games were found to outperform students in control classrooms on general assessments of mathematical skills.[30] Similarly, children following a play-based literacy curriculum centred around mutually-directed play where educators incorporated target vocabulary words into play contexts were observed to utilize these newly taught words more frequently than children taught using direct instruction.[33]

Research Gaps

Developmental and academic perspectives on play-based learning have progressed with differing recommendations regarding the types of play endorsed and the optimal role of educators implementing this pedagogy.[34] Researchers focused on the developmental benefits of play-based learning have emphasized the importance of free play and a passive teacher role, while researchers focused on the academic benefits have emphasized the importance of teacher-directed and mutually directed play with an active teacher role. Few studies have addressed the topic of integrating developmental and academic perspectives together.[34]

These differing recommendations have resulted in an area of confusion for educators, with recent classroom-based studies finding similar variations among educators regarding perspectives and implementations of play-based learning. Teachers who endorsed the developmental benefits of play were found to primarily facilitate free play in their classrooms, while teachers who endorsed the academic benefits of play facilitated a broader range of play

activities with active teacher involvement.[6,35] Furthermore, some common challenges with following play-based learning curricula have been reported by educators, such as struggling to see the academic value of play, a lack of formal training in play-based learning, and pressure to engage in direct instruction to achieve prescribed academic outcomes.[36,37] Both developmental and academic learning are important components addressed in early years curricula to be taught through play-based learning.[38,39] However, guidance regarding how educators can integrate and balance different recommended practices within an academic-focused curriculum remains largely absent.

Conclusions and Implications

Educators implementing play-based learning curricula are currently faced with the challenge of integrating mandated academic standards within play-based pedagogy. While some researchers and educators have endorsed the viewpoint that play should remain a child-directed endeavor,[40,41] educators have reported concern over meeting academic standards without being able to impart some direction during times of play.[6] Considering the evidence, an integrated approach to play-based learning that addresses both developmental and academic benefits is recommended.

In order to integrate developmental and academic approaches, play-based learning can be conceptualized as a continuum that incorporates varying levels of adult involvement in play. Child-directed activities (free play) are situated at one end of the continuum while teacher-directed play (learning through games) falls at the other end, with mutually directed play (collaboratively designed play) falling in the middle.[6] When implementing a continuum of play-based learning, educators negotiate a balance between allocating time for uninterrupted free play and embedding or extending academic content in different ways within playful activities to support children's learning.[6] By providing a range of play types in the classroom where educators take on a variety of roles, the learning of both developmental and academic skills can be addressed in a child-centred, engaging, and developmentally appropriate manner. It is hoped that this broader definition of play-based learning can help to bridge the gap between developmental and academic perspectives on play, as well as enhance the practice of educators implementing play-based pedagogy in the early years.

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The Role of Make-Believe Play in Development of Self-Regulation

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Introduction and Subject

Early childhood is a landmark period for laying the foundations of self-regulation—an array of complex capacities that include impulse and emotion control, self-guidance of thought and behaviour, planning, self-reliance, and responsible behaviour.[1,2,3] Simultaneously, the years between 2 and 6 are the "high season" of imaginative play.[4,5] According to Russian developmental psychologist Lev Vygotsky, this synchrony between the flourishing of make-believe play and self-regulation is no coincidence. Imaginative play, Vygotsky6 proposed, is a "leading factor in development"—a unique, broadly influential zone of proximal development in which children experiment with a wide array of challenging skills and acquire culturally valued competencies. The most significant of these is a strengthened capacity for self-regulation.

In Vygotsky's[6] theory, two unique features of make-believe clarify its contributions to self-regulatory development. First, the creation of imaginary scenes using substitute objects aids young children in distinguishing internal ideas from concrete reality. When children use a cup for a hat or a block for a telephone, they change an object's usual meaning, thereby detaching mental symbols from the real objects and actions to which they refer. Through such playful substitutions, children are aided in relying on thought rather than impulse to guide their actions. Second, Vygotsky[7] noted that an inherent property of pretend scenarios is following social rules. In fantasy play, young children willingly place constraints on their own actions when, for example, they follow the rules of serving a meal, caring for a sick doll, or launching a spaceship.

According to Vygotsky, in separating mental symbols from reality, children augment their internal capacity to regulate their actions; in engaging in rule-based play, they respond to external pressures to act in socially desirable ways.[3] Vygotsky concluded that of all activities, pretense affords young children the greatest opportunity to become self-regulated and responsible.

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Research Contexts and Key Research Questions

Findings of a small literature of correlational studies are consistent with a developmental association between make-believe play and self-regulation. Research has addressed several of Vygotsky's ideas about the mechanisms through which pretense might facilitate self-regulatory abilities.

To explore whether make-believe uniquely fosters use of thought to overcome impulses, investigators have examined the extent to which imaginary play, compared with other play types, promotes private, or self-directed, speech.[8] Task-relevant private speech has consistently been found to increase under conditions of cognitive challenge and to contribute to self-regulation and improved task performance.[9,10]

Several studies have focused on the link between pretense and executive function—a construct that encompasses working memory, inhibitory control, and flexible shifting of attention to suit task demands.[11,12,13] These basic cognitive operations, which improve rapidly between ages 2 and 6, underlie complex self-regulatory abilities that enable children to cooperate with peers and adults and to persist with demanding tasks.[14,15]

Finally, two investigations related the complexity of children's sociodramatic play with peers to subsequent socially responsible classroom behaviour. Whereas most self-regulation measures have been laboratory based, these studies used classroom naturalistic observations.[16,17]

Recent Research Results

Krafft and Berk[8] examined the association between make-believe play and private speech among 59 3- and 4-year-olds in two preschools: a Montessori program where activities were highly structured and pretense was discouraged, and a traditional program where sociodramatic play was encouraged. Observers coded for children's play behaviour, private and social speech, and level of adult and peer involvement. Results revealed that although peer involvement was equivalent in both settings, children in the traditional, play-based preschool engaged in more fantasy play, less constructive play, and more private speech. With verbal ability and age controlled, make-believe play and associative peer involvement were positively correlated with fantasy-related private speech and self-guiding private speech, suggesting that children used private speech to develop imaginary scenarios and guide their own behaviour during sociodramatic play.

Three investigations[11-13] provide preliminary support for an association between imaginary play and executive function, especially inhibitory control. Cemore and Herwig[11] assessed inhibitory control among 37 3- to 5-year-olds using a delay-of-gratification task. Length of delay was positively correlated with children's interview responses about their imaginary play behaviour at home. Videotaped observations of play behaviour at preschool and maternal and teacher reports of play, however, were not significantly associated with ability to delay. Kelly and Hammond[12] used a "conflict" inhibitory-control task that required children to give incongruent responses to pictures (saying "sun" to a picture of the moon and "moon" to a picture of the sun). Among 20 4- to 7-year-olds, scores on a standardized test of pretense skills and on laboratory observations of symbolic play were positively correlated with inhibitory control after adjusting for mental age. Using a substantially larger sample of 104 3- to 5-year-olds, Carlson, White, and Davis-Unger[13] found that performance on a task assessing skill at enacting pretend gestures was associated with scores on a battery of inhibitory control tasks, with stronger links emerging for delay-of-gratification than for conflict measures.

In a short-term longitudinal investigation of 51 middle-socioeconomic status (SES) 3- and 4-year-olds, Elias and Berk[16] examined the relationship of sociodramatic play to future self-regulation, indexed by several types of socially responsible behaviour. In early fall and again five months later, the children were observed during free play for quantity and complexity of sociodramatic play. Also recorded were cooperativeness and helpfulness during cleanup periods and attentiveness during circle times. Frequency and persistence of complex sociodramatic play in the fall predicted future cleanup behaviour after controlling for age, vocabulary, and baseline cleanup behaviour. Additional analyses revealed that these results were strongest for children rated by parents as highly impulsive, nil for low-impulsive children. No effects of play on circle-time attentiveness emerged.

In subsequent research on 19 low-SES 4-year-olds, Harris and Berk[17] were unable to replicate Elias and Berk's[16] findings. The investigators speculated that the thematic content of play in their sample, which was heavily weighted with violence and conflict, might have been responsible.

Research Gaps

Investigation into the play–self-regulation relationship is nascent, with reliability, generalizability, and causal mechanisms yet to be established. Studies with larger, more diverse samples, and in a wider variety of early childhood educational contexts, would enable

researchers to better examine interactions among play features and their effects on children varying in demographic characteristics and personal attributes. Furthermore, researchers must more effectively disentangle the role of make-believe play from related variables (such as language skills) known to be predictive of advances in self-regulatory capacities.

Investigators have begun to examine constructs, such as executive function, that offer concise approaches to assessing the contributions of make-believe play to self-regulation, but more work in this area is needed. At the same time, the links between pretense and manifestations of self-regulation in everyday contexts merit expanded attention.

Recent attention to guided play—in which adults scaffold children's play activities in the direction of learning goals while ensuring substantial play autonomy[18] —may be fruitful in clarifying the nature of the pretense–self-regulation relationship. Research designs demonstrating the efficacy of a guided-play approach for various aspects of young children's knowledge and problem solving offer models of viable experimental strategies for inquiry into the impact of pretense on self-regulation.

Conclusions

The evidence as a whole reveals a general pattern of association between children's pretense and self-regulatory competencies, with possible but not yet confirmed causal effects for self-guiding private speech, executive function, and socially responsible behaviour. Smith[19] proposed that contribution of pretense to development is likely one of "equifinality": one of multiple pathways to favorable outcomes. In a subsequent review of research, Lillard et al.[20] designated an "epiphenomenon" hypothesis as most reasonable: make-believe as associated with factors that induce healthy development but not causal. For example, if parents who converse often with their children also happen to encourage make-believe play, then perhaps the factor that actually enhances self-regulation is not make-believe play but rather parental language stimulation.

It is unlikely, however, that make-believe play is merely epiphenomenal.[21] Young children's complex pretense is goal-directed, rich in symbolic object substitutions and language in its own right, and a prime context in which children willingly subordinate their activity to social rules. In these ways, pretense seems inherently self-regulating.

A key challenge in capturing the causal role of make-believe is that the study of imaginative play does not transfer easily to the laboratory. Although play training studies have been touted as

offering the strongest possible evidence, these manipulations may negate influential elements of children's pretense, including intrinsic motivation, positive affect, and child control.[22]

Implications for Parents, Services and Policy

Theory and extant research, though incomplete, has vital practical implications for parents, early childhood education programs, and therapeutic interventions for children with self-regulation deficits. Increasing numbers of U.S. young children are being deprived of play in favour of narrowly focused academic training in their homes, preschools, and kindergartens.[23] At the same time, many children, especially those from low-SES families, enter kindergarten with self-regulation problems that pose long-term threats to academic success. A serious consequence of prematurely concluding that make-believe play is epiphenomenal is that development-enhancing play experiences will be further diminished in children's lives.

Early childhood programs that elevate academic training at the expense of play have been found to dampen motivation to learn and diminish regulation of attention and behaviour, especially among low-SES children.[24,25,26,27] Until evidence indicates otherwise, returning play, including make-believe play, to center-stage in the curriculum is a crucial step toward restoring developmentally appropriate experiences to children's classrooms and to their home lives, as parents look to educators for models and advice on development-enhancing learning activities.

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Play-Based Learning and Social Development

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Introduction

Play is universal and critical for healthy social development. Defined simply, play is “just pretend”, and the critical characteristics are:[1]

1. Play is intrinsically motivated; it occurs because the child is moved to pursue a given activity, not because it is forced on her or reinforced by others;
2. Play is its own “means” and “ends”; it is a behaviour that is not goal-oriented;
3. Play is non-rule-governed; in this regard, play is distinguished from games with rules;
4. During play, children impose their own meanings on objects. They are beyond discovering object properties, and instead ask, "What can I do with these objects?";
5. Play involves some element of nonliterality. Objects are transformed and decontextualized (e.g., a piece of cardboard becomes a "magic mirror"), and people assume nonliteral identities (e.g., 4-year-old Jason becomes Prince Adam).

Play is enjoyable, intrinsically motivated behaviour that is non-rule-governed, non-goal-oriented, and “just pretend”. Play-based learning takes place in a setting that results from the active engagement of the child and the interaction between the child and her peers or her environment.

Subject

Play takes many forms. Object play occurs when children exploit the properties of objects to use them in a playful manner.[2] Pretend play or pretense is defined as children’s intentional engagement with a mentally represented alternative to reality in a playful setting – that is “it’s just pretend.”[3] Rough-and-tumble play is physical activity in which children interact in ways that connote aggression, but in fact, is “just pretend.”[4] It is through these various forms of play that children learn the skills they need to be prepared for social interactions, school, and the world beyond.

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Problems

Despite the importance of play for children's social development, North American children are experiencing diminished opportunities for play due to increased academic pressures and more time spent on digital devices.[5-8] In recent years, kindergarteners in the United States have experienced a marked increase in the emphasis placed on teacher-directed activities, the use of memorization, and high-stakes testing,[9] and a sharp decrease in the amount of time allotted for child-directed activities. Furthermore, children's use of digital media has increased dramatically.[7] In 2014, 38% of children under the age of 2 had used a mobile device compared to only 10% of children two years prior.[10] For these reasons, opportunities for less structured forms of play are diminishing, both at home and in school.[5,11]

Research Context

Because play is vital for children's healthy social development, the loss of opportunities for play is particularly troubling. Through play, children learn to cooperate and to display socially appropriate behaviour. Pretense bolsters children's social competence by allowing children to self-regulate, to cope with stress, and to talk about emotions.[12-16] This increased social competence is associated with more considerate behaviour, friendliness, conflict resolution, and peer acceptance.[17,14,18-20] Through play, children learn to inhibit impulsive behaviours and to plan more adaptive responses. Preschoolers who engage in more open-ended pretend play compared to children who participate in more closed-ended tasks with teacher-determined goals exhibited more private speech, which is often used by children to regulate their behaviour.[21] Rough-and-tumble play allows children to practice self-regulating their physical behaviours under moderately stressful conditions, yet in a safe and engaging context.[22-26] Children's ability to cooperate, follow social rules, cope with stress, and regulate their emotions are all significant developmental achievements, especially given that children's social adjustment is crucial for school adjustment and success.[27-31]

Key Research Questions

Some key research questions regarding play-based learning and social development remain. First, it is not yet known how best to incorporate play into schools, which, over time, have afforded children fewer play opportunities.[2] Relatedly, it is important for parents to understand the significance of play for adaptive development. Increasingly, children's schedules are being

filled with adult-led activities that require goal-achievement, competition, and the serious attention to adult-designated rules and roles. Simply put, many children do not have access to play opportunities.

Recent Research Results

It is possible to implement evidence-based programs, which improve children's socio-emotional functioning. The preschool program targeting domain-general self-regulatory skills, Tools of the Mind,[32] was designed to improve preschoolers' self-regulatory skills using a play-based curriculum. Classrooms that use this curriculum emphasize child-directed pretense. For example, children may have the opportunity to design learning centers involving pretend play, such as a make-believe convenience store where children can buy and sell items, maintain an ATM, set price points for merchandise.[33,34] One study of 147 low-income preschoolers showed that children who participated in the Tools of the Mind curriculum outperformed their peers participating in the Balanced Literacy curriculum on measures of self-regulation.[34]

Beyond the school environment, parental attitudes about play influence children's access to play in the home and in the community.[35,36] Relatedly, the nature of children's play with their parents is largely determined by parental attitudes about play.[37,38] One program, the Ultimate Block Party, successfully enriched parents' understanding of play and its contribution to children's learning and development.[6] Specifically, parents who visited multiple play sites with their children during a one-day public event perceived a stronger connection between play and learning and between socialization through play and children's later success in life. In these ways, researchers have shown that it is possible to increase children's exposure to playful learning settings in the home and at school.

Research Gaps

Although programs have been successful in making preschool programs more playful for young children, it appears as if play becomes viewed as superfluous once youth enter elementary and middle school. The pressures of high-stakes testing often appear pervasive. There is a need to explore the most effective ways to incorporate play-based learning into traditionally didactic classrooms settings for older children.

In addition, children from lower-socioeconomic (SES) backgrounds spend less time than children from higher-SES backgrounds playing sports, participating in outdoor activities, and passive

leisure activities. Instead, these children spend more time using digital media.[39,11] Accordingly, more work is needed to understand how to increase play affordances, such as safe, engaging playgrounds, for the children who are most in need of playtime.

Conclusions

Play is voluntary, spontaneous, and joyous. Play and play-based learning are integral to healthy social development in children. Children who play more are more self-regulated, cooperative, considerate, friendly, and socially competent. They display more appropriate social behaviours, coping skills, and experience greater peer acceptance. Despite this, children are experiencing reduced opportunities for play due to increased academic pressures and time spent on digital devices. Further, children from lower-SES backgrounds spend even less time playing than their higher-SES counterparts. Recent work shows promising progress on how to better incorporate play into children's lives in school and at home. Finally, more research is needed on how to provide play-based learning opportunities to children in the elementary grades and beyond and to children from disadvantaged backgrounds.

Implications for Parents, Services and Policy

According to the United Nations High Commission for Human Rights,[40] play is the right of every child. Therefore, it is the responsibility of researchers, parents, and policymakers to ensure that children are afforded ample opportunities for play in order to promote healthy social development. In order to achieve this goal, three important steps must be taken. First, research on the importance of play-based learning for children's social development should be disseminated. Researchers can create partnerships with schools and community centers; parents can discuss the importance of play with other parents and their children's schools; and policymakers can promote public awareness of the evidence about play-based learning by funding public awareness campaigns. Second, playtime in educational settings should be emphasized. Researchers can examine the best ways to incorporate play; parents can participate in groups, which contribute to school districts' decisions about how to structure the school environment; and policymakers can support legislation that promotes the integration of recess and other playful times into the school day. Lastly, sustainable community programs should be aimed at increasing access to play opportunities for children from lower-SES backgrounds. Researchers can develop culturally sensitive, evidence-based programs by partnering with community organizations; parents can help their children participate in available

programs; and policymakers can fund efforts to bring play to lower-SES communities.

In sum, play should have a central role in early childhood classrooms and in the lives of all children.[5] In order to achieve this goal, it is the responsibility of researchers, parents, and policymakers alike to “take it to the streets and the playgrounds!”[2]

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Cognitive Development in Play-Based Learning

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Introduction

The important role of play-based learning in fostering young children's cognitive development has been discussed by early theorists, educators, and researchers such as Plato (p. 24),[1] Froebel,[2] and Gesell;[3] later theorists and researchers such as Bruner,[4] Erikson,[5] Piaget,[6] and Vygotsky;[7] and more recent theorists and researchers such as Bodrova and Leong,[8] DeVries,[9] Fein,[10] and Singer & Singer.[11] However, in recent years, time for child active, play-based learning has been shortened in many preschool classrooms because, with increasing emphasis on academic skill readiness, play's importance has been minimized by some educators, curriculum designers, policy makers, and by the general public. The thesis of this discussion is that play-based learning provides an excellent environment for fostering young children's cognitive development, especially for those thinking skills essential for cognitive depth. Because the research evidence is mixed on play's role in fostering such development, robust longitudinal studies are needed to investigate the extent and long term cognitive effects of early play-based learning.

Subject

The role of play as a learning medium[12] has been advocated by many early childhood professionals ever since preschool programs were begun in the early 20th century. However, there always has been debate about the role that play-based learning has in fostering young children's cognitive development, especially in specific areas such as reading or mathematics learning.

Problems

Although the present-day emphasis on the importance of early education is laudable, and increased funding for preschool programs that permit many more children to attend is a positive step, recent advocates for preschool have not always been grounded in early childhood education theory and practice and thus have viewed "learning" as a teacher-directed, highly structured,

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and difficult activity that needs to be imposed on young children. This view is especially problematic in discussions of how play can foster cognitive development because play usually involves child-initiated types of learning that are not easily quantified and, thus, adults are often unclear about how to provide such opportunities and evaluate the learning that occurs during extended and rich play experiences.

Research Context

The ways that the relationship between play and cognitive development have been studied have varied, including observational studies, experimental studies, and self-report types of data collection. However, most studies of play, including those related to potential play/cognition experiences, have been minimally funded, and therefore most are small scale, short-term, and they usually have not been replicated. Thus, the research on play-based learning has not been especially robust and much has shown mixed results, depending on the many differing variables in the studies and the issues faced by researchers.[13]

Key Research Questions

Because of the need to justify children's playtime in preschool programs, researchers have attempted to study potential effects of pretense, games, and constructive play on specific types of learning, such as language growth, reading, and mathematics, as well as on other cognitive skills such as executive functioning, creativity, social/moral development, and theory of mind (i.e., the ability to understand one's own mental states and to realize that other people also have such mental states that may be similar to or different from one's own). Numerous researchers have investigated aspects of these questions and reported various types of cognitive growth related to playful ways of learning.[14]

Recent Research Results

In relation to academic types of skills, good examples of the role of play in literacy learning have been described.[15] These studies have found many positive learning results for children's playful engagement with literacy materials. Kami[16] has demonstrated that various types of mathematical knowledge, such as numeracy, classification, and spatial/temporal relationship understanding can be fostered by children's playful interaction with materials and games that foster such knowledge. Also, Griffin, Case, and Siegler[17] have connected playful mathematics activity to increase development of the "central conceptual structures" of thought. Other researchers have

reported on theory of mind enhancement through play[18,19] and found a relationship between pretense abilities and theory of mind skills, although whether young children see pretense as involving mental action is not clear.[20] Wyver and Spence[21] who studied problem solving in play, noted that there was a reciprocal rather than a unidirectional relationship between cooperative play and problem solving. In a recent review of studies of pretense, Lillard and colleagues[22] have reported that the evidence showed some effects of play on language skills but inconsistent results on reasoning, creativity, and various academic skills. Although these studies were all labelled "play," many were adult controlled activities rather than child-controlled play. Also, most play studies are short term so results related to long term cognitive gains are often unclear or absent.

Longitudinal research has shown some relationships. For example, Wolfgang and colleagues[23] reported that preschoolers who engaged in complex block play showed long term gains in mathematical cognition, and Bergen and Mauer[24] reported that preschoolers with high levels of play with literacy materials were more likely to be spontaneous readers of signs and have greater pretend language in a "town-building activity" at age 5. In a self-report study of college age subjects' memories of childhood play, Davis and Bergen[25] found that high levels of reported pretense and game play at early ages were significantly related to higher levels of adult moral reasoning. Interestingly, Root-Bernstein and Root-Bernstein[26] have noted that McArthur "genius" grant recipients often reported a high level of "small worlds" pretend play during childhood.

Research Gaps

There are many gaps in investigations of play-based learning due to at least four reasons. First, both educators and researchers vary in their definitions of play-based learning so the play experiences may differ in length of time, amount of adult direction/interference, materials available, and methods of data collection. Thus, what one educator/researcher calls play-based learning may differ greatly from that of another. Often curricula called play-based are still highly teacher directed and time available for child self-directed play is not extensive. Second, many studies of play-based learning focus only on academic skill learning rather than on play's role in fostering other types of cognitive growth. Third, most studies are short term and they should be longitudinal in nature (at least over the course of a preschool year) to measure cognitive change. However, in longitudinal studies, there also are factors of general growth that may affect cognitive growth. Fourth, because preschool programs serve children with diverse home play experiences, different play themes, varied skills, and a range of economic backgrounds, these

differences also may affect the results of play-based studies of cognitive growth. Nevertheless, because the theoretical and experiential bases that suggest the importance of play-based learning are so strong, greater funding and attention to research on this issue should be a priority.

Conclusion

The interest in and support for play-based learning in preschool has varied over the past 75-100 years and it is promising that there is presently support and interest in supporting children's play. Young children's play is valuable for strengthening many developmental areas, not only those related to specific academic skills, and thus, the study of play-based learning should include a wide focus that is theoretically-based and scientifically rigorous. It should include study of children's self-directed play as well as of play experiences directed by adults, and longitudinal studies are needed.

Implications for Parents, Services, and Policy

Decisions by all relevant groups related to services and policies should be built upon a deep understanding of play and its crucial role in the lives of young children. Parents should be especially vigilant about monitoring the amount of playtime their young children spend with technology-augmented devices and make sure their children's play includes both traditional play materials and outdoor time. While play-based learning is an important aspect of preschool classrooms, it should be valued not only for learning academic skills but also for supporting children's learning of self-regulation, emotional control, executive functioning, social understanding, creativity, and other cognitive skills, as well as being valued just for the joy play brings to children.

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How Guided Play Promotes Early Childhood Learning

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Introduction

Parents, teachers, educators, and policy makers are all invested in children's learning. Members of all of these groups wrestle with the important question of what pedagogical approach is best to support learning, both in general and for particular domains such as math, reading, and critical thinking. Although direct instruction can be effective for early childhood learning, recent research suggests that more discovery-based methods may be even more effective. Given the widespread agreement in the research and education literatures that play is one of the most natural pathways to discovery and learning in early childhood,[1] a play-based pedagogy may be a particularly powerful mechanism for learning. While it is not yet known exactly how playful experiences can support learning of new content or skills, recent research suggests that guided play (a form of child-directed play with adult support) may be one approach that leverages the enjoyment experienced during free play while concurrently affording opportunities for learning content and skills.

Subject

Play improves young children's health and well-being and also provides them with opportunities to explore social roles and to develop cooperative and self-regulatory skills.[2,3] Ongoing research explores the role of play in more traditional forms of learning (e.g., mathematics, reading, critical thinking), and it is becoming clear that guided play can be an effective teaching strategy.

Problems

While there is widespread agreement that play is good for children's development in general, the research base is less secure about the role of play in children's learning specifically. As noted in a recent review,[4] many have concluded that play provides great learning benefits, but current

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science has not yet caught up with this claim, particularly when it comes to boosting particular skills such as problem-solving and teaching content knowledge.

Research Context

It is undeniable that children find play enjoyable and derive some benefits from it. But when children are expected to achieve a particular learning objective, research suggests that it may also necessary to provide them with a more structured instructional environment in order to allow them to learn. Resolving the paradox between children's natural abilities to learn through play and the need to learn key content and skills involves realizing that there are different kinds of play, each of which can serve different goals.

Key Research Questions

What kinds of learning experiences (e.g., free play, guided play, direct instruction) best support young children's learning of content and skills? Additionally, how can we leverage what researchers find in studies to improve academic and personal outcomes for children in classrooms and homes?

Recent Research Results

When educators and parents talk about children's play, they are often referring to free play: unstructured time in which children are free to choose their actions with a range of objects or activities. This kind of play can confer some benefits, such as improving children's attention by allowing them to release excess energy. However, because it is so unstructured, free play may not be especially beneficial for children's learning of particular types of content knowledge.[5] In one study, for example, children were asked to learn about the criterial properties of shapes (e.g., triangles always have three sides and three angles). Children were able to learn this information when directly taught, using picture cards and bendable sticks as visual support, but not when they were simply given the cards and sticks to play with.[6] Thus, free play may not be optimal where there is a particular curricular goal in mind.

Fortunately, there is another kind of play that benefits children's content learning: guided play. This is a form of play in which the children's activities are scaffolded by a knowledgeable adult, allowing children's actions to lead them to the learning goal.[7-9] Adults can provide this scaffolding by structuring the environment in advance (e.g., providing certain kinds of toys, as in Montessori

education) or by sensitively responding to children's actions in a play session and offering open-ended suggestions (e.g., encouraging children to explore materials they haven't explored yet: "What do you think would happen if you…?").

One of the most crucial features of guided play is that children's actions within the play session must be freely chosen. This is the hallmark of play – that children themselves are in charge and can choose what to do at any given moment. Both free and guided play share this feature. However, guided play additionally includes an important role for adults. In guided play, adults should allow children to maintain the locus of control but should also provide subtle guidance that will allow them to explore the right aspects of the environment to reach the learning goal.

Studies show that guided play is indeed effective at allowing children to learn. Specifically, research has found that children who engaged in guided play activities were more likely to learn a target piece of information than children who engaged in free play --- and in some cases, more than children who were directly instructed. For example, an intervention to teach new vocabulary words through book-reading activities found little learning when children played freely with toys related to the new words. Providing children with some adult guidance in their play, however, significantly increased the number of new words that children learned.[10] Similarly, several studies have shown that children can learn about new causal structures when they explore freely within highly constrained environments.[11,12] In support of these studies, a meta-analysis found that learning in guided play environments was comparable to if not better than learning through direct instruction, both of which were superior to learning through the unstructured environments available in free play.[5]

Research Gaps

Just as all play is not created equal, all types of playful learning are likely not created equal when it comes to supporting different outcomes. For example, free play may be especially beneficial for building collaboration and communication in early childhood, but guided play may be increasingly important for learning content knowledge throughout early elementary or primary school. Much work remains to be done to determine which pedagogical approaches are best for different outcomes and at what ages and stages they are most beneficial. Future work should also focus on exactly what types of guidance are most helpful for different learning goals and for children of different backgrounds, since some target learning outcomes may benefit from more or less of an adult presence in the play situation.

Conclusions

Many educators and researchers take opposing perspectives on play, either believing that all play leads to learning or that play and learning are entirely separate processes. In an attempt to bridge this gap, recent research has begun to examine the ways in which different types of play can support different types of learning objectives. In particular, research has shown that guided play, a form of adult-supported play experience, can be particularly beneficial to children's learning. We believe that the secret to guided play's success is in its combination of adult support and child independence. Having an adult set up the situation and provide nudges along the way ensures that children's exploration is appropriately constrained. But allowing the autonomy to remain with the children keeps the situation fun and interesting to them, harnesses their natural proclivity to learn and explore, and allows their own interests to guide their actions, all of which leads to increased learning.

Implications for Parents, Services and Policy

All parents, educators, and policy makers want to ensure that today's children are tomorrow's successful adults. Often, this desire leads to tensions between children's desire to play and adults' desire to impart specific content knowledge (e.g., mathematics or reading) or capabilities (e.g., communication, creativity, or collaboration). Time in childhood is limited and expectations are high. This combination can lead to decisions that promote direct instruction (e.g., flashcards, repetitive lessons) over exploration and discovery. Research suggests that this tension may be misguided. Guided play, in which adults help structure a play activity but allow children to take the lead and direct the session, is not only more fun for the child but also may be particularly effective for learning. While research remains to be done to determine the best pedagogical approaches for teaching different types of knowledge and skills across development, research to date finds that having a more nuanced understanding of play that includes guided play may provide the outcomes that we are all looking for when it comes to children's learning. Finally, when studying this issue, it is crucial that researchers investigating how children learn collaborate with teachers and parents who are actually teaching children to develop evidence-based curricula and experiences that best support children's learning.

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Assessment in Play-Based Learning

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Introduction

Over the past two decades, a growing accountability climate in public education contexts has resulted in changes in curriculum and pedagogy at early primary and kindergarten levels. Specifically, we have witness increased academic standards coupled with a greater emphasis on assessment – as both a summative act and as an ongoing formative support for student learning.[1,2] Simultaneously, there have been calls in both research and educational policy to teach academic standards and developmental learning expectations through play.[3-7] Play-based learning involves a variety of activities that enable children to learn in increasingly imaginative and independent ways. Described on a continuum, play-pedagogies range from teacher-directed playful learning (i.e., learning through games) to collaboratively designed play to child-directed free play.[8]

Problem

While research has demonstrated that play can support both social and personal developmental outcomes as well as academic outcomes in kindergarten, for many teachers, the integration of assessment within play-based learning contexts remains a challenge, both conceptually and practically.[9-11] Research has shown that teachers struggle to negotiate perceived competing priorities related to accountability mandates, which include increased uses of assessment for monitoring and reporting on student learning in relation to standards-based curriculum expectations, and play-based pedagogical mandates.

Research Context

The vast majority of research in recent years on assessment and learning has examined large-scale, regional assessments and assessment in the upper years.[2,12] Assessment in early years education has historically focused on constructing standardized tests to measure developmental readiness, and only recently has provided an initial conceptual basis for understanding K-2

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classroom assessment practices,[13,14] including assessment in play-based pedagogical environments. These conceptual underpinnings argue for the continuous use of assessments throughout the learning process to not only monitor and communicate student achievement but also promote student learning of academic standards as well as social and personal developmental expectations. As play pedagogies begin to occupy a more dominant role within classrooms, as the primary mode of instruction for achieving curriculum expectations, there is an increased need for research on the intersection of assessment within play-based kindergarten education.

Key Research Questions

When looking across the research base on kindergarten classroom assessment, a primary focus has been on understanding the tools and strategies teachers use to assess student learning, and on the teachers' uses of assessment information. However, when we narrow our view to examine strictly assessment within play-based kindergarten contexts, the focus of research changes towards questions of how teachers negotiate play pedagogies alongside traditional direct instruction of academic expectations, and how assessment operates within this negotiated space. Hence the following research questions have been driving research in kindergarten assessment:

a. What tools and strategies do kindergarten teachers use to assess students' developmental and academic learning?
b. How do kindergarten teachers integrate assessment into their classroom planning and use assessment information?
c. How does assessment operate within play-driven pedagogical kindergarten contexts with high academic expectations as well as social and personal developmental expectations?

Recent Research Results

Emerging research is surfacing on classroom assessment practices that can be used to support formative and summative functions within early learning context.[15-18] Summative assessments are those that contribute towards a student's final grade and serve to evaluate student learning at the end of a learning period. Formative assessments, on the other hand, occur during the teaching and learning period, and do not translate into a grade. A general contemporary framework for assessment involves three primary purposes: (a) assessment for learning, which focuses on using assessment throughout the learning process to actively engage students in

monitoring their learning towards goals through self-, peer- and teacher-based feedback,[19] (b) assessment as learning, which explicitly addresses metacognitive and self-regulatory development through practiced assessment strategies,[20] and (c) assessment of learning, which involves measuring students learning for grading and reporting. This framework importantly addresses metacognition and self-regulation, both of which are key developmental learning goals for fostering independence in kindergarten and primary level students.[16,18,21] In addition, this framework address both accountability requirements – through a continued emphasis on summative assessments (i.e., assessment of learning) – as well as socio-developmental theories of learning that recognize the role of classroom context, social interactions, and developmental learning continua as foundational to student learning through formative assessment functions (i.e., assessment for learning.)[22]

Specifically, with respect to Kindergarten education, Gullo and Hughes[9] have identified three core principles for assessment. These principles are intended to serve as a practical guide for teachers who aim to balance developmental and academic assessment approaches. The principles include: (a) assessment should be a continuous process within kindergarten classrooms and integrated into teaching and learning periods; (b) assessment should utilize multiple formats including observations of learning, conversations, and testing (among others) to appropriate and adequately assess diverse learners, and (c) assessment should focus on both academic standards and developmental targets.

Few studies have explicitly looked at how these principles of assessment operate directly within play-based learning. In a recent study of 77 teachers, Pyle and DeLuca[23] interviewed and observed kindergarten teachers to examine their use of assessment during periods of play-based learning. Findings from this study suggest that traditional assessment strategies including direct observation and withdrawal methods of testing in which teachers remove students from play to engage in assessment activities are most common, even during play-based learning periods. While teachers are increasing using video recordings to monitor student learning during periods of play and displaying products of play via documentation walls and portfolios, these practices are not as common. Several digital applications are used to document student learning during play; however, as teachers recognized, the analysis and synthesis of the large amounts of data collected from these applications can be time consuming and required specific assessment literacy skills and knowledge. Finally, teachers in Pyle and DeLuca's[23] study reported that assessment was a fundamental challenge for play-based learning; requiring greater professional

development and resources to support this aspect of their practice.

Research Gaps

While research has developed frameworks for assessment in early learning contexts with coupled classroom practices, the recent emphasis on play-based pedagogy calls for additional scholarship in both assessment theory and practice. Specifically, little is known about how assessment operates to support and monitor early learning within contexts of play-based schooling. Considering the role and form of assessment becomes increasing complex when play is considered as a multi-dimensional practice ranging from high levels of teacher support to high levels of student autonomy, future research is needed that attends to the various ways assessment occurs, and for multiple purposes, within diverse contexts of play-based learning.

Conclusions

Assessment is a key feature of classroom teaching and learning within the current accountability framework of public education. At kindergarten and early primary levels, teachers are increasingly required to assess both students' learning of academic standards as well as longstanding social and personal developmental learning targets. In contexts in which play is the dominant pedagogical mandate, integrating assessments to monitor and support student learning is a challenge. At present, teachers tend to rely on traditional modes of assessment – observation and withdrawal from play – in order to determine student learning. To date, research has provided strong frameworks for assessment in early learning context (e.g., assessment for, of, and as learning); however, additional scholarship is need that pairs these frameworks with play-based pedagogical contexts. Specifically, additional research is needed that looks at how various assessment practices operate within diverse conditions of play-based teaching and learning.

Implications for Parents, Services and Policy

As students are required to engage in increased academic learning through play there is a growing need to measure and support this learning using varied assessment strategies in the classroom. While research on assessment during periods of play-based learning is burgeoning, there is more substantive research on how to use assessment to support learners' development within Kindergarten and early primary contexts. Moving forward, parents and policy makers should be aware of the limitations of existing research in the area of assessment and play in the

classroom but optimistic that scholarship is currently addressing this limitation. Perhaps most important for parents and policymakers is to recognize that academic as well as social and personal developmental learning can occur through a variety of pedagogical strategies in the classroom, including play, and that various kinds of play will promote different aspects of children's development. The key now is to meaningfully and seamlessly integrate assessment into play-based learning in ways that augment and support this learning rather than detract from it.

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Playing to Learn Mathematics

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Introduction

From the preschool years onward, children with low initial levels of mathematics skills continue to fall further behind their peers.[1] To ensure academic success for all children, these widening gaps must be addressed early. In order to help close content-area gaps, we must leverage the way children learn most successfully to lead to better outcomes.

Subject

Given the importance of early mathematics development for later success, it is crucial to have pedagogical tools that support mathematics learning from the earliest ages. Playful learning—a broad pedagogical approach encompassing free play, guided play, and games— uniquely supports early learning in mathematics by providing an evidence-based method that effectively supports learning in mathematics (among other areas).[2,3]

Problems

Early mathematics competency is a strong predictor of later achievement and success.[4] Yet, across the globe, science, technology, engineering, and mathematics (STEM) skills are rarely introduced adequately in early childhood. Children from lower-income communities experience even lower exposure to STEM related activities than do their middle-income peers—a fact that might account for the gaps in mathematics and spatial competencies present even in early childhood.[1]

Research Context

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Hirsh-Pasek, Zosh, and colleagues[5] recently reviewed the literature from the science of learning—including studies from neuroscience, education, psychology, and cognitive science, —and proposed four pillars of learning that describe the ways in which humans learn best. Learning is optimized when children are 1) mentally active in discovering new knowledge; 2) engaged (not distracted); 3) interacting with material in ways that are meaningful; and 4) socially interactive. Importantly, these four characteristics come together in playful learning.

Playful learning includes both free and guided play as well as games. Free play is child-initiated and child-directed,[6] as when children manipulate objects, engage in social interactions with peers or adults, and narrate activities. Even without prompting, many children incorporate mathematics into their independent free play. Seo and Ginsberg,[7] for example, reviewed videotapes of 90 four- and five-year-old children as they played for fifteen-minutes to determine the types of mathematics that occurred organically in everyday play. Six categories of mathematical content emerged: classification (grouping or sorting by attribute), magnitude (comparing the size of objects, such as a tower built of blocks), enumeration (saying number words, counting, subtilizing, or reading/writing numerals), dynamics (putting things together or taking things apart), patterns and shape (for example, making a necklace out of beads with a pattern), and spatial location (describing a direction or location). The range of mathematics that was generated in this study was impressive, as was the frequency with which children spontaneously engaged in mathematics activities. Fully 88% of children participated in at least one mathematics activity during the 15 minutes.

Guided play maintains the exploratory nature of free play while also incorporating developmentally appropriate adult scaffolding[2]—a temporary instructional interaction that supports children’s mastery of a specific learning goal.[8] Guided play is, at its core, child-directed. Adults help constrain the discovery of the learning goal by 1) arranging the environment and 2) scaffolding and steering a child to attend to aspects of the environment relevant to the learning goal. For example, a classroom that features a block corner affords children opportunities to learn about spatial rotation. An adult who asks “What happened when you built an even taller tower?” helps the child choose from those alternatives that will favor height as opposed to something like trying to build the longest bridge.

Finally, games that weave content into the course of the play are another playful learning approach. Games offer the potential to increase intrinsic motivation to learn, as well as academic content if that content is integral to the game play, such as the Great Race board game with

embedded early mathematics learning.[9]

Key Research Questions

How can parents, teachers, and caregivers leverage the science of how children learn to create a strong foundation of mathematics knowledge through playful learning?

Recent Research Results

Several successful early childhood mathematics interventions employ elements of playful learning to boost children's mathematics knowledge. Current work finds that guided, rather than free play, is central to this mission.

The Building Blocks PreK curriculum[10] employs games and other play activities to engage children in mathematics learning counting and basic mathematics operations. In one lesson, a teacher and children set up their dramatic play center as a store with a selection of dinosaur toys.[11] The students play shopkeeper and collect money (cards with different numbers of dots to represent dollars) in exchange for the dinosaurs. By counting the number of toys to match the dots on the cards, children practice their counting skills and simple arithmetic while engaging in a pretend play scenario. Research demonstrates that children from disadvantaged backgrounds receiving the Building Blocks curriculum improved their early mathematics knowledge more than children in a comparison group using their regular mathematics curriculum.[10]

With similarly aged children, Ramani and Siegler found that playing a linear number board game—Great Race Game— with an adult for four 15- to 20-minute sessions within a 2-week period increased low-income children's knowledge in numerical magnitude comparison, number line estimation, counting, and numeral identification. The gains remained even 9 weeks later. By infusing the game with key number sense concepts, the game's playful and engaging elements helped the children increase their mathematical knowledge more than those children who played a similar game without integrated mathematics content. But, materials must be carefully designed and not just any design will do. Laski and Siegler[12] demonstrate that a circular board game that does not emphasize the linearity of number is not effective for extending mathematical learning.

Finally, in spatial learning (an area closely connected to mathematics), Fisher and colleagues[13] found that guided play promoted children's learning about the features of geometric shapes

better than didactic instruction or free play. Guided play led to the greatest amount of transfer of shape knowledge to atypical shapes.

Research Gaps

During playful learning, children are given a lead role. Adults who have a learning goal in mind constrain the learning space so that the children's focus lands on the relevant aspects of the material before them. In other words, adults set the mise en place: a term borrowed from the culinary arts, which describes laying out the necessary high quality ingredients before the cooking even starts.[14] Children can then generate hypotheses about an end goal within such a constrained space.[15] Further research is needed to determine why guided play is so effective and whether it works for different age groups and children with individual learning differences.

Conclusions

Early childhood learning experiences can have a powerful impact on children's later life outcomes.[16] Yet, adding more time for drill and testing has not proven an effective strategy as reflected by both paltry international testing scores for many countries as well as achievement gaps between different demographic groups within the United States. While there is no question that even preschool children profit from a strong curriculum in math, literacy, and science,[17] better outcomes are likely if this curriculum is delivered with an age-appropriate playful pedagogy.[18] The playful learning approach offers the opportunity to deliver rich mathematics learning through child-directed, adult-supported play activities.[6,19] Research from the science of learning indicates that when learners are active, engaged, meaningful, and socially interactive, learning can soar. The challenge then becomes how best to implement this in classrooms and in homes so that all children reach their mathematics potential. By fostering STEM acumen from an early age, societies can increase the likelihood that they will be able to fill the ever-expanding pool of STEM jobs.

Implications for Parents, Services and Policy

Playful mathematics learning is not a novel concept in many of today's homes, classrooms, and communities, making this approach readily implementable. Children already play with blocks, create pretend play scenarios, and interact with digital apps on a regular, if not daily, basis. By designing these experiences with specific learning goals, child's play may be transformed into playful learning. Through the application of principles culled from rigorous empirical research in

the science of learning, playful learning (i.e., free play, guided play, and games) presents an evidence-based method for sharing mathematical content with young children. By starting early, caregivers and educators can help instill a love of mathematics that may lead children not only to mathematics achievement today but also towards a STEM career tomorrow. Research repeatedly finds that play is more than just fun; it is a valuable educational tool. In particular, adult-supported guided play and games help children learn mathematical concepts in a way that "sticks" and transfers to new problems.

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Digital Play

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Introduction

Young children growing up in the 21st century are known to be active users of technologies. Technology use by young children has introduced a new concept into early childhood education and care - that of digital play.

Subject

The concept of digital play is related to the emergence of the digital age as a cultural context for young children's growth and development in the 21st century. Technically, the digital age commenced with the invention of the transistor in 1956.[1] The transistor enabled innovations in micro-processing. Micro-processors are the small chips that process and store information in digital form. Micro-processors are employed in many different technologies including those commonly accessed by young children (e.g., mobile devices and internet-enabled toys). Researchers now consider the use of such technologies by young children as 'domesticated'.[2] The domestication of technologies provides new opportunities for children's play. These opportunities facilitate children's interactions with digital technologies in a way that was not possible in previous generations prior to the digitization of information via micro-processing.

Problems

The available literature on digital play expresses a common problem. That is how should digital play be defined for the digital age when definitions of play from the preceding industrial age have not yet been agreed upon? Multiple theories and perspectives (e.g., romantic, psychoanalytic, constructivist and socio-cultural) on play have been generated for many years.[3] These viewpoints have engendered specific debate regarding the exact nature and purpose of play. For example, why do children play? What is the relationship between play and learning? Is play universal or a culturally defined activity? Research in early childhood education typically defines play as a contested concept, and therefore in well-designed studies a stated theoretical

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perspective on play is usually provided.[4] Accordingly, play is frequently understood as open to interpretation. This openness now extends to a new body of work seeking to develop the concept of digital play.

Research

Early research into young children's technology use did not focus on the concept of digital play. Instead, research considered the influence of technology use on children's learning and developmental outcomes.[5] This research reached a peak in the 1990s and early 2000s as desktop and laptop computing became mainstream. The research was characterized by two main positions. Some researchers believed that technologies were inappropriate for young children because they displaced children's engagement with hands-on activities and real world experiences.[6] Others argued that technologies, such as robotics and the use of open-ended software facilitated young children's cognitive development and problem solving capacities.[7,8] This debate continued for some time, fading in emphasis following the advent of mobile internet-enabled touchscreen technologies (mostly notably the iPad in 2010).

These technologies released users from a reliance on the mouse and keyboard as input devices and proved particularly user friendly for very young children.[9] Stephen and Edwards[10] describe the influence of Alan Kay[11] in predicting a Dynamic Book as a learning resource for young children based on his reading of key early childhood thinkers, including Montessori, Piaget, Bruner and Vygotsky as a fore-runner to the range of touchscreen technologies enjoyed by children today. Technological mobility also informed new social and communication practices such that children were typically surrounded by adult users of technologies, and themselves had ready access to technological devices at any time or place for play.[12,13] Technology use, and therefore opportunities for digital play were no longer restricted to the home or early learning setting.[14,15] International research showed a rapid increase in the number of children aged birth to eight years using technologies on a daily basis.[16,17,18] This include a noted increase in young children's access to, and use of, online digital media.[19] With more and more children using technologies in their daily lives, scholarly papers and research in the field of early childhood education and care began to focus on the concept of digital play.[20]

Current research in early childhood education and care conceptualizes digital play in two main ways. The first of these attends to the theorization of digital play. Much of this work adopts variations of existing play scholarship and applies these to observations of children's play with

technologies. Some of the earliest thinking was that of Johnson and Christie[21] who described digital play as a social and open-ended activity with technologies. Verenkina and Kervin[22] were amongst the first to define digital play with touchscreen technologies as a self-initiated and self-regulated activity using apps. Fleer[23] defined digital play as the application of Vygotsky's ideas regarding imagination to young children's engagements with technologies. Bird and Edwards[24] created a Digital Play Framework integrating Corrine Hutt's thinking regarding epistemic and ludic play with the Vygotskian idea of tool mediation. Marsh, Plowman, Yamada-Rice, Bishop and Scott[25] generated a typology of play following the thinking of Bob Hughes, while Arnott[26] developed a Digital Play System based on the ecological thinking of Bronfenbrenner.

The second direction in digital play research focuses on understanding the relationship between children's traditional play activities and their engagement with digital technologies. This research highlights the impossibility of separating children's traditional play from their engagement with technologies in the digital age. Marsh[27] commenced the discussion by noting a continuum of digital to non-digital play activities engaged by children. Plowman, McPake and Stephen[28] noted a blurring boundary between digital and traditional play activities by young children. O'Mara and Laidlaw[29] illustrated how digital and traditional role play was seamlessly enacted by children using analogue dolls and an iPad. Edwards[30] proposed the notion of web-mapping as means of understanding the integrative nature of traditional, technological and digital media activities for very young children. Other researchers highlight new forms of play activity by young children in which the direction of play from a technological to traditional direction and vice-versa can no longer be identified.[31]

Key Research Questions

A significant problem for the early childhood education and care sector is how parents, services and policy are likely to understand the concept of digital play in the digital age. This is an issue because play is frequently promoted to parents as beneficial for children's learning. It is also typically used as a basis for curriculum provision in early childhood education and care settings internationally. However concerns regarding the displacement of physical activity, social interactions and sleep with digital activities means that adults are not always clear on how best to manage and provide for young children's digital play.[32,33] How, where and why young children participate in digital play is therefore raising new research questions. For example:

1. To what extent does digital play build young children's early science, technology, engineering, and mathematics (STEM) concepts and capabilities?
2. How should parents and educators balance digital play with young children's requirement for active, outdoor physical activity?
3. What does digital play look like in an early childhood education and care setting?
4. Does digital play differ across social, gendered, cultural and economic contexts according to young children's access to technologies?

Research Gaps

Digital play means that young children are active users of technologies and digital media content. The range of digital play activities afforded to young children growing up in the digital age also involves their online participation. Many toys are now internet-enabled and collect data about children's play and private lives.[34] Toddlers and preschoolers independently access online content through video-sharing channels.[35] The Internet of Things also extends to internet-enabled toys for children's play.[36] These activities can expose children to online risks broadly defined as content, conduct and contact based.[37] Increasingly, there are calls for digital citizenship education to commence in early childhood (e.g., Children's Commissioner for England;[38] NAEYC and the Fred Rogers Centre for Early Learning and Children's Media[39]). Digital citizenship education itself is a conflated concept involving variations of cyber-safety, information literacy, cyber-bullying, online security and management of digital reputation. Significant research gaps exist in identifying what very young children understand about digital play, technologies and the internet as the foundational knowledge base for their digital citizenship education (e.g., Edwards et al;[40]; Heider[41]). Further research is required to establish how young children's digital play can be facilitated in early learning settings to build their knowledge of technologies and the internet for effective digital citizenship.

Conclusion

Digital play is a new concept in early childhood education and care related to the emergence of the digital age. Young children today are growing up in a new cultural context in which the evolution of technologies (beginning with the invention of the transistor) has created new opportunities for play. Research is currently directed towards theorizing digital play and understanding the convergence of traditional play with technological activity as a form of digital

play. These new understandings of play are required by the sector as parents, services and policy-makers increasingly engage with young children growing up with technologies as domesticated aspect of their lives.

Implications for Parents, Services and Policy

Digital play is not going to go away. Parents, services and policy cannot ignore that digital play is a facet of the digital age in which young children are growing up. Thinking about digital play has several implications for parents, service and policy. These are:

1. Promoting digital play as an opportunity for building concepts and skills about STEM
2. Building young children's capacity to moderate digital play with opportunities for active, physical outdoor activity
3. Fostering understandings of what digital play looks like in early childhood education settings
4. Ensuring young children have equal and equitable opportunities to participate in digital play
5. Developing age appropriate digital citizenship education for young children

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Moving Beyond False Dichotomies in the Play-Based Learning Domain: Overall Commentary

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Introduction

It is heartening to see an increase in the amount of research in pursuit of understanding how best to foster young children's social, emotional and cognitive development through play-based learning. That said, the field is replete with varying definitions or purposes regarding play-based learning as there is with the myriad of differing notions of other related and touted benefits of "early learning". Moving coherently, reliably and validly from evidence to improving pedagogy, early learning environmental design and policy remains difficult because of the lack of evidentiary consensus.

Topic editor, Angela Pyle and her co-author Erica Danniels[1] provide an excellent framing of the challenges, noting for example, two differing current research approaches. On the one hand, there are those who focus on the developmental outcomes of play-based learning such self-regulation and the concomitant "free play"-a kind of "do your own thing" for the children-- and a passive role for educators. Contrasting efforts are informed by the pressures of ensuring that children succeed academically with a focus on more educator-directed activities. Dr. Pyle implies that both developmental and academic outcomes can and should be achieved through play-based learning. She provides promising direction through her own work[2,3] that points the way to achieving an integrated and effective balance between the extremes of a totally child-driven approach and totally educator-driven approach, which is largely absent. I agree.

Research and Conclusions: Towards Finding Comfort in the Gray Zone

The contributors provide a useful contribution to the field when it comes to definitions and purposes of play, and collectively illustrate the differences noted by Pyle. Context is important and given that most of the contributors are U.S-based, they note the diminishing amount of time allocated to various forms of play-based learning opportunities due to increasing pressure for achievement gains. While in Canada, most pre-school education is informed largely by one form

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or another of play-based learning. The international inconsistencies in the implementation of play-based learning as a pedagogical tool, result in further challenges to the research addressing play-based learning.

Daubert. Ramani, and Rubin[4] provide the most child-driven notion of play emphasizing its role in social and emotional development, reinforcing the "no rules" intrinsic open-ended play eschewing "governing rules". Although, their notion that "play is just pretend" is confusing given that most advocates of emergent learning and open-ended play would emphasis that a good deal of play-based learning involves the natural curiosity and interests within a child that informs a natural interest in trying to "solve a problem" in the natural environment or in a pre-school setting with various play areas.[5]

Regarding play-based learning that is intended to build on "pretending", Berk's[6] work on the role of make-believe play and its impact on social and emotional outcomes-in particular, self-regulation-- provides a good example of play governed by teacher-developed ground rules. Improvisational opportunities for children to pretend and transform certain objects for differential use has shown some promise. While this work is a bit closer to the teacher-directed end of the continuum, it certainly hovers closer to the balance that Pyle's challenge poses.

Bergen[7] notes that justifying play-based learning in a pressure to achieve environment has led to more research and what she calls "constructive" play and effects on language, reading and math. Naturally, it is easy to infer that play without these more academic outcomes in mind, is not "constructive" regarding a child's developmental trajectory. Notwithstanding what she really means by "constructive" play, Bergen clearly understands the need to pursue research and pedagogy that aims to achieve that balance of creating an environment that impacts on a child's social, emotional and cognitive development. She rightly points to the need for more research that measures things such as self-regulation and the "literacies" and pedagogical practices that find that gray zone of balance between totally child-driven and teacher-directed approaches. Hassinger-Das, Zosh, Hirsh-Pasek, and Golinkoff[8] also speak to how a play-based approach within a "guided-environment" can impact on the development of math concepts.

Weisberg and Zosh[9] portray the balance that is very promising. They note clearly the critically important role of the educator as the environmental designer and guide. Ensuring that children have access to settings (including the great outdoors) that are rich with possibilities for them to apply their natural curiosity to solve problems, to learn from things that don't "work" as they

play, is absolutely key. As well, far from just letting things happen, these colleagues understand the essence of "guided play"-guided by the intersection of the environment with what is already "within" the child, and guided by the adults in their midst who are present and gentle as they ask a question or two of the child. "What would happen it.…?" "Wow, that is so interesting, can you tell me about it?" The authors describe the balance simply: "Having an adult set up the situation and providing nudges along the way.…and keeping the autonomy with the children."

Edwards[10] challenges early learning educators and researchers regarding the appropriate use of digital play. Reinforcing the ubiquitous usage of digital devices, obvious caution about how best to incorporate the use of digital technology into play-based learning and how to adjust its already pervasive use, requires thoughtful research to fill the current void. Given the rise of commercial purveyors focusing on the early years "market", an evidence-based response regarding the potential deleterious effects on young children, is essential.

Finally, DeLuca[11] calls attention to the important challenges of assessment in early learning environments. His main focus, rightly so, is on the challenges to measure the developmental progress of each child and the need to develop approaches that can easily be integrated into an educator's already challenging schedule. There are promising new approaches to documentation, some of them digitally-based, that are both user friendly and actually involve the child's significant others to share in co-constructing stores that portray developmental progress. Key to assessment, is agreeing on appropriate measures for chosen outcomes such as social-emotional, speech and language, and cognitive thinking skills. Much more research and implementation design work is necessary. It is also important that "assessment" is seen in a much broader context, including formative research and evaluation work that seeks to answer other questions about early learning environments.

Development and Policy Implications: Concluding with a Story

Pyle's important contribution asserts that we need to ensure pedagogical balance between a child's natural curiosity with an environment that provides intentional guidance to nurture and support progress regarding key developmental outcomes. Avoiding open-ended "do your own thing" at one extreme and a top down teacher-directed approach at the other, is key. Pyle has it right but getting there has some very difficult challenges.

First, a story.

Once upon a time, a professor at the University of Toronto was visiting a pre-school program in the Toronto area. He loves to visit these programs and is pleased with the progress being made in Ontario when it comes to universal play-based learning for four and five year olds. Implementing a consistent approach to its implementation has been improving over the seven years of the program. This one day, during a three-hour period of simply watching the kids at play, the professor---we'll call him Charles---fixated on a four-year old girl who was at a water station. She started pouring water from a medium size plastic container into a small cup and instantly watched as the water over-flowed from the smaller container. An early child educator observed nearby as the child tried again, pouring more slowly and filling up the smaller cup with more accuracy. The educator quietly asked, "so what's going on?" to which the child responded, "the water in this one was too much for this one?" The professor's notes?: "Piaget's conservation of matter law? Archimedes buoyancy principle? Successive approximation skills? Easy to imagine her thirty years from now as a post-doc in bio-chemistry."

The contributions of these scholars are very important to the ongoing need to better understand and prove the social, emotional, cognitive, and economic benefits of high quality play-based early learning opportunities. Further developing clarity about the full range of outcomes and research designs informed by reliable and valid measures need to be put to the test. Importantly, the biggest challenge is to move from research that reinforces the promises of the gray zone balance to predictable and consistent pedagogy that balances the extremes, with the knowledge that do your own thing or teacher-directed behaviour is a good deal easier to arrange than the "nudging guidance" required half-way between. Research and policy that can demonstrate the ever-evolving role of the educator in a learning environment that provides opportunities for play opportunities that balance child-centered and adult-directed play, and where the provision of these opportunities is guided by the learning goals, can provide a promising framework for play-based programming that addresses children's learning in a comprehensive manner. After seven years of implementation, with emphasis on the balance that Pyle notes, our Ontario case study provides a modicum of promise in this regard with increasing pedagogical consistency along with encouraging research results.[12]

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Negotiating a Holistic View of Play-Based Learning: A Commentary

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Introduction

Play is often thought of as the primary occupation of children and its potential for learning and development has been explored in research for decades. The concept of play-based learning has reinvigorated this interest in play, by placing play in the centre of children's learning. Despite the potential presented by play-based learning, this pedagogy is challenging to implement given its broad definitions and differential implementation in children's lives and their learning settings. The eight papers in this chapter present these diverse and important views on play-based learning and its role in children's development. Taken together they demonstrate the varying possibilities of play-based learning and when implemented in concert, the varying recommendations of these contributions present a promising learning context for children.

However, the challenge researchers and educators continue to face in the implementation of this promising pedagogy is the divisiveness of the research recommendations that are based on projects focused on small components, ignoring the benefits and challenges of other conceptions and understandings of play. Amongst the pieces published in this chapter, there is agreement that play-based learning provides more developmentally appropriate learning opportunities than adult-directed instruction. However, the differing foci of these pieces results in conflicting information that mirrors those in the extant research. As such, we must consider the connections between the recommendations in these contributions, rather than their contradictions.

Research and Conclusions

Research currently paints opposing pictures of practice. There is ample research that addresses the role of play in generalized child development, including social, emotional, physical, and cognitive development. This body of research typically recommends child-directed sociodramatic play as essential to this development. This type of recommendation is reflected in the contribution by Berk who describes the importance of children's imaginary play to support the

development of children's self-regulation. A position that is well supported by research.[1] Daubert et al. further explicate the importance of this type of play through their passionate plea for the inclusion of play in children's lives in the face of American educational policies that are removing play to make time for more rigorous academic learning.[2] Their position concerning the role of sociodramatic play in the development of social skills is important and I certainly support the inclusion of child-directed sociodramatic play in settings that are responsible for the care and education of our children. Their plea resonates. However, their description of play as a child-directed practice that is "just pretend" oversimplifies the complex nature of play and minimizes the learning potential of this multifaceted activity. Research that embraces broader conceptions of play-based learning acknowledges the many types of play that children can learn from when this pedagogy is embraced, not simply sociodramatic play.[3] Further, the learning goals in the early years are not strictly developmental in nature. Academic learning is now at the forefront of many early years programs globally and play-based learning has the potential to support these skills in a developmentally appropriate manner.

Hassinger-Das et al. address this academic side of play-based learning in their description of the role of play in mathematical development.[4] They do not define play as strictly child-directed and imaginative, instead they describe the playing of purposefully created games and the role of the educator in extending the academic learning potential through guided play. This recommendation for the inclusion of guided play in educational settings is clearly articulated by Weisberg et al., whose piece explicitly describes the need for a balance between child-directed and adult-directed learning opportunities, with play that is facilitated by thoughtful and knowledgeable adults as a prime example of this balance.[5] The existing research about guided play frames this type of play as ideal for children's academic learning, as it blends the developmentally appropriate practice of play with the academic learning that is prescribed by the outcomes-based curricula that are common place in North American schools.[6] This inclusion of academics in the early years is always accompanied by a call to ensure that academic learning does not dominate research and educational settings that Berk and Bergen both thoughtfully express in their contributions.[7,8] This is an essential consideration. Just as above I argued against the strict focus on developmental learning goals, here too we must acknowledge that the learning of academic content is not enough. As Danniels et al. and DeLuca clearly state, early learning settings must find a balance between the developmental learning that is crucial during the early years of a child's life and the academic learning that builds the foundation for later scholastic achievement.[9,10] It is expanding our understanding of the appropriate balance that is

key to the implementation of productive play-based learning pedagogy. The contributions of all the authors are further demonstration of both how much we have learned about the value of play-based learning and how little we know about how to negotiate this balance.

In much of the research, the debates surrounding the implementation of play-based learning address the argument for or against academic learning in early years settings. However, as research about play evolves, evidence emerges that these seemingly dichotomous goals of development and academic learning can coexist within the realm of play-based learning.[3] The goal of determining a productive balance, however, is not restricted to the integration of academic learning in the early years. But researchers, policy makers, and practitioners also must consider the tools that children use in their play. For instance, in their call against the reduction of play in children's lives, Daubert et al. cite technology as a barrier to play.[2] However, Edwards' thoughtful contribution concerning digital play describes the connection between play and the digital world, rather than their opposition.[11] While the video games of prior times may have involved sitting on a couch using a controller to manipulate a character who performed menial tasks such as jumping from block to block, today's digital world is rife with learning opportunities. In fact, digital technology plays an essential role in modern day problem solving, communication, and much more,[12] not to mention the essential role that technology will undoubtedly play in most children's adult lives, both personally and professionally. This type of debate paints a clear picture of the need to acknowledge the learning values and challenges presented by each type of play. Sociodramatic play provides the ideal environment in which to develop social, emotional, physical, and self-regulatory skills, but it is not an ideal environment for academic learning.[13] Teacher guided play provides the ideal environment for academic learning, but it is not ideal for the development of social and emotional skills,[13] Digital play provides the opportunity to play with the technology that will be essential to many children's professional success, but it does not provide the opportunity to develop many of the physical skills that are essential to healthy development.[11] Each of these types of play offers both advantages and challenges, but in combination they provide the type of pedagogy that is necessary for holistic child development and learning.

Implications for Development and Policy

There are disagreements in the research and in policy over how children learn best. In the realm of play-based learning, these disagreements largely surround the type of play opportunities that we should provide for young children.[13] However, rather than dwelling on these conflicts and

allowing them to cloud our conceptions of play, we need to examine the connections between these perspectives. If we are truly focussed on what children need to succeed in tomorrow's world then we cannot simply advocate for one approach to play over another; instead research needs to determine a productive and developmentally appropriate balance.[3] To accomplish this monumental task, we need research that exists in the middle, determining how a balance can be enacted in classroom settings. We also need policy makers who see the value of more than just academic outcomes.

One barrier to researching a balanced approach to play-based learning is the methodological issues surrounding research about play-based learning.[14] Bergen thoroughly describes these methodological challenges in her contribution.[8] However, it should be added that laboratory-based studies that involve using play to help children acquire a skill that is typically academic in nature, may not accurately reflect the complexities of a classroom setting. In classrooms, there are conflicting demands on a teacher's time including many children with differing abilities. Researchers who work in classrooms and other learning settings can contribute to a solution by presenting data that show both the benefits of play-based pedagogies to student outcomes and also how practitioners are negotiating the balance of time and learning goals. However, this is not the sole challenge faced by practitioners.

Bergen identifies the differential manner in which practitioners are also defining and thus enacting play-based learning.[8] Research has identified the practitioner perspectives that interfere with the broader implementation of play-based learning. These include educators whose perspectives about play are limited to the developmental benefits of play but fail to consider the academic learning opportunities that are also presented. Educators who hold this perspective implement child-directed free play without considering the role of the educator in extending the learning potential of this play and creating playful learning opportunities for children.[3] These limiting definitions and perspectives of play result in the need to communicate information about the appropriate balance.

Practitioners need to be taught and curricula need to embrace the broad reaching implications of play-based learning. They also need to be presented with encompassing, rather than divisive, definitions of play-based learning. Broad descriptions of play should be accompanied by descriptions of diverse methods for implementing play in the learning environment in order to support both developmental and academic learning goals.[3] One challenge to this implementation comes due to our current educational climate, where the emphasis is placed on the use of

assessment to ensure that children are meeting the expectations and standards laid out in standardized curricula.[15] As Bergen states: “play usually involves child-initiated types of learning that are not easily quantified and, thus, adults are often unclear about how to provide such opportunities and evaluate the learning that occurs during extended and rich play experiences.[8] ” Thus, as DeLuca so aptly states, assessment practices and policies must be developed that support play-based learning.[10] Play is a developmentally appropriate approach to learning because it allows children to develop and demonstrate their knowledge and skills in a hands-on, child centered manner. As this is the environment where children do their best learning, it is an environment where we should focus on assessing student learning and development. Traditional standardized tools may not allow for assessment of children in play-based contexts, requiring both research and policy to examine and determine approaches that are viable and that allow for the holistic assessment of learning and development in play-based contexts.

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